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Educating the Very Able

Current International Research

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Contents

The aim of this report is to provide up-to-date research findings about the development and education of very able pupils, and so improve communication between researchers and those who make and carry out practical educational decisions. Although it does touch on some theories, the text is primarily concerned with work with the very able which can be assessed on compared results, whether statistically analysed or demonstrable. Because the reported studies reflect different educational systems and outlooks, national contexts are provided along with descriptions of the procedures. Not all of the several hundreds of references from which this information has been drawn can be provided in the confines of this book, so those chosen are the ones which are considered important markers in the field.

It is clear from the evidence that excellence does not emerge without appropriate help. To reach an exceptionally high standard in any area very able children need the means to learn, which includes material to work with, focused challenging tuition and the encouragement to follow their stars.

This research report focuses on the three most frequently asked questions:

- Who are the very able?
- What are the very able like?
- How to educate the very able?

on this site.

PART ONE:
WHO ARE THE VERY ABLE?

3 Parent recommendation

The strangely stable ratio of two boys for every girl in identifying the highly able occurs internationally when parents (and usually teachers) recommend children as gifted without tests. This was the proportion in an American study by Johnson and Lewman (1990) of parents' selection of four to six year-olds as gifted. In China, in a 15-year follow-up study, in which parents made the judgement of giftedness first, which was then confirmed by the teachers, there were 69.5% boys and 30.5% girls (Zha, 1995b). Given the supposed differences in the Chinese attitudes, in which girls are seen as inferior, remarkably similar proportions appeared in Freeman's UK study (1991) where parents made the first recommendation - 64.3% boys and 35.7% girls. The reason appeared to be that the boys had more behaviour problems as well as being more demanding in general. This also fitted better with the stereotyped image parents had of the gifted child.

In the Freeman study, 82% of the parents who had sought help from the National Association for Gifted Children (UK) either reported emotional problems or were expecting them. Typically, the child showed over-activity, clumsiness, tantrums, excessive demands, poor sleep and had few friends of any age. However, the comparison children in the study - of identical high ability - who did not exhibit problem behaviour, were much less likely to be seen as stereotypically gifted (simply outstanding at what they did) and their parents did not join the association. This is yet more evidence that without outside comparisons the study of any voluntary association's membership is inevitably biased, which is equally true for a study of Mensa members.

Freeman also found that about 10% of the children presented (though untested) by parents as gifted were only of average ability on IQ tests, and had achieved accordingly at school. This perceived 'failure' was then sometimes blamed by parents on the school, or indeed as teacher discrimination against the child. However, most of the children presented as gifted were indeed so, as measured by IQ and specific tests of talent, even when the teachers were dismissive of the child's exceptional potential. But parents and teachers were in accord that these association children did have emotional problems, significantly much more ($p < 0.1$) than the non-association children of equal ability.

4 Peer nomination

In Montreal, Gagné (1995) asked 4,400 pupils, mostly in mixed-ability classes, to choose and rank the four classmates they thought were the best in a particular category - intellectual, creative, socio-affective and physical. Boys and girls were ranked very differently: boys were most frequently chosen for masculine attributes such as physical or mechanical-technical abilities or business, whereas girls were chosen for language, social strengths and art. The researcher's conclusion was that, despite the originally socially desired gender pressures that produced these achievements, these were the actual talents the children displayed, and so the peer judgements were correct. No comparisons were made of these results with any objective tests of abilities, nor of the children's self-estimates. The likelihood of classmates discovering hidden potential seems slight. Subhi (1997) found that in Jordan peers did not nominate any pupils differently to those identified by teachers.

Brakes on identification

Cultural values may inhibit the achievements of bright youngsters at school. These may be quite specific, such as directing girls into nursing rather than medicine. But they can be more subtle, such as the effect of expectations which vary considerably across cultures. If children do not fit those stereotypes they are less likely to be recognised as potentially highly able. Currently, the most common Western stereotype of a gifted child is of a weedy lad: he (for he is usually male) is bespectacled, lonely, and much given to solitary reading. He is, in fact, a juvenile 'egg-head', at times referred to by his schoolmates and maybe his teachers as 'the little professor'.

Very able children who do not speak the language of the test-makers or who think in different ways are also less likely to be recognised as having high potential. In an overview of 20 research-based international papers on the gifted disadvantaged across all five continents, Wallace and Adams (1993) concluded that it is not only culture which can cut such children out

of recognition and special provision, but poverty. There is, they wrote starkly, "the equation, in reality, of wealth with giftedness, special educational provision and giftedness" (p.446).

