

Gold Standard: The Swiss Vocational Education and Training System

International Comparative Study
of Vocational Education Systems

March 2015



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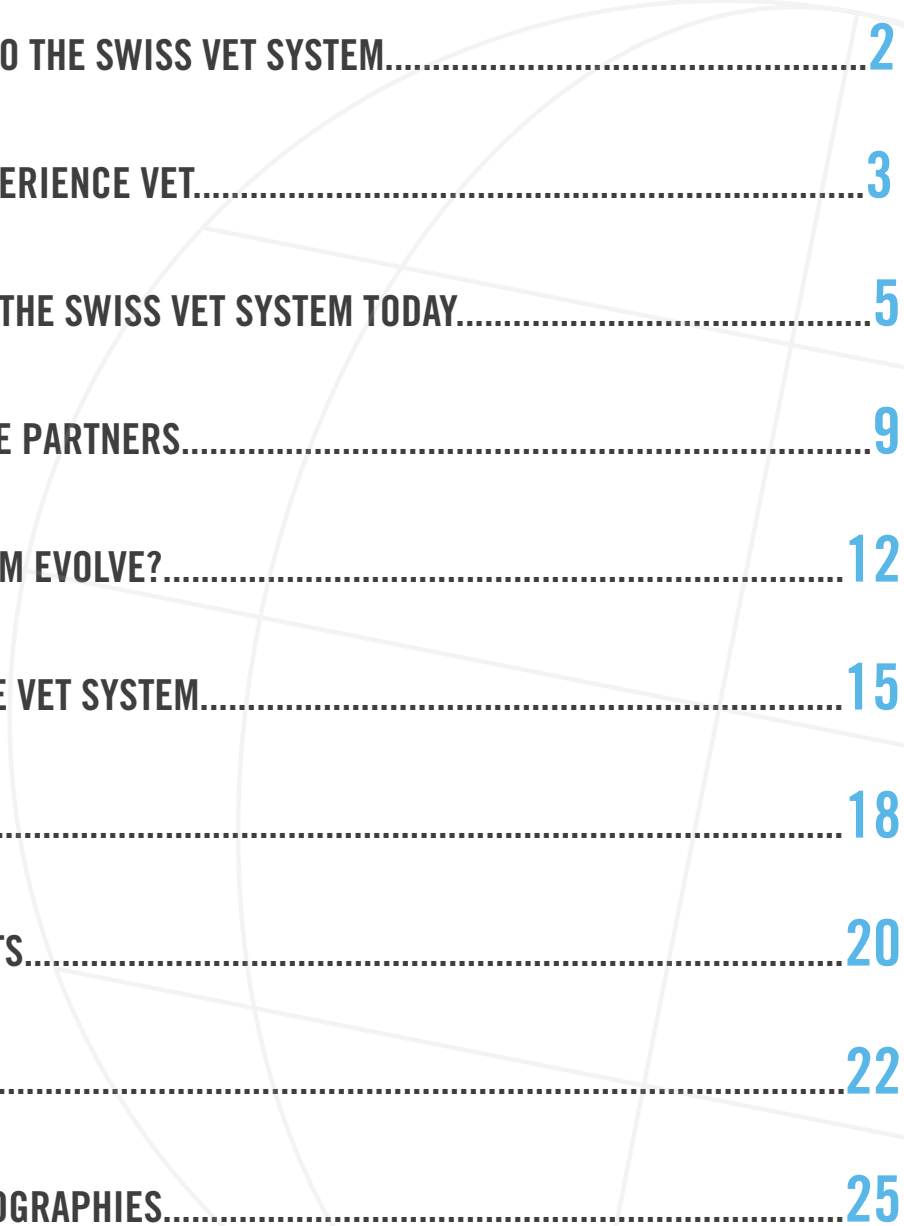
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Gold Standard: The Swiss Vocational Education and Training System

**International Comparative Study
of Vocational Education Systems**

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“It is hard for 15-year-olds to grow up, but in the Swiss system, young people work with adults that they respect and it helps them become good Swiss citizens and efficient, productive employees.”

-CEO of a major Swiss company

WHY SWITZERLAND?

Switzerland is one of several European countries with a so-called “dual” vocational education and training (VET) system in which students combine learning in school with learning in workplace settings. In Switzerland and in Germany, Austria, Denmark and Norway between 30 and 70 percent of students in upper secondary school participate in such systems. While each of the dual system countries has its own strengths and distinctive characteristics, for a variety of reasons we think that the Swiss VET system is arguably the strongest in Europe.

For one thing, VET is the mainstream upper secondary program, serving 70 percent of Swiss young people. It prepares a broad cross-section of students including high achievers for careers in a range of occupations—high-tech, human service, health, as well as traditional trades and crafts, so white-collar as well as blue-collar. It enjoys very strong support from Swiss employers, who credit it with being a major contributor to the continuing vitality and strength of the Swiss economy. One measure of the strength of that economy is that Switzerland enjoys virtually full employment, with a youth unemployment rate that is the lowest among developed countries (Kof 2014). A second is that the Swiss enjoy a very high standard of living.

In his 2008 book entitled *Why We Are So Rich*, Swiss economist and parliamentarian Rudolf Strahm argues that the Swiss dual VET system is one of the key factors explaining the country’s economic success. He is right about “rich.” Today, the Swiss economy is strong and healthy: GDP per capita stood at \$80,528 USD in 2013 according to the World Bank. At over \$80,000 per year, Switzerland’s income per capita is the third highest in Europe after Luxembourg and Norway, and the fourth highest in the world. In the most recent INSEAD Global Innovation Index (GII), Switzerland ranks number one, and has in addition a highly competitive export economy that sends 80 percent of what it produces abroad, this despite comparatively low numbers of university graduates (Global Innovation Index 2014). Unemployment was at 4.1 percent in the 4th quarter of 2013 as defined by the ILO (Lässig and Vuille 2014). It should be noted however, that many Swiss women do not participate in the labor market, and those that do tend to work part time. Young people are in the labor force at about the same rates as the 25- to 64-year-old population, likely due to the seamless transition of almost all youth from apprenticeship to a full time job. (In most developed countries, youth unemployment rates outpace adult rates substantially.) Switzerland emerged relatively early from the 2008 recession, and was less affected by the downturn than the Euro area. But VET did not build the Swiss economic engine; it serves and contributes to it.

Less visible but no less impressive is the impact of a VET education on young people themselves, who seem to thrive in work environments in which increased responsibility is accompanied by extraordinary levels of coaching and other forms of support from adults. Perhaps the most enviable quality of the Swiss system is not just the engagement of a wide range of employers in the system, but the value these employers attach to their role in helping young people grow up and become part of the talent pipeline employers need in order to keep their enterprises productive and competitive. If it is possible for an education system both to serve successfully the needs of adolescents and support their transition into adulthood and the needs of employers in a highly competitive economy, then Switzerland arguably does a better job than any other developed country. This is why we have chosen to focus on Switzerland.

AN INTRODUCTION TO THE SWISS VET SYSTEM

Imagine a teenager advising a hedge fund client, turning out parts on a multimillion dollar machine, or running a retail phone store. It may sound like a teenager's daydream, but, for example, at Credit Suisse, ABB Turbocharger, and the phone and Internet service, Swisscom, up to 800 teens take on responsibilities like these throughout their three- or four-year apprenticeships (Hoffman 2013).

