C 1 EDUCATION AND QUALIFICATIONS

Overview

In all advanced economies there is a trend towards a knowledge-based economy. This is without an economic alternative and creates an increasing demand for human resources. Well educated and highly-qualified personnel are a prerequisite for research and development, for innovations and their implementation, and for the transfer of scientific findings to the private sector. In particular, there will be growing demand worldwide for people with academic qualifications, with increasing numbers of natural scientists and engineers needed in particular for technological innovation processes.

This development presents enormous challenges for the education system, which has to provide the qualified personnel. The greater the demands on the qualifications of the workforce, the greater is the obligation of the higher education system and the vocational training system to turn out sufficient numbers of highly-qualified and well-trained young people. In order to prevent the foreseeable shortages that can develop here, not least for demographic reasons, measures must be adopted such as increased mobilisation of potential, permeability between vocational training and higher education systems, and continuous education for those already in employment. Germany has unfortunately lost its former leading position in education due to shortcoming in its education policies.

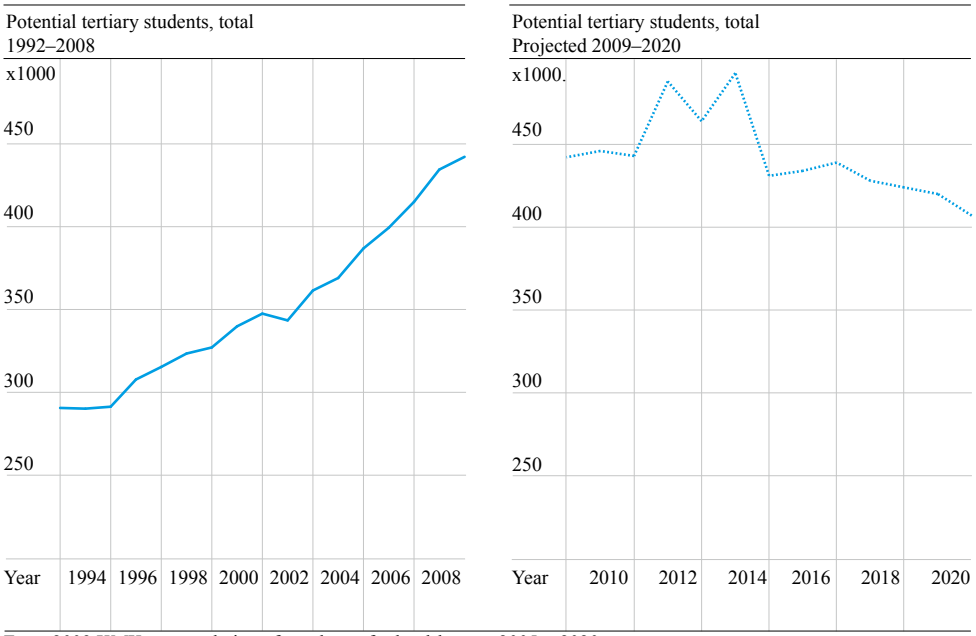
This section draws on a study produced for the Commission of Experts for Research and Innovation.[180] Data is used from the Federal Statistical Office (e.g. microcensus, higher education statistics) as well from the OECD publication "Education at a glance", and surveys of the responsible institutes.

Investigated indicators:

- School-leavers qualified for higher education in Germany
- Number of new tertiary students in an international comparison
- Foreign students at German universities
- Graduation rate and subject structure in an international comparison
- Further training according to employment status and level of qualification
- Proportion of workforce in Europe who are highly qualified

SCHOOL-LEAVERS QUALIFIED FOR HIGHER EDUCATION IN GERMANY

C 1 – 1



From 2009 KMK: extrapolation of numbers of school-leavers 2005 - 2020.
Sources: Federal Statistical Office (collated). Standing Conference of the Ministers for Education of the Laender (2009).

