

Technical education in Austria

An Edge Study Visit

At the kind invitation of Dr Martin Schmidt-Baldassari, Director of HTL Fulpmes, a team of three travelled from England to visit technical schools and businesses in the Tyrol region of Austria: David Harbourne, the Edge Foundation's Director of Policy and Research; Lee Kilgour, Executive Principal of The Greater Manchester UTC; and Emma Abegglen, Deputy Principal at Sir Charles Kao UTC in Harlow. This is our report.

We are immensely grateful to Martin for preparing a fantastic itinerary and sparing so much time to take us to many fascinating places; to Martin, his wife Sylvia and their three sons for welcoming us into their home; to Dr Wolfgang Pachatz, who travelled to meet us from the Ministry of Education in Vienna; to Anton Lendl from the Board of Education of Tyrol, who also spent time with us; and to the leaders, managers and staff of the HTLs and businesses which we visited while we were in Austria. We dedicate this report to them, with our deepest appreciation.

Any mistakes in this report are entirely our own!



Dr Wolfgang Pachatz; David Harbourne; Emma Abegglen; Lee Kilgour; Martin Schmidt-Baldassari

Introduction: why did we go to Austria?

England's education system allows young people to study technical subjects from the age of 13 or 14 (the start of Key Stage 4) as part of a broad and balanced curriculum. At 16+, they can study technical subjects full-time, take academic A levels, or opt for a mixture of both. Alternatively, they can start an apprenticeship.

Alongside choice of subject, students have a choice of institution. While most young people remain in mainstream schools and academies throughout Key Stage 4, some 14-year-olds now choose to transfer to a University Technical College, Studio School or Further Education College - including, in some cases, a Career College set up by an FE College.

The same institutional choice applies at 16, with the addition of sixth form colleges and, of course, apprenticeships, which are supported by employers, colleges and specialist training providers.

UTC, Studio School and Career College specialisms range from engineering, digital technology and science to the creative industries, hospitality and health and social care. They connect the classroom to the outside world in a way which many young people find appealing and motivating. Through project-based learning, young people see how knowledge learned in the classroom is applied in the modern workplace.

Teachers work with employers to design and deliver imaginative real-world projects which not only help young people apply knowledge to an authentic challenge, but also develop the broader skills that employers look for in new recruits: teamwork, problem-solving and communication skills in particular.

Lord Baker of Dorking, Chair of the Edge Foundation and the Baker Dearing Educational Trust, is a leading advocate of this kind of blended education. In "14-18: A New Vision for Secondary Education"¹, he made the case for ending the national curriculum at 14 and enabling young people to spend the next four years in a UTC, Career College, liberal arts college or a specialist college for sports or creative and performing arts.

Lord Baker drew particular inspiration from Austria, which has had specialist upper secondary colleges akin to UTCs, Studio Schools and Career Colleges for over a century. They recruit at 14, mainly from comprehensive lower secondary schools called Neue Mittelschulen, and most offer both four- and five-year programmes of study which combine a solid academic core with specialist technical education and workshop training.

Austria's technical education is widely credited with contributing to the country's economic success. For example, a recent European Commission report on Austria says that "The country's vocational education and training system is well adapted to the labour market, a factor that has contributed to it having one of the lowest youth unemployment rates in the EU."² In the third quarter of 2015, 11.2% of Austrian 15-24 year olds were unemployed, compared with 15.2% in the UK and 19.9% in the European Union as a whole.³

Similarly, IPPR's review of European jobs and skills found "only limited evidence of skills shortages in Germany, Austria and the Netherlands, despite their relatively low rates of unemployment, which suggests that the education systems and labour markets in these countries are very efficient at matching labour supply and demand."⁴

This contributes to an economy that performs well above the international average. According to the OECD⁵, Austria's GDP was US\$ 47,693 per capita in 2014 - well head of the figure for the UK (\$40,227).