Switzerland is a small country, roughly eight million inhabitants, divided into 26 cantons (states). It has four distinct language groups: German (by far the biggest, 67 percent); French (23 percent); Italian (eight percent); and Romanish (one percent) and a handful of other languages spoken by the others. It is not only diverse linguistically but ethnically: nearly a quarter of Swiss students are born outside of Switzerland. In the world's oldest direct democracy, the presidency rotates among seven elected secretaries; the Swiss vote on every imaginable type of public policy, far beyond anything we know in the states. And most important for our purposes, it has over the past 20 years modernized its vocational education and training system in ways that have made it an international leader in educating youth and in maintaining its position as a world economic leader. As the case study will show, the two are connected.

In Switzerland, small and large companies, state of the art factories, insurance agencies, banks, hospitals, retail stores, and child care centers host 16- to 19-year-old apprentices who serve customers, work on complex machines, carry out basic medical procedures, and advise investors—in short, they do everything an entry level employee would do, albeit under the wings of credentialed trainers within the company. About 30 percent of Swiss companies, participants in the Swiss vocational education system, host this sort of “educational” employee. They rotate among three learning sites—workplace, intercompany courses, and school—in different proportions over the three- or four-year period of their apprenticeship. Their learning is highly personalized; their interests and talents are at the core of their training, and their options for further study and changes of course are encouraged and open. They get paid an average monthly starting wage of \$600 to \$700, rising to around



\$1,100 to \$1,200 by the time they are in their third year, a rate substantially below the Swiss minimum but attractive for a teenager living at home.¹ And they do productive work that returns the cost of training and a bit more to their employer, according to the studies of Stefan Wolter, Managing Director of the Swiss Coordination Centre for Research in Education and a Professor of Economics at the University of Bern (Dionisius 2009). In return, the Swiss have a “talent pipeline of young professionals,” youth unemployment in the single digits, and the highly skilled workforce needed to produce high quality goods and services that sell well at high prices.

HOW STUDENTS EXPERIENCE VET

Before introducing the components of the Swiss VET system and getting to the history of how it developed, readers may benefit from a quick glimpse into how students experience VET day-to-day. A particularly interesting place to start is with industry sector organizations and the training companies they sponsor. The Center for Young Professionals (CYP) is a short tram ride from Zurich’s old city in a handsome, light filled refurbished foundry (CYP 2014). Sixteen through 19-year-old vocational education students come here for initial orientation to the profession and then periodically during their apprenticeship years for short courses as part of their upper secondary program for the banking industry. Founded in 2003 by five large banks (Julius Baer, Credit Suisse, UBS, Raiffeisen Switzerland, Surcher Kantonbank) and funded by the Association of the Swiss Banking Industry, with 27 member banks, CYP orients apprentices to the standards and practices of the entire banking industry.

Unlike in the United States where companies avoid joining together to support common training programs for fear of poaching—perceiving training dollars lost if a trainee moves on to another company—in Switzerland, each industry sector in partnership with the State Secretariat for Education, Research, and Innovation (SERI), develops qualifications and assessments for the industry, establishes curriculum, and provides through their affiliated training companies varying amounts of course work during the three- or four-year upper secondary vocational education.

The commercial sector includes 21 areas of specialization including banking, retail, public administration, and some areas of IT, and is the most popular choice of VET students (Swiss Conference of Commercial Training and Examination Branches 2014). The focus of a major collaborative reform called for by employers that took place over six years, commercial training was restructured to respond to the needs of the global market. Today commercial training promotes worker autonomy and “business process thinking” among its 16- to 19-year-old apprentices who must learn to be reflective and to self assess using a required “course journal.” CYP introduces this approach in the banking industry while students go to regular school for such topics as languages, math, specialized theory, and history and work at a bank where in six-month rotations, young people learn by doing,

¹ These are averages usually cited. For salaries for each profession, see <http://www.berufsberatung.ch/dyn/46447.aspx>.

testing theory in practice (OECD/SERI 2008). CYP defines itself as taking a “connected learning” approach in which the process of training is in the hands of the learner, not the teacher. Its pedagogic tenets replicate the requirements of the workplace and include learner autonomy, blended learning, problem solving, and team work in which learning is co-constructed among peers.

Interviews with students and a quick walk around CYP confirm that these principles are practiced: everyone has a tablet from which they can download course materials; here and there small groups gather to solve problems together; and when pulled at random from a group to speak with visitors, two first-year apprentices are confident, outspoken (in English), and unequivocal that they have made a much better choice than spending more time sitting in classrooms at an academic high school. Now that they have seen what they would be doing in the industry, both have plans to earn the vocational baccalaureate, and, after working for a while, earn an advanced degree at a university of applied sciences (UAS). These institutions, created in the 1990s, offer practical university-level education and training for students with interests as different as becoming an architect, a psychologist, an engineer, a social worker or a linguist² (SERI 2014b).

One can observe slightly different routines for teenagers who start their training at the Lernzentrum Industrielle Berufslehren Schweiz (LIBS), a VET center for the manufacturing industry, just across the parking lot from ABB Turbocharger, and next to the VET school where students complete the academic and theoretical requirements for upper secondary. Many students will apprentice at ABB. With 150,000 employees worldwide, ABB is the world’s largest supplier of industrial motors and drives, generators for the wind industry, and power grids (ABB 2014). Because LIBS prepares young people for highly technical work in companies like ABB, students must spend two years in the LIBS setting before being well enough trained to move full-time onto the factory floor. But lest the reader think that LIBS’ students only practice on machines, it is important to note that students actually fill orders for high-end parts for which LIBS receives about three million Swiss francs per year (\$3.15 million USD), an offset to the 3.5 million francs (\$3.38 million USD) the company spends on state of the art machinery and equipment (Ingo Fritschi pers. comm.).

Just as CYP partners work with the Swiss Bankers Association to design competence standards, curriculum and assessments, and keep up with member needs, LIBS is one of several training partners of SwissMEM, the Swiss association of mechanical and electrical engineering industries (MEM industries).³ LIBS is technically a non-profit club to which

² See for example Zurich University of Applied Sciences <http://www.zhaw.ch/en/zurich-university-of-applied-sciences.html> or University of Applied Sciences and Arts Northwestern Switzerland http://www.fhnw.ch/homepage?set_language=en

³ The MEM industries are responsible for 9.2 percent of Swiss added value and account for 35 percent of all goods exports. They employ more than 10 percent of Switzerland’s total workforce, including some 10,000 trainees. This makes the MEM industries an important pillar of the Swiss economy. The MEM industries represent the largest sub-sector of the manufacturing sector, accounting for more than 57 percent of manufacturing positions and 48 percent of industrial added value. Furthermore, alongside the chemical-pharmaceutical industry the MEM industries represent Switzerland’s key export sector. Since 2000, MEM industry exports have risen from CHF 59 billion to CHF 68 billion, reaching a record high of CHF 80 billion in 2008 (SwissMEM 2014a).



member companies belong. Under contract to train for 85 companies, LIBS works with about 1,200 of the more than 8,200 young people under training in mechanical and electrical engineering industries at a cost per student for four years of about 100,000 Swiss francs (\$105,102 USD), on the very high end because of the cutting edge equipment required. LIBS trains in the fields of manufacturing, automation and electronics and prepares students to be computer technicians, commercial employees, engineering designers and logisticians. Watching students at work at LIBS and then in the ABB factory next door, the degree of professionalism is palpable. Standing at their machines, they can readily present an account of the work they do, why it is important to the company, and why they chose it. In addition, during our visit we were proudly introduced to a student who started learning to work on CNC machines, but showed an interest in CAD; and there he was, working a floor above the machines, ready to tell us about how he discovered his talent for design.