Numbers and proportion of school-leavers qualified for higher education: school-leavers are qualified for tertiary education if they obtain a general or subject-specific higher-education entrance qualification. The proportion of school-leavers qualified for higher education is expressed relative to the age cohort.

Lower proportion of school-leavers qualified for higher education but new record number of school-leavers qualified for higher education

The number and proportion of school-leavers qualified for higher education show how many young people could be trained in the universities to provide the specialist workforce of the future. In 2008, 271 000 school-leavers obtained an entrance qualification for universities or for universities of applied sciences (fachhochschule). Since the mid-1990s this number has been rising almost continually. In 2011 and 2013, the effects of the staggered shortening of school education to twelve years will lead to spikes in the numbers of school-leavers qualified for higher education, but this will then be followed by a downward trend. In 2008, 161 500 young people also left vocational-training schools with a qualification for higher education. This meant that a total of 442 100 school-leavers were qualified to go on to tertiary education in 2008. This is 45 percent of the age cohort and 52 percent more than in 1992. 53 percent of school-leavers qualified for higher education are female.

The potential for tertiary education had increased appreciably. This is due mainly to an increase in the proportion of school-leavers qualified for higher education from 31 percent in 1992 to 45 percent in 2008. This trend will continue, but in an international comparison Germany is still in a poor position. In most OECD countries the proportion of school-leavers qualified for higher education is much higher.

C 1 – 2 NEW TERTIARY STUDENTS IN SELECTED OECD COUNTRIES

Countries	1998	2001	2002	2003	2004	2005	2006	2007
Australia	53	65	77	68	70	82	84	86
Finnland	58	72	71	73	73	73	76	71
France	–	37	37	39	–	–	–	–
Germany	28	32	35	36	37	36	35	34
Italy	42	44	50	54	55	56	55	53
Japan	36	37	39	40	40	41	45	46
Netherlands	52	54	54	52	56	59	58	60
Spain	41	47	49	46	44	43	43	41
Sweden	59	69	75	80	79	76	76	73
United Kingdom	48	46	48	48	52	51	57	55
USA	44	42	64	63	63	64	64	65
Average	40	48	52	53	53	54	56	56

Net rates of tertiary education entry for the typical age cohort.
Sources: OECD (2009c). OECD indicators.

Tertiary education entry rate: Proportion of the appropriate age cohort starting tertiary education. It is a measure for the utilisation of the demographic potential for the formation of academically-trained human resources.

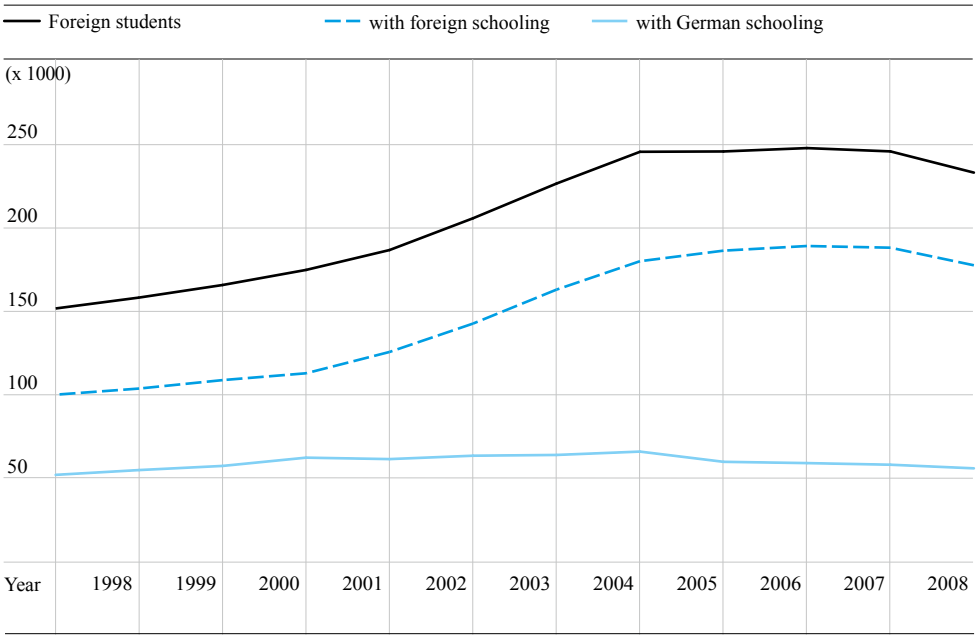
Current high entry rates for tertiary education cannot be maintained

