

Swiss Education Report | 2014

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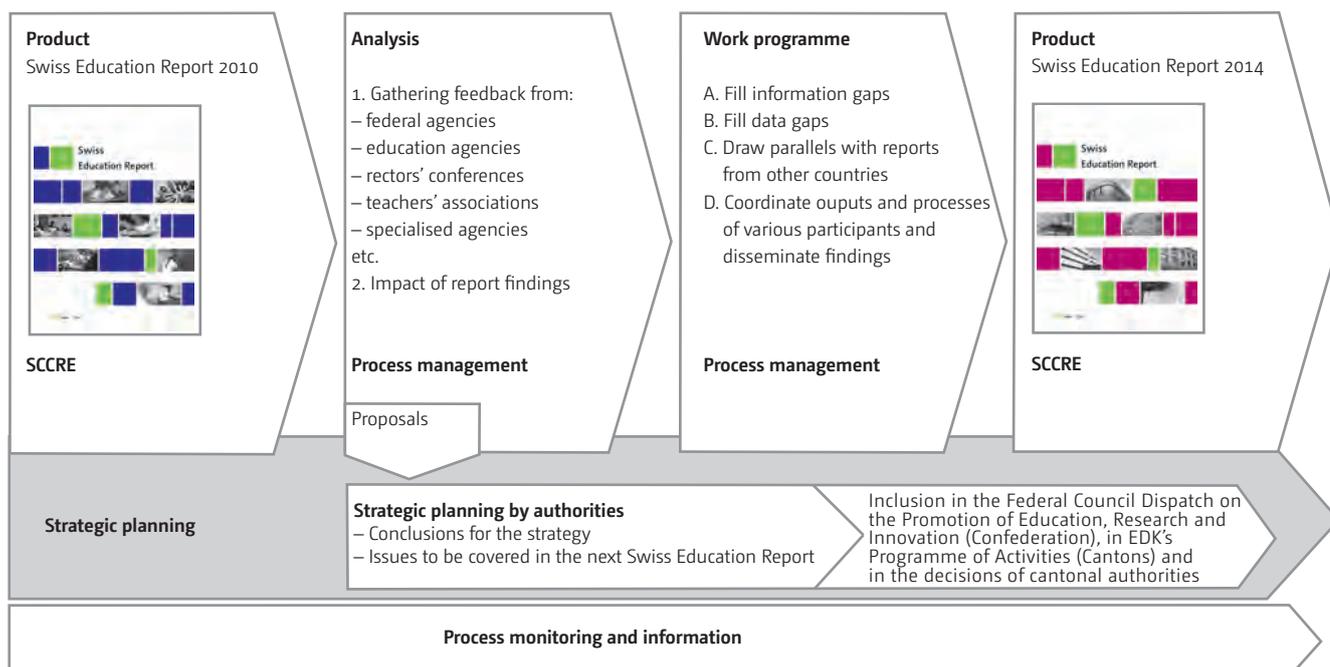
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Foreword by those
commissioning the
report

Art. 61a, para.1 and 2 of the Swiss Federal Constitution (FC) state that the Confederation and the Cantons, within the scope of their powers, shall jointly ensure the high quality and accessibility of the Swiss Education Area and shall coordinate their efforts and deepen their level of cooperation. Monitoring of the Swiss education system is an important means of fulfilling this mandate. It serves the purpose of gathering, compiling and analysing long-term information about the Swiss education system and its environment in a systematic and scientifically sound manner. It is therefore a key pillar in evidence-based education policy.

The Swiss Education Report 2014 marks completion of the first full cycle of the education monitoring process (→ Figure 1). After the first Swiss Education Report was published in 2010, a comprehensive analysis phase was launched. While different, albeit closely aligned, objectives were pursued, this analysis provided the Confederation and the Cantons with the information needed to establish a work programme comprised of strategic planning objectives and measures to develop the education system further. In addition, research and data gaps were identified and measures to fill these gaps were taken. Finally, parallels were drawn with reports from other countries. The results of this process were then fed into in the present Swiss Education Report 2014.

1 The Swiss education monitoring process 2010–2014



Results of the analysis phase from 2010 to 2014

The joint statement «Making Optimal Use of Opportunities», issued in 2011 by the Federal Department of Home Affairs (FDHA), the Federal Department of Economic Affairs (FDEA) and the Swiss Conference of Cantonal Ministers of Education (EDK), is the main result of the analysis phase of the now complete first process cycle. Acting in a federalist spirit of cooperation, both the federal and cantonal levels agreed on a set of common education

policy objectives to be reached over the course of this decade. The Confederation and the Cantons, within the scope of their constitutionally assigned powers, will also take suitable measures to reach these objectives.

