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AND TRAINING

FIFTH TREND REPORT

AREAS OF TENSION IN VOCATIONAL EDUCATION AND TRAINING IN SWITZERLAND AND OTHER COUNTRIES – DEVELOPMENTS, CHALLENGES AND POTENTIAL

Brief summary

National systems of vocational education and training (VET) must continuously adapt to technological, economic and social change to ensure that young people acquire the knowledge and skills needed to become active members of society and the labour force. This trend report examines how the Swiss VET system has evolved in recent years, taking a clearly different direction from that of other European countries. It is therefore important to understand what benefits this counter-current choice brings and what challenges Switzerland will have to face in the future.

- Changes in the education system result from collective negotiations and compromises between the various stakeholders. A key consideration here is striking the right balance between VET and general education. For one thing, there is the matter of managing enrolment to the two different pathways: how many young people should enter VET, how many should pursue general education? At the same time, it is important to find the right proportions of workplace training and classroom instruction in VET programmes.

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- In many European countries, the proportion of young people enrolling in general education has risen in recent years and fallen in vocational education and training. In addition, the boundaries between general and vocational education are becoming increasingly blurred. Only Switzerland has thus far largely escaped this trend. It currently has the highest proportion of young people enrolled in dual VET at upper-secondary level.
- Long considered a prime example of a country with a strong dual VET system, Germany's education system has seen a clear shift in favour of general education in recent years. A comparison with Germany suggests that Switzerland's dual VET system has remained solid because it has been governed in a more targeted fashion. The small size of the country, the firm commitment to consensus and the robust collaborative partnership between the Confederation, the cantons and professional organisations – with extensive involvement of companies – have all contributed to this.
- Although it can be said that the Swiss education system as a whole places great emphasis on VET, cantonal education systems have developed in a non-uniform fashion since the 1970s. While the proportion of holders of vocational qualifications awarded from dual VET programmes has increased in many German-speaking cantons, the French- and Italian-speaking cantons have given greater importance to general education and school-based VET.
- In other words, dual VET in Switzerland is not a homogeneous block. Although workplace training is the main form of learning for most of the 250 occupations covered by Swiss VET programmes, the proportion of training content allocated to workplace training and classroom instruction in dual VET can vary considerably from one occupation to another. The same applies to the proportion of young people who decide to prepare for the federal vocational baccalaureate (FVB). Just under half of Swiss VET programmes have a comparatively high and increasing proportion of classroom instruction and of learners who attend vocational baccalaureate school. The other half of VET programmes has remained predominantly focussed on workplace training for the past twenty years, with the FVB playing a very minor role. The rise of the services sector, the heightened skills requirements of employers and the growing prevalence of technology in the workplace will likely lead to greater importance being given to VET programmes with comparatively large proportions of classroom instruction.

Conclusion

The strengths of the Swiss education system include: a close match between training content in dual VET and the real-world needs of employers on the Swiss labour market; a low youth unemployment rate; and a large proportion of young people who complete upper-secondary level. In order to maintain these remarkable achievements, there is a constant need to strike a balance between VET and general education and to regularly review and readjust the proportion of workplace training and classroom instruction in education programmes. In this manner, Switzerland is able to meet future challenges associated with the rapid changes taking place in the labour market and society.

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INTRODUCTION

Anyone who has completed their schooling in Switzerland is familiar with the local education system. In German-speaking cantons of Switzerland, in particular, enrolment in dual VET is the most typical option chosen by most young people coming out of compulsory education. However, this has not always been the case in Switzerland in the past nor is it a reality across national borders. Our current VET system is just one possible variant among many and even within Switzerland there is a considerable degree of heterogeneity.

Research shows that the Swiss VET system, which today is mostly dual (i.e. a combination of workplace training at a host company and classroom instruction in a vocational school, plus supplementary branch courses) only became firmly established in the mid-20th century. It emerged in parallel with and largely separate from the general education pathway of the Swiss education system.[2] While Germany and Austria established very similar dual VET systems during the same period, other countries in Europe designed their education systems differently. Thus, in the European context, the status and design of VET varies considerably.

In order to fulfil their core functions, national VET systems face the great challenge of constantly having to adapt to technological, economic and social changes. This is the only way to ensure that young people gain the knowledge and skills needed to become active members of society and the labour force.[3]

However, there is rarely agreement on the type and extent of adjustments required. Therefore, changes within the VET system are always based on negotiation processes and compromises between the stakeholders involved.[4–6] The ideal **balance of VET and general education** is therefore the first area of tension. The key question here is how many young people in lower-secondary education should be streamed to general education and how many to VET? While greater emphasis is placed on general education in many European education systems, dual VET has retained its predominant position in Switzerland. Roughly 60% of all young people coming out of lower-secondary education still go on to enrol in dual VET. This situation is not without controversy, and education policy positions in Switzerland can also be very different. For example, while Pfister[7] calls for a strong increase in the proportion of young people streamed to general education at upper-secondary level and actively promotes the 'Baccalaureate for All' campaign, the Canton of Lucerne's SME and Trade Association calls for exactly the opposite: reducing the proportion of young people streamed to general education to 15% and increasing the proportion streamed to dual VET.[8]

A second area of tension relates to the **balance of workplace training and classroom instruction within education programmes**, where the various proportions can change over time. In many countries, hybrid forms of education and training have emerged in recent years, integrating aspects of VET into university education or introducing more general education aspects in VET programmes.[8,9] This closer convergence (pluralisation) of VET and general education can be seen, for example, in Germany's hybrid 'dual study programmes' at tertiary-level or in Switzerland's federal vocational baccalaureate (FVB) at upper-secondary level.[10] Regarding VET, the area of tension relates to how much training should be allocated to the classroom instruction portion of a dual VET programme.[6,11] While countries such as Sweden or Belgium rely on predominantly school-based models, including in VET, dual VET models have prevailed in other countries. Changes can also be seen here: In Switzerland, the proportion of classroom instruction in dual VET has been increasing steadily since the early 1900s despite constant dissenting voices.[6]

International comparative studies show that the proportion of young people enrolled in upper-secondary VET programmes has decreased considerably in many European countries over the past 20 years. Switzerland has resisted this trend more strongly and still today most young people enrol in upper-secondary level dual VET after completing lower-secondary education.[8] The dual VET model is even considered the gold standard today[12], as it allows for the quick and seamless integration of young people into the labour market. At the same time, there is also robust demand for tertiary-level qualifications: demand for holders of university degrees has risen sharply and the skills shortage is particularly pronounced in occupations that require tertiary-level qualifications.[13,14]

In this context, the present trend report considers how the Swiss VET system has evolved in recent years, how

this development differs from that of other European countries, and what challenges and potential this poses for the future. This report consists of five chapters.
The first chapter deals with how the Swiss VET system compares with those of other European countries. The second chapter compares the Swiss and German VET systems. Both countries used to have very similar dual VET systems until the 1990s, but since then have evolved in different directions. These comparisons can help to shed light on possible reasons for developments in Switzerland.

Chapters 3 and 4 focus on whether and to what extent VET has developed uniformly in Switzerland. Chapter 3 discusses cantonal differences with regards to the importance given to VET. Chapter 4 touches on differences between dual VET programmes in terms of the balance between general and occupation-specific education and between workplace training and classroom instruction. Chapter 5 summarises our findings and discusses the challenges and potential for further development of VET in Switzerland.

The Swiss education system

Switzerland has a stratified education system. After six years of primary school and three years of lower-secondary school subdivided into several tracks, the vast majority of young people enter post-compulsory education at upper-secondary level (for a stylized version of the Swiss education system see Figure on page 35). Upper-secondary education in Switzerland has a strong vocational orientation. In the year 2020, 63% of young people enrolled in a firm-based dual VET programme, 7% enrolled in a school-based VET programme and 30% attended general education. General education is provided both at baccalaureate schools (which award the academic baccalaureate) and specialised schools (which offer both the specialised diploma and specialised baccalaureate).
Upper-secondary VET covers around 250 different occupations, which vary in terms of their duration (2–4 years), intellectual requirement level and emphasis on workplace training. Dual VET combines three to four days of workplace training at a host company with one to two days of classroom instruction at a vocational school. School-based VET programmes include very little practical training at host companies. Learners in three and four-year VET programmes may also prepare for a federal vocational baccalaureate. This hybrid form of education combines VET with more general education at a vocational baccalaureate school. Learners may prepare for the federal vocational baccalaureate examination either by attending classes during their VET programme (FVB option 1) or after graduation when they have earned their Federal VET Diploma (FVB option 2).
At the tertiary level, there are four main types of education: traditional universities, universities of applied sciences, universities of teacher education and professional education (higher vocational education). Access to traditional universities is reserved for holders of an academic baccalaureate. Universities of teacher education require an academic or specialised baccalaureate. Universities of applied sciences are open to vocational baccalaureate holders (or holders of the academic/specialised baccalaureate provided they have a certain amount of work experience). Holders of a Federal VET Diploma who do not obtain the vocational baccalaureate have the option of pursuing professional education at tertiary level.

For a stylized version of the Swiss Educational system see page 35.

1 COMPARISON OF SWISS AND EUROPEAN VET SYSTEMS

Brief overview

- European VET systems are faced with the challenge of a growing services sector and rising demand for a highly skilled labour force.
- Many countries with (formerly) strong VET systems are now prioritising general education pathways at the expense of VET. In contrast, countries that have traditionally had a high proportion of young people enrolled in upper-secondary general education are now attaching greater importance to VET.
- Throughout Europe, the boundaries between general education and VET are becoming increasingly blurred. These developments are bringing European VET systems closer together.
- Only Switzerland is resisting this trend, retaining a highly distinctive VET system. It is currently the country with the highest proportion of dual VET learners at upper-secondary level.

Vocational education and training in Europe is diverse

In Europe, interest in VET has grown since at least the economic shock of 2008. This is particularly due to the fact that countries with highly developed VET systems often experience lower youth unemployment and report a high level of integration of young people in upper-secondary education.[15] These countries, such as Germany, Austria and Switzerland, have collective VET systems where the state actively engages with economic players and professional organisations to jointly manage VET. This approach differs from that of liberal VET systems, where the private sector drives VET, and from that of state-controlled VET systems, where the state is responsible for (mainly school-based) VET and provides the necessary funding.[4]

The relative importance of VET varies considerably among European countries, as shown in Fig. 1. While around two-thirds of upper-secondary level qualifications are vocational in countries such as Switzerland, Austria, Slovakia or Finland (right-hand side), this figure falls to less than half in other European countries.

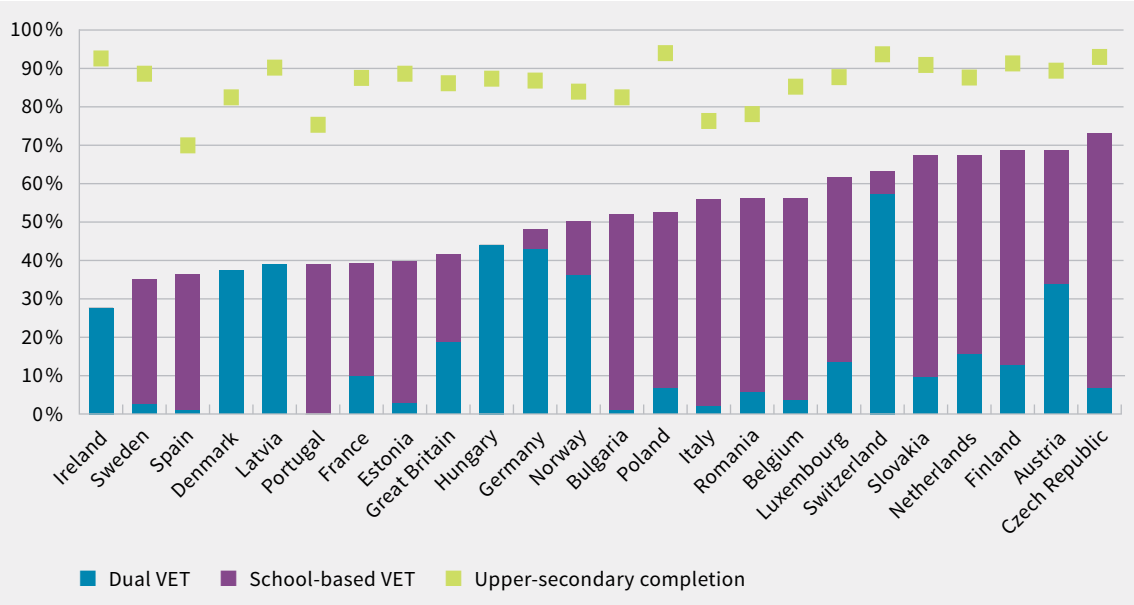

Fig. 1: Upper-secondary level completion rates in Europe in 2019. Sources: Eurostat[16], Cedefop[17], Rustico et al.[18]
Note: The data on upper-secondary level completion rates refer to the proportion of persons between the ages of 25 and 34 who obtained at least one upper-secondary level qualification.