Shore and his colleagues (1991) reanalysed international research on the gifted disadvantaged and listed research-based indications of ways to overcome such handicaps to fulfilment as learning difficulties (e.g. dyslexia) and physical disabilities. These guidelines also apply to children with emotional problems, who have lost self-confidence and who prefer to hide their gifts rather than stand out from the crowd. Passow (1993) pointed out that disadvantaged groups are often handicapped by the test situation itself owing to lack of experience with tests, which produces inhibiting test anxiety, along with low motivation and poor expectations of success. Child-initiated learning, including high-quality peer interaction, has been found to encourage a sense of self-efficacy or empowerment, especially in deprived bright children, compared with teacher-initiated learning, which aims more specifically at a 'product', usually in high examination marks (Ari & Rich, 1992). The list below is a composite:

Identifying disadvantaged highly able children

- Use tests which are less dependent on words (e.g. the Raven's Matrices).
- Use a variety of identification procedures, tuned where possible to specific cultural rather than national norms.
- Look for a broad range and wide variety of high-ability children, and do not label one group as *the* gifted.
- Recognise that discovering and nurturing talent are not the same thing.
- Use the best results from multiple criteria, and provide multiple opportunities for discovery, not multiple hurdles.
- Recognise performance outside the school environment.
- Recognise multilingual capacity.
- Recognise the ability to be competent in situations which have different expectations of the children.
- Include peer, self and parent nomination for high potential.
- Encourage children to initiate their own projects and learning.
- Take the children's facilities for learning into account.

THE BEST WAY TO IDENTIFY THE VERY ABLE

Identification by provision

Identification by provision implies offering a challenging education for the highly able. Like any other pupils they need this *consistently*. Researchers are in agreement that the very able cannot make progress without the means to learn. Consequently, a notable educational move is taking place, away from the relatively static labelling of specific children as gifted towards a more flexible developmental approach which recognises the learning context. This new outlook is nicely summed up by the Americans Treffinger & Feldhusen (1996), who, after very many years of school-based research in this area, now describe the blanket term gifted as "indefensible".

This movement away from static towards dynamic assessments of giftedness was partly initiated in the 1920s by the work of Vygotsky (in Wertsch, 1990) on the Zone of Proximal Development (ZPD), this being distinct from the Actual Developmental Level (ADL) (also promoted by Reuven Feuerstein in Israel: see Feuerstein & Tannenbaum, 1993). The idea is that with specific provision (scaffolding) and mediation (adult guidance, especially through language) children can learn at a far greater speed than otherwise. For young children, Vygotsky pointed to guided play as a rich context for the development of the ZPD in exploring new knowledge and ideas. Kanevsky (1994), investigated the ZPD of 89 4-8 year-olds, asking each child to learn, transfer and generalise a specific problem. She found that "The benefits of high IQ were not as consistent as of chronological age" (p.163). Some high-IQ children made up their own challenges when they were bored, but their learning could deteriorate when they were offered the same curriculum as their age-peers.

The Dynamic Theory Of Giftedness (DTG) is based on Vygotsky's developmental concepts of "plus- and minus-giftedness" (Vygotsky, 1983). This uses the dynamic paradigm that either giftedness or defectiveness are possible outcomes when a child is faced with barriers to development. There are many examples of successful overcoming, as when Alicia Markova, the prima ballerina, took up ballet because of physical problems. Failure to overcome such barriers, though, can lead to a child hiding behind the weakness, which then becomes reinforced.

In an important six-year experimental study in Moscow, Babaeva (1996, and 1998 in press) investigated how to overcome such barriers in 31 children aged 6-7, identified as non-gifted by teachers and conventional tests. She compared their progress on a specially devised system of education with two control groups, identified gifted children in 'normal' gifted education and non-gifted children in regular education. The main goal was to help children develop effective means of overcoming psychological barriers to promote their desire for self- development. By the end of the first year, the average IQ in the class had increased by 10 points, especially verbal IQ, as had creativity, and there were fewer emotional problems. After six years, according to the report, measures of the experimental group's abilities were equal to those of the identified gifted children, and considerably surpassed those of the non-gifted control children.

Such an interactive approach, considering aptitude and provision together, places less emphasis on school marks, and seeks instead to find and provide for potential strengths and talents of all kinds. A clear indication of the need for this was shown in the British Sports Council's research on the Training of Young Athletes (Rowley, 1995). A three-year longitudinal study involving 453 athletes aged 8-16 years examined ways in which the children began participating in sport who had identified the potential, and why the youngsters started intensive training. It was apparent that the identification of high-level sporting talent was heavily dependent on provision for both tuition and practice, which often depended on parents, as well as on the motivation of the children themselves. Thus, sports clubs and coaches could only play a secondary role in identifying talent, as they could only select already high achievers who had been encouraged and provided for by their parents.

To accommodate this new, flexible approach in finding the potentially very able, special educational techniques are needed, which are different from the conventional route (at least in the USA) of an IQ test followed by a gifted programme which is often simply more school-type teaching. Treffinger and Feldhusen (1996) suggest that there should be considerable involvement by the pupils in identifying themselves as they come to understand their own potential and decide their own goals. Nor does this mean a one-off self-selection; it should be continuous over the school years, resulting in a flexible open-ended talent profile which is regularly added to by all those involved, especially the pupil.

All the evidence indicates that specific provision within subject areas is by far the most effective in promoting excellence, rather than general enrichment without identified goals. This might be, for example, a journalism class for sharp writers or photography for the visually talented. It is helpful to observe children in rich and varied educational settings; perhaps a dancer in a serious dance class, or future programmers with access to good-quality computers. Without high-level learning opportunities it is hardly possible for highest-level potential to flower. The focus is particularly important because unevenness in gifts is more likely than being superb at everything. Consequently, it makes more sense to look out for specific talent in addition to an IQ test.