Students entering the social care sector—very popular among young people—also work as apprentices. Bildungszentrum Interlaken (BZI) is a deeply impressive vocational school training for occupations as diverse as electronics, elder care, hospitality, and construction. Sixteen-year-old BZI students begin their elder care training in a nursing home where they attend to Alzheimer residents and other elderly people with serious conditions. While young people in the United States might volunteer in such a place, students would not be entrusted with drawing blood to test a diabetic’s blood sugar, taking blood pressure, identifying and distributing medications, and helping a severely impaired resident get their daily exercise. Here the pride the staff took in their young apprentices was tangible, with proud managers talking about the competence and joy these young people bring to their practice just as the electronics teachers at BZI had boasted nicely about their students’ skills, their high grades on the Cambridge exams, and the jobs they would be moving seamlessly into when school came to an end.

THE STRUCTURE OF THE SWISS VET SYSTEM TODAY

The vignettes above provide some sense of the Swiss VET system in action. In order to understand the role of VET, however, it is important to understand some basics about the structure of the larger Swiss education system. The first important fact to note is that compulsory education in Switzerland ends at grade 9, which marks the end of what Europeans call “lower secondary school”—equivalent to what used to be called junior high school in the United States. While lower secondary schools are tracked in Switzerland, the curriculum is common for all students: it’s the pace of delivery that varies. Compulsory education in Switzerland gets strong results, as evidenced by performance on the most recent PISA assessments, where Swiss scores in literacy and science are well above the OECD average, and math scores are among the highest in the world, and this when most students are taught in high German, a language most do not speak at home.⁴ The Swiss

⁴ While High German is the language of instruction in the German speaking section of Switzerland, people speak the unwritten language, Schweizerdeutsch, which is sufficiently distinct from German that a listener who knows neither language can hear the difference.

compulsory education system is focused on the goal that all Swiss children get a solid foundation of core academic skills for whatever the next path they choose.

The next major thing to note is that the Swiss university system, like most others in Europe, is very different from ours. It is not a place you go for a broad general or liberal arts education. Rather, it is much more specialized, focused on preparing young people for a relatively narrow band of professions. If you want to be a lawyer, a doctor, a professor, or carry out scientific or mathematical research, this is where you go, and in the case of medicine, for example, you begin your medical studies immediately upon entry to the university. The premise is that you have had a strong enough general or liberal arts background in upper secondary school (“senior high school”) to enable you to proceed directly to professional studies.

What this means is that as young students near the end of compulsory education and begin to think about their future, their choice between two broad upper secondary options—academic and vocational—can’t help but be influenced by their goals beyond high school. If they know they want to head toward one of the handful of occupations for which a traditional university education is required, and if their academic performance in lower secondary school has been strong, then academic upper secondary school is the obvious choice. This means that they need to be comfortable with the idea of spending the next six or seven years learning mostly in a classroom setting with other age mates.

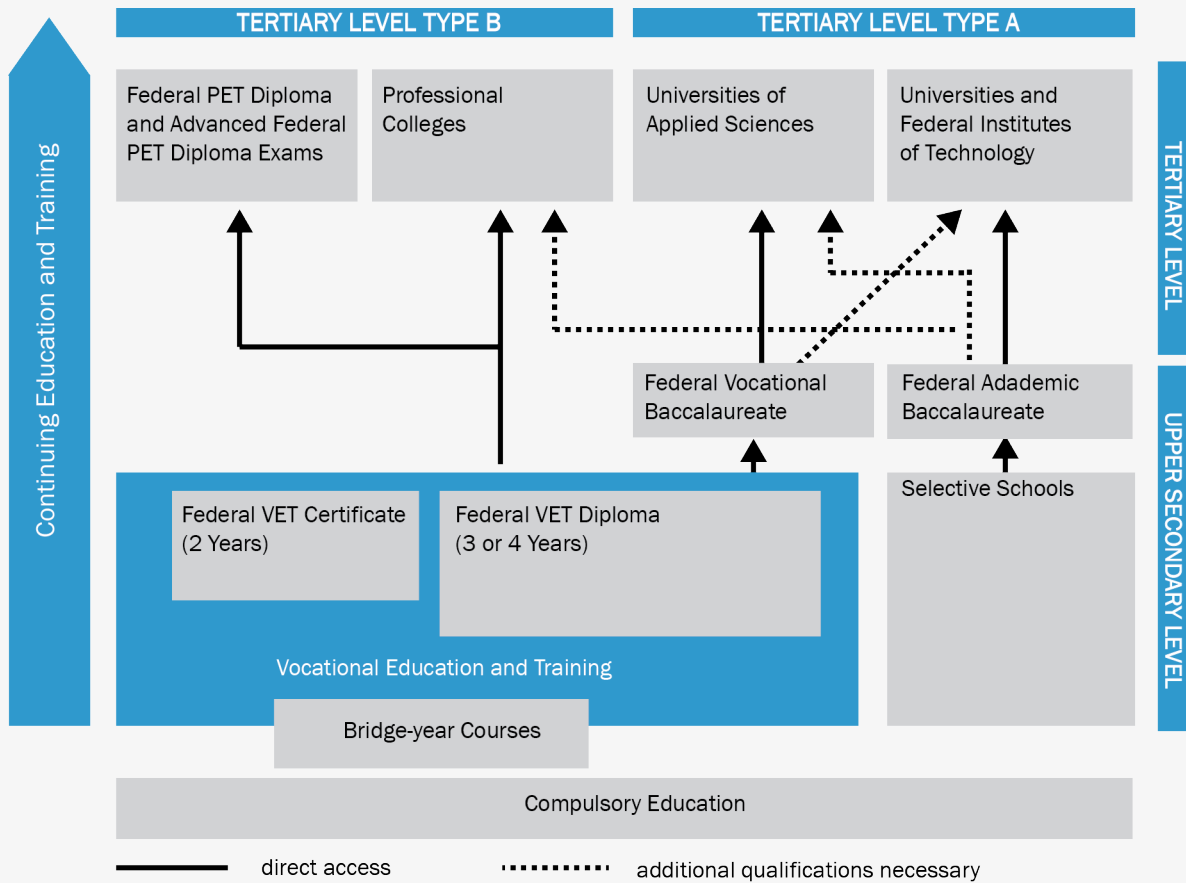
If, on the other hand, they want the opportunity to choose from among 240 different occupations, running the gamut from the traditional trades and crafts to banking, insurance, IT, health and social care, dance, and pre-engineering, upper secondary vocational education is a very attractive option. It has four features that make it especially attractive to many young people:

- It immediately puts young people in a setting with adults, where they are treated differently than in school and given more responsibility coupled with lots of coaching and support.
- The learning is much more hands-on, contextualized, and applied: academic concepts are made real.
- Students are paid while they are learning, typically the equivalent of about \$600-\$700 a month to begin, growing to \$1,100-\$1,200 by the third year, and this for three to four days of work a week at the most.
- And at the end of the apprenticeship they have a nationally recognized qualification that is portable, and the opportunity to move directly into full-time employment or to continue on to get more education.