		Most learners complete:	
		General education pathway	**VET pathway**
Most learners enrolled in VET complete:	**School-based VET**	Sweden, Spain, Portugal, the UK, France, Estonia	Austria, Luxembourg, Netherlands, Finland, Slovakia, Czech Republic, Poland, Romania, Belgium, Italy, Bulgaria
	Dual VET	Ireland, Latvia, Denmark, Hungary, Germany	Norway, Switzerland

Table 1: Grouping of European countries by predominant form of VET (school-based or dual) and dominant pathway (general education or VET) in 2019. Sources: Eurostat[16], Cedefop[17], Rustico et al.[18].

The proportion of young people enrolling in VET is particularly low in countries such as Ireland, Sweden and Spain (left-hand side of fig. 1). The education system in these countries is mostly geared towards the general education pathway.

There are also differences in terms of the number of young people who complete upper-secondary education (light green squares in Fig. 1). Generally speaking, countries with a high proportion of young people enrolled in VET also have higher upper-secondary level completion rates.

Finally, Fig. 1 also reveals differences in the structure of VET, i.e. the importance of dual VET (blue bars) and school-based VET (purple bars). Table 1 shows the countries where general education and VET pathways predominate at upper-secondary level and where most young people enrol in school-based or dual VET. If we draw a line at 50%, we obtain a four-field table illustrating the diversity of European VET systems. In the group of countries where most young people complete a general education pathway (left column), we find countries with predominantly school-based VET (top) and those where dual VET predominates (bottom). In the group of countries where most young people follow the VET pathway rather than general education (right-hand column), we find that the school-based form of VET clearly predominates (top). Only Switzerland and Norway combine a strong VET sector with a high proportion of learners enrolled in dual VET programmes. In the case of Norway, however, the proportion is only very narrowly in favour of vocational education and training.[8] Switzerland's special position is all the more remarkable when one considers that the VET systems of Germany, Austria and Switzerland used to be very similar until the early 1990s.[19]

Regardless of the specific design, today all European VET systems face similar challenges. These include the structural transformation of their economies and changing skills requirements.[4] The emergence of the service and knowledge economy, the relocation of low-skilled labour abroad and resulting deindustrialisation followed by subsequent technological advances have all contributed to a growing demand for highly skilled labour in most European countries.[4, 20] VET stakeholders are somewhat concerned about these trends, fearing that the VET pathway will become less appealing to the most talented young people.[21]

On the relationship between VET and general education in Europe: diverging trends

If we look at the education systems of European countries, we see different developments with regard to VET and general education. In many countries with traditionally strong VET sectors, the proportional prevalence of VET and its status in society have declined in recent decades. This is particularly true for Germany, Denmark and some Eastern European countries. In Germany, for example, the proportion of VET learners at upper-secondary level has fallen from two-thirds back in the 1990s to less than 50% today. At the same time, young people and their parents are now showing a greater interest in university education. In Denmark, too, the proportion of young people enrolling in VET has declined. This may also be related to the fact that VET enjoys much lower prestige than general education.[19]

That said, many European countries that have thus far prioritised general education over VET are now experiencing a trend in the opposite direction, namely a strengthening of VET at the expense of general education.[19] Typical examples are Spain and Portugal. Since the economic crisis in 2008, the proportion of young

VET- versus general education-oriented systems

We consider **education systems to be oriented towards VET** if a large proportion of people pursue training at upper-secondary and/or tertiary level for the purpose of acquiring specific vocational/professional skills. A **vocational drift** means that the proportion of young people enrolling in VET is increasing or more weight is being given to the acquisition of specific vocational/professional skills and work experience. This implies greater emphasis on practical skills and increasing labour market orientation of training programmes, for example through internships.

We consider **education systems to be oriented towards general education** if a large proportion of people enrol in general education at upper-secondary level and/or go on to enrol in universities at tertiary level. An **academic drift** occurs when the proportion of young people enrolled in upper-secondary general education increases or when greater emphasis is placed on the acquisition of theoretical and general knowledge at school or university. Analogously, **a growing importance of school and general education aspects in VET** occurs when greater weight it given to classroom instruction and general education content.

Pluralised vs. distinctive VET systems

In **pluralised** (or hybrid) **VET systems**, the boundaries between VET and general education become blurred. Diverse learning forms and combinations thereof (e.g. learning locations and forms of learning) are available and accepted. Pluralisation thus describes a trend towards a less clear-cut differentiation between VET and general education. In the German-speaking debate, this trend is also termed *hybridisation*, which describes increasing permeability between and the combination of elements from different types of education (e.g. Switzerland's federal vocational baccalaureate at upper-secondary level or Germany's hybrid 'dual study programmes' at tertiary level).[10]

Distinctive VET systems in contrast, are characterised by a clear separation of VET and general education. In VET, the focus is on the acquisition of vocational/professional skills. There is a clear separation of learning locations and forms of learning. The forming of a clear professional identity is essential. The term 'strengthening of VET' is used when the characteristic and unique features of the VET system become increasingly clear (i.e. distinctive) and VET thus becomes more strongly differentiated from general education.

people enrolling in VET in Spain has increased by 55%. Portugal also saw a significant increase in VET enrolment during this period (+22%), which is also linked to policy measures aimed at strengthening VET. Despite this, general education continues to enjoy greater prestige among the population and draws significantly more young people than VET.[19]

Increasing pluralisation of (vocational) education in many countries

In many European countries, an increasing pluralisation of the (vocational) education system can be seen, i.e. the boundaries between VET and general education are becoming increasingly blurred (i.e. hybridisation/pluralisation). One example of pluralisation is the increasing importance of school-based VET in Austria. Here, vocational qualifications that combine elements of vocational and general education and are obtained at VET schools at upper secondary level have become much more important. Dual VET now accounts for only a minority of vocational qualifications awarded. The popularity of vocational qualifications from school-based VET probably has to do with the fact that they provide access to both the labour market and university education.[22] In Germany, too, we are seeing an increasing pluralisation of VET and tertiary education.[23] One example of this are Germany's hybrid 'dual study programmes' at tertiary level, which combine vocational training with higher education at universities of applied sciences and thereby link two different levels of the education system. Dual study programmes are intended primarily for holders of the *Abitur,* Germany's main university entrance qualification.[24]

European trend towards convergence – with Switzerland being the exception

Education systems are the result of social, economic and political negotiation processes and developments. For this reason, the change is very gradual and occurs in pre-determined directions.[12] This was confirmed by a comparative study from Cedefop summarising general developmental trends in European education systems. On average, differences between countries have narrowed significantly since the 1990s.[8,19] However, there have been no radical changes. For example, no country has replaced a school-based VET system with a dual VET system or vice versa.[8]

Fig. 2 summarises Cedefop's assessment on developments in Europe. The arrows indicate the changes in the relationship between VET and general education (horizontal axis) and within the VET system itself (vertical axis) between 1995 and 2015. The chart clearly shows that VET systems have become more pluralized in many countries (vertical axis). This is mainly due to the strengthening of general education and the associated weakening of workplace training within VET. The increasing proportion of VET learners being able to obtain two separate qualifications (one vocational and the other general education) as a means of opening up access to university education is another driver of pluralisation.

On the horizontal axis, there are opposing tendencies. In many VET-oriented education systems, there has been a move to strengthen the general education pathway, which has led to a decline in the VET enrolment rate from over 55% to below 50% on average in Europe. In contrast, in general education-oriented education systems (e.g. Portugal and Spain), efforts have been made to strengthen the VET pathway, albeit to a very limited extent.[19]

Only Switzerland has thus far resisted this trend towards convergence. Switzerland continues to have a distinctive VET system with a clear separation between VET

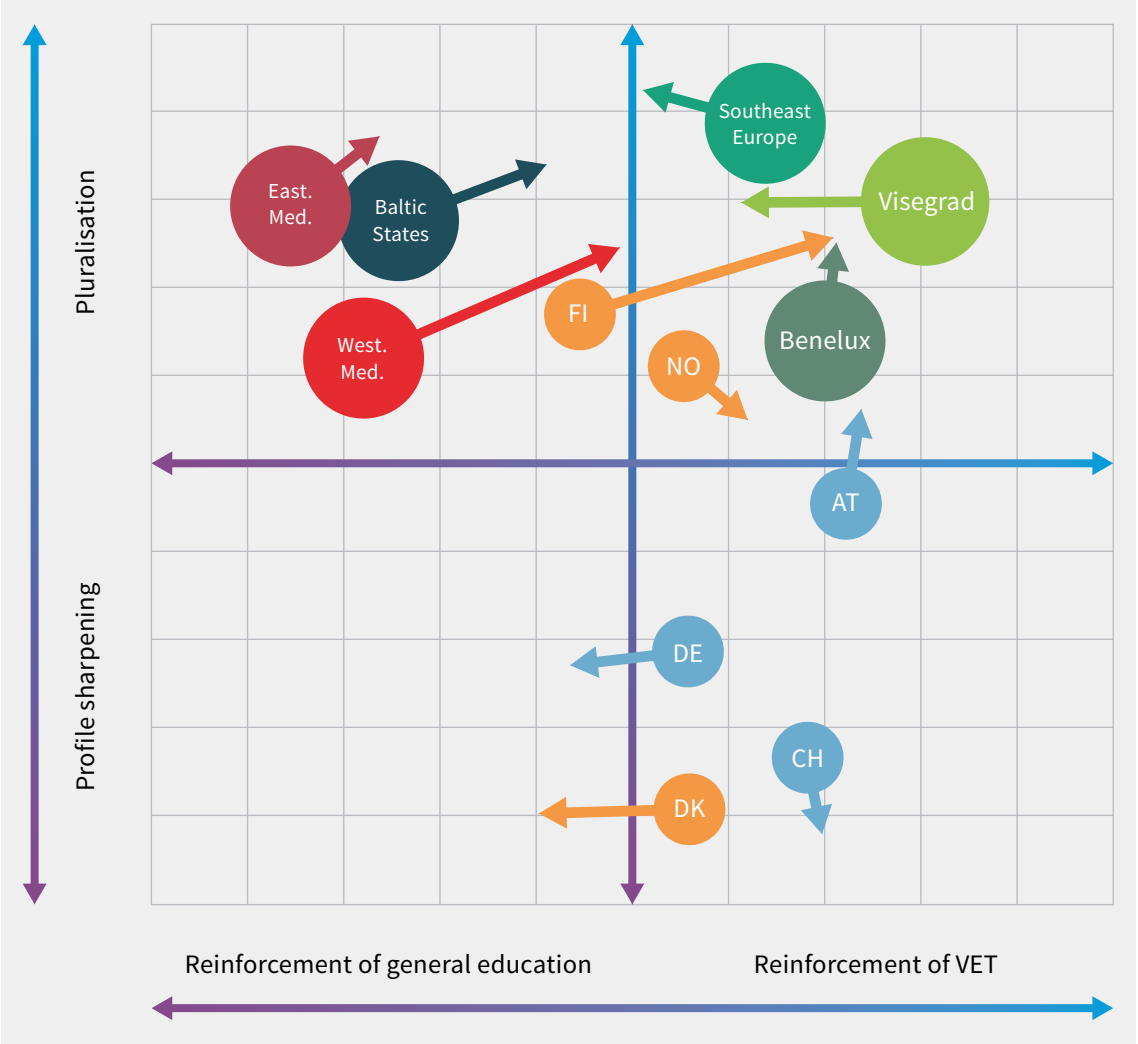

Fig. 2: Schematic representation of changes in VET in Europe, 1995–2015. Source: Cedefop[19], p. 156, minor adaptions of figure by authors.

and general education and a high proportion of learners enrolled in dual VET. That said, the creation of the federal vocational baccalaureate and universities of applied sciences have introduced pluralising elements into Switzerland's education system, which have resulted in a stronger linkage between VET and general education. At the same time, however, profile sharpening tendencies can also be seen. These include, for example, the strengthening of Switzerland's professional education sector, which was assigned to tertiary level in 2002 but not made part of the university sector. Other examples include the integration of health, agricultural and social occupations into dual VET at upper-secondary level and the creation of two-year VET programmes leading to the Federal VET Certificate. These two-year VET programmes are intended to facilitate the integration of less academically inclined learners into VET.[23] Overall, Cedefop considers Switzerland to be one of the few countries where the strongly distinctive features of VET have been preserved or even strenghtened.

The following chapters take a closer look at developments observed in Switzerland, highlighting different trends within the Swiss cantons and between individual occupations. These differences tend to be obscured when general comparisons are made between the Swiss VET system and those of other countries.

2 COMPARISON OF SWISS AND GERMAN VET SYSTEMS[iii]

Brief overview

- Germany and Switzerland used to have very similar education systems, both with a strong orientation towards dual VET. The education systems in these two countries began diverging around 30 years ago and since then have evolved differently.
- Germany has expanded school-based VET and academic baccalaureate schools (these schools award the *Abitur,* which is Germany's main university entrance qualification). It can be said that the German education system has become more oriented towards general education.
- In contrast, Switzerland has expanded dual VET and institutionalised the transition from VET to universities of applied sciences with the federal vocational baccalaureate while at the same time limiting the proportion of young people enrolling in academic baccalaureate schools.
- Germany's tertiary level has become more pluralised with the introduction of hybrid 'dual study programmes'. Switzerland, in contrast, has maintained a clear separation at tertiary level between its universities sector and professional education sector.
- Possible reasons for the different choices made by Germany and Switzerland can be found in the need to strike what each country perceives to be the 'right' balance between vocational and general education. Additional explanatory factors include a desire to facilitate the transition from upper-secondary level to tertiary level, how each VET system is governed and financed in the respective country, which have been handled differently.

