

# Exceptionally gifted women in vocational training

## **Margrit Stamm**

Full professor of educational science, focusing on socialisation and human development, at the University of Fribourg, Switzerland

## **Michael Niederhauser**, lic. rer. soc.

Research assistant on the project entitled 'Giftedness and performance excellence in vocational training' at the Department of Educational Sciences, University of Fribourg, Switzerland

### SUMMARY

**This article investigates the extent to which exceptionally gifted women in vocational training differ from their exceptionally gifted male colleagues. On the basis of a Swiss follow-up study of the development of performance excellence of particularly gifted apprentices, three areas were investigated in more detail: choice of occupation, stress behaviour and performance development. Gender-specific differences are observed in all three areas. It is particularly noticeable that female apprentices, although significantly less resistant to stress, perform more successfully in individual fields of competence than gifted male apprentices. The further course of these women's vocational training is therefore of great interest.**

### **Keywords**

Giftedness, gender, vocational training, apprentices, performance excellence, overcoming stress

## Giftedness and gender in vocational training

Findings on gender differences are legion in educational/psychological research, and there have also been some contributions from the field of giftedness research (Beermann et al., 1992; Wagner, 2002). They relate primarily to two tendencies: First, women are under-represented in technical/mathematical/scientific training fields. Secondly, they seem less single-minded in their training ambitions than men, and also less sure of success than men. Recently, the situation appears somewhat different: in many Western and Eastern countries, girls have caught up with boys, and so on several occasions it has been reported that the gender gap has been eliminated (Hyde, 2005). In German-speaking Europe, this applies both with respect to the *Abitur* [university entry examination] figures and to completion of degrees in medicine and law, and to the significantly increased participation of girls in gifted student support programmes (Kerr, 1997; Wagner, 2002). The same applies to vocational training (Bundesministerium für Bildung und Forschung, 2004 Bundesamt für Berufsbildung und Technologie, 2006).

However, a more subtly differentiated look at training statistics that includes career patterns shows that there continue to be gender-specific and social hierarchies which are reflected in poorer career opportunities for women. For example, women occupy only a very limited number of top positions in industry and politics (Cornelißen, 2004). Women's and men's salaries also continue to differ significantly in German-speaking Europe. In 2003, women in Switzerland earned around 80 % of the annual income of a man; in Germany the figure was 75 %. However, these income disadvantages are to a large extent the result of career breaks. Young women are also affected by youth unemployment to a greater extent. Of those aged 15 to 24, in Germany an average of 15 % are unemployed, in Switzerland 4.6 % and in Austria 9.8 %. In all three countries, the unemployment figures are higher by over one third for women (Bundesinstitut für Berufsbildung, 2006).

What is the position in vocational training with regard to exceptionally gifted apprentices? What profiles do particularly gifted women display with respect to their male colleagues? A Swiss follow-up study on the development of talented apprentices in vocational training pursues such questions. Against the background of the current discussion of excellence in vocational training, they are of particular interest for two reasons: firstly because vocational research into giftedness, generally and with a specific focus on gender themes, is still in its infancy; secondly, because it must be

a significant objective of vocational training to foster performance excellence in both genders in accordance with their performance potential and not in accordance with old-fashioned patterns of attribution.

## Objective of the study and sample

The Swiss follow-up study, entitled *Hoch begabt und „nur“ Lehrling?* [‘Exceptionally gifted and “only” an apprentice?'], runs from 2004 to 2008. It seeks to investigate the performance of particularly gifted apprentices in vocational training and to ask to what extent they are able to implement their potential in performance excellence and what supportive measures firms providing training and vocational colleges supply in reaction to this. The subjects investigated are (a) giftedness profiles, personality traits and environmental features, (b) performance development from completion of compulsory schooling until the end of vocational training, and (c) support and assistance supplied by firms providing training and vocational colleges (Stamm, 2007a).

In autumn 2004, by means of a three-stage selection procedure, 2 706 apprentices at a total of 21 randomly selected Swiss vocational colleges were analysed using the performance examination system (L-P-S) of Horn (1983). It covers practical/technical intelligence, dexterity and spatial sense. Additionally, other criteria deemed relevant to giftedness on the basis of the research, such as prior knowledge, school grades and motor and manual capabilities, were recorded. This made it possible to include 191 people (7.6 %) in the talent pool. They had above-average L-P-S scores corresponding to an intelligence quotient of  $\geq 120$ . This group was contrasted with a group, also selected randomly and parallelised in terms of gender, of merely averagely gifted apprentices (control group,  $N=146$ ). In contrast to the control group, in which the ratio of men to women is 60 : 40 %, the talent pool consists of 49 % ( $N=93$ ) female and 51 % ( $N=98$ ) male apprentices. This means the proportion of women is significantly higher. While there are no significant differences between the genders in the intelligence areas recorded, overall the women achieved slightly better scores than the men.