The following is a visual depiction of the structure of the system from the end of compulsory education:



FIGURE 1: THE SWISS EDUCATION SYSTEM



Given these two choices, it shouldn't surprise us that over 70 percent of young Swiss take the vocational route, and only about 25 percent the academic version of upper secondary education. To characterize this solely as a matter of student choice is not entirely accurate, for as the Rector of the leading Swiss university (ETH) said to us, Swiss leaders are justifiably proud of the high quality of their universities and believe that enrolling more than 25 percent of students in that system might lead to a diminution in quality. There are three points at which access to that system is controlled: entrance to academic upper secondary; exit from upper secondary; and entrance into the second year of university study. Interestingly, anyone with an academic diploma (matura) can enroll in a university—there is no entrance exam. But at the end of the first year there is a rigorous exam, enabling only about half of the entrants to continue. This might be one more explanation for why so many students opt for the vocational route. For students opting for vocational education, the vast majority succeed in lining up a three- or four-year apprenticeship contract which they sign with their parents, and which leads to a Federal VET Diploma. They get help from a local career guidance center (about which more below) if needed in finding apprenticeships, but they learn from 8th grade onward about the labor market during the search. The availability of openings in the apprenticeship market signals which careers are growing and which are stagnant or declining.

For those who don't succeed in signing an apprenticeship contract, either because of weak academic preparation (especially language skills) or inability to make a choice, there are two options. One is the so-called 10th year program, a transitional year in which students are given additional training and support in finding a place. Before the year is out, most of these students are counseled into starting a two-year apprenticeship. The second option for those unable to secure a place in a Federal VET Diploma program is to go directly into a two-year rather than a three- or four-year apprenticeship. This option, typically in less demanding fields and for young people with more practical gifts, leads to a Federal VET certificate. In keeping with the goal of permeability, a set of modules is available to qualify young people to move on to a regular VET Diploma.

For young people who have been identified in lower secondary school as being at-risk of dropping out or not making a successful transition into the VET system, the Swiss have put in place a case management system at the local level that ensures that such students get individualized attention and support. There is a case management team at the cantonal level that includes staff from social service agencies, migration offices, career guidance centers as well as from the education and training systems that oversees the case management system, assigns an appropriate lead staff person for each case, and tracks the progress of each young person. This strategy is designed to prevent any young person from falling through the cracks at the point of transition, as well as to provide support throughout the next year.

One of the most frequently raised questions about Switzerland and other dual system countries is, how do they ensure that students as young as 15 are given enough information and advice about careers to make informed choices among the bewildering variety of occupations in which apprenticeships are offered. While parents and teachers obviously play an essential role in guiding young people, each canton in Switzerland operates a network of community-based career centers specially organized and staffed to help young people in the transition from grade 9 to whatever comes next. These centers are organized outside the education system but do outreach in the schools as well as offering individual consultations to students and their families. From a recent visit to a Zurich career guidance center on a late afternoon in June, it was clear that the services of the centers are well-used. We saw several teenagers browsing the well-stocked shelves on their own as well as parents and students awaiting an opportunity to talk with a counselor. The services these centers offer range from interest inventories, help with resume-writing and portfolio development, and assistance in lining up "sniffing" opportunities or short pre-apprenticeships to sample prospective apprenticeship sites. At the end of the day, though, it is the student's responsibility to write the actual application letter for an apprenticeship, and evidently it is not uncommon for students to file ten or more such application letters before landing an apprenticeship since many are very competitive. The career counselors support students through this process, helping them persevere until they have found the right match.

Although the basic divide in the system is between the academic and vocational side, one of the most impressive features, depicted in Figure 1, is the number of crosswalks and points of transfer between the two systems. A growing number of students who start a three- or



four-year apprenticeship decide to pursue either simultaneously or with an additional year of study a more applied version of the academic baccalaureate (the Federal Vocational Baccalaureate, on the chart above, but often called the “Professional Bac”). This diploma entitles students to admission to a University of Applied Sciences (UAS), where students can earn Bachelor’s and Master’s degrees in such fields as information technology, health care, social work, business, arts, music and engineering. But students with the Vocational Bac can also sit for an additional exam—University Aptitude Test, created in 2005—that qualifies them to enroll in the more traditional university system if they choose. Note that students from the academic side can also transfer to a UAS, but (an important feature not indicated on the chart) only after at least one year of full-time work. Otherwise they would be seen as at a significant disadvantage with other UAS students, all of who would have had at least a three-or four-year apprenticeship.

Another impressive feature of the system, obvious from the chart, is that there are two major options for students on the vocational side to get continuing professional education, even if they do not choose to pursue the path leading to a UAS. By far the most popular option is a competency-based set of exams in virtually all occupations that students can study for while they work. This option is pursued mostly by people with many years of work experience. The only requirement is that one needs to be working at least half-time. These exams lead to a Federal Professional Education and Training (PET) Diploma, which not only qualifies you for advancement in your chosen field but is considered a postsecondary degree, comparable to an AA or AAS degree in the United States. There is also an Advanced Federal PET Examination for those seeking management positions in their sector. For those who prefer to take courses rather than study on their own for a PET degree, there is a web of PET colleges overseen by the cantons—some private, some public—that can also prepare you for a PET degree, although this can be a more expensive option. In 2012 roughly 25,000 workers achieved a PET degree, roughly half via the competency-based exam route (SERI 2014, 17).

ONE MISSION, THREE PARTNERS

This phrase, more than any other, sums up the political and structural underpinnings of the Swiss system, central to its strengths and encoded in law. There is a very clear division of responsibilities between the partners, all in the service of a shared vision of what is best for the future of the Swiss economy, and most importantly, the healthy development of its young people. The role of the federal government, generally referred to as the Confederation, is to regulate and steer the system. There are a whole series of specific functions under that broad heading, carried out through two governmental units: the State Secretariat for Education, Research, and Innovation (SERI), the closest thing Switzerland has to a Ministry of Education; and the Swiss Federal Institute for Vocational Education and Training (SFIVET), a small, highly focused institute responsible for the basic and continuing training of all teachers in the VET and PET system, including those based in firms and interfirm training centers like the CYP and LIBS. SERI plays an especially

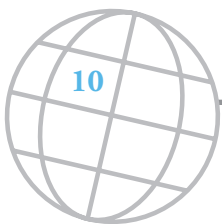
important role in assuring transparency and comparability of programs across the cantons, especially in its role in overseeing the examination systems for both VET and PET, and both SFIVET and SERI play a key role in quality assurance across the system. While the cantons are responsible for providing three-fourths of the public funding for the system, the Confederation is responsible for the other fourth.

The second critical partner is the employer organizations and associations. In an important sense, they are the real drivers of the system. Not only are they the ones who decide the training content of VET and PET programs, for it is their industry standards that must be met, but they also take the lead in determining when new occupational programs need to be developed to take account of projected changes in the economy, and existing programs need to be closed down or radically revised. This is a fundamentally different model than we are accustomed to in the United States, where it is the responsibility of schools, colleges, and other providers to take the lead in the development of vocational program content, ideally with advice from industry. In Switzerland both the government and the education community are clear that their system works because it is designed to meet the needs of industry. One consequence of this decision, as was evident in our interviews with leading CEOs, is that the VET system enjoys enormous support from the employer community. The employer community – the associations and the member companies that employ apprentices – contribute about 60 percent of the total cost of the VET system.

With some 330,000 employees, SwissMEM is a useful example of an employer association. The MEM industries are Switzerland's largest industrial employer and, since they account for 32.5 percent of the country's exports, they are an important economic and political player. In 2013, the nearly 1,000 member companies of SwissMEM exported goods worth 65 billion Swiss francs (\$68 billion USD) (SwissMEM 2014b).