Able youngsters' leisure activities have been found to be a reliable predictor of future high achievement in that area (e.g. Feuerstein & Tannenbaum, 1993; Renzulli, 1995; Hany, 1996). Although such choice is largely self-directed, showing task commitment, intellectual abilities, persistence and other personal attributes, it also depends on provision. Eighteen years after secondary school, 48 of the original 159 subjects of a high school in Tel Aviv, Israel, were surveyed for their occupational accomplishments and outstanding career achievements, and with few exceptions were seen to have focused on a single domain of endeavour (Milgram & Hong, 1993). A third of the sample had continued to work seriously in their childhood leisure areas with relatively much higher attainment than their school-fellows whose careers were unrelated to their interests. It was concluded that serious adolescent leisure activities were highly indicative of future successful careers and that this form of self-identification should be encouraged and provided for.

Identification by provision in practice

Recent work is beginning to reflect the outcomes from this wider and more child-directed approach. At the Szold Institute in Jerusalem, Zorman (1997) is working on experimental education, termed Eureka, which takes special education for the highly able away from the medical model of 'diagnose and treat', and uses instead a dynamic approach looking at the outcomes of exposing children to opportunity in the visual arts and sciences. It is based on a seven-year follow-up of 60 talented pupils. The model is now implemented in 56 schools and includes all the country's religions. The assessment process uses teacher ratings of pupils' behaviour, professional evaluation of portfolios and task performance. The research also uses self-report questionnaires both inside and outside school, including the children's social behaviour. Voluntary out-

of-school enrichment activities are available, from which children's talents are also assessed. Hence the assessment net is flung widely. Although the pupils are generally above average, it has been found that the most important predictor of their success is their high motivation within the chosen subject area. There are also indications that pupils' reading comprehension has been improved, and that their interests have been extended beyond the visual arts and sciences.

Another Israeli example of self-selection through provision is at The Technological Centre for the Galilee, dedicated to the study of ecology (Brumbaugh *et al*, 1994)). The centre works in concert with the local comprehensive school, from which teenage boys and girls have been invited over the past 18 years to work on their own projects under supervision. They are not selected in any way. The centre has the specific aim of developing scientific thinking, using projects such as the effects of magnesium on plants, or cultivating wild mushrooms, or the effects of hormones on fish reproduction. At the laboratory, youngsters design and conduct work on original problems for which there are no existing answers nor (often) methods, then continue to work with the data back at school. The teenager has to prepare and write a research proposal, which is discussed with the laboratory supervisor, submitted to the Ministry of Education for approval, then he or she can begin, either alone or in a group. Each youngster has to be able to work on a computer, and eventually to provide a bound dissertation. The Centre displays the youngsters' work, which is sometimes of Master's degree standard. The cost is low and largely supported by the state.

The Children's Palaces in China practise a very different and highly successful means of identification by provision with primary school children, which again relies on the children's own motivation and interest for its success. (Academic reference exists in Chinese.) Each 'palace' is simply a large house with rooms crammed with activities. Whole schools of mixed- ability children come at one time and are let loose. Some run right through into the playground while others head for the calligraphy, puppet theatre, stationary bicycles, science labs, music rooms etc. The children are not tested for aptitude, but many are stimulated by the novelty of what they discover there to want to learn more. The rules are simple. Those who want to take their chosen subject further must make a contract to come for a specified number of lessons. If they do not attend them all (without good reason) they cannot continue. Some come for years and reach breathtaking standards in their chosen field. Normal teachers are paid extra for this work, which they say they greatly enjoy.

Freeman's Sports Approach

Excellence in some abilities is more acceptable than in others in all cultures. In Britain, for example, local education authorities normally encourage keen, talented footballers to benefit from extra tuition outside school hours, provide them with equipment, arrange transport for them to meet and engage with others at roughly the same level as themselves and pay for it all. Although there is some provision around for other subjects, notably music, and there are mathematics contests and extra-curricular activities, such as art classes in museums, the idea of opening up the school labs for a Saturday morning practice in chemistry is rare, if it exists at all. It is not difficult or expensive to find out what interests and motivates pupils, via questionnaires, interest tests or simply by asking them. Furthermore, the facilities are already largely in place to provide excellent support for abilities other than football.

Freeman (1995) has proposed that, given the opportunity, and with some guidance, the talented (and motivated) should be able to select themselves to work at any subject at a more advanced and broader level. She terms this the 'Sports Approach'. In the same way as those who are talented and motivated can select themselves for extra tuition and practice in sports, they could opt for extra foreign languages or physics. This would mean, of course, that such facilities must be available to all, as sport is, rather than only to those pre-selected by tests, experts, family provision or money to pay for extras. This is neither an expensive route, nor does it risk emotional distress to the children by removing them from the company of their friends. It makes use of research-based understanding of the very able, notably the benefit of focusing on a defined area of the pupil's interest, as well as providing each one with the facilities they need to learn with and make progress.