Upper-secondary level: expansion of general education vs. pluralisation of vocational and general education

Developments in upper-secondary level qualifications are presented in Fig. 3. The figures show the relative importance of vocational and general education qualifications in the total number of upper-secondary level qualifications awarded.

In Germany, dual VET is still the most common source of upper-secondary level qualification despite a decline from 48% to 41%. If we also consider school-based VET, which accounted for around 13% of all upper-secondary level qualifications, the VET pathway still amounts to over half of the total number of upper-secondary level qualifications awarded in 2019. Germany's *Berufsabitur* (vocational baccalaureate), on the other hand, is relatively insignificant at 2%. There has also been a significant increase in the number of *Abitur* (academic baccalaureate) qualifications, which now account for over one-third of the total number of upper-secondary level qualifications awarded.

In Switzerland, the proportion of qualifications from dual VET has also been declining since 2005, but still remains at a much higher level than in Germany. In 2019, dual VET still accounted for 60% of all upper-secondary level qualifications. Although qualifications from school-based VET have risen somewhat, they still only account for 5% of the total. The unequal importance of the vocational baccalaureate and academic baccalaureate qualifications in Switzerland and Germany is striking. The former is much more prevalent in Switzerland than in Germany. However, the proportion of academic baccalaureate qualifications in Switzerland has not risen since 2005 and remains at the rather low level of 18%. Overall, in Germany, there has been a noticeable trend towards more general education at upper-secondary level. This is reflected in the increasing proportion of German academic baccalaureate qualifications awarded. In Switzerland, on the other hand, the introduction of the vocational baccalaureate and the associated linking of VET and general education has led to a slight pluralisation of the formerly very distinct upper-secondary level pathways.

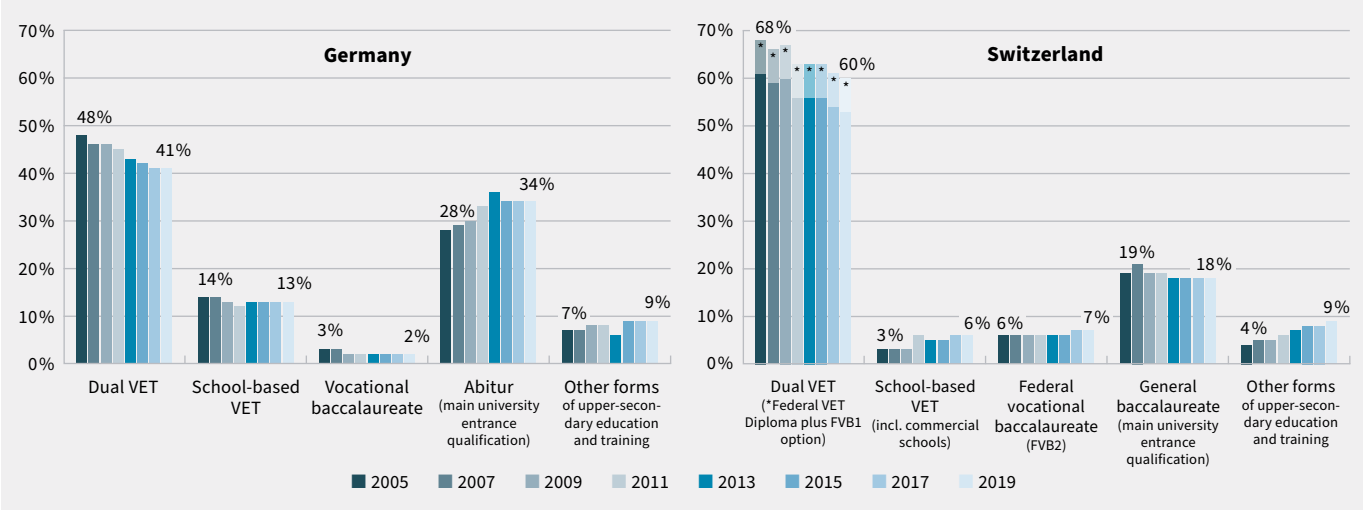

Fig. 3: Relative importance of upper-secondary level qualifications, 2005–2019. Sources: Germany: Federal Statistical Office 2020c[25]; CH: FSO 2020a[26], 2020b[27], 2020c[28], 2020d[29, iv]. Remarks: Other upper-secondary level qualifications: in Germany, only *Fachabitur*; in Switzerland, specialised baccalaureate *(Fachmaturität),* specialised school diploma *(Fachmittelschuldiplom),* university aptitude test *(Ergänzungsprüfung Passerelle Berufsmaturität / Fachmaturität)* for holders of the vocational baccalaureate or specialised baccalaureate, International Baccalaureate and other general education qualifications.

Tertiary level: clearly differentiated profiles in Switzerland and hybridisation in Germany

In Germany, tertiary-level qualifications are evenly distributed between professional education, universities of applied sciences and universities, as shown in Fig. 4. The proportion of tertiary-level qualifications awarded from professional education has declined somewhat since 2005. At the same time, the proportion from universities has remained stable and the proportion of UAS Bachelor's degrees has increased significantly from 23% to 34%.

In Switzerland, the professional education sector is more important than in Germany, accounting for 48% of all tertiary-level qualifications up to Bachelor's degree level. The trends are similar for lower-level university degrees. The relative importance of tertiary-level qualifications awarded by Swiss traditional universities and universities of teacher education remains stable at around 30%.

In the meantime, the proportion of tertiary-level qualifications awarded by universities of applied sciences have almost doubled from 13% to 22%.

Dual study programmes as a feature of pluralisation

An important difference between Germany and Switzerland is not visible in Fig. 4. In particular, German universities of applied sciences and professional academies have greatly expanded their range of hybrid 'dual study programmes'. For some time now, they have been offering dual study Bachelor programmes in cooperation with large companies. These programmes combine general and vocational education by combining a Bachelor's degree at a university of applied sciences either with dual vocational education and training or with company internships.[30, 31] These hybrid dual study programmes are often intended for holders of the main university entrance qualification. The aim is to provide these young people with the exact knowledge and skills needed to satisfy employer demand for skilled workers and hence secure their long-term employment prospects.[20, 24] Dual study programmes may thus be perceived as a manifestation of this process of 'hybridisation' or 'pluralisation of tertiary education in Germany.

Switzerland has not yet introduced comparable dual study programmes. At individual universities of applied sciences, pilot tests are being carried out with 'work-study Bachelor's degree programmes' in the field of science, technology, engineering, and mathematics (STEM). These programmes include more internships in host companies than normally found in conventional Bachelor's degree programmes and last four years instead of three. Such programmes facilitate admission to a Swiss univer-

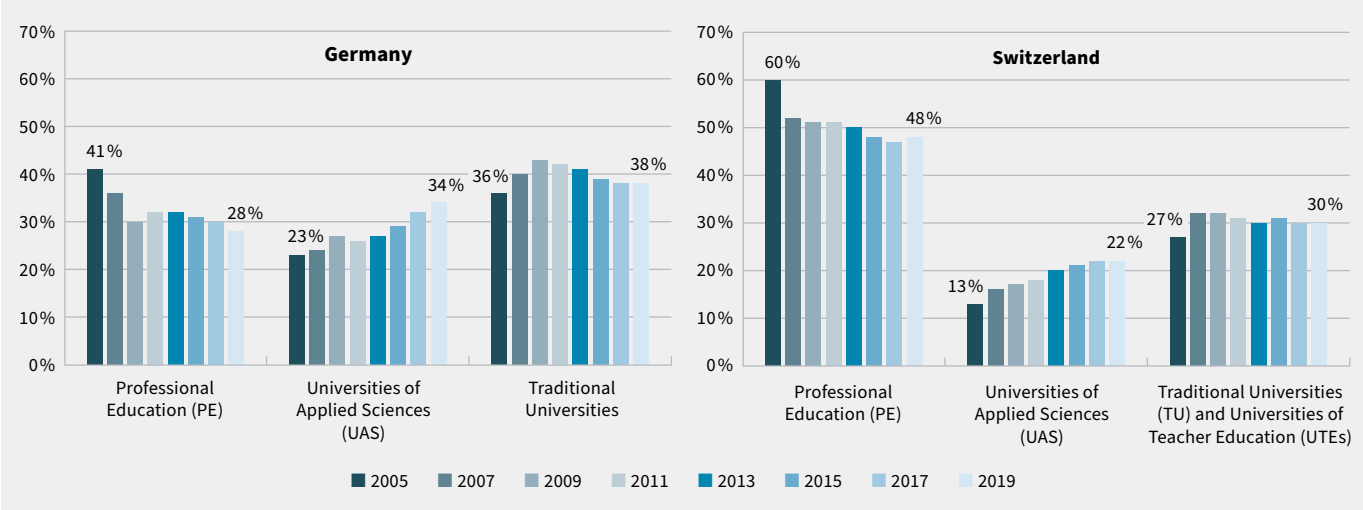

Fig. 4: Development of the relative importance of forms of education and training at tertiary level, 2005–2019. Sources: Germany: Professional education sector: Federal Statistical Office 2020a[33], 2020b[34]; universities (UAS / TU): Federal Statistical Office 2020d[35]; CH: Professional education sector: FSO 2020a[26]; universites (UAS/TU/UTE): FSO 2020d[29].

sity of applied sciences both for holders of an academic baccalaureate and for holders of a vocational baccalaureate in an unrelated field, with the aim of alleviating the shortage of skilled workers in the STEM sector.[32]

How do changes occur within education systems?

The different development of qualifications in Germany and Switzerland raises the question of why the collective VET systems (both based on negotiation processes between government, companies, associations, and trade unions) in these two countries are changing. Research assumes that collective VET systems have four neuralgic points. Changes made to one or more of these points can result in a transformation of the system.[4]

The first neuralgic point has to do with the balance between dual VET and school-based VET and essentially addresses the issue of who provides skill formation. The second neuralgic point deals with the balance between vocational and general education within the education system as a whole. The third neuralgic point is funding of education and training. The fourth and final neuralgic point relates to VET system governance. Below we discuss the different strategic choices that Germany and Switzerland have made in relation to these neuralgic points (see Table 2 for an overview).

Upper-secondary level: differences in the provision of skill formation…

At upper-secondary level, Germany has set a different course than Switzerland with regard to dual VET and school-based VET (first neuralgic point). Germany chose to expand its general education sector and prioritise VET programmes where learning takes place predominantly, if not entirely, at the vocational school. The training for many health and social care occupations is still aligned with school-based VET.[36] For young people who do not perform well at school, a large number of 'transitional' courses are available to help them to prepare for enrolment in upper-secondary level VET. These courses are taught at vocational schools but do not lead to issuance of a vocational qualification nor do they guarantee a successful transition from lower- to upper-secondary level. Switzerland, on the other hand, chose to expand its range of dual VET programmes in the 2000s. This was done firstly by integrating health, social, artistic and agricultural occupations into the dual VET system. Secondly, two-year VET programmes leading to the Federal VET Certificate (FVC) were introduced as a low-threshold option for young people with lower scholastic performance. Overall, these changes most likely counteracted the erosion of dual VET by opening this sector up to new target groups.

…and different linkages between VET and general education

Also in terms of the balance between VET and general education (second neuralgic point), both countries set

different priorities. In Germany, admission to academic baccalaureate schools was made easier in order to increase university enrolment and thus pave the way for the next generation of highly skilled workers, researchers and academics.[37] This prioritisation of the general education pathway likely resulted in an overall weakening of upper-secondary level VET in Germany.
In Switzerland, many cantons have informal quotas to restrict access to academic baccalaureate schools. This keeps baccalaureate school enrolment at a rather stable and low level for education policy reasons.[38] The Swiss VET sector benefits from this, as it ensures the influx of those pupils who are denied access to academic baccalaureate schools.[39] Moreover, with the introduction of the federal vocational baccalaureate, Switzerland has institutionalised the transition from VET to universities (specifically access to Swiss universities of applied sciences).[40] This is likely one of the main reasons why the VET pathway in Switzerland is still an appealing option for young people who have strong scholastic performance.[20]

Funding of education and training: a favourable cost-benefit ratio can strengthen dual VET

Germany and Switzerland also differ with regard to the financing of dual VET (third neuralgic point). In both countries, funding comes from both the state and companies. Indirectly, the learners themselves also contribute to the costs of workplace training because they perform work at their host company in exchange for a relatively low apprenticeship salary. Companies are a key pillar of dual VET because they are the ones that decide whether or not to offer apprenticeships. For many companies, this decision depends on various factors, an important one being the cost-benefit ratio that they can derive from the provision of workplace training in dual VET programmes.
Companies in Germany incur higher average net costs for providing workplace training than companies in Switzerland.[41] For this reason, dual VET is less worthwhile for small companies than for large companies, which can subsequently amortise their workplace training costs by covering their future demand for skilled workers.
In recent years, there has been a disproportionate withdrawal of companies from dual VET programmes in Germany. This development, however, is also related to the declining number of applicants.[42, 43]
In Switzerland, on the other hand, most companies already derive a net financial gain from apprentices during the period of workplace training.[41] This creates incentives for small and medium-sized enterprises to create paid apprenticeship positions. The supply of apprenticeships in Switzerland has remained stable or has even increased since 2004.[44]

VET system governance: uniform vs. fragmented

The VET system governance structure influences the way in which decisions are made on matters such as changes in education provision, the linkage of VET and general education and education funding (neuralgic point 4). On the whole, it can be said that education system governance is more fragmented in Germany than in Switzerland.
In Germany, the workplace training portion of dual VET as well as school-based VET for health professions are regulated by federal legislation. In contrast, other school-based VET programmes and tertiary-level professional education are the responsibility of the federal states *(Länder).* Moreover, each federal state has authority over the classroom instruction portion of dual VET and may designate a different state ministry.[45] In addition, there are steering committees where trade unions have institutionalised veto powers. Due to this horizontally and vertically fragmented governance structure, the collective adaptation of the VET system to new challenges is more difficult in Germany than in Switzerland.
In Switzerland, all VET is regulated at federal level and thus unified and standardised.[40] Switzerland's small size combined with a strong culture of political consensus (favouring compromise and the involvement of numerous stakeholders), further simplify VET system governance. This may partially explain why the Swiss VET system is able to adapt more flexibly to new challenges.[20]

Data and methodology

Source of data: The Swiss data come from the Federal Statistical Office's statistics on learners, statistics on upper-secondary level vocational education and training, statistics on education qualifications and university students as well as statistics on universities' qualifications. The German data from the Federal Statistical Office are based on a series of special reports on vocational education and training, vocational schools and university examinations, as well as on integrated training reports.