Common education policy objectives

- *Harmonisation of compulsory education in terms of the age of enrolment, mandatory schooling, duration of education levels as well as transitions and objectives.* The Cantons intend to reach this objective within the framework of the Intercantonal Agreement on Compulsory Education (HarmoS). In 2015, they will take stock of the progress made by each Canton towards harmonisation of compulsory education.
- *95% of all 25-year-olds shall hold an upper-secondary level qualification.* Improvements will be needed in order to help young people of foreign origin who entered the Swiss education system at a later stage of their schooling.
- *Maintain examination-free access to Swiss universities for baccalaureate holders.* Gaps in academic knowledge and skills of individual baccalaureate holders were mentioned in the Swiss Education Report 2010.
- *Achieve international comparability of PET qualifications.* By ensuring the national and international comparability of Swiss professional education and training qualifications (ISCED 5B), the Confederation and the Cantons fulfil their obligations under Art. 61a para. 3 of the Federal Constitution of ensuring that general and vocational courses of study achieve equal recognition in society.
- *Sustainably enhance the appeal of careers in research at Swiss tier-one universities.* Swiss tier-one universities are still having difficulties recruiting young researchers.
- *Establish validation of prior learning (VPL) processes throughout the entire education system to enable the acquisition of formal qualifications on the basis of non-formal and informal learning.* Competences gained through various means (i.e. non-formal and informal learning activities) should be assessed to determine whether a formal qualification may be awarded.

In addition, the Confederation and the Cantons have agreed to intensify their coordination efforts and cooperation in order to face current challenges. This will include the following:

- Coordination and further development of language courses and exchange programmes between linguistic regions of Switzerland
- Measures to address shortages of skilled workers in the area of mathematics, IT, natural sciences and engineering as well as health care
- Maintaining the quality of teaching at all levels within the education system through well-trained teaching staff, support for the development of specialised didactics centres and research in the field of specialised didactics
- Support for political education.

Where possible, the present Swiss Education Report 2014 will provide an initial update on progress towards these long-term objectives. The analysis phase that follows publication of this edition of the Swiss Education Report will also focus on whether established objectives have been reached.

Work programme

Statistical data and scientifically backed information are required in order to assess further development of the Swiss education system and continue pursuing the above-mentioned education policy objectives. The work programme, which was jointly established and subsequently developed by both federal and cantonal agencies, shows where information and data gaps persist and how these gaps may be closed over time through close cooperation between those responsible for compiling education statistics and those involved in education research and development.

Within the long-term Swiss education monitoring process, the Swiss Education Report is both a product and an indicator. It is the result of analysis of the previous edition of the Swiss Education Report and corresponding work programme and serves as the basis for the analysis phase and work programme leading to the next edition of the Swiss Education Report. Here, the aim is not merely to perpetuate the cycle but rather to optimise it.

Education research and development serves to generate new knowledge and raise follow-up research questions. In order for this process to be successful, there needs to be dialogue between education policymakers and those who carry out education research and development activities. Needs must be articulated and an understanding must be reached regarding the improvements to be made. This will create a solid foundation whenever possible for evidence-based management of the Swiss education system.

Acknowledgements

This second edition of the Swiss Education Report is the result of cooperation between the Confederation and the Cantons in the area of education. The individuals entrusted by the Confederation and the Cantons to carry out the education monitoring process as well as those who are actively involved in policymaking, government activities and research relating to the Swiss education system deserve our appreciation.

A special word of thanks goes out to the employees of the Swiss Coordination Centre for Research in Education (SCCRE) in Aarau, who prepared the Swiss Education Report under the guidance of Prof. Dr. Stefan C. Wolter. Their work has helped the Confederation and the Cantons to fulfil their constitutional mandate of coordinating their efforts and working together.

Bern, January 2014
Swiss Education System Monitoring

Process Management Committee

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Introduction

The 2014 Swiss Education Report is now the second official education report to be published for the country, following the pilot publication of 2006 and the 2010 edition of the report. Taking up the findings from the assessment of the 2010 Swiss Education Report and aiming to ensure the greatest possible comparability of the education reports over time, this latest report has been structured in virtually the same manner as the previous one. Hence, the 2014 report also sets out the Swiss education system with all its different education levels and education types and (apart from two exceptions) describes the context and the institutions within these different levels and types. This is followed by an assessment conducted on the basis of the three criteria of effectiveness, efficiency and equity.

In addition to the individual chapters on the education levels and types, we have once again included three overview chapters for the three levels compulsory education, upper-secondary education and tertiary-level education. These overview chapters make it possible to cover topics that relate to a number of different education types at one and the same level – in the case of the tertiary level, for instance, these are the universities of applied sciences, the universities of teacher education, the universities and tertiary-level B professional education and training. This makes it easier to draw a comparison between the different education types at any given level. Once again, in the same way as in the 2010 report, two further chapters have been included alongside the chapters on the education levels and types. The first of these describes the external setting within which the education system operates, i.e. the demographic, social and economic developments which all have a varying impact on the education system. The final chapter of the report, in turn, is dedicated to the cumulative effects of education, whereby cumulative has to be understood in several different ways. This chapter first looks into the effects of different learning locations on education (in school and outside school). Secondly, it considers education as a cumulative process leading to aggregate abilities and skills (cognitive and non-cognitive) and, thirdly, it covers the cumulative effects of education on a large number of outcomes, such as satisfaction, health and income, plus many more.