All of this made us want to find out more about Austria's technical education system, and in February 2016, we had the chance.

A brief outline of education in Austria

In Austria, compulsory education starts in the September following a child's sixth birthday. Primary education lasts four years (grades 1 to 4). Secondary education is subdivided into level I and level II. Level I covers grades 5 to 8 (age 10 to 14), while Level II extends to age 18 or 19.

From the age of 10, children attend an Academic Secondary School (Allgemeinbildende Höhere Schule) or a Neue Mittelschule - literally "New Middle School", but usually referred to in English as "New Secondary Schools".

Academic Secondary Schools (AHS) cover the full secondary age range from 10 to 18/19. Entry is largely based on achievement in primary school. From the third year onwards, education is sub-divided into three types: Classical Academic Secondary School (Gymnasium), Academic Secondary School emphasising Maths and Science (Realgymnasium) and Academic Secondary School emphasising Economics (wirtschaftskundliches Realgymnasium). Students have the opportunity to transfer to other types of school at 14, but not many do. Most AHS students go to university when they complete their final exams, but some choose specialised education or training, including apprenticeships.

The New Secondary Schools replaced most other types of lower secondary school over the period 2008-15, though variations can still be found: Vienna, for example, still has some Cooperative Secondary Schools. Academic Secondary Schools were invited to convert into New Secondary Schools, but very few did. (Anecdotally, we heard that Academic Secondary Schools, like English grammar schools, are popular with university-educated middle class families: it would be politically difficult to compel them to become comprehensive schools.)

New Secondary Schools were set up to provide comprehensive, general education for children of all abilities. According to the Austrian government⁶,

The curriculum of the New Secondary School combines the traditional emphasis upon quality that was found in the Academic Secondary School Lower Level (AHS-Unterstufe), with a new culture of teaching and learning. One of the principal aims is for the curriculum to be focused on the potential and the talents of the children attending the school. Educational and careers guidance provide an ideal foundation for any subsequent decisions regarding a pupil's future education or vocation.

Austrian students - especially girls - seem to take a below average pleasure in studying maths. In 2012, across all countries that took part in the OECD's PISA tests, 53% of students agreed or strongly agreed that they are interested in the things they learn in mathematics. In Austria, 50% of boys and 32% of girls agreed with that statement⁷.

Socio-economic status also makes a significant difference to performance in PISA (the Programme for International Student Assessment). In 2012, across OECD countries as a whole, socio-economically advantaged students scored 39 points higher in mathematics than less advantaged students (the equivalent of nearly one year of schooling); in Austria, the gap was 43 points.

The New Secondary Schools (Neue Mittelschulen) were established with some of these issues in mind. An initial evaluation published in early March 2015 pointed to improvements in the learning culture, behaviour and atmosphere at school, and to improved rates of transfer to upper secondary education. The report also indicated that pupils whose native language is not German particularly benefit from attending a new secondary school. On the other hand, there has not yet been a marked improvement in students' levels of achievement⁸. These are still early days for New Secondary Schools, and future rounds of PISA tests will show whether the new schools have started to make a significant and measurable difference to outcomes.

Whereas the lower secondary landscape is relatively simple, upper secondary education and training comes in various forms:

- Integrative Education
- Pre-Vocational Year
- Pre-Vocational School (1 to 3 years' duration)
- Part-Time Vocational School and Apprenticeship
- Intermediate Vocational School
- Higher Vocational Institute
- Academic

But that's not the end of the story. As noted already, the Academic stream is sub-divided into three types. The list of Intermediate Vocational Schools (Berufsbildende mittlere Schule/"Fachschule") is far longer; the nomenclature varies and the age of entry and duration of courses also varies:

- Technical, Trade or Artistic Trade Schools (three or four years)
- Commercial school, Practical Commercial School (three years)
- Specialist School for Commercial Professions (three years)
- Specialist School of Fashion (three years)
- Hotel School, Tourism School, Hospitality Trades School (three years)
- Schools for Social Professions (three years)
- Federal Sport Academy (three years)
- Schools for Social Care Professions (two to four years): admission from the age of 17 or 19 years
- Schools for Healthcare and Nursing (three years): admission from the age of 16 or 17 years)
- Agricultural and Forestry Schools (two to four years)

- Social Services School (two years)
- Commercial School (one to two years)

The most important types of Higher Vocational Institute (Berufsbildende höhere Schule) are:

- Higher Technical Institute
- Higher Institute of Fashion
- Higher Institute of Art and Design
- Higher Institute of Tourism
- Commercial Academy
- Higher Institute for Commercial Professions
- Higher Institute of Agriculture and Forestry
- Training Institution for Early Childhood Education
- Training Institution for Social Education

In 2015, about 430,000 young people were enrolled in upper secondary education and training⁹:

- 127,934 (30%) in pre-vocational programmes and apprenticeships
- 74,930 (17%) in Intermediate Vocational Schools
- 135,524 (32%) in Higher Vocational Institutes (of whom about 63,000 attend HTLs - see below)
- 91,485 (21%) in Academic Secondary Schools

To put it another way, four out of five young Austrians follow a vocational or technical path from the age of 14.



Engineering workshop at HTL Fulpmes

Higher Technical Institutes (HTLs)

The focus of our study visit was the Higher Technical Institutes, or Höhere Technische Lehranstalt (HTLs). HTLs and Fachschulen can be combined on a single site, offering both intermediate and higher vocational programmes.

There are 75 HTLs across Austria. They all attract state funding, though about a quarter are classed as private institutions. According to the HTL website¹⁰, they -

- offer their pupils a thorough technical and commercial vocational training and comprehensive general and personal development;
- see themselves as centres of excellence for the teaching of technical skills;
- connect theoretical and practical professional training through cooperation with industry;
- are committed to the highest quality and continuous development;
- offer their pupils development and support in a motivating learning and working environment;
- consider the skills, experience and commitment of all the stakeholders involved in education as an essential basis for success;
- provide a strong international dimension and promote mobility, cosmopolitanism and cross-cultural understanding.

HTLs' specialisms depend on labour market demand. In some cases, there is only one HTL in the whole of Austria with expertise in a particular sector: optometry, for example. In sectors where career opportunities are more numerous, several HTLs have the same or similar specialisms: examples include construction and engineering.

HTL specialisms include -

- Structural engineering
- Operational management
- Biomedical and health technology
- Chemistry and chemical engineering
- Electrical installation
- Electronics and technical computer science
- Construction
- Graphic and communication design
- Computer science and IT
- Interior design and wood technology
- Art and design
- Plastic technology
- Food technology
- Glass
- Mechanical engineering
- Mechatronics
- Media technology and management
- Materials technology
- Industrial engineering

Around half of all HTL students progress to higher education, either immediately or after a period of employment. Higher education includes both "traditional" universities and "Fachhochschulen" - Universities of Applied Science (UAS) - which were launched in 1994. By 2014, UASs had a student population of 45,660¹¹. The unemployment rate among people who recently completed studies at HTLs is around 1.2%, significantly below the national average.

In industry as a whole, about 53% of employees followed the apprenticeship route, 21% attended HTLs and 12% are university graduates. In engineering, two-thirds of all employees are former HTL students.

HTL Fulpmes¹²

Our host for the study visit was Martin Schmidt-Baldassari, Principal of HTL Fulpmes.

Fulpmes is a small town in the Tyrol, about 12 miles from Innsbruck. In the 14th century, the area was known for its silver mines, but these became uneconomic once cheaper silver started to be brought to Europe from South America. The area remained known for metalworking, and survived an economic crisis in the late 19th century by investing in new technology and better education and training for workers. The Fulpmes Fachschule was founded in 1898 as part of this investment programme. The HTL was established alongside the Fachschule in 1969.