The key qualifications were recorded as criteria for performance excellence. These qualifications are interdisciplinary, content-neutral but practically relevant requirements on the part of an enterprise which are necessary for filling a post. We have geared our study towards Schelten (2002) and Ripper and Weisschuh (1999). Schelten distin-

guishes four forms of key qualifications: substantive knowledge and skills (practical knowledge and skills as well as general knowledge); formal capabilities (independent thinking and learning, powers of coordination and concentration); personal capabilities (an employee's virtues such as conscientiousness, sense of responsibility, critical faculties); social capabilities (group-oriented behaviour).

To date, the apprentices have been questioned in two waves of surveys (in spring 2005 and 2006) about their character, their family and company/educational context, and their key qualifications. At the same time, the trainers were also asked to evaluate the performance potential of their apprentices. Further interviews will take place in summer 2007 and 2008.

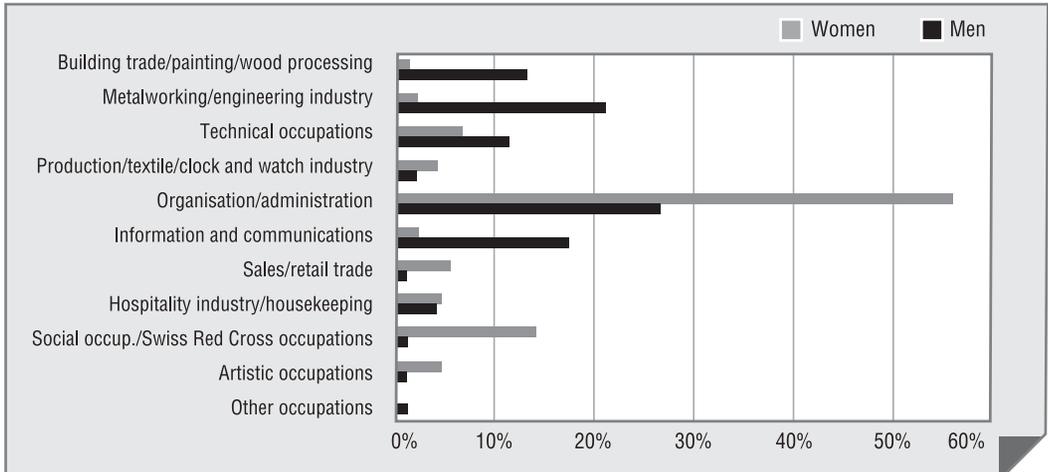
This article investigates three selected aspects of relevance to the development of performance excellence: choice of occupation, stress behaviour and performance assessment by the trainers. It asks what distinguishes exceptionally gifted female apprentices from exceptionally gifted male apprentices and where their common ground lies.

## Occupational areas and gender

The choice of a specific occupational area is a complex and fairly long-term process characterised by certain prestructured features before the actual deliberate choice is made (Wieczerkowski, 2002). We know from giftedness research that gifted young women and men already differ in their choice of optional subjects in school and later in their choice of occupation and study. According to Fauser and Schreiber (1996) and Fauser and Egger (2005), in the scholarship programme for gifted vocational apprentices, the rate of representation of women, at 50 %, is disproportionately high compared with the proportions in vocational education, although these women come almost exclusively from service occupations, while men are predominantly employed in skilled occupations.

Which occupational areas did our gifted female and male apprentices choose? It can be seen from Figure 1 that our study also demonstrates a typically gender-specific distribution across the various occupational areas. At a figure of 56 % of talented female apprentices, in percentage terms just over twice as many female as male apprentices are training for an occupation in the field of organisation and administration. Furthermore, female trainees are more strongly represented in social and artistic occupations than male apprentices. However, the latter are dominant in the fields of the building trade,