Methodology: The results are based on a comparison of the annual number of upper-secondary level and tertiary-level qualifications awarded from 2005 to 2019.
The relative importance of the respective qualifications is shown in relation to their share of all qualifications at the given level of education and training. At tertiary level, only first degrees (Bachelor's degrees) are taken into account in addition to professional qualifications; Master's degrees are not shown in order to avoid the problem of double counting. In addition, degrees awarded to foreign students (foreign students who have only temporarily moved to Switzerland or Germany for the purpose of pursuing studies) have also been excluded from the calculations.

Case of learners who are awarded two qualifications: Individuals who receive two qualifications within the same year may end up being counted twice in the statistics. This occurs rarely in Swiss statistics but generally occurs in relation to the FVB1 option, where learners prepare for FVB examination during training for the Federal VET Diploma. We can see this in Fig. 3.

Tertiary level: Germany's 'a little of both' vs. Switzerland's 'either-or'

At the tertiary level, the two countries have set very different priorities. In Switzerland, the professional education sector was integrated into tertiary level earlier than in Germany, where professional education has only recently been positioned at tertiary level.[36] In Germany, the number of universities was expanded in parallel with the increase in the number of main university entrance qualifications. In the course of this expansion, private universities of applied sciences and private universities also experienced considerable growth. In the competition for students, they created hybrid 'dual study programmes', which are particularly intended for *Abitur* holders who are not interested in pursuing university studies *per se.* The dual study programmes are also intended for holders of vocational qualifications.
In Switzerland, hybrid study programmes and private universities have remained only a marginal phenomenon. These differences most likely result from the different ways in which VET and general education pathways are linked together, as well as from the different proportion of academic baccalaureate holders. The latter aspect has presumably encouraged greater competition for university students in Germany and reduced such competition in Switzerland.
In Germany, the switch between VET and general education pathways is easier at the transition from upper-secondary level to tertiary level. On the one hand, holders of vocational qualifications are entitled to enrol in university degree programmes relating to their occupation. On the other hand, holders of the main university entrance qualification can freely enrol in a study programme at a German university of applied sciences without first having to demonstrate relevant work experience. The latter – coupled with the increase in the number of main university entrance qualifications awarded – has presumably boosted the number of university qualifications awarded by universities of applied sciences and traditional universities.
In Switzerland, the switch between different forms of tertiary education – professional education sector, universities of applied sciences (UAS), universities of teacher education (UTEs) and traditional universities

(TU, i.e. cantonal universities and Switzerland's two federal institutes of technology, ETHZ and EPFL) – are theoretically possible, but actually quite challenging in practice. The Federal VET Diploma provides the holder with direct access to Switzerland's professional education sector. If the holder has also obtained the federal vocational baccalaureate, he/she is also entitled to enrol in a Swiss university of applied sciences (in a related field of study); Switzerland's academic baccalaureate entitles the holder to enrol directly in a traditional university or in a UTE. Switching between vocational and general education programmes at the transition from upper secondary to tertiary level is hampered by additionally requested examinations or internships.[13] Accordingly, few holders of the academic baccalaureate enrol in study programmes at Swiss universities of applied sciences and few holders of the FVB enrol in traditional universities.[39] This impediment to permeability – together with the low proportion of young people who graduate from academic baccalaureate schools – is the most likely reason why there is much less competition for students at Swiss universities than in German ones. Hence, the demand from companies and students for hybrid study programmes has remained low.

Differences in terms of funding and governance

The increased importance of dual study programmes in Germany is probably also related to the different ways in which the VET system is funded and governed. In Switzerland, companies generally contribute to the financing of professional education. In Germany, on the other hand, large companies and (private) universities of applied sciences have taken advantage of a legal loophole between VET and tertiary education to design study programmes that correspond as closely as possible to the skills requirements of the companies that co-fund the study programmes.[12, 46] Germany's hybrid study programmes give companies more room for manoeuvre and allow them to bypass the traditional and potentially conflictual social partnership-based governance structure for the VET system.[20] The formerly collectively governed VET system is changing in Germany towards a more segmented system, where large companies are breaking away from the collaborative partnership and developing training models tailored to their specific needs.[24, 47]

Neuralgic point	Germany	Switzerland
1. Balance between dual VET and school-based VET	• Maintained school-based VET • Large number of 'transitional options' without certification	• Expanded the range of occupations covered in dual VET programmes • Created low-threshold two-year VET programmes leading to issuance of the Federal VET Certificate
2. Balance between VET and general education	• Increased the number of academic baccalaureate schools and (private) universities • Increased the level of permeability between VET and general education at the transition point from upper-secondary level to tertiary level	• Restricted access to academic baccalaureates and increased numbers of federal vocational baccalaureates • Less permeability between VET and general education at the transition point from upper-secondary level to tertiary level
3. Funding of education and training	• Companies incur major costs when providing workplace training for dual VET at upper-secondary level • Companies contribute funding to support hybrid 'dual study programmes' at tertiary level	• Companies derive a net profit when providing workplace training for dual VET at upper-secondary level • Companies contribute funding to support professional education at tertiary level
4. VET system governance	• Fragmented, conflictual, different areas of legal and political authority	• Standardised at national level, consensus-based

Table 2: Overview of the differences between Germany and Switzerland in relation to the four neuralgic points.

3 CANTONAL DIFFERENCES WITHIN THE SWISS VET SYSTEM

Brief overview

- In international comparisons, the term 'Swiss VET system' is used. However, if one takes a more detailed look at how the system actually works, major cantonal differences can be seen.
- Federal legislation has always given the cantons ample room to pursue their own VET policies.
- Cantonal differences began to manifest themselves more clearly in the 1970s. Today there are clear differences between German-speaking cantons and French- and Italian-speaking ones.
- Since the 1970s, the classroom instruction portion of dual VET programmes has grown and general education pathways have become more popular. In the French- and Italian-speaking cantons this increase is particularly marked.
- Factors such as the role of the state, the role of professional associations, the role of vocational schools and the attribution of social policy aims to VET are decisive in the emergence of these cantonal differences.

Cantonal differences at upper-secondary level

Since 1930, vocational education and training (VET) has been governed by a federal act that ensures uniform provisions throughout Switzerland. However, this federal act gives relatively considerable leeway to the various stakeholders, in particular the cantons. This is reflected by the fact that there are major differences in the types of upper-secondary education and training in the various cantons.

As Figure 5 shows, these differences are mainly along the axis of "dual VET-oriented systems vs school-based oriented systems". Some cantons clearly favour dual VET while other cantons focus more on school-based VET and general education schools. Overall, a "pluralisation" effect of provision at upper-secondary level can be observed.

The left-hand side of this chart shows a relatively consistent pattern for 16 cantons: a very large number of learners enrolled in dual VET, very few learners enrolled in school-based VET and a moderate number of pupils enrolled in general education. On the right-hand side of the chart, the picture changes: the number of learners in

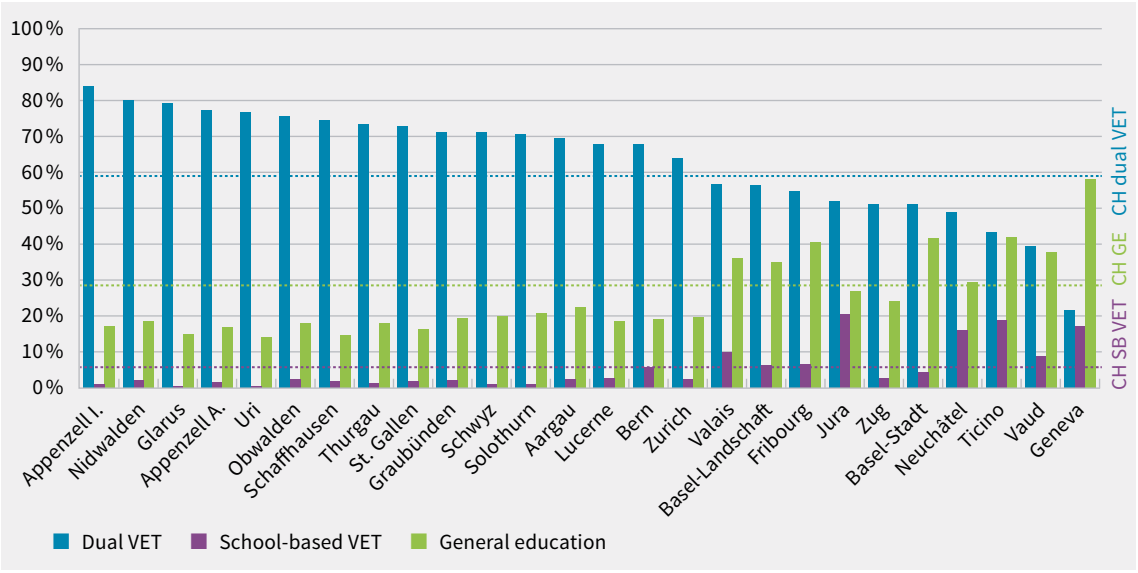

Fig. 5: Relationship between the number of apprentices, full-time vocational school students and general education students and individuals in the age group 15–18 in 2019, in %. Source: FSO (2021).

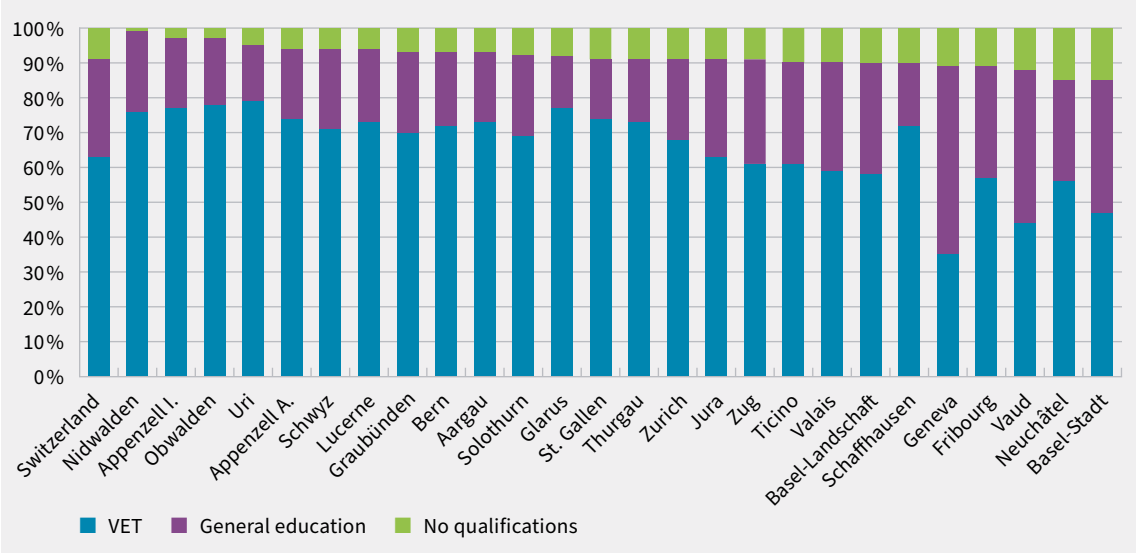

Fig. 6: Upper-secondary level completion rates by canton of residence in 2019. Average ratios from 2018–2020 of young people who obtained their first upper-secondary qualification by age 25 as a percentage of the reference population of the same age. Source: FSO (2021).[48]

dual VET drops, the number of learners enrolled in school-based VET rises, as does the number of pupils enrolled in general education schools. This trend towards school-based education is particularly marked in the Canton of Geneva, where 21.5% of young people are in dual VET (compared to national average: 59.6%) and 58.2% are enrolled in general education (compared to national average: 27.7%).

