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Medium-Term Perspectives of Engineering Colleges Surveys and Analyses to Safeguard and Further Develop the Quality of Education and Training

The colleges of engineering (*HTLs*) constitute a major pillar of the Austrian engineering education system. Some 8,000 people a year complete an *HTL* programme, when counting their main forms and the forms for people in employment. These are some 30% more than in the early 1990s. The share of the workforce with an *HTL* degree increased from 2.4 (1991) to 3.8% (2006).

Company surveys and labour market data reveal that the *HTL* is recognised in the business sphere. Even the fact that the share of the workforce with an *HTL* degree is increasing has not led to a reduction of their positive professional and career opportunities.

To guarantee that this positive situation can be maintained in an ever-changing future environment, repeated surveys and analysis are required aiming at safeguarding and further developing the quality of education and training provision. Within the framework of this project, which was commissioned by the Federal Ministry of Education, the Arts and Culture (BMUKK), surveys were conducted among enterprises and graduates and analyses of job ads in the print media and on the Internet carried out. The obtained data was analysed in the context of the current trends in the education and employment systems with a view to the medium-term perspectives offered by the *HTL*.

The *HTL* holds a unique position in the Austrian education system and enjoys wide acceptance in the population, business sphere and politics. Its educational mission is to qualify graduates for engineering or technical and business careers at the executive level and provision of general higher education (HE) entrance qualifications.

The attractiveness of this school type has in recent decades reflected in increased influx. Thus, the share of young people in their tenth school year (i.e. the first year following completion of compulsory schooling) who attend *HTL* increased from 7.5% in the 1992/93 academic year to 8.5% in 2002/03. Some 41,000 young people attended an *HTL* programme in 2006/07 (not counting *Kollegs*, i.e. postsecondary VET courses), whereas in 1991 this figure had been below 30,000. Currently, over 6,500 young people a year complete an *HTL* main form (14-to-19-year-olds); in addition, *HTLs* for

#people in employment count around 1,500 graduates p.a. This is equivalent to a total growth in annual graduate figures by some 30% in a comparison to the early 1990s.

High labour market acceptance

The majority of *HTL* degree holders enters the world of work, some take up a study at an HE institution, others intend to combine employment and HE studies. The employment rate of the workforce with *HTL* qualifications increased from 2.4 to 3.6% between 1991 and 2006. Despite rising employment figures, their risk of becoming unemployed is far below average: In August 2007, for example, the workforce with *HTL* qualifications were facing a risk of becoming unemployed of 2.6% as compared to an average of 4.5% of all education levels.

The HTL mainly qualifies for the upper and upper middle segment of demand for engineering or technical and business qualifications. From more than 1,000 job ads in 2006/07 seeking applicants with HTL qualifications, 55% also aimed at candidates with Fachhochschule degrees. The following approximate annual figures of non-university graduates with an Ingenieur title can be

assumed for recent years: 3,500 Ingenieur professional titles awarded by the Economics Ministry on the basis of recognising (at least 3 years of) specialist occupational practice and more than 2,300 graduates in the Fachhochschule (FH) sector in the fields of Technology and Engineering in 2005/06.

TABLE 1:

Competitors specified in job advertisements for HTL graduates with other qualifications in %

Competitors specified in the job ad	76.4	-
<i>Of which: competition from graduates of:</i>	Compared to ads with competitors	Compared to all ads
Fachhochschule programmes	72.0	55.0
Universities	53.5	40.9
VET schools	21.2	16.2
Apprenticeship training	17.4	13.3
Part-time industrial master college	8.9	6.8
College of business administration	8.3	6.3

Source: ibw analysis of job ads 9/2006-3/2007, n=1,005

Professionals and executives with an HTL degree

Rising employment figures can be observed in a comparison of the most recent censuses not only among qualified technical and scientific staff, who with almost 50% still constitute the largest segment of HTL employment, but also among executives and commercial as well as business occupations. Of graduates of an HTL main form, the 2001 census revealed 22% in an executive function, mostly in medium-sized and larger enterprises. Overall, more than 80% of the labour force with an HTL degree held senior positions as skilled workers or in executive functions.