A considerable amount of new statistical and research data has been channelled into the 2014 Swiss Education Report – a fact that is borne out not least by the more than 500 references that have been included. On three key aspects, however, the report is the last one prior to major changes. First of all, it is the last report before the structural reforms triggered by the HarmoS Agreement come into effect. This is reflected by the co-existence of two different systems for counting school years (to which repeated reference has to be made in this report). Of greater importance, however, is the fact that, once HarmoS has been implemented, system-relevant pupil performance data will be recorded at the individual education levels and for individual subjects throughout Switzerland for the first time. This should permit a more detailed and differentiated assessment to be conducted of the performance of compulsory education than has been possible to date using just the international comparative tests (PISA). In addition, only as of the next report will it be possible to present the different education levels and types on the basis of the new UNESCO statistical classification (ISCED 2011), since the Swiss education statistics are only being based on this classification as of 2014. And, thirdly, we hope that it will be possible, after the introduction of a pupil identifier into the educational statistics, to better map, in the 2018 report, the transitions between education levels (and, in

some cases, between the different education types), thus making it possible to analyse individual educational paths.

One of the bigger challenges we face when compiling the education report is whether or not to give coverage to topics that have been included in earlier reports. Given that new topics which merit coverage repeatedly emerge between reports (and not simply new findings on «old» topics), space constraints alone make it impossible to take up all the earlier topics once again. Hence, as a matter of principle, only topics that allow information to be gleaned from their development over time and which are constant factors in the strategic planning of education policy are covered on a regular basis. Issues on which no new information has emerged and where there have been no research findings to prompt renewed coverage have been mostly left out in favour of new topics. Certain matters which would be of interest are thus not included in the 2014 Education Report, because we feel that there have been no essential new findings since the 2006 or 2010 reports which would warrant taking them up again.

It is also important to note that the education report complies with the scope specified by those who commissioned it. A description of the education system that is only published once every four years is not aimed at, and, indeed, cannot be aimed at conveying the detailed basic statistics that are updated by the Federal Statistical Office and other authorities every month. Similarly, the education report should not be devoted to educational topics that are not primarily the preserve of education policy or the administrative authorities. This means that findings from research into teaching can only be of interest for the education report if they provide information on the assessment and strategic planning of the system as a whole rather than setting out primarily to support individual teachers in their work. In terms of our remit, therefore, the education report can only deal with a specific area of education research.

Finally, it must be pointed out that the education report was commissioned to collate all the information necessary for an assessment of the system. The actual report was not, however, intended to carry out this assessment or even to put forward or recommend measures for changing the education system. It is aimed at giving all the players in the education system the opportunity to assess the Swiss education system as it stands today and to come up with ideas for shaping the system of tomorrow. This it does by providing the best possible summary of current knowledge. We trust that we have fulfilled this purpose in a commensurate manner and hope that the 2014 Swiss Education Report will provide you with an informative read.

Definitions

Effectiveness

Effectiveness is a gauge of the efficacy of an action or measure in terms of achieving a specific objective. In contrast to efficiency, effectiveness only measures the extent to which the objective is achieved and does not take into account the outlay required to do this.

Types of objectives

In the education sector, as in other areas, a system, institution or an individual measure is deemed to be effective if the set objectives are achieved through its implementation. The difficulty in measuring effectiveness in the education sector stems from the complexity of the objectives being pursued, which are difficult to precisely define and operationalise.

Broadly speaking, the potential objectives of educational measures or institutions can be divided up into three categories:

Educational outputs are the direct results of the education process: on the one hand, qualifications and percentages of students achieving them and, on the other hand, students' skills and abilities at the end of their education and training.

Outcomes refer to the medium to long-term effects of education on other factors of social and economic relevance.

(1) In terms of quantitative outputs, the absolute number of pupils or students at a given level and the qualifications obtained can be defined as objectives. The participation of the population in education is also a potential quantitative objective, in the form of qualification rates or the percentage of the population that attains a specific level of education. At the outcome level, quantitative impacts on the job market can constitute objectives of education, such as low unemployment or a high participation level of the population in gainful employment.

(2) Alongside these quantitative output parameters, the qualitative performance and impacts of the educational institutions also constitute an objective, given that imparting skills is their prime task. In addition to specialist skills (academic achievements), this can also include interdisciplinary, social and other skills. At the outcome level, qualitative impacts, such as satisfaction, quality of life and similar factors can count as objectives, i.e. the potential finalities of the education process.

(3) In addition to outputs and outcomes, which are seen at the end of the educational process or reflect its impact, it is also possible to define equity within the process as an objective.

Establishing objectives

Objectives for educational institutions or for an entire education system can be established at institutional level, or at local, regional, national or international level. With the new Intercantonal Agreement on Harmonisation of Compulsory Education, known as the HarmoS Agreement, the cantons have, for the first time, set out joint, overall objectives for compulsory education. These incorporate underlying principles relating to the acquisition of knowledge and skills, the development of a cultural identity and the encouragement of responsible behaviour towards others and the environment. The Swiss Conference of Cantonal Ministers of Education (EDK) is also de-

veloping national educational standards which, as of 2016, will be monitored by regular testing at the end of the 4th, 9th and 11th school years. At tertiary level, education is currently steered by objectives set out in performance mandates, which the institutions are required to achieve within the framework of an overall budget. Finally, the objectives for vocational and professional education and training in Switzerland are specified in the Federal Vocational and Professional Education and Training Act. The problem at all levels of the Swiss education system is that the objectives are neither explicitly stated nor set out in a hierarchical structure. In a complex system like education, a large number of objectives are generally pursued at one and the same time, and hence a relative (political) weighting of the individual objectives would not only be essential for assessing the effectiveness of the education system but would also provide the players with a key source of information for the action required and for strategic planning. Without this information, it is impossible to determine whether it is better to maximise the attainment of one objective, jeopardising the attainment of others, or to accept a lower-level attainment of objectives (and hence a lower effectiveness) for certain sub-objectives and thereby permit a higher degree of attainment for other sub-objectives.