Only three-quarters of the school-leavers qualified to go on to tertiary education actually do so: females less often than males, those with parents with low levels of education less often than those with an academic family background. In 2008, there were 396 600 newly enrolled students at Germany's universities. According to preliminary figures, the number was even higher in 2009 at 423 000. However, in contrast to the numbers of school-leavers qualified for higher education, the numbers of entrants have fluctuated. At the start of the 1990s and between 2004 and 2006 there was actually a marked decrease. Just less than half of tertiary education entrants are female, although they represent more than half the school-leavers qualified for higher education. 15 percent of new tertiary students now come from other countries.

In the next few years, the combined effects of switch to 12-years of schooling and a brief rise in birth rates at the end of 1990s will lead to a further increase in the number of entrants to tertiary education. However, due to the long-term demographic trends this will be followed by a decrease beginning in about 2014. The Standing Conference of the Ministers for Education of the Laender (KMK) expects about 374 000 entrants to tertiary education in 2020. The tertiary education entry rate in 2007 was 34 percent, which is the lowest value among the OECD comparison countries. In the USA, Sweden and Finland the entry rates were 65 percent and higher.

FOREIGN STUDENTS AT GERMAN UNIVERSITIES AND COLLEGES

C 1 – 3



Sources: DAAD (2009). Federal Statistical Office.

Foreign students are non-German nationals, who may either have attended school in Germany and obtained a higher-education entrance qualification there or may have attended school in another country.

Foreigners and "upwardly mobile" students more likely to choose science subjects

One way of increasing the numbers of students, in particular those studying mathematics, computer sciences, natural sciences and engineering, is to make use of the development potential among foreign students and those with a non-academic family background. In 2008, 234 000 foreign students were enrolled at German universities, of which 178 000 had not attended a German school. The overall proportion of foreigners is thus about 12 percent, compared with 8.3 percent a decade previously. However, both this increase and the recent decline are solely due to changes in the numbers of students with non-German schooling. The unchanging numbers of foreign entrants with German schooling over the past decade is an indication that Germany has problems guiding schoolchildren with a migrant background through to higher education. Every second foreign student with non-German schooling comes from a European country, and a large majority are from eastern Europe. Every third student is from Asia, and China is particularly well represented, (higher degrees and doctorates are particularly attractive for this group). 79 percent of foreign students with German schooling come from a European country, and of these a quarter have Turkish nationality. In the Winter Semester 2007 / 2008, 55 percent of all students in Germany had parents with academic qualifications, and only 9 percent had parents with basic secondary education or lower. Students with a non-academic background are more likely to enrol for mathematics, computer sciences, natural sciences and engineering. Engineering is a typical choice for the educationally "upwardly mobile", and the proportion of foreign students in this case is also particularly high.