But to practice identification by provision, the evidence is that teachers will need specific training in differentiated teaching methods, in addition to a variety of techniques for bringing out high-level potential. For example, there would have to be some training in collecting information for a portfolio, or at least some unification of approaches within a school or authority, as well as some form of recognition of what provision the pupils had access to. This could be done by a simple rating scale so that children who were excelling within their context would be seen to be doing so and not penalised because they had fewer opportunities than others. It is a very difficult concept to put into practice, though, as American positive action has shown. The answer lies in allowing wider and easier access to all education, particularly higher education, perhaps as in European universities which accept all applicants with basic qualifications. Suggestions as to how this might be practised are offered here:

The Sports Approach: identification by provision

- Identification should be process-based and continuous.
- Identification should be by multiple criteria, including provision for learning and outcome.
- Indicators should be validated for each course of action and provision.
- The pupil's abilities should be presented as a profile rather than a single figure.
- Increasingly sharper criteria should be employed at subsequent learning stages.
- Recognition should be given to attitudes possibly affected by outside influences such as culture and gender.
- The pupils must be involved in educational decision-making, notably in areas of their own interest.

SPECIFIC PROBLEMS OF RESEARCHING THE VERY ABLE

Educators who might act on the conclusions from research into high ability should be aware of the particular problems in this field, and from what stance this report has been written. Scientific research described here is considered to be the objective assembly of data using a recognised methodology, followed by statistical analysis, interpretation and conclusions. The collection and reporting of statistics is not scientific research *per se*; rather it is part of the provision of material for the research. Nor are personal impressions scientific research, however frequently experienced, well recorded or intensely felt. For example, a summer school for highly able children may give them a great deal of pleasure and companionship as well as increase their knowledge, which the organisers perceive as highly satisfactory; but only comparative experimental research could tell us whether a particular kind of provision is more appropriate for the very able than another, or whether all children might well benefit from those activities.

Researchers' attitudes to the very able vary widely. Some favour the case-study approach because they say a gifted child is unique and so cannot be compared, whereas to others the gifted are normal children with exceptional aptitudes. The case-study approach can be vividly illustrative, but in order to be most effective and rigorous it has to be set in a wider social context to justify generalisations. For instance, if one high-IQ child refuses to go to school, is this really typical of a frustrated future Einstein in a mixed-ability class, or could it be because of subtle messages from home that the child is 'too clever' (and by implication too sensitive) to fit in?

How typical is the sample group?

A variety of methods are used to select highly able children for studies. Some samples are made up of children who are already highly achieving, and because of that have been selected for vacation courses or special 'gifted' education. How much of their subsequent improvement can then be said to be due to the special treatment, and how much to the fact that the best predictor of future success is present success? There should be some comparison of the selected group with children of different abilities and educational experiences.

This lack of comparison was notable in a study by Benjamin Bloom (1985) of 120 young Americans who had reached "world-class levels" of accomplishment. He concluded that certain family influences were vital in the promotion of talents, particularly encouragement combined with discipline and good teaching. This seems reasonable, but we do not know the effect of similar parenting behaviour on other children, even on the siblings in those families, because no such comparisons were made. Nor was any reference made to possibly inherited aptitudes; all the credit for talented achievement was presented as entirely environmental. The study was also retrospective, relying on memories of early years, and as most of the interviews were done by telephone, there was no independent assessment of the children's social or physical environments. We do know that many parents work extremely hard at training their children for great accomplishments - without success - while others, such as Leonard Bernstein's father who sold the piano because his son practised too much, actually discourage their talented children.

Many often-referenced studies use tiny and so perhaps unrepresentative samples, such as that of six American boy "prodigies" who were followed up for 10 years (Feldman with Goldsmith, 1986). They did not continue their advantage into exceptional adult achievement, a feature of 'hot-housed' children. Nevertheless, a complex theory of giftedness emerged from that study, including the idea of "trace elements" a combination of unrecognised chance events which are essential for gifted performance some might call it luck. In Australia, Gross (1993) used the contentious IQ of 200 to select

just three "profoundly gifted" young children. They were described as exhibiting the 'typical' symptoms of emotional disturbance, such as school-refusal, and were without any friends because to them being with normal children was akin to interacting "solely with children who are profoundly intellectually handicapped" (p.475).

Looking back at the lives of eminent adults (e.g. Goertzel *et al*, 1978; Radford, 1990; Albert, 1992) also presents problems of interpretation, such as unreliability of memory, the perception of early experiences in terms of later achievements, and the different outlooks of those times which brought those people to eminence. In truth, although we can never identify and measure the full context of anyone's life, even in the present, there are certain basic scientific research concerns which should be in place before expensive and life-changing action is taken, based on the conclusions from findings.

Improvements needed in researching the very able

- Clearly defined theoretical bases and statements of goals for extra provision.
- Comparisons of outcomes from different forms of provision e.g. enrichment or acceleration.
- Generally acceptable scientific standard of methodology and case-study reports.
- Cross-cultural and cross-social comparisons to test concepts of universality.
- Comparisons of experimental interventions in and out of places of education.
- Investigation into high-level learning and thinking.
- The effects of labelling children as very able.