Before a coordinated package of objectives can be specified for an education system as a whole or for individual levels within the system, it is necessary to identify the various connections (interactions and interdependencies) that exist between the individual objectives. The multiple objectives of the education provided can be independent of each other, complementary, or conflicting. Objectives are complementary if the achievement of one objective permits the conclusion that another objective has also been attained. If it is assumed, for instance, that socially well-integrated, contented and interested students also display a high level of academic achievement in the conventional school subjects and, at the same time, that a high level of academic achievement promotes contented and well-integrated students, then it is possible to get by with measuring just one of these factors. Since the two effects and objectives are complementary, if one of the sub-objectives is attained, then the other sub-objective will automatically have been attained too.

In addition to complementary objectives, it is also possible for objectives to be in competition with each other, leading to a dilemma between individual objectives. Hence, the objective of maximising the number of students achieving university qualifications can compete with the objective of providing a high-quality education. Aiming to achieve a high number of graduates without the appropriate measurement of quality would run the risk of effectiveness in achieving this one objective undermining the effectiveness in achieving the qualitative aspect of education, which would mean that the overall outcome would not be a positive one.

Effectiveness in this report

For the effectiveness sections in this report, it was not possible to make reference to an existing, definitive set of objectives for the reasons set out above. At each individual level, therefore, we have attempted to define a number of key objectives on the basis of the available education administration documents, on the one hand, and the research literature on the other. In order

to avoid falling into the trap of ultimately commenting only on objectives for which measurement data is available, reasons are set out in the text as to why important objectives cannot (as yet) be measured and hence assessed. Where appropriate, we also suggest which steps would need to be taken to permit these objectives to be measured and assessed in future. This marks an attempt to compensate, in the text sections, for the inevitable focus on measurable parameters that is evident in the graphs and statistical charts in this report.

Efficiency

Efficiency refers to the degree of effectiveness and the suitability of measures in relation to the specified objectives. More specifically, efficiency is an indicator of the ratio of input to output in a system.

As a rule, efficiency is not an official objective of the education system and is thus not mentioned per se in most education policy or administrative documents. Why, therefore, is efficiency included as a criterion in the Swiss Education Report? When allocating resources or establishing incentive conditions in the education system, the prime question asked by education policy-makers and researchers is, in many cases, simply whether they will make any contribution to the attainment of objectives at all. It must also be added that the fact that resources are used effectively by no means implies that they are used efficiently too. Efficiency is of prime importance in the education sector for two reasons. On the one hand, in the education system too it is essential for objectives to be achieved with the lowest possible input. Since resources are limited, they must always be used sparingly. This is not because the aim is to achieve profit in the education sector, as in a business, but because the resources channelled into the education process (time and money) could also be used to satisfy other social or individual needs. If students can acquire the mathematical or language skills specified in the curriculum with fewer lessons, then sufficient time will be available for tuition in music and sports as well. On the other hand, it also makes sense to maximise the output per resource unit, since the return will then have a positive impact on other outcomes for society and the individual. If the education system is able to produce more competent students for a given amount of resources, then the resultant gain in competence will have a positive impact on other areas, such as health-related behaviour, social behaviour and many other areas besides.

Definition of concepts

In the literature, a distinction is drawn between different concepts of efficiency (*Wolter, 2010*), all of which are significant for the education sector.

If the correlation between inputs and specific outputs of the education system (e.g. skills) is observed, this is referred to as internal efficiency, while if the influence of education on other individual or social objectives (e.g. economic growth) is observed, this is referred to as external efficiency.

If the real inputs are used to calculate efficiency, this is referred to as technical efficiency, and if the inputs are expressed in monetary terms (i.e. have

a price put on them), this is referred to as economic efficiency. The performance of the education system is not achieved with just a single input, and the combination of inputs (such as teaching staff and teaching materials) is not rigidly specified but can be varied. This means that the allocation efficiency, i.e. achieving the most efficient combination of inputs, is also extremely important. All these forms of efficiency are of interest in the Swiss Education Report, since they all play a key role in assessing the performance of the Swiss education system.

Equity

For the purpose of this Education Report, the concept of equity refers to equality of opportunity. The internationally used term of equity is given precedence over equality of opportunity not least because this latter term has gained many different connotations – not all of which are positive – after years of drawn-out ideological debate in the education and social policy fields.

In order to limit the rather broad scope of interpretation associated with the term equity, we will use the definitions included in the OECD study entitled «Equity in Education» (*Coradi Vellacott & Wolter, 2005*) in this report:

«Educational equity refers to an educational and learning environment in which individuals can consider options and make choices throughout their lives based on their abilities and talents, not on the basis of stereotypes, biased expectations or discrimination. The achievement of educational equity enables females and males of all races and ethnic backgrounds to develop the skills needed to be productive, empowered citizens. It opens up economic and social opportunities regardless of gender, race, ethnicity or social status.»

A distinction can be drawn between two different dimensions of equity (*OECD, 2007*). The first dimension encompasses the aspect of fairness: personal and social attributes should not stand in the way of academic achievement. The second dimension relates to inclusion: minimum educational standards must be guaranteed for everyone.