SwissMEM represents the interests of the MEM industries, 98 percent of which are small and medium firms, to the Swiss government, national and international organizations, employee representative bodies and the public. It also acts as the MEM industries' service center. In its capacity as employer representative, SwissMEM negotiates the terms of the collective bargaining agreement for the MEM industries with the unions. Today, Swiss manufacturing is highly demanding, with much of the routine work done outside of the country, and SwissMEM makes it its mission to recruit and train the best technicians and engineers in the world, a task that is a top-priority challenge for the MEM industries (SwissMEM 2014b).

SERI and SFIVET work closely with industry associations in the development of the so-called "ordinances" that define the curriculum frameworks or "training plans" for entry into each of the 240 occupations in which there are apprenticeships. Each occupation has a qualification certificate that is attained through a final assessment, and is standardized across the country. The training plans are complex. As in other VET systems, key skills are categorized as knowledge, abilities or competencies, and attitudes. The Swiss tripartite system has slightly different names for these and defines each in detail for each occupation:



1. Technical or professional skills defined as the content of the work and its application,
2. Methodological skills defined as the ability to organize work efficiently, solve problems systematically, and improve how work is carried out, and
3. Social skills defined as team work and conflict management, ability to acquire new knowledge independently, and to interact professionally.

The training plan breaks down each skill, and specifies which are learned in the workplace, interfirm training centers, or the VET school, how they are integrated and sequenced, and how they are demonstrated. For example, while presentation skills are introduced in school, they are applied in both interfirm training centers and at the worksite, while principles of quality for an occupation are introduced in school but applied in the interfirm training centers alone.

In addition to the role that the employer associations play in program development and standard setting, they play a crucial role in working with their members to assure that there are adequate numbers of apprenticeships on offer each year to match the numbers of students seeking apprenticeship contracts. Because Swiss employers view the VET system as one that is designed to meet their long-term workforce needs, they neither expect nor receive any direct governmental subsidy for taking on an apprentice. They are aware that in addition to the benefit of having three or four years to support the development of a young person in their own work setting before having to make a longer-term hiring decision, the likelihood of hiring a worker who will be productive from day one is much greater than if they were hiring someone off the street. They also know, based on careful cost-benefit economic analyses, that for most employers the costs in apprentice wages and associated training expenses over three or four years are more than offset by the bottom-line increases in productivity provided by the apprentice. Participating Swiss employers tell visitors over and over again that this is a classic win/win situation, good for the firm as well as the young person.

The third partner is the canton. If the United States has strong states and highly values local control, Switzerland is even more extreme. The cantons and within them the municipalities are the decision-makers: taxes are set locally, not by the Federal government, and cantons have the primary responsibility for most services including education. Consequently, the school component of the VET system is organized and run by the cantons. Each canton has a VET office that has broad responsibility for overseeing the implementation of VET programs. The cantons are also responsible for funding and operating the PET colleges, and for funding and operating the network of Careers Centers that play such an important role in providing advice and assistance to young people and their families as they navigate the transition from the end of compulsory schooling to the VET system, including the choice of an appropriate apprenticeship placement. The cantons also play an important role in marketing apprenticeship to the employer community and ensuring that firms that

offer apprenticeships meet a national set of quality standards. But because the employer associations are country-wide and the Federal government is responsible for standardization of processes for developing, revising, and supporting VET, there is sufficient counter balance even with such a strong tradition of local control.

HOW DID THE SYSTEM EVOLVE?

How did the Swiss invent such a unique education system responsive to the developmental needs of adolescents and serving the needs of employers and the Swiss economy? Studying the Swiss case from a historical perspective first requires undoing one of the persistent myths about the Swiss vocational education system: that its current structures were inherited from the guilds of medieval times and have existed ever since. This myth leads to the unfortunate conclusion that these structures are so deeply embedded in Swiss culture and tradition that their characteristics cannot possibly be adapted or their features replicated elsewhere. A form of vocational training was practiced in medieval times and up through the 18th century throughout most European countries. Guilds controlled entry into the trades, and skilled masters passed on their knowledge to apprentices or journeymen who gained entrance (Hoeckel 2013).

But by the end of the 18th century, as capitalism developed, guilds became a target rather than a supporting structure for industrialization because they restricted entry into professions and were often seen as conservative rather than innovative forces, impediments to the freedom to practice a trade of one's choosing. While it is beyond the scope of this paper to probe the complexity of guild contributions as well as barriers they represented to the growth of free market economies thriving on competition, suffice it to say that whether they are seen as outmoded institutions left over from feudalism, or the foundation for modern trade unions and employer associations, their presence in medieval Europe does not explain the success and particular design of the Swiss vocational system of the 20th and 21st centuries (Ogilvie 2011). The more appropriate context for VET today lies in paths taken and decisions made over the last century.

Several characteristics of the country itself, particularly the heterogeneity of its population, its neutrality, and its grassroots democracy set a context for the development of the VET system in the twentieth century. A very small country with no natural resources but water, Switzerland sits at the center of the European continent. While it has no ocean access, merchants, travelers and merchandise have always had to pass through its mountains moving from one market to another, making it both a stopping place for foreigners and a home to immigrants and refugees who came and decided to stay. And with a very small domestic market, it has had to market its goods abroad. Looking today at the great industrialist families and companies, in *Swiss Made: The Untold Story Behind Switzerland's Success*, R. James Breiding makes the point that "most prominent entrepreneurs were not Swiss at all" and some arrived as impoverished immigrants. He notes that Henri Nestlé was a German political refugee; Charles Brown of Brown Boveri was from the UK, Nicolas



Hayek of Swatch is Lebanese, and Zino Davidoff of cigar fame was a Russian Jew. And so on. The point is that Switzerland has had to accommodate multiple cultures and languages over the centuries, and in so doing has created a melting pot that works, particularly on the business side. As Breiding points out, Swiss entrepreneurs have a reputation for melding diverse corporate cultures more successfully than most other nationals when Swiss and foreign companies merge.

A second unusual feature of Switzerland is its neutrality; it has both avoided the devastation of war and functioned as the supplier of goods and services to other countries when their markets were disrupted by conflict, a lucrative though not always palatable endeavor. The Nazis were controversial consumers of Swiss goods during the Second World War (Cowell 1997). Nor did it ever have colonial pretensions. Thus the country both profited from the great wars of the 20th century, and avoided devastation. The Swiss also seem to have made a bargain about the minimalist role of a central government and the benefit of making most decisions locally: they have opted for maximum individual freedom but the trade off is active engagement in governing themselves responsibly. Swiss have plebiscites on every imaginable issue, and generally the vote results in moderate positions—hence the enormous surprise recently when 50.3 percent of the population voted to restrict immigration, much to the embarrassment and anger of the business community and many others.⁵

In keeping with these radical democratic practices, despite its neutrality, Switzerland maintains “one of the largest citizen militias in the world” (Breiding 2013). Breiding makes the point that since all males serve, and officers and the ranks are trained together, the military is also a democratizing force, where a lawyer or doctor can find himself (and now herself) reporting to a plumber. Perhaps it is this equalizing tendency—the Swiss maintain a very high standard of living while also having the lowest income inequality in the OECD countries along with the four Nordic countries (OECD 2012, 184)—that leads a number of observers to conclude that the Swiss have long had an appreciation for hard work and have valued the professionalism of those with vocational training just as much as they have admired their business leaders and entrepreneurs. But according to historians, apprenticeships, the foundation of today’s vocational education system, were not always high quality, nor did they have the breadth, appeal, and results they have today.