HIGH-LEVEL THINKING AND LEARNING

Scientific-type thinking is not restricted to science. It is thinking which can cope with the relationship of theory to knowledge, and which provides the flexibility to revise what you 'know' in the face of fresh evidence. It is the root of the development of the skills needed to justify assertions. The thinking of more successful learners, even as children, has been found to be closer to that of experts, in that they make more reference to what they already know, rather than only to the information presented in given problems. This was seen in Canadian work by Shore *et al* (1992), who audio-taped and analysed young children's thinking-aloud comments. Although some researchers have concluded that the learning procedures of the gifted are more mature (Luthar *et al*, 1992), others find them to be different in style (Kanevsky, 1992). The value of knowledge, though, is not to be underestimated: it is vital to outstanding performance. Individuals who know a great deal about a specific area are seen to achieve at a higher level than those who do not (Elshout, 1995).

Emotions help or hamper learning at all levels. German research on gifted young children has found that fear can inhibit the development of curiosity, an important motivator in learning, thinking and creative endeavour (Lehwald, 1990). Boekaerts' (1991) overview of international research on the learning of gifted young children found that those who achieve most highly are not only very curious but have a hunger to learn, often along with a strong urge to control. Canadian research with young children has also found an extra quality of playfulness in the learning of highly able little children (Kanevsky, 1992). Investigating the current work of creative scientists in California and later that of living "classical" composers, although some of this work was retrospective, Simonton (1988; 1991; 1994) could demonstrate that above a certain high level, personal characteristics such as independence contributed more than intellect to reaching the highest levels because of the great demands of effort and time needed. Perhaps for that reason, a four-year follow-up investigation of talented American teenagers by Csikszentmihalyi *et al* (1993) found that in learning to tackle difficult tasks, the stronger the social support the more developed the youngster's skills, though schools were found to be much less effective in this than parents.

Self-regulation in learning

Self-regulation implies autonomous learning, being able to prepare and supervise one's own knowledge acquisition, to provide one's own feedback and to keep oneself concentrated and motivated. The equation is relatively straightforward: the more able an individual the more self-regulation will be needed for high achievement; the less able an individual the more teacher regulation is needed (Span, 1995). Indeed, applied research into how children learn science brought Adey (1991) to the conclusion that "the children's ability to think about the nature of their own thinking was a critical contributor to success". Conversely, teachers who are too directive can diminish their pupils' learning autonomy. Although 'spoon-feeding' can produce extremely high examination results, these are not always followed by equally impressive life successes (e.g. Kaufman, 1992; Arnold, 1995).

After 20 years' work in this area, Merenheimo (1991) in Finland concluded that "gifted pupils have an analytic strategy of perceiving information. The less gifted use either atomistic or serialistic strategies" (p.115). He believes this results from learned habits upheld by social experiences. Indeed, for the more average pupil, when teacher regulation is missing they often fall back on simple trial and error and rote-memorising, which can become a difficult habit to change. But Wertsch (1990) found that guided conversations with young children, helping them to understand the way knowledge and arguments could be practised, resulted in a measurable shift from teacher to self-regulation.

If, as the evidence indicates, the intellectually gifted think and learn differently from others, then it is important to teach them appropriately. Overviewing research on the thinking process of highly able children, Shore and Kanevsky (1993) put the teacher's problem succinctly: "If they merely think more quickly, then we need only teach more quickly. If they merely make fewer errors then we can shorten the practice."(p. 142). But this is not entirely the case, they say; adjustments have to be made in methods of learning and teaching to take account of thinking differences. There is now ample scientific evidence which shows that in order to learn by themselves the very able need some guidance from their teachers (Paris & Byrne, 1989). To be at their most effective, pupils can be helped to identify their own ways of learning which include

strategies of planning, monitoring, evaluation, and choice of what to learn. They should also be helped to be aware of their attitudes to the area to be learned, such as curiosity, persistence and confidence.

When teachers help pupils to reflect on their own learning and thinking activities they are increasing their pupils' self-regulation. For a young child, it may be just the simple question: what have you learned today? which helps them to recognise what they are doing. Given that a fundamental goal of education is the transition of the control of learning from teachers to pupils, improving pupils' learning to learn (metacognition) should be a major outcome of the school experience, especially for the highly able.

To help teachers in schools, Nisbet (1990) distinguished these five methods:

Promoting self-regulation in learning

- *Talking aloud*. The teacher talks aloud while working through a problem so that the pupil can see the working.
- *Cognitive apprenticeship*. In this the teacher demonstrates the processes that experts use to handle complex tasks, guiding the pupil via experiences.
- *Discussion*. This must involve analysis of the processes of argument.
- *Co-operative learning*. The pupils explain their reasoning to each other. Co-operative teaching-learning interactions in the classroom are ideal for helping pupils take the leap to higher levels of understanding.
- *Socratic questioning*. In this, the teacher uses careful questioning to force pupils to explain their thought processes and explain their arguments. The questioning is not used to teach new knowledge, but to help pupils to know and use what they already have.