Equity represents an important policy objective for the education system, which is why there is near unanimity that the abilities and talents of students must determine their academic achievement. When it comes to the question as to how these different abilities and talents are to be nurtured, however, a range of different viewpoints prevail.

Applying the principle of meritocracy (equality of access or equality of opportunity), equity is achieved if formal equality is guaranteed and access to further education is granted on the basis of academic achievement. The equality of treatment approach, by contrast, specifies that everyone is entitled to receive the same education and benefit from the same learning conditions, irrespective of their individual achievement, and hence that the selection of students on the basis of academic achievement is to be avoided. The concept of equality of achievement, in turn, requires special support for individuals with socially-conditioned weaknesses, so that they can gain the most important basic skills. Finally, the approach of equality of social actualisation requires highly individualised teaching, enabling everyone to develop their own specific abilities.

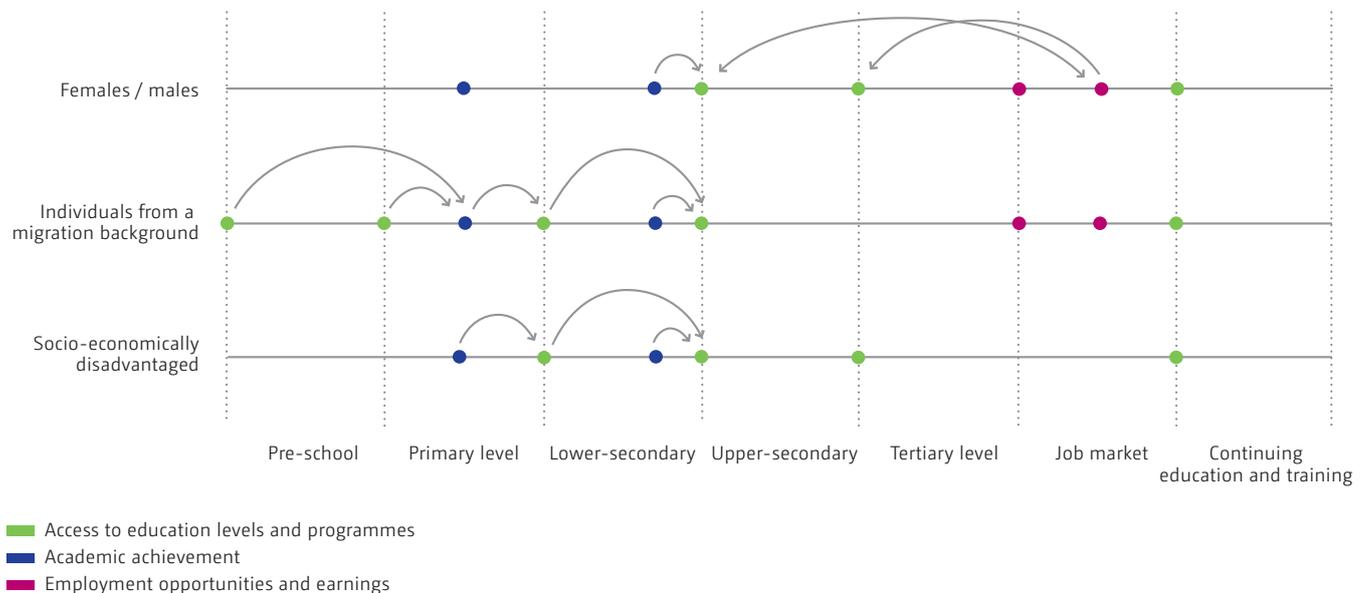
The most important indicator for measuring equity is probably the distribution of social groups across the various levels and types of education and training. Unequal distributions between social groups do not necessarily mean that the equity principle has been violated, since these can fundamentally be based on entirely rational decisions too and thus be free from stereotyping, distorted expectations or discrimination. Depending on the interpretation of the equity principle, inequalities between individual types of education do not violate the equity principle if they can be explained on the basis of inequality of achievement. By contrast, inequality of opportunity between students with identical academic achievement is a strong indicator that the equity principle is being violated – irrespective of what is regarded as fair in each case.

In analysing equity in the education system, it is logical to observe this from a lifetime perspective: in some cases, the place where an equity problem is diagnosed is not actually the place where the problem was originally caused. This is because a violation of the equity principle generally affects subsequent education levels and because anticipated future discrimination can influence early educational decisions (→ Figure 2).

Overall, the virtual absence of longitudinal or cohort data within the Swiss education system considerably limits the validity of any statements on the cause and effect relationships governing equity within a particular level of education and on outcomes at subsequent levels of education. The creation of student identifiers in educational statistics will, however, bring about an improvement in this respect over the long term.