By the end of the 19th century, apprenticeships in Switzerland were in a serious crisis (Bonoli 2012). In 1883, the Federal government launched an inquiry to understand the situation of the Swiss professions that were in decline and under increasing pressure from international firms. Quality of craftsmanship and occupational education evolved from a private issue to a national cause. However, the legal power of the government was very limited at this time. An 1884 decree allowed the Federal government to subsidize vocational training without touching the power of the other two actors: the cantons

⁵ The vote stimulated commentary from the international press with varied analyses of why this vote surprised the Swiss. One key issue is that Switzerland signed the Schengen area of border-free travel treaty, and this vote threatens this historic agreement. The Swiss have three years to implement quotas and there appear to be various “workarounds” under consideration (Nauer 2014).

(states) and the professional associations which started to emerge from guilds in the second half of the 19th century. These professional associations took over the organization of training and further education in their sector. Through a final apprenticeship exam, they also reintroduced regulation of the training required to exercise a profession and quality control of goods produced. The cantons had the responsibility for education in schools just as they do today; they made basic schooling compulsory and were instrumental in the establishment of technical, professional and arts schools that developed during the 19th century. A series of cantonal laws were also introduced to protect the apprentices against abusive patrons, unsafe working conditions, and to ensure the quality of their training (Hoeckel 2013).

In the early 20th century (1908) the Swiss electorate voted in favor of the proposal that the government should be empowered to regulate the trades. Several legislative proposals followed that were delayed because of World War I and disagreements between parties involved. The first federal law on VET was passed in 1930. It drew heavily on cantonal legislation already in place to protect apprentices and ensure the quality of their training and regulated the duration of vocational programs in industry, the hotel and restaurant sector, commercial training and the crafts as well as the assessment of vocational students and master craftsmen (*Meister*). It was also the first VET law that responded to the early twentieth century's women's movement, and opened vocational training to women, although it took until 1970 for Swiss women to get the vote (Renold 1998). It is important to note that VET did not include the "modern" apprenticeships of today: health, the social sector, agriculture, forestry, and arts were added in the most recent revision of the VET law in the early 21st century (Hoeckel 2013).

The 1930's law, however, did not immediately lead to a substantial increase in VET enrollment; this was a post World War II development. In 1935, only about 40 percent of male and 20 percent of female graduates went beyond compulsory school, which ended as today at about age 15, to enter vocational education. In the 1950s, Switzerland experienced a phase of continuous economic growth that lasted with few minor interruptions until the early 1990s when Switzerland experienced a significant economic downturn, and a critical turning point for VET. With the Swiss franc strong, and European growth slowing, the Swiss economy suffered the weakest growth in Europe. Unemployment rose to five percent, high for Switzerland, and deficits increased. But as if a warning, companies began to restructure in the mid-1990s, with an upward turn that continues today and was only modestly affected by the 2008 economic crisis.

The second edition of the law on vocational education and training was developed in the 1960s to cope with a rising number of VET students. The new law determined that vocational education should not only prepare young people for a profession, but for a more comprehensive education, including also general education, and enable the apprentices to become entrepreneurs and managers, one of VET's distinguishing factors today. The vocational education sector expanded rapidly over these decades and the number of apprenticeships grew close to 190,000, similar to what it is today.



A third edition of the federal law on vocational education and training (introduced in 1978, enacted January 1st, 1980) brought several additional innovations to improve the VET system. For example, it introduced the third learning place—the interfirm training company—where practical skills and orientation to an occupation could be learned in a setting outside the shop floor to alleviate the burden of foundational training falling on employers. VET teachers and trainers were obliged to attend a specific preparatory course, an important step towards professionalizing the VET system. Several options for weak students were created in an increasing awareness of the importance to provide every young person with a minimum level of education to perform in an increasingly complex labor market (Rehbinder 1981).

While VET development in the early twentieth century was not out of keeping with what was going on in education and training across Europe, beginning in the 1960s and '70s, the Swiss made a set of decisions which did not reflect the trends elsewhere. During the later decades of the 20th century, as other countries were expanding academic upper secondary and after that access to higher education—especially bachelor's degree programs—the Swiss hued to their own course. Switzerland suffered a lengthy recession in the 1990s, in large part due to the high value of the Swiss franc, and while the economy recovered in the late '90s, there were substantial layoffs, and companies were forced to restructure. Unemployment rose from virtually zero to just above five percent, a number that would be positive in other countries, but that was a warning to the Swiss who were accustomed to almost full employment, and hadn't seen a number like five percent since the 1930s (Puhani 2002, 6).

The decisions made by Swiss leaders during this period shape the VET system as it stands today. Instead of expanding academic programs in the 1990s, the Swiss enhanced the general education component of VET and planned and launched the Federal Vocational Baccalaureate (FVB) and the Universities of Applied Sciences (UAS). These choices made reflected knowledge about the kind of labor force needed to fuel the Swiss economy: highly skilled, proud, professionally trained technicians who would come out of the VET system and go on to hone even greater applied skills in the UAS. They would partner with the small number of researchers, entrepreneurs, and inventors who graduated from universities making for a culture of collaboration and innovation. In a sense, the Swiss were lucky in the 1970s and '80s; according to one informant, the country simply was isolated from the policymaking in regard to education that developed after WWII. Today, Switzerland still does not conform: while it was a founding member of the OECD, and in 1992 joined the World Bank, it is not a member of the European Union, nor does it use the Euro. And it has hosted the UN headquarters in Europe since 1946, but did not join until 2002.

CEOS' VIEWS OF THE VET SYSTEM

During our most recent study tour to Switzerland we had the opportunity to visit with Lino Guzzella, the rector of Swiss Federal Institute of Technology (ETH), called colloquially, the Swiss MIT, and a group of CEOs of major companies meeting at the 2014 Swiss Economic

Forum in Interlaken. Their views of the factors underlying Switzerland's economic success and the role played by VET within it generally confirm the historical analysis, but the CEOs' unique voices add a dimension of special interest for this chapter since they are participants in and the end users of the VET system, and several are products of it themselves. These distinguished CEOs from such companies as Price Waterhouse, UBS, the Swiss postal service, and Alpiq (an electrical power producer) see the VET system as one among four or five interconnected factors that have resulted in the Swiss business success.

As the CEO group explained, you don't need massive numbers of university-trained theorists; a small number of such people can produce high quality work with excellent technicians and designers as partners.

Perhaps the most striking theme from the ETH rector and the CEOs is that because Switzerland is a very small country with no mineral resources to extract, process, and sell, it can only flourish economically by being number one, two or three in everything it produces—the highest quality services (including education) as well as material goods. While the VET system doesn't guarantee such an outcome, it makes a major contribution. As Rector Guzzella remarked, "In the United States you have the same brilliant innovators in research and development that we Swiss do, but here the lab technician can make prototypes to specification that are higher quality than anywhere in the world. PhD students have highly trained and respected technicians who can do what's asked right, better, and faster than anyone else."

It is hard to overemphasize the importance of Rector Guzzella's point. Switzerland is a very expensive country, with a high standard of living. Swiss leaders across the sectors have decided that the only way for Switzerland to maintain this standard of living is to compete with other countries not on the basis of costs, but on the basis of skills. At all levels of the system the focus is on investing in the skills of its current and future workforce. In 2013, INSEAD and the Adecco Group published the results of the first-ever analysis across 103 countries of how nations approached the challenge of human talent development. To conduct this analysis, the researchers constructed a comprehensive Global Talent Competitiveness Index. With 48 indicators, Switzerland ranked first, across all levels of the talent pipeline, including initial vocational education and training (Lavin and Evans 2013).