If we consider cantonal differences in terms of holders of upper-secondary level certificates in persons under the age of 25 (Fig. 6), it becomes clear that cantons with large proportions of young people enrolled in VET also report higher rates of completion of upper-secondary education. Conversely, cantons with a larger proportion of young people enrolled in general education report a higher number of young people who lack an upper-secondary level certificate. This ratio varies from 99% to 1% in the Canton of Nidwalden (72.6% holders of a vocational certificate) and from 85% to 15% in the Canton of BaselStadt (46.5% holders of a vocational certificate).

The origins of cantonal autonomy

The broad contours of the Swiss VET system emerged at the end of the 19th century – a socio-economically and politically complex phase of Switzerland's history. The federal constitution of 1874, which was in force at the time, was strongly federalist and conferred a great deal of autonomy to the cantons – especially with regard to education, crafts and commerce *(Gewerbe).* It is therefore not surprising that the first regulatory frameworks for apprenticeships and VET were enacted by the cantons, which played, and continue to play, a major role in the development of federal VET policies.[49, 50]

The institutionalisation of VET at federal level was a gradual process. In order to avoid conflicts with the cantons, the Confederation pursued a strategy of cautious involvement from the end of the 19th century. This was handled 'with all due caution and consideration for the cantons' claim to cultural policy autonomy'.[51] This prudence on the part of the federal government is also reflected in the scope of the first federal act of 1930 and in the subsequent revisions of this act (1963, 1978, 2002). They are referred to as 'framework laws'[52] and contain mainly general provisions. The details of implementation are left up to the stakeholders involved, mainly to the cantons and to professional organisations.

The Confederation gradually took over a number of tasks relating to the general coordination of VET. However, it always left the cantons a certain degree of institutional autonomy in the implementation of federal provisions.[53] This autonomy, strongly defended by the cantons, led to different designs of **specific cantonal VET policies**. This explains the differences shown in Figure 5.

Differences between Swiss cantons across the linguistic divide

Figure 5 raises another highly complex issue: the French- and Italian-speaking cantons all appear on the right-hand side of the chart, with a share of dual VET well below the national average and a corresponding enrolment in school-based VET and general education well above the national average. Why is that? The differences be-

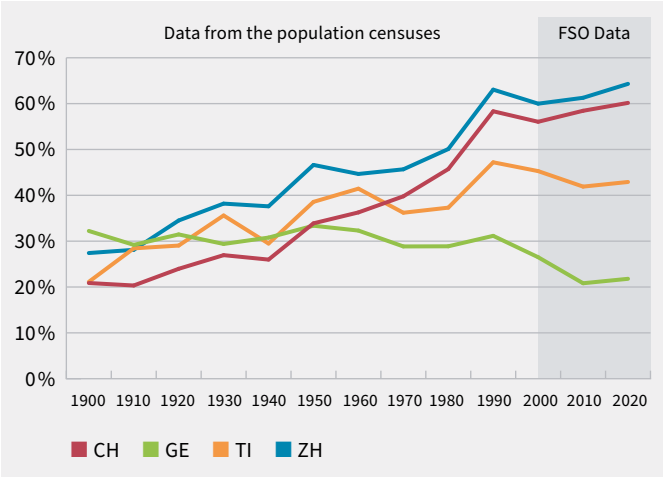

Fig. 7: Development of the proportion of apprentices in dual VET, national average and in the cantons of Zurich, Geneva and Ticino. Sources: Federal Population Census (1900–1990), FSO data 2021 (2000–2019).

tween the German-speaking cantons and the rest of Switzerland are traditionally explained by cultural mindset and the influence that neighbouring countries have had on the respective cantonal education policies. While these factors are undoubtedly relevant, they do not explain how they concretely affect the design of cantonal VET policies. A new study analysing the development of VET between 1950 and 1970 in the cantons of Geneva, Zurich and Ticino sheds fresh light on the origin of cantonal differences (see research project funded by the Swiss National Science Foundation (SNSF) *'L'Evolution de la formation professionnelle en Suisse, entre cadre fédéral et différences cantonales',* PN 100019_179203).[54, 55]

Development of VET in the cantons of Zurich, Geneva and Ticino

The clear differences in prioritisation of different pathways at upper-secondary level emerged in the years 1950 to 1970, i.e. in a period of economic growth and educational expansion.[56] Since then, the proportion of dual VET in the French- and Italian-speaking cantons has always remained below the national average. Figure 7 shows this situation based on data on learners enrolled in dual VET in the Canton of Zurich (blue curve), the Canton of Ticino (orange curve) and the Canton of Geneva (green curve) as well as the national average (red curve). In the first decades of the last century, the proportions of young people enrolled in dual VET were above the national average in all three cantons, after which time they then moved in very different directions. While the Canton of Zurich shows a more or less steadily rising curve above the national average (now above 60%) for dual VET, the corresponding curve for the Canton of Ticino shows a slight initial increase and then the curve falls below the national average from 1970 onwards. The curve for the Canton of Geneva fell below the national average as early as around 1950 and is now considerably lower.

Figure 8 provides further clues to understanding the different trends. It shows the proportional development of enrolment in dual VET, baccalaureate schools and the other full-time schools at upper-secondary level in the three cantons. There are clear differences between the three cantons. It is particularly worth noting that the

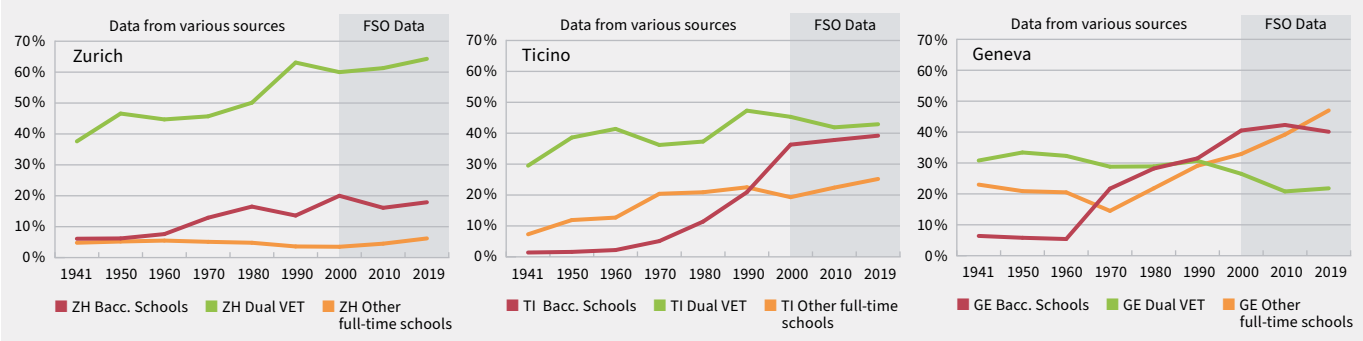

Fig. 8: Development of the proportion of young people aged 15–18 enrolled in different types of upper-secondary education in the cantons of Zurich, Ticino and Geneva. Sources: 1940–1990: Federal Population Census (dual VET), cantonal reports (general education); 2000–2019: FSO data 2021.[v]

proportion of young people attending baccalaureate school (red curve) rises slightly in the Canton of Zurich from the 1960s onwards, while in the Canton of Geneva – and in the Canton of Ticino a decade later – it virtually explodes. It is also clear that the category of 'other full-time schools' (orange curve), particularly full-time technical vocational schools, commercial schools, specialized schools *(Ecoles de culture générale, Diplom-mittelschule etc.)* and teacher training schools, remains well below 10% in the Canton of Zurich, while it is much higher in the cantons of Ticino and Geneva, where this category has also risen sharply again in recent decades. The chart shows that the Canton of Zurich has a more dual VET-oriented education system, whereas the cantons of Ticino and Geneva have a more school-oriented one. The orientation of these two cantons also shows a tendency towards pluralisation of upper-secondary level pathways: while the dual VET system is predominant in the Canton of Zurich, the cantons of Geneva and Ticino have developed an education offering that combines dual VET, baccalaureate schools and other forms of school-based education.

Five factors explain differences in cantonal policymaking

A comparative analysis of developments in these three cantons helps to explain the observed differences. Five areas of differentiation have shaped cantonal VET policies differently: the role played by cantonal authorities, the role played by companies and professional organisations, the role played by vocational schools, the scope of social policy measures relating to VET, and the different weighting of economic, social and educational aims in cantonal VET policies.

Role played by cantonal authorities: From 1950 to 1970, the two French- and Italian-speaking cantons considered in this study took advantage of the autonomy given to them under federal legislation to develop their own specific cantonal VET policies. In contrast, the Canton of Zurich limited itself, so to speak, to implement federal requirements in cantonal legislation. The will to pursue their own cantonal policies can also be seen in how the two French- and Italian-speaking cantons perceive their role in organising the cantonal VET system. In Geneva and in Ticino, the cantonal authorities tend to be the main drivers of the VET system. In the Canton Zurich, instead, the cantonal authorities play a more discrete role, limiting themselves to coordinating and supporting private initiatives.

Role played by companies and professional organisations: In the Canton of Zurich, the commitment of private stakeholders (companies and professional organisations) to workplace training in dual VET programmes is deemed adequate and appreciated accordingly. The situation is quite different in the two French- and Italian-speaking cantons: there, private stakeholders are criticised for not being sufficiently committed to the VET system, as reflected in a lower levels of company participation in VET to date.[57] This helps to explain why the cantonal authorities play a more active role within the VET system. During the period considered in this study, the cantonal governments of the two French- and Italian-speaking cantons took steps to encourage the more active involvement of companies (by establishing a tripartite committee) or to compensate for their insufficient engagement in workplace training (by creating and expanding full-time cantonal vocational schools).

Role played by vocational schools: From 1950 onwards, the cantons of Geneva and Ticino strongly emphasised the importance of theoretical and general knowledge contents taught in a school context. At the same time, the dual VET model was explicitly criticised. These two elements led to the development of baccalaureate schools, commercial schools, specialized schools and full-time technical vocational schools. Moreover, within the federal regulatory framework, the number of hours spent by apprentices at vocational school was also increased. In Zurich, on the other hand, the dual VET model enjoyed more widespread support. Calls for more general educational content focused primarily on the development of the *"Berufsmittelschule"* a programme that targeted only an elite of particularly academically stronger profiles among young people choosing apprenticeship and that facilitated the transition to higher technical education.

Scope of social policy measures relating to VET: In the 1960s, a broad discussion about the democratisation of education and training began in Switzerland. While the issue was addressed in all cantons, these debates had very different influences on the respective policies of each canton. The cantons of Geneva and Ticino introduced measures to provide the broadest possible access to high-quality education and training at upper-secondary level – in particular by facilitating access to general education for all young people. Various measures were also taken to reduce discrimination on the basis of geographical or social origin: a uniform (comprehensive) lower secondary level was established; upper-secondary education became free of charge; and cantonal subsidies and scholarships were generously provided. In the Canton of Zurich, in contrast, policy debate on democratisation had less of a concrete impact on the education system. A strong selection at lower-secondary level has been maintained and quotas restricting access to baccalaureate schools are still in place. Moreover, it also took longer in the Canton of Zurich for all forms of upper-secondary education to become free of charge. Finally, it was not until the mid-1970s that financial support in the form of subsidies and scholarships developed.

Purpose of VET: In all three cantons, the VET system is intended to help satisfy employer demand for skilled workers and to improve the level of education and training of the population. Individual cantons, however, interpreted these objectives very differently. In the Canton of Zurich, socioeconomic aims were the main focus: VET was meant to ensure entry into the labour market and help to satisfy employer demand for skilled workers. Only by integrating young people well into working life would it be possible for VET to contribute to social development. In the cantons of Geneva and Ticino, however, the focus was more on social and educational aspects: VET was seen as a stage in life intended to complete the general knowledge and aptitudes developed during compulsory education. Young people were to receive a good general education, which could then serve as the foundation for subsequent specialisation. It was also considered to be a stage where, under the control of the State, equal opportunities and general knowledge must be ensured for all young people.

Conclusions

The evidence presented in this chapter allows us to identify cantonal differences in upper secondary education in Switzerland and to understand their historical origins. In addition, based on an exemplary analysis of three cantons, it provides a key to interpreting the 'cultural' differences between the cantons, and relating these to differences in VET policies, which diverge mainly in terms of the five dimensions presented above.
All cantons today place greater emphasis on classroom instruction and general education content. In the French- and Italian-speaking cantons, however, this preference is more firmly expressed. In these cantons, the share of dual VET has diminished in favour of school-based options at upper-secondary level, whether it be general education (baccalaureate schools and specialised schools) or school-based VET (full-time vocational schools, commercial schools, etc.). This development has led to a pluralisation of the educational options at upper-secondary level, which reflects the political will of the French- and Italian-speaking cantons to develop a unified policy for upper-secondary level where baccalaureate schools, full-time vocational schools and dual VET are all intended to provide a satisfactory level of education and training. The German-speaking cantons of Switzerland, on the other hand, seek to preserve the distinctive features of dual VET and maintain it as a valid alternative to the general education pathway, particularly to baccalaureate schools. That being said, upper-secondary level completion rates for young people up to the age of 25 demonstrate that cantons showing a greater predilection for general education pathways tend to have a higher proportion of young people who lack upper-secondary level certification than cantons where dual VET is the most popular pathway.