The HTL and Fachschule specialise in mechanical engineering, with a special emphasis on manufacturing technology, plastic materials and product development. The 260 students at Fulpmes come from all parts of the Tyrol and neighbouring Austrian provinces. Most of them live in a boarding house in the town, run by a religious order. There are 40 full- and part-time teaching staff. Many of the part-time staff work in local businesses: they contribute valuable, up-to-date knowledge of current industry practice.

Both the five-year HTL course and the four-year Fachschule course focus on engineering for the production of metal and plastic products. By the time they leave, students should be able to manage medium to large batch production of virtually any component, efficiently and economically.

In addition to basic subjects such as maths, German and English, students study manufacturing tools (eg metal press tools and plastic injection tools), handling systems, automation, industrial measurement and control technology, quality assurance and production management. Classroom tuition is supported by practical experience in well-equipped workshops and laboratories.

Students also learn to use IT, especially in the fields of computer numerical control

(CNC) machining and computer aided design (CAD).

The four year Fachschule course takes trainees up to a final exam

(Abschlussprüfung) which shows them to be highly skilled - though not over-specialised - both on the shop floor and at the CAD terminal. They also have foundation skills in costing and accounting. On average, Fachschule students spend about two days a week in workshops, developing practical skills. The vast majority of Fachschule students start a career when they leave¹³, while a few stay on to complete higher level qualifications or look for other opportunities for further training. Over time, about 39% of Fachschule students go on to higher education.

HTL students follow a mixed general, technical and practical programme:

- Technical education (classroom based): 31%
- General education (German, English, religion, geography, history, politics, sport, etc): 25% of the curriculum
- Workshop skills and experience: 16%
- Science and maths: 14%
- Design: 10%
- Business studies: 4%

HTL students take matriculation exams (Reifeprüfung) and diploma exams (Diplomprüfung). In their final year, they also work in small teams (usually of two or three; occasionally up to five) on an extended project linked to their technical subject. This used to be optional, but became compulsory in the 2015/16 academic year. Examples we were given included:

- Developing a process for drying Swarovski crystals after the first polish
- Designing equipment which enables mountain rescue helicopter pilots and winchmen to practise communications in training simulations

Students have to present their projects to a large audience and to a group of examiners.

Links with employers

Every HTL has an employer advisory board (Kuratorium or Förderverein), which provides advice on the curriculum and support for fund raising. Membership typically includes individual employers (many of whom are themselves former students of HTLs), Chambers of Commerce and recruitment consultants. Total membership varies: one HTL has a Kuratorium of 170 people. Members sometimes donate or loan equipment to their HTL, ranging from individual computers to substantial (and expensive) items of equipment. Employers also participate in careers fairs and provide factory tours, demonstrations of equipment and processes (including quality assurance methods), and paid work placements lasting up to eight weeks.

Schweiger Fulpmes

Hubert Schweiger founded a business in 1953 with his eldest son Walter, making tools and components for agriculture.

Today Schweiger remains very much a family business: we were met by the current managing director, Markus Schweiger, who showed us round.

The company employs 71 people, forging and machining cable clamps for ski lifts and cable cars, steel carabiners for mountaineering, components for high-performance motorcycles - gears, cam shafts and followers, rocker arms and other precision parts - and short runs of parts specified by clients. They prefer to work with a small number of clients in close partnership: some have been purchasing components from Schweiger for over 40 years.

The company works closely with HTL Fulpmes. It has provided paid work experience placements of four to five weeks every summer since 1980. Applications open in January or February and involve a written application and an interview. Some students return every year throughout their time at the HTL.

Every year, one or two HTL or Fachschule students go on to work for the company when they leave - indeed, Schweiger would take more if they could. In addition, the company employs seven apprentices aged 15 and over. Conversely, only two out of the 71 employees are university graduates: for Schweiger, technical skills and ability are more important.