VERY ABLE GIRLS AND BOYS ARE DIFFERENT

The effects of being a boy or girl are different for the highly able than for those of more average ability (Freeman, 1996a). Many studies have shown gender to be the strongest single influence on high-level achievement, possibly owing in part to the 'glass ceiling', the invisible social barrier that prevents high-ability females from fulfilling their true career potential. German evidence has shown that intellectually gifted girls appear to be more like gifted boys than girls of average ability (Stapf, 1990). Emotionally, though, in America they have been found to be more depressed than equally able boys, often underestimating their abilities because of conflicts between success and 'femininity' (Luthar *et al*, 1992). Golombok and Fivush (1994) write that: "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 conclude 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).

There are currently changes in school achievement in Britain, showing that at school girls are achieving higher national examination grades than boys in *all* subjects. Although some other countries are moving in this direction, notably Australia, the situation in Britain appears to be unique. Investigating this, the Equal Opportunities Commission considered that better school inspection was partly the reason for the relative improvement in girls' achievements (Arnot *et al*, 1996). Women now make up 51% of university graduates (about the same in the USA and 61% in Russia), but in all countries men reach very much higher positions in their careers (e.g. of all British full professors and high court judges, women make up less than 5%).

An experimental intervention programme in Indiana gave girls 'directed enrichment', after which they were able to reach much higher levels in a variety of talent areas (Moon *et al*, 1994). Investigating mathematically precocious American youth in the USA, Benbow & Lubinski (1993) found that although gifted girls did significantly better on standardised tests in mental arithmetic and computation, they were much less successful with higher-level problem-solving, and much less frequently studied mathematics at a higher level. While recognising the effects of cultural influences, they reached the conclusion that there is a genetic mathematical bias in favour of boys, although the British figures refute this.

When girls start school in America they are identified in equal proportions to boys for gifted programmes, but as they get older there is a striking loss in the proportion of girls selected for gifted education (Winner, 1996). Although girls make up

half the gifted population in kindergarten, this proportion shrinks to less than 30% at junior high school, and even less at high school, and so on. Asian American girls (usually meaning those from Pacific Rim countries), though, are an exception; they score more highly on Scholastic Aptitude Tests (American SATs are used to decide college entrance) than non-Asian girls. It has been suggested that they are born with a different brain structure (in Benbow, 1988), a conclusion which is clearly untrue for girls in other cultures.

Gender expectations

Taking a long-term look at giftedness in mathematics in the USA, Jacobs & Weisz (1994) found that parents held somewhat fixed and conventional gender expectations. This influenced the girls' self-esteem more than their actual performance, and inhibited their ambitions. In agreement, teachers questioned in 722 schools and 136 colleges in England and Wales reported that the main reason for low take-up in advanced mathematics and science was the perceived difficulty of the subject more true for girls than boys and for girls there was the added lack of women teachers as role models in these subjects (Sharp *et al*, 1996). According to Smithers (1997), physics A level is the only area in which girls' grades may be beginning to decline again because the earlier exam is a more general measure of "scientific literacy", whereas A levels are a high-level selection device for university which picks out different ambitions and character traits. However, the published examination results appear to contradict him.

An international review of research on gender differences in the highly able in mathematics and natural sciences failed to find any reliable evidence that girls are inherently less able than boys in these subjects (Heller 1996). So, because they have similar abilities, girls and boys can act as experimental controls for each other to gauge the power of social effects, probably best seen in career outcomes. Heller pointed out, for example, that even on present tests of spatial abilities at which boys do better, we could expect only twice as many male engineering graduates as females, whereas there are 30 times as many. This effect was found to be more pronounced among the gifted, girls being more influenced by social pressures than boys, e.g. by the 'unfemininity' of subjects such as physics, as well as having much less practice and fewer role-models. Most importantly, the often-noted 'learned helplessness' of girls (a feeling that events and outcomes are beyond their control) was considered to be the result of 'wrong' attributions, so that girls often think their success is due to luck rather than their own ability. Thus, Heller states, believing that they are not good at maths, but simply lucky to have done well that time, girls adjust their behaviour to fit their belief (attribution) and 'confirm' it by doing less well as time goes by.

Children's feelings about what they are able to achieve start early. Young children do not understand ability in the same way as they will begin to at about age 11, in that they start by expecting effort to lead to results (Heyman & Dweck, 1996). They learn as they grow up, maybe falsely, that they are not able to achieve high-level results, and so stop trying. Differences in motivation to learn in young children may also be more to do with their ideas of goodness and badness than with specific ideas of intellectual competence. Increasing motivation to learn, then, implies taking the blame away from personal deficiencies, such as perceived low ability over which children have no control, and putting it on lack of effort or appropriate learning strategies over which they *do* have control. Bennett *et al* (1984) emphasised the importance of teacher feedback which enables a pupil to learn from mistakes, rather than, as sometimes happens, giving different feedback to those for whom teachers have high or low aspirations.