Employment in industry and in growing branches of the services sector

Increasing HTL employment between the last two censuses was characterised by additional demand in the production sector and, even more pronounced, in the services sector, above all in commerce and trade, business services, data processing and databases. Despite high demand by industry for technicians in 2007, which was due to the favourable economic development, it can be assumed that, in the medium term, transfer from HTL to the future employment system will at some 60%

or more occur in the services sector, particularly in the business and ICT services.

Employment of HTL graduates is characterised by the growth of qualified services, the computer penetration of the business sphere and world of work, and the internationalisation of markets. In a parallel development, stronger requirements are made on additional IT skills, the willingness to be mobile, and command of foreign languages.

Broad specialist and supra-disciplinary qualification required

The spectrum of employment is broadly diversified and ranges from R&D and design to service/support or customer support, to mention but a few examples. Top-notch additional qualifications are required in all specialisations. As far as qualification requirements are concerned, the following trends can be discerned:

- ☞ Computer-based employment across all specialisations at senior levels
- ☞ The limits of specialisation via IVET paths: high and continuous CVET need – IVET serves as a "learning platform"
- ☞ Interactive provision of services with customers, in teams, etc.
- ☞ Project-type work organisation
- ☞ Mobility and foreign language skills

TABLE 2:

Share of HTL graduates who rate the following education and training elements as very useful* for employment, in %

The two highest values per area specialisation have been highlighted

Area specialisation	IT instruction	Occupation-related practice	Occupation-related theory	English	Business knowledge
IT and Organisation	71	48	33	39	33
Electronic Engineering	65	42	35	44	23
Information Technology	58	36	24	38	20
Construction Engineering	55	34	38	19	24
Electrical Engineering	48	36	25	30	14
Mechanical Engineering	46	39	35	35	24
Interior Design and Timber Technology	44	39	42	33	43
Industrial Management	44	29	16	31	30
Media Technology and Management	41	44	47	29	35
Chemistry and Chemical Engineering	35	63	36	27	11
Total	55	40	34	35	24

* Answer options from "very useful" to "not useful at all" (5 levels)
Source: ibw HTL graduate survey, autumn 2007

The HTL is a "double qualifying" education path in that it affords occupational qualifications and the general HE access qualification. The enrolment rate has risen only slightly since the early 1990s and has in recent years been around 46%. This rate comprises university and FH students as well as those who simultaneously take up a career and a study (at least 20% of holders of the upper secondary school leaving certificate *Matura*). The enrolment rate within three semesters following the *Matura* exam was 26.5% in 2005 regarding *university-based studies* and around 10% in *FH programmes*; another 10% take up a study at *FH* at a later point, frequently on a part-time basis.

For many years, the HTL has constituted a major route for university students of the engineering sciences: Thus, for example, 53% of Austrian study entrants holding a *Matura* from a college for engineering, arts and crafts are enrolled in the engineering sciences, whereas this share is only 18% among Austrian new students overall.

Problems of classifying HTL internationally

Austria has no tradition of short tertiary education programmes. In Anglophone and Scandinavian education systems, by contrast, they are encountered frequently. In Austria it is particularly the VET college (*BHS*) that fulfils the function of providing advanced education and training programmes between long university studies on the one hand and apprenticeship

and VET school (*BMS*) programmes on the other. And this is successful, as is shown by the economic development on the basis of key indicators (GDP per capita, export rate and low unemployment rates).

But there is also widespread misunderstanding in international comparisons, which mainly results from the lacking accuracy of the *International Standard Classification of Education (ISCED)* for the Austrian education system. As a consequence, Austria is regularly shown as having artificial "backlogs" regarding higher qualifications compared with the OECD country mean. In the case of technical and scientific qualifications, for example, this is because only the *HTL Kolleg*, but not the *HTL* main form nor the *HTL* for people in employment (together 92% of the workforce with *HTL* qualifications), is classified under ISCED Level 5B and hence as tertiary.