Schweiger also helps devise final year projects for students at HTL Fulpmes, such as one which required students to devise a safe way to install components into a complex machine.

For more information in English, visit <http://www.schweiger-fulpmes.at/en/company>



Brandauer Kunststofftechnik

Brandauer is another family business, established in 1905 to make hand tools. As plastic started to replace wood as the material of choice for tool handles, the company branched out into injection moulding: today, it manufactures plastic parts for many companies in Austria and Germany using highly-automated, state of the art equipment. The current managing director is Raimund Brandauer, who gave us a guided tour of the business and answered our many questions.

The company employs 40 people, including seven technicians, thirteen machine operators and four specialist mould makers. Other roles include research and development, quality assurance, work planning and of course office administration.

The company has difficulty recruiting experienced technicians, so concentrates on developing its own workforce in partnership with HTL Fulpmes. When recruiting staff for technical roles, Brandauer looks first and foremost for "tech-savvy problem solvers". The company offers four work experience placements per year, provides factory tours and demonstrations of manufacturing and QA equipment, and takes part in an annual careers fair. In addition, the company makes use of specialist measuring and quality assurance equipment at HTL Fulpmes on a fee-paying basis.



Raimund Brandauer (centre)



Former HTL Fulpmes student working on a plastic injection moulding machine at Brandauer Kunststofftechnik



Art restoration class at HTL Bau und Design

HTL Bau und Design

The HTL for Building and Design in Innsbruck offers courses in construction, civil engineering, graphic design, painting (including art restoration) and sculpture. It was founded in 1884; today, there are about 1100 students in all. We were kindly shown round by the Director, Manfred Fleiss.

Cooperation with companies is central to construction and civil engineering programmes, including visits to construction sites, exhibitions and specialised events.

In the design department, some classes are taught in both German and English from the second year onwards. Students specialise in graphic design, painting or sculpture (including product design). Students specialising in sculpture and product design learn to work with wood, clay, ceramics, metal, plastic and stone. Career opportunities include graphic design (both

traditional and digital), public relations, painting and interior decoration, sign making, product design, jewellery design and production, stage set design and art restoration. A significant number of former students will be self-employed at some point in their careers.

During the tour, we met students practising painting techniques for art restoration, learning the craft of gilding working on graphic designs and studying line drawing.

We also met final year students working on their projects, each of which involved responding to a design brief for a local construction or civil engineering project such as a community centre, a bridge or a water management project. Students were using 3D design and architectural software and building physical models of their designs.

Examples from previous years are summarised on the HTL's website¹⁴.

HTL Kramsach

At HTL Kramsach, our generous and helpful host was the Director, Dr Ursula Pittl-Thapa. There are about 320 students in two departments, chemistry and glass. The latter is subdivided into glass for glazing and construction, and glass for craft and design. There is also some metalworking, mainly for students in the glazing department.

There are both four-year (Fachschule) and extended (HTL) courses in glass. After the first year, craft and design Fachschule students spend more than a third of their weekly classroom time working in small groups in the practical workshops. They learn glass blowing, painting, grinding, engraving and etching, and combine glass with other materials such as metal, plastic, stone or wood. They also study design practices and principles, including form and colour, and forming and fusing glass into complex shapes. The higher level HTL course takes an additional two years. In their final year, students complete an extended project.

In the glazing and construction department, students learn a range of techniques ranging from basic cutting and installation to painting, sandblasting and grinding and the use of architectural glass in facades, room dividers,

doors and roofs. Again, the higher level HTL course includes an extended project.

While the glass school as established in 1948, the school of chemistry was established only three years ago (2013), with the aim of developing expertise in the application of chemistry in a range of industries including



Science laboratory at HTL Kramsach

paint, cement, glass, plastics and metal industries, as well as in wastewater treatment and "green" production methods.

Students study general, inorganic, organic, physical and analytical chemistry and biochemistry.