2 Points at which a lack of equity is most apparent and the cause and effect relationship

Source: Coradi Vellacott & Wolter, 2005





General context of the Swiss education system

Demographics

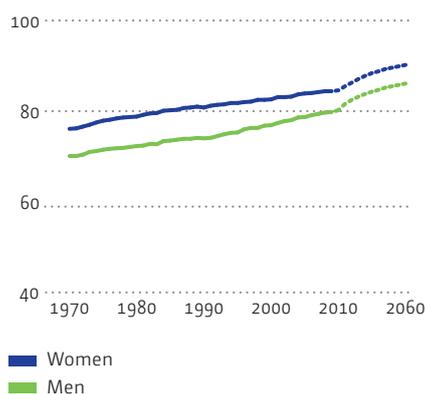
Demographic trends are a key factor affecting the education system. While cyclical fluctuations in the number of students can be largely accommodated by adjusting class sizes, if longer-term demographic changes occur in a specific direction, then class size adjustment is only possible to a limited extent and is also not the logical solution. Since demographic changes affect the individual school levels and school types differently, these changes will also be analysed in greater detail in the chapters that follow in respect of the impact they have on the school level in question.

Population development

The Federal Statistical Office (FSO) has calculated **three basic scenarios for population development** in Switzerland. The medium-growth scenario, which serves as the reference scenario, continues the developments observed over the past few years and includes current trends. The high and low-growth scenarios are based on a combination of assumptions favouring additional population growth or doing little to encourage it, respectively.

3 Increase in life expectancy at birth, 1970–2060

Data: FSO



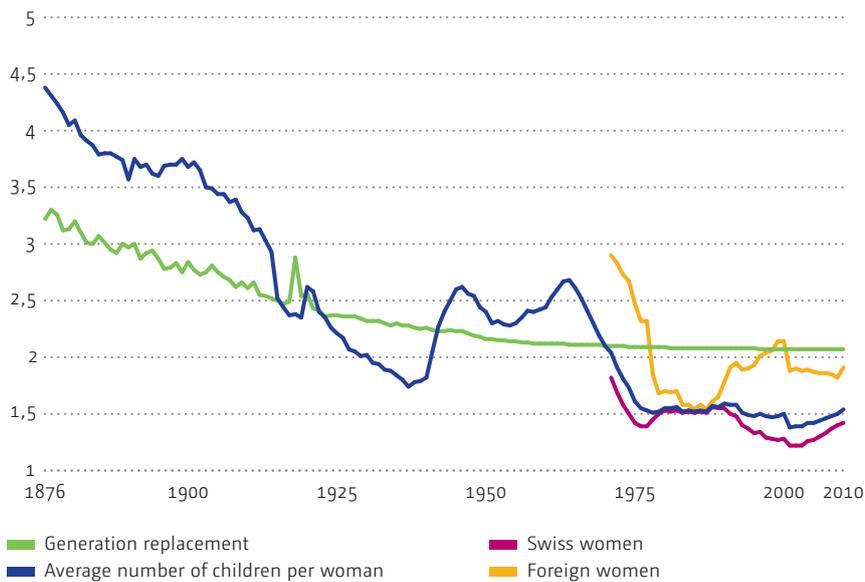
Switzerland's population has more than doubled since the start of the 20th century, rising from 3.3 million in 1900 to 7.9 million in 2010. Population growth has been decisively influenced by three factors: life expectancy and fertility rate (excess of births over deaths) and migration (net migration).

Human life expectancy has risen continually over the past few decades, and the medium-growth demographic scenario compiled by the Swiss Federal Statistical Office (FSO) shows that it is likely to rise still further (→ Figure 3). In 1970, the predicted life expectancy for men (women) at birth was an average of 70 years (76 years), in 2010, it was 80 years (85 years) already, and for 2060 an average age of 86 (90 years) is forecast.

The average number of children born to each woman of child-bearing age has fallen dramatically over the last 100 years (→ Figure 4). While, in 1910, a woman still gave birth to 3.2 children on average, the birth rate has fallen steadily since then. As of 2001, it has shown a slight rise again, reaching 1.5 in 2010. According to the reference scenario for demographic trends published in 2010, it can, however, be assumed that the fertility rate will stabilise over the years to come (*FSO, 2010e*). The reference scenario does not expect the most recently observed trends to continue, since it is assumed that the increase in the birth rate is not due to the fact that more children are being born in general but rather to a stabilisation of the age at women choose to have children. Women in Switzerland now have their children at a later age (at 31.2 years on average). This shift in births led to a decline in the first instance and then to a renewed increase (*FSO, 2010e*); in the meantime, however, the birth rate has stabilised once again.

4 Development of the fertility rate and generation replacement 1876–2010

Data: FSO



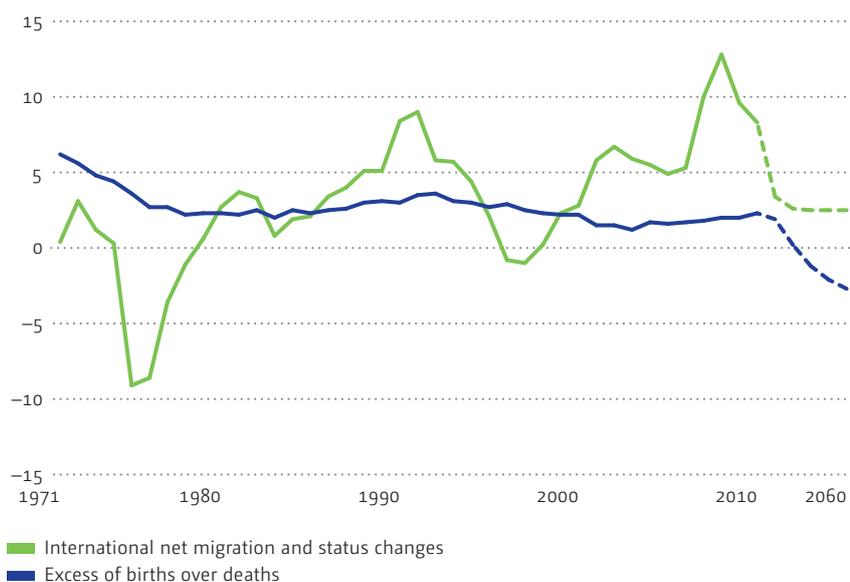
Generation replacement: the average number of children that each woman must give birth to in order to ensure that the number of girls in the children’s generation is equal to the number of women in the parents’ generation.