Mentoring and counselling to improve self-esteem have been found to be effective in promoting a more realistic acceptance by gifted girls of their abilities (Arnold & Subotnik, 1994; Freeman 1998). German researchers (Heller, 1996) designed a focused and "largely successful" experimental programme of 're-attribution' to help girls recognise and accept their real talents. For this they used personal experience and positive feedback with 19 boys and 23 girls in six one-hour sessions, then compared their achievements with a group who had only attended the school course. Results indicated that re-attribution should be started soon after the bases of the learning had been laid down; another opportune time was at the move from primary to secondary school -- prevention, they say, being better than cure. The team stressed that for teachers to really help underachieving gifted girls (or perhaps British boys) they should have special training to use these re-attribution techniques in the classroom situation. One especially effective technique they used was verbal encouragement to increase motivation, e.g. as follows:

Increasing self-esteem for higher achievement

Successful performance

- Emphasise the student's abilities or talents "The topic suits you".

- Give consistency information "You have done that right again".
- Give consensus information, and thus stress success "Most people have difficulties with this problem, but you did it".

Unsuccessful performance

- Attribute it to insufficient effort "If you read that again it will soon become clear to you".
- Take the edge off failure by providing consensus information "Most students have difficulties with that".
- Give distinctiveness information "The other topic suits you better, doesn't it".

THE VERY ABLE ARE EMOTIONALLY NORMAL

There is no reliable scientific evidence to show that exceptionally high ability *per se* is associated with emotional problems, or that an inadequate education results in delinquent or disturbed behaviour. On the contrary, an American meta-analysis pointed to *low* intelligence and attention problems as being associated with delinquency (Maguin & Loeber, 1996). Investigators who describe the gifted as having emotional problems have usually taken their data from clinical settings and case-studies, where the population is self-selecting and no comparisons are ever made with other equally able children (e.g. Silverman, 1993; Gross, 1993) or voluntary gifted children's associations (see above).

However, an American researcher has written: "Like other children, the problems gifted students bring to counselling usually arise from family relationships." (Robinson, 1996, p. 130). When types and degrees of behavioural problems were compared for gifted and non- gifted elementary school children in the USA, there were no significant differences (Cornell *et al*, 1994); similarly, using self-reporting techniques comparing adolescent gifted and non-gifted children, "the gifted students show better adjustment" (Nail & Evans, 1997, p18). It could even be said that the gifted have to be emotionally *stronger* to achieve so exceptionally.

In fact, some studies of the gifted have indeed found them to be emotionally stronger than others, with higher productivity, higher motivation and drive, and lower levels of anxiety. An Israeli study (Kener, 1993, in Zorman, 1996) found that gifted junior-school boys and girls showed significantly higher self-esteem when compared with those of average ability from similar backgrounds. In Italy, a sample of 300 high school pupils were given tests and open-ended questionnaires, although the follow-up only managed to trace 63 of them 8 years later (Boncori, 1996). There were three sub-samples, 'highly gifted' (the top 10% of the general population), 'less gifted' and 'average'. The 'highly gifted' not only had far greater academic success than the other two groups, but also right through university enjoyed better social integration, wider interests, less materialism and more satisfaction.

Specific pressures

High-achieving learners and labelled 'gifted' children are sometimes susceptible to extra pressure from teachers and parents to be continually successful in examinations, possibly at the expense of more challenging intellectual, artistic and emotionally satisfying activities (Freeman, 1997). What is more, no individual can perform at a high level all the time, not least because these children's abilities may develop at different and extreme rates, which can bring difficulties of co-ordination (Terassier, 1985: Silverman, 1993). For example, children who are advanced in verbal ability are not, on average, more advanced in motor skills (Robinson, 1996). Additionally, the highly able may suffer from false stereotyping along a spectrum which ranges from expecting them to be emotionally handicapped to expecting them to be perfect in every respect. Fear of failure and feelings of failure and of disappointing others' expectations are likely to develop, with possibly negative emotional consequences
for life.

Social life: The particular pressures which the very able may experience usually stem from others' reactions and expectations of them. For example, although the gifted may be expected to be too clever to enjoy normal relationships with ordinary people, in most findings, higher IQ youngsters have *better* all-round social relationships (e.g. van Leishout, 1995; Boncori, 1996). There is some evidence, though, that under special stresses, such as the certain expectation of top-level examination results, highly-achieving adolescents can become depressed and even prone to suicide (Farrell, 1989; Yewchuk & Jobagy, 1991). Other researchers have pointed to the tendency to perfectionism in the gifted (Stedtnitz, 1995; Robinson, 1996). But we cannot be sure about the causes, or whether this kind of obsessionality is found more among the gifted than

other children. Certainly the gifted can suffer from adults who mistake the abilities for the child.

A problem which each talented pupil in a mixed-ability class has to solve is socialising with less able classmates while being intellectually at a higher level, and thus different from them. This calls for exceptional maturity and social skills, since a high level of individuality needs to be shown at some times and conformity to social norms at others. American work by Webb (1993), though, has found that gifted children can sometimes make social problems for themselves: "They often repeatedly and intensely attempt to organise people and things, and in their search for consistency, emphasise 'rules' which they attempt to apply to others. Often they invent games and then try to organise their playmates. Almost regardless of the settings, tensions are likely to arise between the gifted children and their peers." (p.529).