The CEOs made similar points about the Swiss commitment to quality, efficiency, and competitiveness. Hans Hess, president of SwissMEM, the manufacturing association, spoke for a number in the group saying the Swiss were very poor until about 150 years ago, but came to understand that the country's best resource was its people, and as it industrialized, Switzerland built technical schools and provided industrial goods on a global scale very early. The domestic market was very small and remains so—just 20 percent today. In other words, the Swiss had to focus on customers outside of Switzerland and thus were always required to be competitive: they had to be better in quality, more innovative than others, and now with very high living standards and high labor costs, they have learned to be very efficient. In the last four years when the Swiss franc became so strong, Swiss



competitiveness was declining so efficiency had to be raised even more. “Over and over, we Swiss have had to prove we can be competitive and we are.” Added Jasmin Staiblin, the CEO of Alpiq Holding AG, but formerly at ABB, and one of the few women CEOs in Switzerland: “When I worked in manufacturing, I thought it was best to work in the highest cost country because you know you are the most competitive. ABB did manage to build a semiconductor factory in Switzerland. The highest cost puts so much pressure to be better than the rest. ... It’s also about the efficiency. The country is very, very efficient because they can get the right skills. It costs more to hire 10 inefficient people than one that costs a fortune.”

Each CEO had a list of factors contributing to the Swiss economic success: political stability; democracy—Switzerland is the world’s oldest direct democracy; a governmental guiding economic framework that provides industry with great flexibility; a good mix of small, medium, and large companies and a wide mix of services and products; their own currency (not the euro) but a free flow of people—28 percent of the Swiss population is foreign born; and close cooperation between industry and universities.

But all agreed that the vocational education system was among the four or five top factors. As Valentin Vogt, Chairman, Burckhardt Compression (40 apprentices) and President of the Confederation of Swiss Employer Associations, said for all of them: “The academic and the VET system is the education system, not one, but both. Unlike some other countries, Switzerland isn’t moving to increase the numbers in academics. You would have the wrong mix and it would lower standards for both types. The Swiss economy is based on the VET system; 70 percent after compulsory school go to apprenticeship, 25 percent go academic, five percent go directly to work. It is a public/private partnership; companies pay for apprentices and government pays for school and associations provide the profiles of the jobs and provide mentors. If any of the three is missing, the system wouldn’t work. It is at scale.” And then he added a refrain that we heard from all the adults involved in the VET system: “It is hard for 15-year-olds to grow up, but in the Swiss system, young people work with adults that they respect and it helps them become good Swiss citizens and efficient, productive employees.”

To confirm the centrality of VET, these major global players were proud to provide data about their own routes to the corner office as well as the educational attainment mix among their employees. In contrast to similarly successful U.S. companies, the bachelors’ degree is not the screen to get an interview at one of these firms. Among the SwissMEM companies (manufacturing sector), for example, of 300,000 in the industry, 10 percent have a research university degree; another 15 percent started as apprentices, then after working for a while, completed a degree at a university of applied sciences; 55 percent have an apprenticeship as a base but may be going on for further levels of VET; five percent have only the apprenticeship; and about 15 percent have not completed the full apprenticeships or just finished compulsory school. At the postal service, reported Susanne Ruoff, the CEO, about 10 percent have academic degrees, but most of these started as apprentices as did the 80 percent who went on to get university of applied sciences degrees.

Lukas Gaehwiler, the CEO of UBS Switzerland, who started as an apprentice himself and then went on to get a degree at a university of applied sciences, reported that of UBS's 22,000 employees in Switzerland, only 10 percent have "a straight academic degree." Another 20 percent have degrees from a university of applied sciences, 8 percent finished only compulsory school, leaving 68 percent as having taken the apprenticeship route. Currently, about 1,800 employees are in training, of whom about two-thirds are apprentices; and the rest are either getting graduate degrees or in company-designed training to help those hired dropouts from either upper secondary or UAS to complete their degrees. Gaehwiler explained the bank's training philosophy regarding dropouts this way: "It's not easy to find good people. All of the dropouts, or at least 95 percent, get a degree while they are training with the bank. This is our safety net for dropouts—to make sure they finish and get a degree. The best 20 percent get an additional year of training that includes a three-month assignment abroad. If you give those incentives to apprentices, it is 10 times more likely that they will stay with the bank as university grads. We understand that 65 percent don't drop out because of bad grades; they are just sick of school and want to be more independent."

There is additional pressure on the Swiss VET system today to educate every young person to a high enough level so she or he can contribute to the economy, so it is likely that VET will continue to have strong support. Like other OECD countries, Switzerland is an aging-society. Its demographic structure changed over the course of the 20th century. The proportion of young people (under age 20) fell from 40.7 percent (1900) to 21.9 percent (2005). The proportion of older people (aged 64 and over), in contrast, rose significantly from 5.8 percent to 16 percent. Over the next years, the proportion of people aged 65 and older will grow steadily and by 2050 will represent 28 percent of the entire population—compared to the current level of 16 percent. This means that there will be 51 people at retirement age for every 100 people at working age, compared to the current level of 26.⁶ This means that providing every young person with the skills and experiences that are relevant for the labor market is key to the future of Switzerland (BBT 2008).

CONCLUSION

The Swiss VET system is well supported by employers who see it as their obligation to help prepare young people for productive and meaningful employment. Apprenticeships also make economic sense for employers, providing them with an incentive to continue to participate in the system. The apprenticeships provide hands-on and applied learning opportunities, giving students real work responsibilities with plenty of coaching and adult support. This is an attractive learning option and over 70 percent of Swiss students currently opt for a vocational route. And, unlike in some other countries, the Swiss system intentionally provides a number

⁶ Overall, young people represented just under a fifth of the EU population in 2007. At the national level, the most 'youthful' nations in the EU included Ireland, Cyprus, Slovakia and Poland, each with more than 24 percent of young people; in Denmark, Germany and Italy, on the other hand, young people accounted for less than 18 percent of the population. Youth and their elders are facing two demographic challenges: the aging and the impending decline of the European population (Eurostat 2009)(Trading Economics 2014).



of crosswalks and points of transfer to allow students to move seamlessly between academic and vocational studies as well as seamlessly from VET on to higher education at a university of applied sciences. This feature helps motivate students to keep pursuing further education and advanced qualifications.

At the end of our discussion with Swiss employers, we asked them about potential threats to the continuing strength of the Swiss economy, and to the VET system that they all see as an essential contributor to that strength. The changing demographics mentioned above are one such threat: today, there are already more apprenticeships offered than young people to fill them. Another is the growth of an anti-immigration faction within Switzerland, coming not from the far right but from the environmentalist party, Ecopop. While the Swiss surprised themselves by passing legislation (barely) in early 2014 to limit immigration to 16,000 a year, in a subsequent referendum in November 2014 nearly three-quarters of voters rejected this quota, leaving the matter open to further debate. In this nation of immigrant industrialists and entrepreneurs, the initial vote was of major concern; businesses feared that if the doors to immigration were closed, they would not have the workforce they will need in the next decades (Eddy 2014).