Technical content provides an introduction to manufacturing processes, chemical technology, biotechnology, energy and environmental technology, industrial engineering (including chemical engineering) and quality assurance systems. Students use modern, industry-standard equipment in brand-new laboratories.

The chemistry department is supported by an employers' association. Full membership costs €2,000 and associate membership €500. The association provides financial support for the purchase of tools, machines, equipment and teaching aids, as well as providing career counselling and assistance with visits to laboratories and factories.

***You are interested in natural sciences and want to know how to develop new materials?
Then chemical engineering is your best choice!***

You get an insight into general, inorganic, organic, physical and analytical chemistry, as well as biochemistry. In technical studies you learn about manufacturing and chemical technologies, biotechnology, process engineering, energy and environmental and industrial engineering. In the laboratory you will use modern, industry-standard equipment, learn about quality assurance management and benefit from project-based teaching.

Your interest in natural sciences and mathematical understanding plus curiosity, research and deduction skills and dexterity open up an exciting future!

Training at HTL Kramsach will give you worthwhile experience leading to careers in many industries and opportunities for further study.

Translated for meaning, not word-for-word, from an information leaflet published by HTL Kramsach



Lee Kilgour; Martin Schmidt-Baldassari; Emma Abegglen; Albert Rössler

Adler

Adler is Austria's leading manufacturer of paints, varnishes and wood preservatives. The current CEO, Andrea Berghofer, is the granddaughter of the company founder, Johann Berghofer, who started out as a paint merchant in Schwaz. The first purpose-built plant was built in 1947, and the company continued to grow until today, it employs 500 people, including 300 at its headquarters on the outskirts of Schwaz. It is currently constructing Europe's most modern water-based paint factory, where products will be made using a modular, computer-controlled system. Adler is investing over 25 million euro in the first stage of this new plant.

Our host for the visit was the company's Research and Development Director, Dr Albert Rössler. He attended the HTL in Wels, where he specialised in chemical engineering. He later studied in Stockholm and at the Swiss Federal Institute of Technology in Zurich.

Dr Rössler now oversees 100 people, ranging from analytical chemists to experienced carpenters and painters who

can assess the quality, ease of use and durability of coatings manufactured by Adler. Staff can also assist clients with technical queries, and suggest adjustments to spraying equipment to achieve optimum results when using Adler products. The R&D department pays particular attention to environmental factors including European Union regulations restricting the use of chemical solvents. The manufacturing plant itself has extensive environmental controls and recycling facilities.

Alongside his role at Adler, Dr Rössler chairs the association of employers which helped establish the chemistry department at HTL Kramsach. He explained that until recently, four HTLs had some connection with chemical engineering and chemistry, including two connected with declining industries (textiles and corrosion protection). Employers in the Tyrol felt there was a significant gap in provision, and came together to support the new programme at HTL Kramsach. Dr Rössler was very confident that the industry-standard courses offered at the HTL would help meet future skills needs and provide young people with excellent career paths.

Swarovski Optik

Mention Swarovski, and most people in the UK would think "crystals". However, the company also makes binoculars, rifle sights and spotting scopes to exacting standards at their factory in Absam. The company is wholly owned by the Swarovski family and has 800 employees, including over 100 in research and development. Turnover in 2014 was €119 million, and 90% of all production was exported.

A factory tour allowed us an insight into the production of Swarovski's binoculars. The first stage involves placing a cylinder of solid magnesium into a computer-controlled milling machine. Twelve minutes later, out comes one half of a pair of binoculars. In the optics department, CNC machines grind lenses and prisms to a tolerance of between one and eight microns. The machines are of course programmed and monitored by technicians: indeed, the technical expertise required in programming, running and maintaining these highly sophisticated machines is extremely high and staff are often recruited directly from local HTLs.

The Swarovski group of companies trains apprentices in a range of occupations, including process technology, mechanical engineering, electrical engineering and applied electronics, automation and process control engineering and catering. During our visit, we saw the company's optics training room for process technology apprentices.