Figure 1. Occupations of talented apprentices according to gender



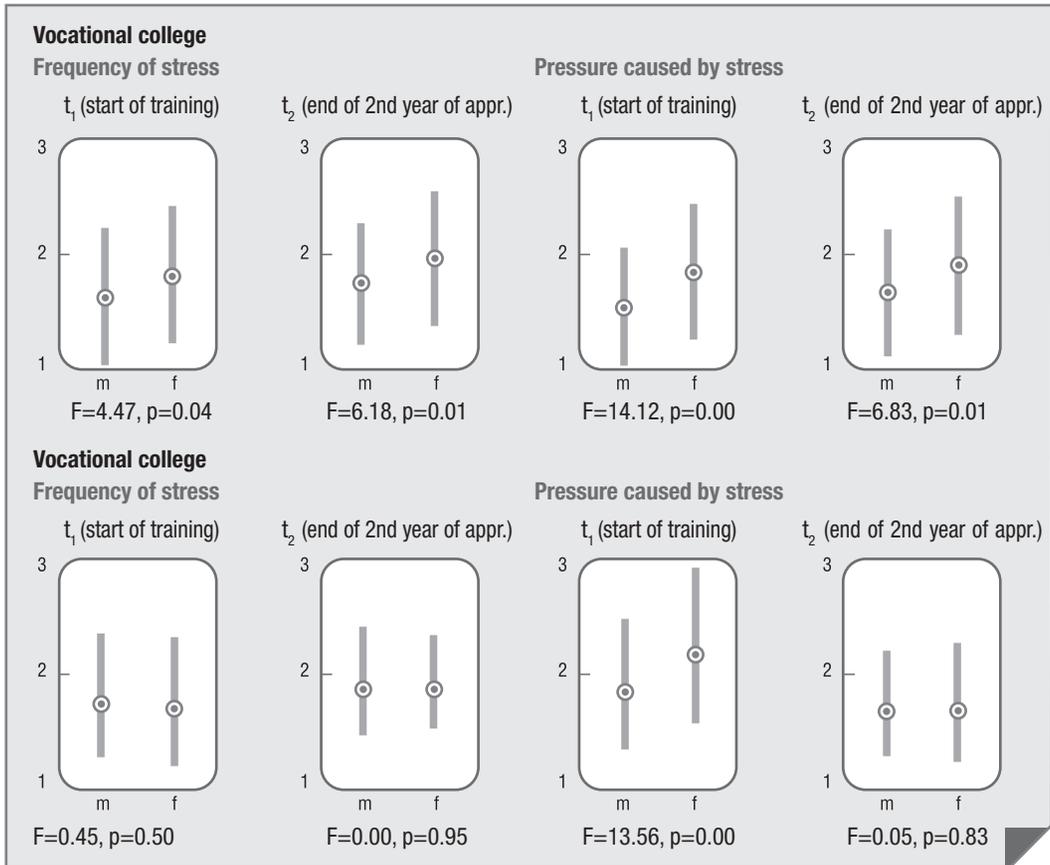
production and industry, information and communications and in the category of other technical occupations. In contrast, among talented women these occupational areas have only marginal representation of around 2 % to 6 %.

The gender-specific distribution of talented apprentices across the various occupational areas in our study approximately reflects the countrywide gender ratio among all occupational trainees in Switzerland. For example, in 2006 around 50 % of all new female trainees were training in an occupation in the field of administration and business, whereas this field only accounts for slightly more than a quarter (27 %) of male apprentices (Bundesamt für Statistik, 2005).

### Stress behaviour and gender

Stress is a state of imbalance between the requirements of the environment and personal performance assumptions. This state of imbalance is of personal significance and is experienced as unpleasant by the person involved. The most recent research works are American research works which investigate stress symptoms in connection with giftedness (Mallinckrodt & Leong, 1992). They prove that factors which in gifted people may lead to stress symptoms relate to being underchallenged, feelings that certain aspects of work are pointless, critical feedback which is (mis)interpreted by persons in authority as a challenge, fruitless attempts to adjust, and

Figure 2. Frequency of stress and pressure caused by stress



Notes: Mean value +/-1s; m=male, f=female; survey times (t<sub>1</sub>/t<sub>2</sub>);  
N<sub>m</sub>=98, N<sub>f</sub>=93 (N can vary as a result of missing values).

so on. Powerful striving towards perfectionism, aimed at avoiding errors, can also trigger symptoms of stress (Stamm, 2007b). As a result, therefore, the desire to make everything perfect, coupled with fear of not being able to fulfil the high demands made by third parties and of failing, thus seems to cause stress among gifted young people (Misra et al., 2000). In our study, we investigated such questions by asking the apprentices, on the basis of the survey tool of Seiffge-Krenke (1989), (a) about the frequency of stress and (b) about the pressure caused by stress.

Figure 2 shows the results. It illustrates the mean values and standard deviations (mean value +/- 1 standard deviation) of the frequency perceived and the personal pressure experienced by the male and

female apprentices as a result of stress at vocational college and in the firm providing training. It can be seen from the graphics that the gifted female apprentices are less resistant to stress. They discern stressful situations more frequently and also experience greater pressure as a result of stress than the male trainees.