The NQF as an opportunity for a more realistic classification

The development of the NQF (National Qualifications Framework), which is primarily oriented to learning outcomes, should provide a medium-term opportunity for a more realistic classification of the *HTL* qualification and the *Ingenieur* qualification (*HTL* degree plus at least 3 years of practice at advanced professional level) than currently offered by ISCED.

Two- and three-year studies as a novelty in Austria

With the introduction of consecutive studies within the framework of the Bologna process, not only structural innovation for the HE system in business-oriented studies is expected, but also need arises for clarification and coordination regarding the relation between HE institutions and *BHSs*. It is a fact that the Bachelor's degree from HE institutions necessitates merely one year more of theoretical learning workload than a *Kolleg* (with the same formal access requirements). In some EU countries, also a so-called "short cycle" is offered (i.e. a two-year study at or outside HE institutions) and therefore also included in the EQF (Level 5 of 8). This *short cycle* aims to cover one half to two thirds of the Bachelor's studies.

Raising the Matura and study rates

One emphasis of the educational reform is on increasing the rate of *Matura* holders as well as the study rate. Issues of relevance for the schools and colleges for engineering, arts and crafts include: the positioning of VET school and the *HTL* diploma in relation to the *Berufsreifeprüfung* certificate, for which strong expansion is foreseen, and to short-term HE studies and improved crediting for *HTL* programmes and the engineering qualification. All this will have to be implemented with a view to the European reference framework (EQF) and by applying European instruments (ECVET).

Objectives of the educational reform

As the problem of supplying all young people with apprenticeship and school places has been persisting since 1996, new priorities have been set in education policies in recent years. Even though the majority of announced measures related to "guaranteeing education up to the age of 18" aim at improved early learning initiatives and compulsory schooling as well as apprenticeship posts or equivalent provision, related reform concepts also aim at providing a sufficient number of places at *BMS* and *BHS*, reducing the number of repeat takers, and preventing premature dropouts.

Austrian educational institutions at the upper secondary level do not filter access rigidly but pursue the practice of several years of selection by interests and skills. In addition, year 9 of schooling primarily meets a search and test function for students. Today the success rate in the years following completion of compulsory schooling (that is: between grades 2 and 5) at *HTL* is about 76%.

This is higher than at HE institutions with a success rate of 65% (according to OECD calculations).

We are pleased to state in this connection that a study conducted by the Austrian Institute for Advanced Studies (IHS) in 2005 clarified that the "rate of loss of schoolchildren" at *BHS* is not equivalent to dropout rates, because the majority of the young people concerned transfer to *BMS* or an apprenticeship or a *BHS* specialisation. In an EU comparison, the "true" educational dropout rate for Austria in 2006 was 9.6% as compared to 15.3% in an EU country mean. For the future, however, it is vital to enhance documentation of the retention rates of students in all educational programmes at the upper secondary level by school statistics.

Quality strategy for HTL absolutely essential

At the basis of the Austrian education strategy there is a differentiation at the upper secondary level by interests and skills, into apprenticeship, *BMS*, *BHS* and *AHS*. Only recently (in a document dated 8.9.2006) the EU Commission pointed out that the upper secondary level was the *most appropriate time* for differentiation in terms of efficiency and equity. The *HTL* should by no means give up its quality standards for the benefit of increasing success rates, because consequences would be disastrous. High-performing youth would transfer to *Academic upper secondary school*. Full-time school-based VET without any advanced educational requirements would, similarly to many *BMSs*, hardly attract many young people in relation to apprenticeship training. In the longer term, acceptance by employers would be lost as well.

Starting points to increase success rates can only be found in pedagogical improvements and the introduction of interim qualifications or certificates (e.g. after the third grade, by replacing apprenticeship training time). This would require additional funds. As the demographic potential for education paths after compulsory schooling will decline in the medium and long term, released capacities could be used for strengthening the focus on learners (guidance, screening, acquisition of school qualifications by adults, grants, etc.). According to projections by Statistics Austria, the number of 15-year-olds will decline (for example, from about 99,500 in 2008 to approx. 92,700 in 2012).

The full text of the study (222 pages, in German) has recently been published as ibw research report no. 138 (ISBN 3-902358-87-5) and can be obtained from the ibw.

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