C 1 – 4 GRADUATES AND SUBJECTS STUDIED

	1995	2000	2002	2005	2006	2007	2008
Total no. of graduates	197015	176654	172606	207936	220782	239877	260498
Of which women, %	41.2	45.6	48.1	50.8	51.6	51.8	52.2
University graduates, (%)	63.6	64.3	63.2	60.8	61.9	62.4	62.4
Languages and humanities	27125	29911	30175	35732	39769	43827	50680
in percent	13.8	16.9	17.5	17.2	18	18.3	19.4
Law, economics, social sciences	66538	62732	62284	76566	79235	85838	87196
in percent	33.8	35.5	36.1	36.8	35.9	35.8	33.5
Mathematics, natural sciences	27800	21844	21594	30737	34062	38417	43333
in percent	14.1	12.4	12.5	14.8	15.4	16.0	16.6
Medicine / Health sciences	12075	10620	10223	11817	12230	13358	14345
in percent	6.1	6.0	5.9	5.7	5.5	5.6	5.5
Engineering	47295	35725	32414	34339	35627	38065	42558
in percent	24.0	20.2	18.8	16.5	16.1	15.9	16.3
Art, Art history	7280	7630	7857	9678	10503	10399	11185
in percent	3.7	4.3	4.6	4.7	4.8	4.3	4.3

Source: Federal Statistical Office, Series 11 - 4.2. HIS / ICE.

Subject structure and rate of graduation: The subject structure shows the proportion of first degree graduates in each subject or subject group. The rate of graduation measures the proportion of tertiary graduates in the relevant age cohort of the population.

Germany's graduation rate is poor in an international comparison; the proportion of women has increased significantly

The number of first degree graduates from German universities reached a record level of 260 500 in 2008. Compared with 2002, this represents an increase of 50 percent. This trend will continue in the medium-term. However, in the long-term the demographic development will lead to a decline in the numbers of graduates. Over the past 15 years the proportion of women graduates has increased from 40 to 52 percent. However, in mathematics, computer sciences, natural sciences and engineering it is still below a quarter. A third of all graduates qualified in law, economics and social sciences, a fifth in languages and cultural sciences, 17 percent in mathematics and natural sciences, and 16 percent in engineering (which seems to mark an end to its downward spiral).

The graduation rate in Germany has risen in particular since 2002, and is currently at 26.2 percent. However, this is still some way below the target of 35 percent formulated by the Science Council. In an international comparison of graduation rates, Germany is at the end of the field, and in terms of the change of the rate of graduation, Germany comes last in the OECD comparison.

FURTHER TRAINING ACCORDING TO EMPLOYMENT STATUS AND LEVEL OF QUALIFICATION

C 1 – 5

	1996	1997–1999	2000–2002	2003–2005	2006	2007
Employed	**4.1**	**3.8**	**3.4**	**5.2**	**5.3**	**5.5**
Low (ISCED 0–2)	1.1	1.0	0.9	1.3	1.3	1.1
Medium (ISCED 3–4)	3.8	3.4	3.1	3.8	3.9	4.0
High (ISCED 5–6)	6.7	6.2	5.4	10.0	10.6	10.8
Unemployed	**5.5**	**4.5**	**4.4**	**2.7**	**2.4**	**2.8**
Low (ISCED 0–2)	2.0	2.0	2.1	1.5	1.4	1.7
Medium (ISCED 3–4)	5.9	4.8	4.7	2.7	2.4	2.9
High (ISCED 5–6)	10.7	8.5	7.9	5.2	5.0	5.5
Non-employed	**4.1**	**3.5**	**3.3**	**1.1**	**0.9**	**0.8**
Low (ISCED 0–2)	0.5	0.5	0.6	0.4	0.4	0.4
Medium (ISCED 3–4)	5.8	4.7	4.2	1.3	0.9	0.8
High (ISCED 5–6)	8.9	7.4	6.3	2.1	2.0	1.7

Figures as percentages of all those aged 15 to 64 years.
Source: Microcensuses 1996 to 2007. Calculations by EFI.