Reports from a 15-year Chinese study of 115 extremely high-IQ children (Zha, 1995b) showed the strong influence of family provision on both achievement and emotional development. The children were first identified by parents (two boys to every girl) and then validated as gifted by a psychologist. Every year parents were given a questionnaire and interviewed several times. The parents-to-be had taken their future responsibilities very seriously by studying parenthood. As the toddlers were learning to speak the parents often taught them to read, and some children even mastered writing at the same time. By the age of three many children could recognise 2,000 Chinese characters, and at four many could not only read well, but also write compositions and poems. However, these 'hot-housed' children were found to be lacking in easy social relationships, and the parents had to be given some more lessons in how to help their children to have some social life.

Popularity: Researching the emotional adjustment of the very able via one-to-one interviews in Germany, Rost and Czeschlik (1994) compared the responses of 50 high-IQ with 50 average-IQ primary school children, and concluded that the former were the better adjusted. Later, working with mixed-ability primary school children, they found that those with high-IQs were the most popular (Czeschlik & Rost, 1995). Brody and Benbow (1986) used American Scholastic Achievement Tests to select mathematically and verbally high-scoring 13-year-olds. Questionnaires about their lives and feelings were mailed to them (response 78%). Although a less able comparison group were only included two years later, it was concluded that the high scorers saw themselves as less popular although more in control of their lives; but as there was no actual contact with the youngsters it was difficult to tell why this was so.

The effect of being labelled: Possibly there is cultural difference in the way children react to being labelled as highly able or gifted. In Croatia, Kolesaric and Koren (1992) experimented with the effects of publicly labelling the top 10% of 11-year-old pupils from 14 schools as gifted, based on four tests of cognitive ability. They were then compared with non-labelled mixed-ability control children, none of the sample being in a special programme. The total sample of 1,215 pupils was examined before and after two years, as were their parents and 300 of their teachers. The selected pupils felt much more frequently than their teachers and parents that the label 'gifted' carried some danger to their developing personalities, and also disagreed with the adults' preference for separate schools. Yet for American youngsters who were in pre-college gifted programmes, their self-esteem was found to be highest when attention was focused on their gifts but lowest when focused on personal relationships (Colangelo & Assouline, 1995). In Israel, too, most of the children in a national survey of special classes for the gifted felt that the label increased their self-confidence (Shahal, 1995).

Research, unique in its in-depth approach, was carried out in Britain over 14 years (Freeman, 1991). This was a comparative follow-up study of carefully matched triads of children, initially aged 5-14. The target group of 70 children, identified by their parents as gifted, were compared with a second group of 70 who were unlabelled - but of equal measured ability - and with a third group of 70 randomly selected children. All were interviewed and tested in their homes across the country, as well as their families and teachers in the schools being questioned. The children were also given a wide variety of tests and their environmental circumstances rated. It was found that those who had been labelled 'gifted' (whose parents had joined the National Association for Gifted Children) had significantly ($p< 1.0$) more behaviour problems than those of equal ability who were not so labelled. However, the possession of an IQ within the top 2% was not found to be related to emotional problems or social relationships, which were instead associated with other difficulties in the child's life. In fact, the brightest appeared to be exceptionally empathetic. The most practical finding was that at all levels of intelligence (70 IQ-170 IQ) the children's school achievements were directly related to accessibility of facilities for learning, as well as to parental involvement and example.

Ten years later, using the same home interview methods, the labelled young people had often remained the least happy (as measured by rating scales), for which their gifts were sometimes blamed. Labelling appeared to have had the effect of putting pressure on children to live up to it in high achievements, notably in the case of those who had been wrongly labelled and could not fulfil their parents' ambitions. As a result of having highly able children, parents can themselves have emotional problems, whether through feeling inadequate or trying to gain social advantage from living vicariously through their child. Whatever problems already exist in the family, these can be intensified when there is an unusual child present (Freeman, 1993).

Too many talents: Although some youngsters have specific gifts and thus can see their career route quite clearly, there are others who seem to have the potential to do almost anything to a high level. The problems of being able to do a great number of things extremely well arise when vocational choices have to be made, and skilled attention is needed to help young people make the best decisions in that situation (Milgram, 1991; Deslisle, 1992).

For the multi-talented, vocational problems can be more severe than for other pupils. For example, by the age of 17, one highly talented boy in the Freeman sample had acquired degree-level music qualifications, but he also had four A grades in A-level sciences. His dilemma was whether to study music or medicine. After great anguish, he decided to take the science option but found little in common with his fellow medical students. As a hospital doctor he grieved so much for his music that he eventually gave up medicine. Having lost his years of music practice, however, he became a musicians' agent rather than a performer. Specialised vocational guidance for these children should start early, possibly even in primary school. It is distressing and wasteful for all-round highly able young people to change their post-school course, as well as being an extravagant form of vocational guidance.

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