According to the FSO’s medium-growth scenario for long-term population development, Switzerland’s population will increase up until 2055, albeit with falling growth rates (→ Figure 5). As of 2055, the population will stabilise at a level of just under nine million inhabitants. A decline in the population due to the low birth rate is being prevented by positive international net migration (FSO, 2010e).

5 Population development 1971-2060

Forecasts 2020-2060 according to the medium-growth scenario, per 1000 inhabitants

Data: FSO



The **excess of births** over deaths is the difference between the number of births and the number of deaths.

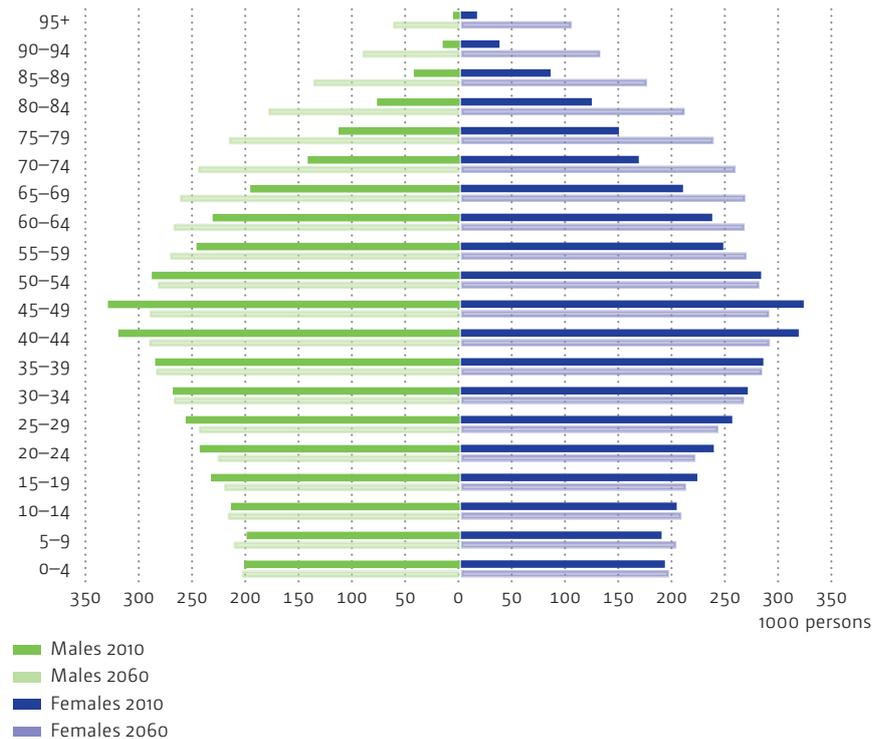
Net migration is the difference between immigration and emigration. This also includes (up until 2010) individuals who entered Switzerland on a residence permit valid for less than one year and who were subsequently granted a residence permit valid for several years (status change).

Age structure

Even if the population figure stabilises as of 2050, however, the increase in life expectancy will still bring about a change in the age structure. Over the course of the next 50 years, the tip of the age pyramid will become continually wider, while the base remains unchanged (→ Figure 6).

6 Age distribution 2010 and 2060

Data: FSO



Big regional differences in population development and age structure have a much greater impact on the education system than the average change for Switzerland as a whole would suggest. And the long-term trends (more elderly people and fewer young ones) are not moving in the same direction in all the cantons. Since major regional differences also exist within individual cantons, Figure 7 shows the youth quotients for the individual MS regions.¹ Certain regions are even displaying developments that run counter to the trend for the country as a whole.