Apprentice training room at Swarovski Optik

The quality control and assembly departments rely on highly-skilled staff, first to identify even the tiniest flaws in the prisms and lenses, and then to assemble each scope or pair of binoculars by hand, ensuring optics are perfectly aligned and that every item is checked before dispatch. According to the [company's website](#), "an entirely manual final inspection guarantees maximum precision, quality workmanship and functionality".

Swarovski's most popular binoculars - EL, for "extra light" - retail for up to £2,000 a pair. Such is their reputation that the company holds a royal warrant, "By Appointment to HM Queen Elizabeth II Swarovski Optik, Supplier of Binoculars".

The College for Optometry at Hall in Tirol is a private HTL, set up as a not-for-profit association and funded by the government. It provides diploma-level courses for opticians, plus a certificate in fitting contact lenses and the Meister's certificate for opticians. Not to be confused with a Master's degree, a Meister's certificate is granted to people who combine higher craft/ technical skills with business skills. It is held by people who run their own businesses.

The HTL, which has around 30 students at any one time, is supported by a large number of opticians and optical supply businesses.

Many thanks to the Director, Markus Rainer, who kindly hosted our visit.

Reflections

Austria is rightly proud of its strong tradition of technical education. Hands-on and applied learning is combined with theory, knowledge and core academic subjects to create a well-rounded curriculum, supported by excellent links to the needs of the Austrian economy. The low rate of unemployment among HTL graduates illustrates the effectiveness of links between the worlds of education and employment.

Furthermore, the system is capable of adapting and evolving, as shown by the creation of the chemistry department at HTL Kramsach in response to demand from employers.

As noted earlier, about half of all HTL graduates go on to higher education, either to a traditional university or to one of the Universities of Applied Sciences (UASs) launched in Austria since 1994.

More broadly, the fact that up to 80% of young people choose a vocational or technical route is quite remarkable when compared with England's long-standing preference for a general education epitomised by GCSEs, A levels and direct entry to university.

Austrian students who choose the technical or vocational route start their specialist training and education at 14. They have extensive careers education before making up their minds but even so, 14 seems an early age to most people in England.

Edge believes that 14 is not too soon, provided there are opportunities to change direction at 16 or 18. That is one of the aims of the curriculum offered by UTCs, Studio Schools and Career Colleges, and there are already examples of students changing from engineering at a UTC to food preparation at a Further Education College, or moving to a sixth form college before studying English at university.

HTLs and their English counterparts do not produce "oven ready workers". They provide a broad-based education which happens to be taught in a particular technical context. Time spent in a workshop, using design software or tackling a team project add to the educational experience, boosting motivation and helping young people to see how the concepts they learn in the classroom are used in the outside world.

Apart from a standard transfer age of 14,

one of the most striking differences between Austria and England is the large number and sheer diversity of small technical and vocational schools. As noted already, there are 75 HTLs in Austria, the largest of which - HTL Mödling - has 3,500 students and eleven specialisms ranging from civil engineering to interior design.

In England, small technical and vocational schools are still relatively rare. Instead, we have 216 general FE Colleges,



which each combine a wide variety of technical and vocational specialisms in a single institution.

Can England be more like Austria? Edge would like to think so; hence our support for UTCs, Studio Schools and Career Colleges, which bring the worlds of education and employment close together.

What else might we learn from Austria? First, the value and importance of final year projects. These draw not only on students' academic and technical knowledge, but also their practical, problem-solving, team-working and communication skills. In England, Extended Project Qualifications go part way towards this form of summative experience, but largely miss out the team-working element. UTCs, Studio Schools and Career Colleges go further, by using team projects to support the curriculum from age 14 upwards.

Second, the standard reached at the end of a five-year HTL course is equivalent to Higher National Certificate - possibly even Higher National Diploma - in England. It counts as tertiary education. We have witnessed a dramatic fall in HNC, HND and Foundation Degree programmes in

England, and we lag far behind international benchmarks for the number of people qualified at this level.