4 PLURALISATION AND GREATER EMPHASIS ON CLASSROOM INSTRUCTION IN DUAL VET PROGRAMMES: DEVELOPMENTS SINCE 2003

Brief overview

- The approximately 250 occupations covered in the dual VET system differ both in terms of training content, the proportion of classroom instruction and in terms of the proportion of FVB holders.
- Generally speaking, dual VET programmes where a relatively large proportion of training content is allocated to classroom instruction have tended to become even more classroom-based over the last 20 years. In addition, more learners are completing vocational baccalaureate school.
- More and more learners are completing training in dual VET programmes for occupations where there is a high proportion of classroom instruction.
- More than half of the occupations and specialisms have a high proportion of workplace training and a low proportion of FVB holders. These occupations help to facilitate the integration of less scholastically inclined learners in VET programmes leading to the Federal VET Diploma.
- The growth of the services sector and the qualification requirements combined with increasing use of technology will presumably lead to a future increase in the significance of dual VET programmes with greater proportions of classroom instruction.

Two areas of tension in dual VET

Although VET is structured differently in each canton, as the previous chapter shows, dual VET remains the predominant form of VET in Switzerland. Around 90 % of learners complete a dual VET programme. This means that they spend three to four days doing workplace training at a host company or attend branch courses. The rest of the time is devoted to classroom instruction at a vocational school.[40] The impetus for development of the dual VET model came about as skills requirements on the labour market increased during the period of industrialisation. At the start of the 20th century, classroom-based components were integrated into the compulsory training period and then steadily increased over the decades.[58] This development, however, has always been controversial and debated.[6] Accordingly, the relationship between practice (workplace training at the host company) and theory (classroom instruction at the vocational school) in VET is still an area of tension today.

Another area of tension is the amount of importance given to general education, including language, communication and society (LCS) subjects in VET programmes, which is repeatedly discussed.

In previous decades, it was felt that there was a need for moral and civic aspects to be taught in general education.[6] The current debate focuses more on the need to broaden basic skills and encourage the acquisition of transferable skills.[40, 59] The latter include basic IT skills, communication or problem-solving skills, which have become more important due to several factors such as technological progress, the structural transformation of the economy and heightened skills requirements on the labour market.[60] One outcome of these debates was the introduction of the federal vocational baccalaureate and its increasing importance.[6] The federal vocational baccalaureate complements the Federal VET Diploma (FVD) by providing learners with a general education qualification that entitles them to enrol in a Swiss university of applied sciences.

Heterogeneity also within dual VET

Although the dual VET model and the FVB are firmly established, proportions of classroom instruction and the status of the FVB differ considerably among VET programmes for the various occupations. In the following paragraphs, these differences in dual VET programmes and how they have evolved over the last 20 years to the present day will be examined more closely. The level of importance given to classroom instruction for a given occupation is reflected in the average number of school lessons taught per training year. In occupations where learners spend more time at vocational school, a proportionately greater level of importance is given to theoretical knowledge and skills that can be used more generally in other companies and occupations. At the opposite end of the spectrum, when learners spend a lot

Fig. 9: Proportion of FVB holders and school lessons by training programme and specialism (N = 251). The larger the dot, the more occupations and specialisms are found in this position. Sources: own chart based on Grønning et al. 2018[61] and FSO data from 2022[62].

of time doing workplace training at a host company, we find that greater importance is given to the practical aspects of training. The ratio of FVB to FVD holders per occupation indicates the level of pluralisation of a VET programme and the extent to which different forms of training are combined.

Fig. 9 shows the differences between current VET programmes (including specialisms). The vertical axis shows the proportion of FVB holders for the given occupation, the horizontal axis shows the number of school lessons per training year. The distribution of points illustrates the considerable differences between occupations. In 2020, between 320 and 600 lessons per training year were taught at vocational schools, depending on the occupation considered.

Different developments in dual VET

The proportion of FVB holders varies between zero and just under 80%. For example, for the shoemaker (FVD) occupation, little time is spent in the classroom and there are virtually no FVB holders. This situation is inversed for the physics laboratory technician (FVD) occupation, where we find much more classroom time and a large proportion of FVB holders.

In order to shed light on different developments in VET, we examined the change in proportions of FVB holders and volume of school lessons between 2003 and 2020 and present the results in Fig. 10. The right-hand side of the chart in the positive area of the y-axis, shows the occupations (and specialisms) for which the volume of school lessons or the proportion of FVB holders has increased. Occupations for which there was a decrease appear on the left-hand side in the negative area. Firstly, it can be stated that most training programmes have experienced a trend towards pluralisation. The proportion of FVB holders has increased in 86% of the occupations and specialisms. However, the differences between occupations are quite noticeable. While the proportion of FVB holders in the mediamatics technician (FVD) occupation has increased by 26 percentage points, the proportion in the dairy technologist (FVD) occupation has decreased by three percentage points. Secondly, Fig. 10 shows that, unlike what we have seen

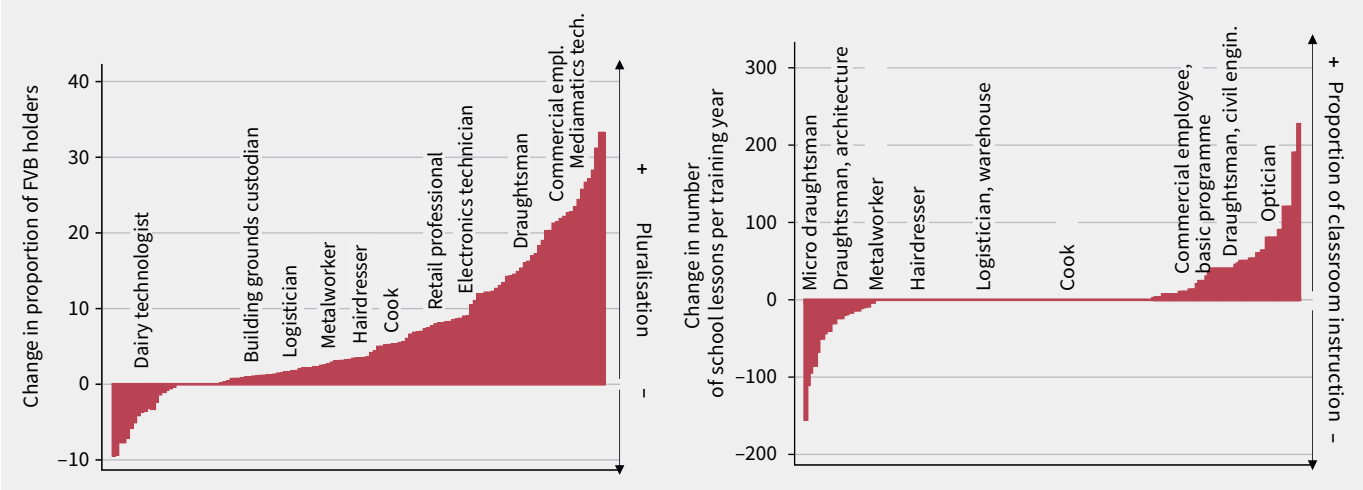

Fig. 10: Changes in the proportion of FVB holders (N = 235/215) and vocational school lessons (N = 231/205) between 2003 and 2020 by training programme and specialism. Sources: own chart based on Grønning et al. 2018[61] and FSO data[62]. Example: for the hairdresser (FVD) occupation, the proportion of FVB holders increased by four percentage points between 2003 and 2020, while the number of school lessons remained the same.

with the federal vocational baccalaureate, the proportion of classroom instruction has remained stable in over half (58%) of the occupations and specialisms since 2003. 29% of the occupations and specialisms experienced an increase in the proportion of classroom instruction between 2003 and 2020. This proportion decreased in only 13% of the occupations and specialisms – and those changes were only slight in most cases.

Four groups of occupations

In order to be able to better classify developments within the Swiss VET sector, training programmes and specialisms were first divided into four groups based on two criteria: 'proportion of FVB holders' and 'number of school lessons' in 2003. The following distinctions can be drawn between training programmes, which nearly twenty years ago were: 1) not very classroom-based and with little pluralisation 2) not very classroom-based but with a higher than average level of pluralisation, 3) medium to strongly classroom-based but not much pluralisation and 4) medium to strongly classroom-based and above average level of pluralisation (see Data and methodology below). The second step was to determine the average changes taking place in these four groups between 2003 and 2020. This grouping and analysis show the corresponding trends in VET, which are depicted in Fig. 11.

Group 1 – Dual VET programmes with a high proportion of workplace training and a low proportion of FVB holders

The occupations in Group 1 comprise two-thirds of all VET programmes (N = 129). This group had a high proportion of workplace training and a low proportion of FVB holders 20 years ago. We find that the occupations in this group are highly stable and have maintained their initial orientation. The largest occupations in this group are car mechanic (FVD), hairdresser (FVD), dental assistant (FVD), gardener (FVD), cook (FVD), electrician (FVD), logistician (FVD) and carpenter (FVD).

In 2003, an average of 4% of learners from the occupations in this group obtained an FVB. The proportion of FVB holders has since doubled to 8%. However, the FVB is much less firmly established in this group than in the other three groups. With an average of 375 school lessons per training year and four days of workplace training at the host company per week, these occupations and specialisms today offer comparatively little classroom instruction and remain strongly workplace training-oriented. The slight average increase in school lessons per training year since 2003 is mostly due to only seven niche occupations and specialisms that experienced a very strong increase of 100 or more school lessons.

Group 2 – Dual VET programmes with a high proportion of workplace training and FVB holders

Group 2 includes only four training programmes and specialisms: architectural mockup designer (FVD), land surveyor (FVD), fabric designer (FVD) and engraver (FVD). These were very workplace training-oriented 20 years

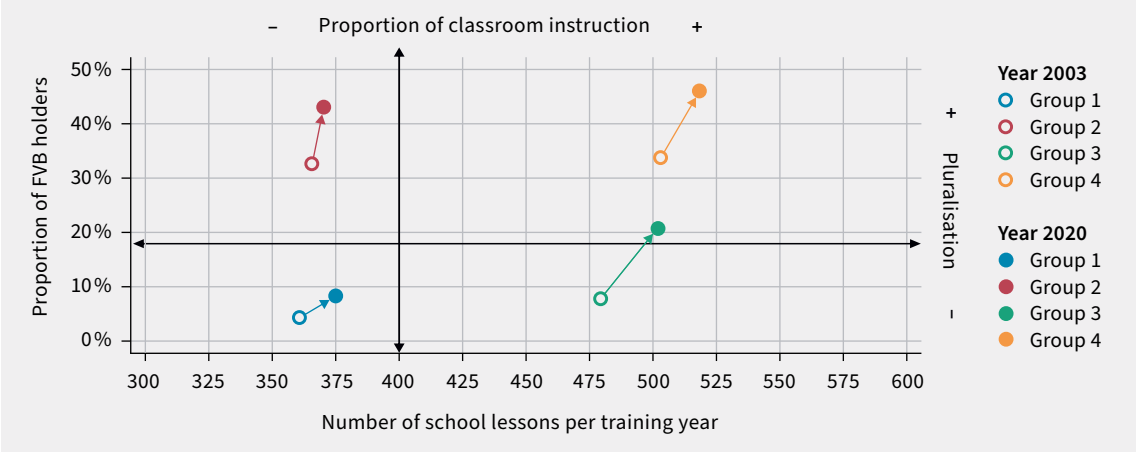

Fig. 11: Pluralisation and proportion of classroom instruction in VET – change between 2003 and 2020. N = 228/202. Sources: own chart based on Grønning et al. 2018[61] and FSO data[62]. The horizontal line refers to the average proportion of FVB holders in 2003. The vertical line distinguishes between occupations where proportions of classroom instruction were comparatively lower and those where the proportions were medium or high (see Data and methodology below).

ago with a low proportion of classroom instruction and a lot of time spent at the host company. Nevertheless, they also had a reasonably large proportion of FVB holders back then. The workplace training orientation has remained relatively unchanged over the last 20 years. The proportion of FVB holders has increased significantly, from about 33% in 2003 to 43% in 2020.
In these occupations, there has been a clear trend towards pluralisation of training.

Group 3 – Dual VET programmes with a medium proportion of classroom instruction and a low proportion of FVB holders
Group 3 comprises just under one-fifth of the training programmes (N = 38). Most of the occupations in this group had an average proportion of classroom instruction and a low proportion of FVB holders in 2003. The proportion of FVB holders rose sharply in this group thereafter, on average from 8% to 22%, which is the highest increase observed in all four of the groups considered. The proportion of classroom instruction also increased on average more than in any of the other groups. The time devoted to workplace training at the host company fell over the same period. All in all, these occupations are characterised by pluralisation of training and by higher proportions of classroom instruction. This group includes, for example, the occupations of retail specialist (FVD), electrician (FVD), healthcare assistant (FVD) and medical assistant (FVD).