But perhaps the greatest fear expressed by employers as well as VET educators is that over time Swiss parents will succumb to the view that their children, whatever their talents and interests, will be better served by completing an upper secondary academic pathway leading to a traditional university degree than by the VET pathway. The case of Denmark offers a sobering warning for the Swiss, in that in a very short period of time, VET enrollment fell from nearly 50 percent to below 30 percent. This precipitous decline has Danish policymakers and employers deeply worried, for it seems to be a response not to any real or perceived decline in the quality of vocational programs, which remains very high, but rather to a belief on the part of parents that a university education is the key to a better life for their children. The early returns suggest that the result of this erosion of support for vocational education in Denmark may well be a decline in the standards of the gymnasium and a dramatic increase in the unemployment rate of gymnasium graduates. And Germany, perhaps best known and most admired for its apprenticeship system, now has fewer than 50 percent of young people choosing that option. It is this scenario that for Swiss CEOs represents the greatest potential threat to the continuing viability of the Swiss VET system, and the continuing strength of the Swiss economy. The Swiss system, as presently structured, represents the gold standard in vocational education and training. A major source of its strength derives from its being the mainstream system, the way most young people make the transition from schooling to working life. It offers proof that it is possible to design a system that can simultaneously meet the needs of a highly developed, innovative economy and the needs of the vast majority of young people. The public and private sector partners who drive the system must aggressively communicate its successes to successive generations of Swiss parents if the system's strength is to be sustained. Should Swiss young people begin to make the academic choice alone, they would be sacrificing an opportunity more engaging, more effective, and more in tune with their developmental needs than we have seen in any other country.

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Sarah Hauser, Computer Science Department, School of Engineering

Manfred Vogel, Computer Science Department, School of Engineering

InterlakenBusiness Leaders from Panel During Swiss Economic Forum

Urs Honegger, CEO, PriceWaterhouseCoopers (PwC)

Susanne Ruoff, CEO, Swiss Post

Jasmin Staiblin, CEO, Alpiq

VET School

Urs Burri, Principal

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Robert Brügger, teacher, and several apprentices

Jörg Wyss, teacher, and several apprentices

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RESEARCH TEAM BIOGRAPHIES



Marc S. Tucker is the President and Chief Executive Officer of the National Center on Education and the Economy in Washington, D.C. He is an internationally recognized expert on academic and occupational standards and assessment, and has also been among the leaders in researching the policies and practices of the countries with the best education systems in the world. Tucker served in the 1970s as the Associate Director of the National Institute of Education, in charge of the nation's government-funded research on education policy. He then created the Carnegie Forum on Education and the Economy at Carnegie Corporation of New York, and authored its report, *A Nation Prepared: Teachers for the 21st Century*. He led the Carnegie Forum team as it created the National Board for Professional Teaching Standards and served as the Board's first president. Tucker then founded the National Center on Education and the Economy and, in that role, created the Commission on the Skills of the American Workforce, the *New* Commission on the Skills of the American Workforce, the New Standards Consortium, America's Choice (a comprehensive school reform program), the National Institute for School Leadership and *Excellence for All* (a high school reform program). Tucker was appointed by President Clinton to the National Skill Standards Board. He is a Visiting Distinguished Fellow at the Harvard University Graduate School of Education and was the recipient of the ECS 2014 James Bryant Conant Award for outstanding individual contributions to American education. He has also served as author, co-author or editor of many articles and several books and reports, including, *America's Choice: high skills or low wages*; *Standards for Our Schools: How to Set Them, Measure Them and Reach Them*; *Thinking for a Living: Education and the Wealth of Nations*; *The Principal Challenge*; *Tough Choices or Tough Times*; and *Surpassing Shanghai: An Agenda for American Education Built on the World's Leading Systems*.



Betsy Brown Ruzzi is Vice President of the National Center on Education and the Economy and Director of its Center on International Education Benchmarking. Since 2011, Brown Ruzzi has directed the Center's effort to help countries around the world understand the principles, policies, and practices that top-performing countries use to drive their education systems. She oversees a grant program supporting scholars from around the world to study the practices of countries whose students regularly top the PISA league tables. She helps states redesign their primary and secondary education systems to match the performance of the world leaders in education. Brown Ruzzi also manages the National Center's outreach and public relations work including its web site, newsletter, blog and other social media. Most recently she managed the research, publication and outreach for the Center's studies: *Strong Performers and Successful Reformers* for the OECD; *Surpassing Shanghai* (Harvard Education Press); *Fixing Our National Accountability System*; *Chinese Lessons: Shanghai's Rise to the Top of the PISA League Tables*; *The Phoenix: Vocational Education and Training in Singapore*; and *What Does it Really Mean to be College and Career Ready?* During her career at the National Center she helped create the National Institute for School Leadership, the National Skill Standards Board, the Commission on the Skills of the American Workforce, and the National Board for Professional Teaching Standards, all initiatives to improve the academic performance of our nation's students and strengthen the skills of our workforce. In addition to working at the National Center, Brown Ruzzi worked on Capitol Hill, in the British Parliament and in the Governor's Office in Massachusetts.



Nancy Hoffman is a Vice President and Senior Advisor at Jobs for the Future, a national non-profit in Boston, Massachusetts focused on improving educational and workforce outcomes for low-income young people and adults. Hoffman is the co-lead of the eleven state Pathways to Prosperity Network with Bob Schwartz (Harvard Graduate School of Education). The Network seeks to ensure that many more youth



complete high school, attain a postsecondary credential with currency in the labor market, and get launched on a career. Hoffman has held teaching and administrative posts at a number of U.S. universities including Brown, Temple, MIT, and UMass, Boston, and currently teaches a course on non-profits, philanthropy and education improvement at Harvard Graduate School of Education. She has served as a consultant for the education policy unit of the OECD and is engaged in studying strong VET systems. Her book, *Schooling in the Workplace: How Six of the World's Best Vocational Education Systems Prepare Young People for Jobs and Life*, is a result of that work (Harvard Education Press, 2011). She writes and speaks on the topic of college and career preparation, and is an editor of three JFF books: *Double the Numbers: Increasing Postsecondary Credentials for Underrepresented Youth*, *Minding the Gap: Why Integrating High School with College Makes Sense and How to Do It*, and most recently *Anytime, Anywhere: Student-Centered Learning for Schools and Teachers*, all three published by the Harvard Education Press. Hoffman is also author of *Women's True Profession: Voices from the History of Teaching* (Harvard Education Publishing Group). Hoffman holds a B.A. and Ph.D. in comparative literature from the University of California, Berkeley. She serves on the Massachusetts Board of Higher Education.



Robert Schwartz is Professor of Practice Emeritus at the Harvard Graduate School of Education. Prior to joining the Harvard faculty in 1996, Schwartz served in a variety of roles in education: high school teacher and principal; education advisor to the Mayor of Boston and the Governor of Massachusetts; director of The Boston Compact; and Education Program director at The Pew Charitable Trusts. From 1997-2002 Schwartz served as founding President of Achieve, Inc., a non-profit organization created by governors and corporate leaders to help improve performance in U.S. schools. More recently Schwartz has contributed to two OECD studies, *Learning for Jobs* and *Strong Performers and Successful Reformers in Education*, and co-authored an influential report calling for more attention to career and technical education, *Pathways to Prosperity*. He is currently co-leading a national network of ten states that was formed in 2012 to act upon the analysis and recommendations outlined in the Pathways report.

The Center on International Education Benchmarking's international comparative study of vocational education systems is a four-part series and includes the following titles which can be found online at <http://www.ncee.org/cieb/publications/#VET>

The Phoenix: Vocational Education and Training in Singapore

Made in China: Challenge and Innovation in China's Vocational Education and Training System

Gold Standard: The Swiss Vocational Education and Training System

And a forthcoming report on vocational and technical education in the United States

For more on the world's leading education systems including what can be learned from their success, please see the following works also published by the National Center on Education and the Economy:

Chinese Lessons: Shanghai's Rise to the Top of the PISA League Tables

Surpassing Shanghai: An Agenda for American Education Built on the World's Leading Systems

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