Could we take a leaf out of Austria's book and offer an optional final year to enable 19-year-olds to achieve HNC/D (or equivalent) at technical institutions such as FE colleges and UTCs? There's no reason why not, other than the simple question of funding.

Finally, Austria has an international outlook. That is hardly surprising for a land-locked country with a population of about 8.5 million. Fulpmes is half an hour from the border with Italy and about an hour from Germany. Switzerland and Liechtenstein are two hours away.

English is the foreign language of choice in Austrian schools. Again, not surprising: the same is true in most European countries. But what we found during our study visit, confirming our previous experience, is that our Austrian friends are keen to develop closer links with us here in England. There have already been successful Erasmus bids to support student and teacher exchanges between HTLs and UTCs, and we strongly recommend extending this further in the months and years to come.



Examples of final year projects at HTL Bau und Design

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11 Federal Chancellery, Austria (2015), National Reform Programme.

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12 This passage is based on information on the HTL Fulpmes website, <http://www.htl-fulpmes.ac.at/schule/150-about-us-> and provided to us during our visit.

13 Careers may be deferred or interrupted by the requirement for all young men to undertake basic military training for at least six months before the age of 35 or complete a period of community service. Most young men choose to fulfil this obligation sooner rather than later.

14 Home page: <http://www.htl-ibk.at/cms/> Each department has lists of former projects - eg <http://www.htl-ibk.at/cms/index.php?id=1206> and <http://www.htl-ibk.at/cms/index.php?id=1226>



Learning about injection moulding at HTL Fulpmes

Technical education in Austria

An Edge Study Visit



A beautiful, quiet alpine village in the Tyrol hides a technical education secret: HTL Fulpmes, which is delivering a technical curriculum of the highest quality.

It is the sum of the HTL's many parts that ensures that students experience an outstanding technical education. The core elements of the curriculum are very similar to the UTC curriculum; that is, a core academic curriculum combined with a broad technical curriculum, in this case mechanical engineering.

This mechanical engineering curriculum is where the experience differs. Learning is deep and develops occupational competency and in some cases mastery. It always begins with a focus on the basics - bench fitting, machining and technical drawing - before progressing to CAD and modern manufacturing techniques including CNC programming.

Learning is made truly inspirational by the support that eager and committed employer partners bring to the table. This idyllic district is home to high tech, high precision engineering companies manufacturing products of the highest specification. Schweiger makes cam shafts for BMW motorbikes and carabiners for mountaineers; Swarovski makes high quality binoculars which retail at £2000 a pair; and Brandauer specialises in injection moulding plastic parts.

These companies know their futures depend on their ability to recruit engineers and technicians of high quality and potential, and recognise that HTL Fulpmes has a significant part to play in this.

The Austrian model for technical education clearly works:

- Employer involvement is significantly higher in Austrian HTLs than in most parts of the English education system, covering projects, equipment, staff and work experience placements.
- Student recruitment - students in Austria have to make a choice about schooling at age 14. It is, therefore, easy for HTLs to advertise and reach students so that they are fully informed about their choices. Schools in England do not (yet) have to provide any information to 14 year olds about UTCs and all too often it is evident that schools encourage their more "challenging" students to join a UTC at the same time as actively discouraging their more able students from joining.
- Teaching staff - recruiting high quality staff is an issue for Schools throughout England, and staff with technical skills and industrial experience are especially hard to find. In Austria, there is a strong tradition of experienced experts from industry working part-time in HTLs.
- Funding - HTLs attract generous funding, allowing high teacher-student ratios. Difficulties with student recruitment mean that some UTCs have been impacted by clawback, with a knock-on effect on their ability to recruit and retain sufficient highly skilled staff.
- Projects allow students to develop a detailed understanding of specific areas. In Austria, students select final-year projects linked to their particular areas of interest.

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