Group 4 – Dual VET programmes with a high proportion of classroom instruction and FVB holders
The training programmes in Group 4 had on average a high proportion of FVB holders and the highest proportion of classroom instruction in 2003. In this group, 16% of the occupations and specialisms are represented (N = 31). Since 2003, the proportion of FVB holders has continued to increase, on average from 34% to 46% in 2020. The amount of time spent in the vocational school has also increased. At the same time, the amount of time devoted to workplace training at the host company has fallen slightly. These occupations thus have the lowest proportion of workplace training of the four groups and have experienced the highest level of pluralisation. Large occupations in Group 4 are information technologist (FVD), commercial employee (FVD), mechanics (FVD) and draughtsman (FVD).

Overall, the results indicate a certain segmentation of training programmes and specialisms. On one end of the spectrum, there are occupations with higher proportions of classroom instruction and a substantial increase in the proportion of FVB holders (Group 3 and Group 4). On the other end, there are occupations with low proportions of classroom instruction and a low level of pluralisation (Group 1). The small occupational group where a low proportion of classroom instruction is combined with a high proportion of FVB holders (Group 2) shows that exceptions to the general rule are also possible. In other words, emphasis on workplace training and a large proportion of FVB holders are not necessarily mutually exclusive. Further analyses show that occupations with higher proportions of classroom instruction and FVB holders tend to have significantly higher competence requirements[63]. This suggests that the level and development of classroom instruction and proportion of FVB holders are correlated with increasing skills requirements in these occupations.

Increasing prevalence of dual VET programmes with a higher proportion of classroom instruction

Learners are unevenly distributed across the four groups of occupations. In 2020, more than half (56%) of learners pursued training in an occupation with a comparatively high proportion of classroom instruction (Groups 3 and 4), although these two groups account for only 27% of the total number of occupations and specialisms. The stable workplace training-oriented Group 1, on the other hand, which comprises half of all occupations, currently trains only about one-third (32%) of learners. This means that learners are more likely to pursue an occupation where there is a higher proportion of classroom instruction than one where there is a lower proportion of classroom instruction. This tendency has intensified over the last 20 years, as indicated by further analyses not presented here.
Compared to twenty years ago, a larger proportion of learners now attend VET programmes with high proportions of classroom instruction and medium to high skills requirements. The growth of the services sector and the average skills requirements as well as the increasing prevalence of technology have presumably led to an increasing prevalence of dual VET programmes with a higher proportion of classroom instruction. This means that dual VET is adapting to the structural transformation of the economy.
It is also worth noting that the trend towards higher proportions of classroom instruction and more FVB holders is limited to about half of the occupations that already had a comparatively high proportions of classroom instruction and/or FVB holders 20 years ago. The other

half of the occupations have maintained a clear predilection for workplace training and have low proportions of FVB holders. These latter occupations are also characterised by lower average competence requirements. It can be assumed that this group of occupations plays an important role in helping young people with lower scholastic performance to enrol in VET programmes leading to the Federal VET Diploma. At the same time, the consistently high workplace training orientation of these VET programmes raises the question of whether graduates will be sufficiently able to cope with rapidly changing skills requirements in the future. Previous research shows that VET programmes with a comparatively high proportion of classroom instruction are not only associated with higher proportions of FVB holders, but also with more frequent transitions to tertiary-level professional education.[11, 64] The importance of vocational schools for the future of VET should therefore not be underestimated.

Data and methodology

Data basis and sample: Our analysis is based on the VET ordinances and training plans of all occupations and specialisms leading to a Federal VET Diploma that were in force from 2003 onwards (601 documents in total). These VET ordinances and training plans specify the number of lessons to be devoted to general education (language, communication and society, LCS), vocational instruction and physical education at the vocational school. They also specify the amount of time that learners must spend doing their workplace training at the host company.[61] For analysis of changes made to VET programmes since 2003, the present study considered occupations for which information on the proportion of FVB holders and volume of school lessons is available for the entire observation period (N = 228 in 2003 and N = 202 in 2020).

Methodology: Because VET ordinances and training plans are reviewed and revised at approximately five-year intervals, information is available for most occupations (incl. specialisms) for several time points. This makes it possible to record changes in the number of school lessons (vocational instruction, LCS, physical education) and the amount of time learners spent doing workplace training at the host company from the year 2003 onwards. Lessons devoted to preparation for the federal vocational baccalaureate examination during training (FVB1 option) were not counted, as these are only relevant for a small proportion FVB1 learners. Occupations with fewer than 400 school lessons per training year were defined as not very classroom-based. Occupations with 400 to 600 school lessons per training year are defined as medium to strongly classroom-based.

The indicator for pluralisation of training for a given occupation (i.e. the proportion of FVB holders) is based on data from the Federal Statistical Office (FSO). The ratio of holders of the Federal Vocational Baccalaureate (FVB1 + FVB2) to holders of the Federal VET Diploma for each training programme[vi] is calculated using three-year moving averages (2000–2003 vs. 2018–2020). This ensures that the change is not based on random peaks between individual years. The average proportion of FVB holders is used to determine the level of pluralisation (high or low) of training for the given training programme. In 2003, on average across all occupations, 18% of holders of the Federal VET Diploma also obtained an FVB. Occupations with a proportion of FVB holders below 18% were defined as having a low level of pluralisation and occupations with a proportion above 18% as having a high level of pluralisation.

The calculation of changes up to 2020 is based on average values. The development of individual occupations within the four groups may deviate slightly from the average. In order to describe the four groups, the average competence profiles in the areas of mathematics, natural sciences and language[63] were used.

5 CONCLUSIONS: CHALLENGES AND POTENTIAL FOR VOCATIONAL EDUCATION AND TRAINING IN SWITZERLAND

Switzerland, alongside Germany and Austria, belongs to the category of countries with collective VET systems. These are now considered as best practice models in Europe due to high employment rates among youth and young adults.[65] Chapters 1 and 2 show, however, that most countries with collective VET systems have prioritised general education, which has led to a reduction in the proportion of young people enrolling in VET, particularly dual VET. Unlike Switzerland, Germany, for example, has reported an increase in the number of holders of the *Abitur* (its main university entrance qualification). At the same time, new hybrid pathways are being developed that combine VET and general education. The aim of these reforms is to better prepare young people for the challenges arising from technological, economic and social changes and the accompanying structural transformation.

Switzerland a prime example of a distinctive VET system?

Within Europe, Switzerland is currently the only country where the absolute majority of young people coming out of lower-secondary education enrol in a dual VET programme. This distinctive positioning with a clear distinction being drawn between VET and general education creates a certain need for explanation both at home and abroad. It also masks the fact that education policymaking varies greatly within Switzerland. Today, for example, there are major differences between the cantons in terms of the balance between VET and general education pathways, which only developed from around 1970. This great cantonal diversity can be seen as a strength of federalism because the freedom of action enjoyed by the cantons allows them to try out new ideas; at the same time, however, it is doubtful that such diversity can continue in the long term. The status and function of VET differ so much from one part of the country to another that finding nationwide solutions is likely to become increasingly difficult.

In Switzerland, there are also major differences in the structure of individual VET programmes. Depending on the occupation in question, learners may attend twice as many lessons at vocational school as learners in other occupations. VET programmes also vary in terms of the proportion of learners who prepare for the FVB, either during their training (FVB1 option) or after graduation (FVB2 option). Over the past 20 years, the number of learners has increased, especially in VET programmes where a greater portion of training content is allocated to classroom instruction. The proportion of FVB holders has also risen considerably during this time. Thus, classroom instruction and general education components in VET programmes have become increasingly important in Switzerland.

Clear strengths …

The strengths of the Swiss education system are undisputed. Its well-developed VET system is closely aligned with the needs of the labour market and professional practice. This makes it easier for young people to enter the labour market and helps to ensure that a large number of young people obtain an upper-secondary level qualification, as noted in international comparisons. Moreover, at relatively low cost to taxpayers, VET programmes are able to provide young people with the knowledge and skills that are in demand on the labour market.

Swiss baccalaureate schools are the main source of enrolment for Swiss traditional universities, which compare very well in international university ranking lists.

… and fresh challenges

As in every education system, there is room for improvement despite these strengths. Specific aspects of collective VET systems have also been criticised in foreign and domestic research. For one thing, the large number of stakeholders involved leads to a certain sluggishness of such systems.[20] The strong focus on vocational learning also limits the time available for general education content. The optimal balance between VET and general education is therefore the subject of intense debate. Research using data from international performance assessments of adults seems to confirm that holders of upper-secondary vocational qualifications are more likely to be employed and earn more at the beginning of their careers than holders of general education qualifi-

cations. At the same time, however, this trend may invert as careers progress.[66, 67] And it is precisely the long-term employment prospects that are a key measure of a good education system. This is because skills requirements change rapidly.

Generally speaking, the employment and earnings prospects of young people who complete upper-secondary education and training in Switzerland are favourable, whether they hold vocational or general education qualifications.[68–70] Nevertheless, the balance between VET and general education as well as the balance between classroom instruction and workplace training within VET programmes must be constantly reviewed and readjusted. This includes casting a critical eye on the major differences seen in both the general education and VET sectors (e.g. between different academic subjects in the case of general education and different occupational fields in the case of VET) and examining the potential for improvement in areas where performance is below average.

International and intercantonal developments show how education systems have adapted over time to technological progress (automation and digitalisation processes) and to structural change towards a service- and knowledge-based economy. The challenge for the future is therefore to enable the Swiss education system to evolve in a way that preserves its inherent strengths while still taking new developments into account. Given the complex interdependencies, the recommendations formulated below should not be taken as simple recipes to be followed. Instead, they are intended as food for thought for an open debate on the future and optimisation potential of our education system.

Review admission requirements for VET and general education

In a system where there is a clear separation between general education and VET pathways, proper management of the flow of young people to these two pathways is crucial. The trend towards higher-level qualifications, combined with the strong demand for skilled workers in various occupational fields, makes it more difficult for young people and companies to adjust their initial education and training decisions via detours. This is particularly true for Switzerland, where admission to academic baccalaureate schools is very restrictive in many cantons compared to other countries. Good admission practice should fulfil the requirement that all young people can choose the education and training pathway that suits them best on the basis of their abilities and personal motivation. Young people whose abilities and interests make them eligible for both pathways should enjoy equivalent career prospects regardless of the pathway that they choose. And they should not be restricted in their choice by institutional constraints or social norms. It is a largely open question, which should be investigated, whether the current mechanisms i.e. admission procedures for baccalaureate schools and applying for apprenticeships on the apprenticeship market – actually come close to this ideal.

International comparisons suggest that countries with stronger VET systems offer their young people better labour market entry prospects. However, the large cantonal differences observed in Switzerland suggest that there is no single correct model. Cantons with higher levels of enrolment in baccalaureate schools tend to have upper-secondary completion rates below the national average. These cantons should therefore find ways to make dual VET a more appealing option for both companies and young people. Conversely, cantons with low levels of enrolment in baccalaureate schools should consider whether their admission procedures truly offer a fair chance to all young people. In other words, are pupils admitted to baccalaureate school purely on the basis of their academic merit and personal motivation or do other factors come into play such as their socio-economic background?

(Further) increase the proportion of holders of upper-secondary level qualifications

With an upper-secondary level completion rate of 91% (both VET and general education combined), Switzerland compares quite well with other countries. Nevertheless, this also means that there are still around 9% of young people who do not obtain an upper-secondary level qualification by the age of 25.[71] Since the labour market offers progressively fewer prospects for people

without such qualifications, the focus of education policy should remain on the low-skilled category. This includes young people who, despite the introduction of low-threshold two-year VET programmes leading to a Federal VET Certificate, are still unable to find a suitable apprenticeship after completing lower-secondary education. Other young people are unable to find an alternative solution after early termination of their apprenticeship contract or after failing the qualification procedure. Since many of these young people performed poorly in school or face other disadvantages, they also have no means of gaining access to upper-secondary level general education. Some young people drop out of upper-secondary school without graduating. For these groups of young people there is a gap in the education system. One possible reason for this gap is the fact that, apart from the Canton of Geneva, young people are only legally required to remain in school until the age of 16. In contrast, young people in Germany and Austria are (generally) required to remain in school until the age of 18.

Switzerland's formerly prevalent 'tenth school year' (i.e. a bridge year between the end of lower-secondary school and the start of upper-secondary school) has also now been repositioned in many cantons as a transitional option intended only for young people who do not manage to find a suitable apprenticeship immediately after completing lower-secondary school. This raises the question of whether an alternative solution might not be a combination of several measures: increasing the age at which young people must remain in school, creating additional school formats and providing targeted support for young people who are at risk of not obtaining an upper-secondary vocational or general education qualification.