At the time of the first survey at the beginning of the apprenticeship, the particularly gifted women at vocational college noticed stress situations significantly more frequently than their equally gifted male colleagues ( $M_{\text{women}}=1.82$ ,  $M_{\text{men}}=1.63$ ). The difference between the genders is even more pronounced with respect to the personal pressure caused by stress. The female apprentices perceived themselves to be under considerably more pressure as a result of vocational college stress than the male apprentices. The difference is highly significant ( $M_{\text{women}}=1.82$ ,  $M_{\text{men}}=1.51$ ). In firms providing training, while at the beginning of their apprenticeships women and men perceived stressful situations to be approximately equally frequent, ( $M_{\text{women}}=1.70$ ,  $M_{\text{men}}=1.75$ ), the women felt themselves to be under considerably more pressure as a result of stress than their male colleagues ( $M_{\text{women}}=2.17$ ,  $M_{\text{men}}=1.82$ ). Overall, therefore, the gifted female apprentices demonstrated considerably more disadvantageous pressure caused by stress at the start of their apprenticeship both at vocational college and in the firm providing training.

This situation had changed by the end of the second year of the apprenticeship: at vocational college, both the frequency and the pressure caused by experiencing stress had risen slightly among both genders, and significant differences were still to be found. In firms providing training, on the other hand, while the frequency of stressful situations had increased, the level of pressure experienced had decreased. This applied to both genders, but was somewhat more pronounced among the women than the men. Therefore, the differences are only a matter of chance.

In contrast to the particularly gifted women, the gifted men experienced clear and significant negative correlations between stress perception and performance at the firm. The more distinctly gifted men perceived stressful situations in the firm providing training, the lower their performances overall ( $r_{11}=-0.61$ ,  $p<0.01$ ;  $r_{12}=-0.45$ ,  $p<0.01$ ). There is also a tendency towards these negative correlations among the gifted women, but to a significantly smaller extent. With regard to the correlation between stress at vocational college and performance at college, it can be established for both genders that the perceived stress at vocational college correlated significantly negatively with performance in mathematics, but not with performance in German as a subject. The more frequently pressurised stressful

situations were perceived, the worse the apprentice's performance in mathematics. Among the gifted men, the perceived frequency of stressful situations correlates more strongly with the mathematics grade than pressure caused by such stress ( $r_{\text{frequency t2}} = -0.44$ ,  $p < 0.05$ ;  $r_{\text{pressure t2}} = -0.29$ ,  $p > 0.05$ ); among the particularly gifted women matters are exactly the opposite ( $r_{\text{frequency t2}} = -0.29$ ,  $p < 0.05$ ;  $r_{\text{pressure t2}} = -0.52$ ,  $p < 0.01$ ). Since the vocational college grades in mathematics and German were only surveyed for trainees sitting the vocational *Abitur* ( $N=58$ ), these findings should be interpreted with caution.

If the stress perception of particularly gifted women is compared with that of averagely gifted women, a significant difference can only be determined for the perceived frequency of stressful situations in the firm providing training at the time of the first survey. At the beginning of the apprenticeship, averagely gifted women perceived fewer stressful situations at the training firm than gifted women ( $M_{\text{exceptionally gifted}} = 1.70$ ,  $M_{\text{averagely gifted}} = 1.93$ ,  $F = 5.33$ ,  $p < 0.05$ ). Otherwise, the differences between particularly gifted women and averagely gifted women are rather small and not all significant. There was an overall tendency for particularly gifted women to feel under more pressure, both as a result of stress at vocational college and in the firm providing training, than normally gifted women. After one year of the apprenticeship, at the time of the second survey, this tendency had been exactly inverted.

## Performance evaluation by trainers

Table 1 provides findings regarding the evaluations of key qualifications as features of performance excellence by the trainers at the beginning of training and at the end of the second year of the apprenticeship.

First of all, it can be seen that at the start of the apprenticeship the gifted women were evaluated as being better overall in terms of key qualifications than the male apprentices. The differences are clearest in the area of routine actions ( $M_{\text{women}} = 3.71$ ,  $M_{\text{men}} = 3.50$ ) and with respect to compliance with requirements ( $M_{\text{women}} = 3.87$ ,  $M_{\text{men}} = 3.65$ ). At the end of the second year of the apprenticeship, however, the situation is different: the male apprentices have caught up with the women in routine actions ( $M_{\text{women}} = 3.62$ ,  $M_{\text{men}} = 3.63$ ), although the increase in performance by the gifted men is not significant ( $T = 1.63$ ,  $p > 0.05$ ). It is only in the field of compliance with requirements that women are still assessed to be better ( $M_{\text{women}} = 3.82$ ,  $M_{\text{men}} = 3.66$ ), but the difference has also decreased here.