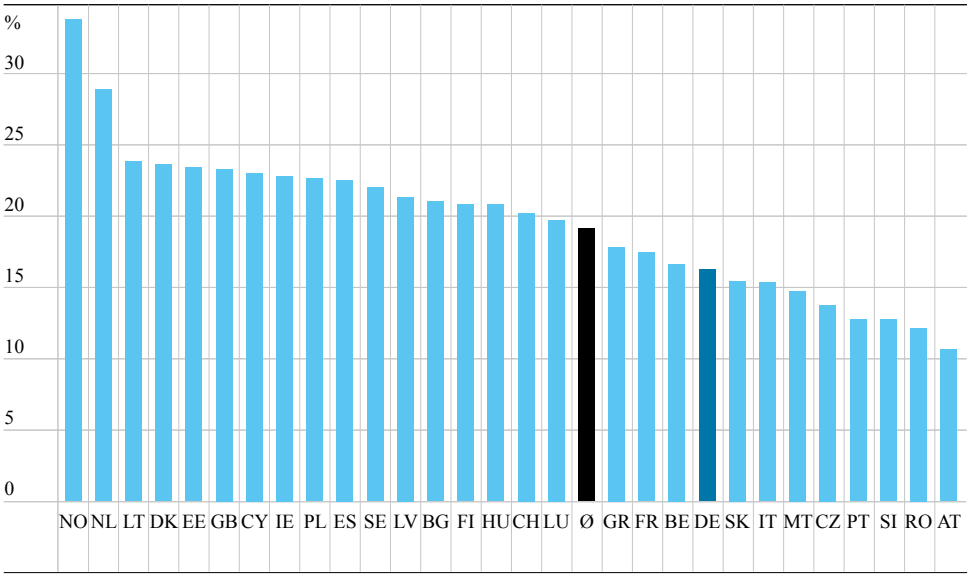
Further education rates: Proportion who have participated in a further training measure in the four weeks prior to being questioned.

Level of qualification and employment status influence further training behaviour

Participation in further training courses is influenced by two main factors: the level of qualification and the employment status of the individual. The higher the level of education, then the higher is the likelihood of receiving further training. The employed are much more likely to attend further training courses than the unemployed or non-employed. This is shown by the responses to the microcensus, in which people are asked if they had taken part in a further training measure in the previous four weeks. In 2007, eleven percent of highly-qualified employed responded positively, compared with only 1.1 percent of the employed with low qualifications. Unemployed people have taken part in further training much less frequently in recent years than the employed. The only exception is the unemployed with low levels of education.

There are only slight differences between men and women (5.2 percent against 5.9 percent in 2007). However, women in the knowledge-intensive occupations are considerably more active in further training than men. Age has only a slight influence on the tendency to take part in further training. The rate of further training is currently similar for all age groups of the highly qualified between 15 and 54 years, ranging from 11 to 12 percent. Across all qualification levels, however, there is a steady rise in participation in further training above an age of about 35 years.

C 1 – 6 PROPORTION OF EUROPE'S WORKFORCE WHO ARE HIGHLY QUALIFIED* IN 2008



*ISCED 5a + 6.
Source: European Labour Force survey. Calculations and presentation by Fraunhofer ISI.

Highly qualified: People with a tertiary education qualification in accordance with the International Standard Classification of Education (ISCED). Level 5A includes qualifications such as a "diplom", a bachelor's degree or a master's degree. Level 6 is reserved for programmes, which lead to advanced research qualifications, such as a doctorate or an habilitation at institutions of higher education.

Increasing demand for highly-qualified personnel

In Germany, 16.3 percent of employed people held a university degree in 2008. This proportion has risen steadily in recent decades. However, Germany has at first sight a very weak position in an international comparison. This is due in part to the higher importance attached in Germany to vocational training courses and dual vocational training, where in other countries higher education courses are provided.

Considering only those working in knowledge-intensive jobs, Germany does better, reaching the EU average with about 43 percent. There is thus a considerable difference in qualifications between knowledge-intensive and non-knowledge-intensive sectors in Germany. This applies above all for the services sector. Here the proportion of the employees with a tertiary qualification is five times higher in the knowledge-intensive sectors than in the remaining services sectors. In an international comparison, the proportion of people with lower level tertiary qualifications in Germany is usually lower than in other countries.