Optimise the level of permeability between VET and general education

In promoting successful careers, Switzerland relies on the principle of 'no dead-end qualifications', which means that each qualification awarded opens the door to subsequent training options. However, this principle does not guarantee full permeability between VET and general education pathways. Holders of the Federal VET Diploma face serious obstacles if they wish to gain admission to traditional universities (first they need to obtain the FVB and then afterwards take the University Aptitude Test). Conversely, holders of an academic baccalaureate do not readily gain admission to Swiss universities of applied sciences (UAS). They too are subject to certain additional requirements. Also worth mentioning are the unclear permeability rules between Switzerland's universities and the professional education sector and even between the different types of universities (TUs, UAS, UTEs). These de facto barriers mean that most young people remain either on the vocational or on the general education pathway that they embarked on at upper-secondary level.[13] This is a problem because a person's socio-economic background (i.e. parental home) also has a bearing on his/her access to education and training pathways. This state of affairs is not conducive to equal opportunities. It is worth considering the fact that limited permeability is also disadvantageous from an economic standpoint, as it hinders the flexible adaptation to labour market demand.

The example of Germany shows that permeability could be enhanced through greater flexibility. For example, certain *Aufstiegsfortbildungen,* which are roughly equivalent to the tertiary-level courses attended in Switzerland to prepare for the advanced federal professional examination (AFPE), are also a university entrance qualification. Moreover, holders of vocational qualifications with adequate work experience may also gain admission to German universities at least for study programmes relating to their occupational field. Likewise, holders of the *Abitur* are freely able to enrol in a German university of applied sciences. The effective permeability of the Swiss education system could thus be further enhanced. This issue remains a relevant one for education policymakers.

Introduce hybrid forms of training to create more options and pathways

Several European countries have introduced hybrid forms of education and training to bridge the gap between workplace training and classroom instruction. The aim is to achieve the best of both worlds through creative combinations. Switzerland introduced a hybrid

learning format at upper-secondary level when it launched the federal vocational baccalaureate (FVB). This is an optional general education qualification that may be pursued either by attending a vocational baccalaureate course in parallel to their training (FVB1 option) or do so after graduation (FVB2 option). Learners who pass the FVB examination are entitled to enrol in a Swiss university of applied sciences (UAS). This model has been quite successful, as attested by the steadily increasing numbers of FVB holders, which over time has also helped to boost UAS enrolment figures. At present, though, the proportion of FVB holders has stagnated.[72]
A further source of concern is the growing preference among young people for the FVB2 option over the FVB1 option. When learners attend the FVB course after graduation (FVB2 option), the total duration of education at upper-secondary level increases. Such delays are less desirable in a context of rising demand for university graduates. In the absence of political will to increase the proportion of academic baccalaureate holders, an increase in the numbers of university graduates would require opening up university admission to a larger proportion of holders of vocational (and to a lesser extent specialised) baccalaureates.[13]
The FVB enhances the appeal of vocational education and training for more scholastically minded young people, thus bolstering the reputation of VET. If the strengths of the dual VET system are to be maintained, particularly given structural changes and heightened skills requirements, VET needs to be an appealing pathway for different groups of young people. The FVB should therefore be developed further with the support of host companies and professional organisations. It is worth noting, however, that the FVB1 option does not generate the same cost-benefit ratio for host companies as the FVB2 option because the former entails additional school lessons during the training period, which reduces the number of hours spent doing productive labour at the workplace.
The potential of new hybrid forms of training should also be explored. In Switzerland, for example, study programmes at universities of applied sciences are usually organised on a full-time basis or part-time alongside employment. In Germany, on the other hand, there are various types of hybrid "dual" study programmes.
In some of these programmes, a professional qualification is awarded alongside a Bachelor's degree.[31] Such programmes could offer holders of university entrance qualifications a viable alternative to studies at a traditional university. Moreover, the professional training provided in these hybrid study programmes may also appeal to holders of vocational qualifications.

Support the acquisition of transferable skills and lifelong learning

In view of the rapid changes taking place in labour markets, education and training must allow people to reorient themselves whenever the need arises. For one thing, this means greater emphasis must be placed on the acquisition of skills that can be used in a variety of different contexts. Hence, we refer to such skills as transversal or transferable skills. For another thing, people need to be able to access subsequent levels of training as well as lifelong learning in order to adapt more readily to new skills requirements.
Personal, methodological and social skills are already a core part of VET programmes. However, greater support can be provided to further improve acquisition of these transferable skills.[59] To this end, the various work situations considered when training young people for a given occupation should not be too narrowly focussed only on the working realities that learners will encounter when they enter the labour market. Instead, attention should also be paid to how these working realities will evolve in the future. In Germany, VET programmes are mostly process-oriented specifically for this reason.[73] There is always a risk that individual vocational skills will become obsolete as technology advances. Therefore, a conscious effort must be made to familiarise learners with entire processes. In engineering, for example, this means not only completing individual production steps, but also becoming involved in plant maintenance, including fault detection and troubleshooting, as well as in process optimisation.[74] This develops their ability to think holistically, taking interconnected systems into account. Thinking in this manner requires not only the relevant technical expertise, but also the ability to work with internal and external partners and use suitable personal, methodological and social skills. If learners fully know and understand the processes that are rele-

vant to their occupation, they can help shape future changes in production processes rather than find themselves at the mercy of them.

Classroom instruction at vocational schools also helps to prepare learners for new activities after graduation as well as for tertiary education and lifelong learning.[11, 64] Given heightened skills requirements on the labour market, a greater proportion of training content in dual VET programmes could be allocated to classroom instruction at the expense of workplace training. However, the drawbacks associated with a large proportion of classroom instruction allow us to better appreciate the conflicting goals within dual VET.

For one thing, increasing the number of hours of classroom instruction invariably means less time that learners will have to work in the host company. This reduces the cost-benefit ratio that host companies derive from apprenticeships. If this ratio deteriorates, there is a risk that some companies will no longer offer workplace training. At the same time, young people who do not perform well in school or who are tired of attending school are less likely to enrol in a VET programme that places higher academic standards on them. And this creates an integration problem. That said, preparing the next generation of skilled workers also means that both learners and the industries concerned have an interest in maintaining learner ability to pursue higher levels of education and training, including classroom-based forms. Therefore, development of training content and programmes for specific occupations should always take into account the future training needs of young people after graduation and pave the way for this, whether it be subsequent tertiary-level professional education, the FVB, or other forms of lifelong learning.

Conclusion

The Swiss VET system has clear strengths. However, this trend report has also shown that rapid changes in the labour market continue to challenge the education system and especially the relationship between VET and general education. The trend towards higher levels of education and training is increasingly limiting the employment prospects of low-skilled workers who lack upper-secondary level qualifications. Efforts are also needed to ensure that those who hold only an upper-secondary level qualification do not experience a worsening of their career prospects. Analyses of average employment figures and median wages still indicate a positive job outlook for holders of upper-secondary VET and general education qualifications. However, such results can only be sustained if the education system continuously adapts to new circumstances and requirements. Averages can also mask underperforming groups in different parts of the education system. Therefore, the appeal, balancing and design of all educational pathways should be continuously reviewed and adapted to changing conditions. Experiences from other countries, in different cantons and in certain occupations can offer valuable insight into further development of VET and general education and how best to balance the two.

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NOTES

i See article published in Tagesanzeiger daily newspaper dated 10 March 2017; https://www.tagesanzeiger.ch/leben/gesellschaft/ich-plaediere-fuer-eine-matura-fuer-alle/story/21514215, last viewed on 29 March 2022.

ii See https://www.zentralplus.ch/wirtschaft/luzerner-gewerbeverband-fordert-tiefere-gymi-quote-2219381, last viewed on 29 March 2022.

iii Chapter 2 refers to research conducted by: Dionisius, Regina; Illiger, Amelie; Kriesi, Irene; Neumann, Jörg & Müller, Marianne (2022). 'Der Trend zu höheren Bildungsabschlüssen in Deutschland und der Schweiz' (Trend towards higher-level qualifications in Germany and Switzerland, in German only). Working Paper, Federal Institute for Vocational Education and Training BiBB and Swiss Federal University for Vocational Education and Training SFUVET.

iv The data for Germany differ from the results presented in Chapter 1: Firstly, the definition of what constitutes a dual VET programme differs from one data source to another. International comparative statistics define a VET programme as 'dual' if at least 25% of training content is allocated to workplace training. In contrast, the national data on Germany used in Chapter 2 define a VET programme as 'dual' if there are two different learning locations where training takes place, namely a host company (for the workplace training portion) and a vocational school (for the classroom instruction portion). Secondly, Figures 1 and 2 refer to learners, whereas the calculations in Chapter 2 are based on qualifications.

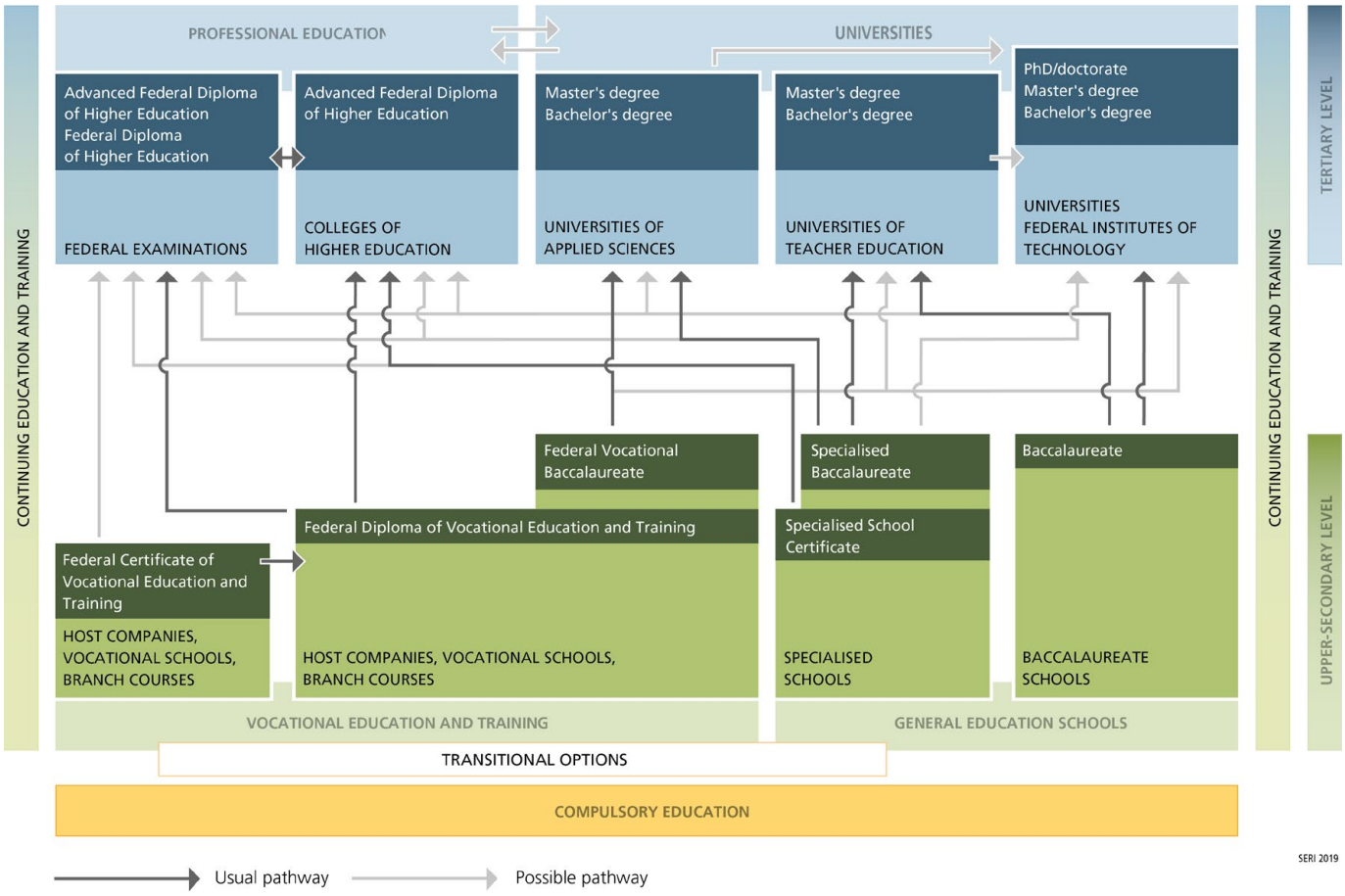
v See Gonon & Bonoli 2021 for a presentation of the same data.[1] The data on baccalaureate schools and other schools between 1940 and 1990 were taken from cantonal statistical databases, some of which are difficult to compare. In the case of the Canton of Zurich, for example, there is no centralised source of data on full-time technical vocational schools. However, these are likely to account for less than 1 per cent of the schools attended by the age group considered. See https://transfer.vet/bildung-etwa-doch-ein-polenta-und-roestigraben

vi Given the insufficient data, it is not possible to determine the exact proportion of FVB holders for each individual specialism.

ABBREVIATIONS

FSO	Federal Statistical Office
FVB	Federal vocational baccalaureate
FVB1	Vocational baccalaureate school, preparing for FVB examination during training
FVB2	Vocational baccalaureate school, preparing for FVB examination after completion of training
FVD	Federal VET Diploma
UAS	University of applied sciences
SB	Specialised baccalaureate
SUS	Specialised upper-secondary school
AB	Academic baccalaureate
PE	Professional education
STEM	Science, technology, engineering and mathematics
UTE	University of teacher education
TU	Traditional university (i.e. cantonal university or federal institute of technology)

THE SWISS EDUCATION SYSTEM



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