Table 1. Performance evaluation by trainers, broken down by gender

Performance excellence (key qualifications)		t1 (start of training)		t2 (end 2nd year of apprenticeship)		T	Sig.
		M	s	M	s		
Routine/effective actions	Female	3.71	0.69	3.62	0.70	-0.93	0.36
	Male	3.50	0.70	3.63	0.71	1.63	0.11
Problem-solving	Female	3.32	0.92	3.34	0.90	0.13	0.90
	Male	3.39	0.92	3.49	0.96	0.88	0.38
Ability to communicate	Female	3.55	0.83	3.51	0.87	-0.33	0.74
	Male	3.57	0.74	3.51	0.81	-0.56	0.58
Innovative ability	Female	3.25	0.93	3.28	0.85	0.22	0.83
	Male	3.45	0.78	3.48	0.88	0.25	0.80
Social competence	Female	3.74	1.04	3.74	1.04	0.00	1.00
	Male	3.79	0.97	3.84	0.82	0.35	0.73
Compliance with requirements	Female	3.87	0.75	3.82	0.76	-0.58	0.56
	Male	3.65	0.77	3.66	0.69	0.11	0.91

All scales range of values 1-5; M=Mean values, s=standard deviations, T-Test for related samples, Sig. = Significance.

## Conclusion

The findings on the gender-related development of performance excellence in vocational education described in this article prove that exceptionally gifted women constitute a special group. Why?

1. The proportion of women among exceptionally gifted apprentices in our study is significantly higher, at 49 %, than the proportion of women among averagely gifted apprentices. Since our talented young women also have slightly higher intelligence quotients than their equally talented male colleagues, it is legitimate to state that this group has a specific profile.
2. However, the specific features of this profile are not constant. The choice of training occupations, for example, is just as gender specific as is the case for averagely gifted women. This means that, even if they have identical, above-average capabilities in areas such as practical, technical/theoretical and analytical/synthetic intelligence, the genders differ considerably in their choice of occupation. The choice of occupation is also gender specific in the case of exceptionally gifted apprentices. Thus, a preference for an area of interest might not be merely a question of an individual's own capabilities, but also of the role expectations at

school and within the family, cultural integration, peer relationships, and so on.

3. Specific features are also apparent with respect to the experience of stress. It is considerably more pronounced among exceptionally gifted female apprentices than among their equally gifted male colleagues. The women experience more stress and also feel less resilient than men; this results in pressure as a result of stress, which is disadvantageous overall. For both sexes, this pressure increases during the course of training at the vocational college, while it decreases slightly at the firm providing training. However, this applies to the women to a greater extent: overall, they seem to have become more resistant to stress at the end of the second year of the apprenticeship.
4. In comparison with their male colleagues, the exceptionally gifted women are judged in a more positive manner overall by the trainers with respect to performance development. However, a slight drop in performance excellence can be detected in the first two years of the apprenticeship. There is no simple interpretation of this fact. It is conceivable, for example, that the female apprentices were the subject of a certain amount of sympathy at the beginning of the apprenticeship, which made it more difficult to obtain a realistic judgement. Consequently, the assessment by the apprentices' trainers when they began their apprenticeships would have been too stringent for the exceptionally gifted male apprentices and too positive for the gifted female apprentices.
5. The question of why talented women demonstrate such high levels of pressure as a result of stress even though they have been judged so well by their trainers must remain unexplained for the time being. Does experiencing stress result in high levels of performance? Or do attitudes of high expectations on the part of trainers lead to stress reactions? Finally, could other factors – such as the climate within the firms, structures of relationships with other apprentices, examination pressure, etc. – not also be responsible for this? What role do perfectionism, being underchallenged or critical feedback play?

It is not currently possible to answer such questions using the set of data which is available. However, the question of stress resistance and the role played by the training firm and vocational college will be raised particularly carefully in the next surveys. We therefore hope to be able to use the data determined to clarify the mutual correlations between stress resistance and performance excellence as the expression of particular vocational giftedness by means of appropriate structural equation models.

Precisely these gender-specific results are of great interest for the future development of performance excellence: what personal characteristics and/or personal qualifications will do most to foster success in training? A high self-image (which would speak in favour of the male trainees) or committed and goal-oriented persistence (which would speak more in favour of the women)? It will not become apparent which apprentices will actually be particularly successful and which will not until the project ends in 2007. *The fact* that the particularly gifted women in our study have extraordinary potential is not in doubt. However, *how* and in *what ways* they will be able to put it into practice must for the time being remain the great unanswered question.

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