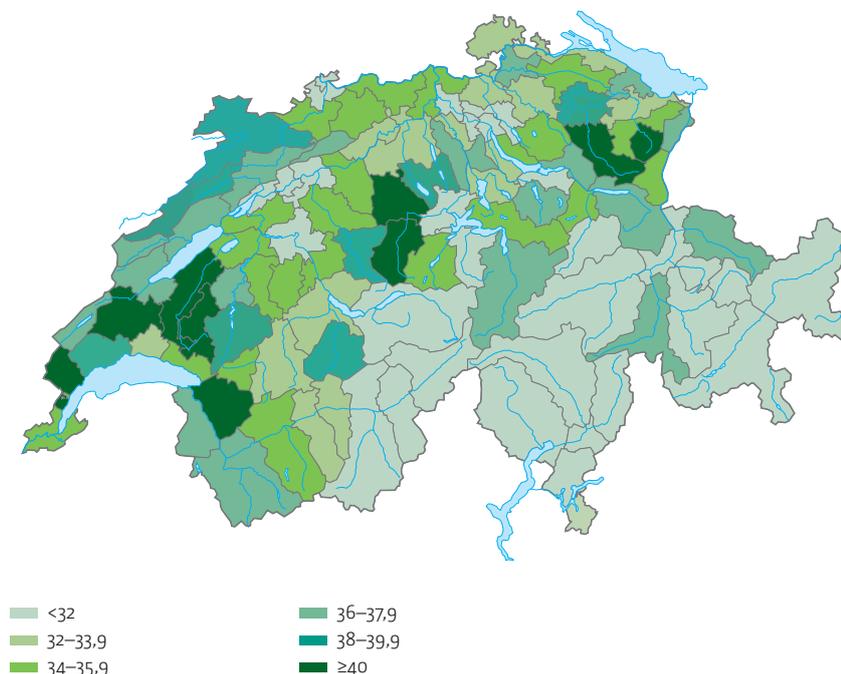
The highest youth quotients are found in predominantly rural areas in Eastern and Central Switzerland as well as in French-speaking Switzerland (see the darkest colour on the map), while the lowest figures are seen in two urban regions (Zurich and Basel-Stadt) and in two tourist regions (Schanfigg and Davos) (see the lightest colour on the map).

¹ The 106 MS (*mobilité spatiale*) regions are characterised by spatial homogeneity and reflect the principle of small employment areas with a functional orientation towards regional centres (www.bfs.admin.ch).

7 Youth quotient by region, 2010

Share of those aged under 20 relative to the population aged 20 to 64, in percent

Data: FSO; map: Swisstopo



Such a society constitutes a challenge for the Swiss education system, since educational planning requires the anticipation of both national and regional developments.

Level of education

Apart from demographic developments, there are also structural changes in the resident population that have an impact on the level of education.

Gainfully employed people in Switzerland have shown a consistently higher level of education and training over the past few years, with the proportion of those who have graduated at tertiary level having risen by about 13.5 percentage points between 1995 and 2010. This trend has been observed in all the different regions of Switzerland. It is not the core cities that display particularly high growth rates, but first and foremost the semi-rural regions (→ Figure 8).

Irrespective of the population scenario selected, it is assumed that the trend towards a higher level of education will continue, and that the education level of the population in Switzerland will increase considerably once again over the next few years. According to the reference scenario drawn up by the FSO, the share of people in the 25 to 64-year age bracket with tertiary-level education will rise from 35% in 2009 to 50% in 2025, before going on to reach 60% in 2045 (FSO, 2010e). One factor in this increase is also the change in migration with regard to the level of education (→ *Migration*, page 26).

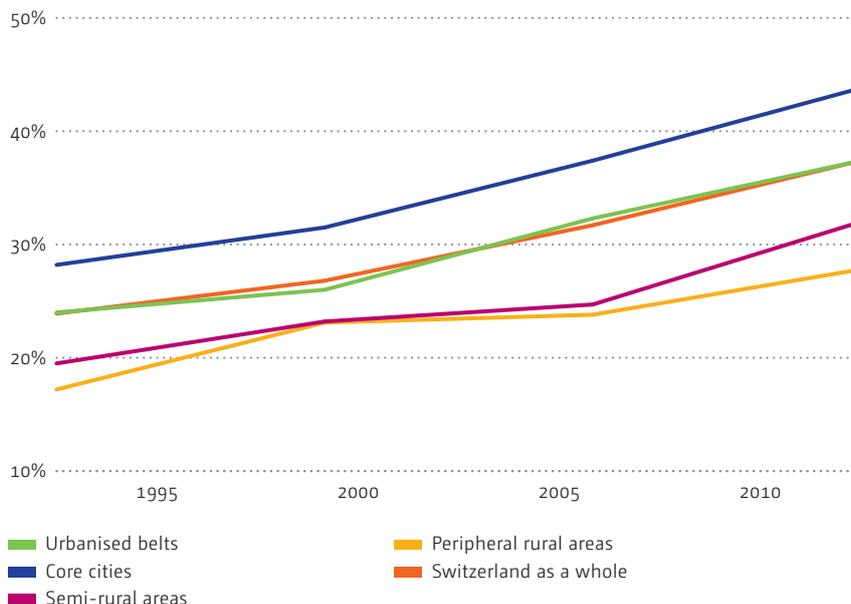
The **level of education** of a population can, however, in itself exert an influence on a country's demographic development. A negative correlation is frequently measured between education and fertility in overall terms. One explanation for this are the higher opportunity costs for better educated women, which lead to lower fertility. It is necessary to draw a distinction between this effect and the general education effect, which has been investigated in a study (Fort, Schneeweis & Winter-Ebmer, 2011). This study showed that lengthening compulsory education leads to more children. This can be explained by the fact that a longer period of compulsory education is more likely to lead to marriage, and particularly to a stable marriage, and hence to more children.

According to the ILO definition, **gainfully employed persons** cover the employed and the unemployed. The employed are persons aged at least 15 who, during the reference week, worked at least one hour for remuneration, as an employee or self-employed person.

The FSO has defined the **core cities** and their **urbanised belts** as making up the urban areas. The **peripheral rural areas** take in primarily communities geared to agriculture, which are additionally often confronted with a sharp decline in their number of inhabitants. The concept of **semi-rural area** covers the remaining rural areas, outside the urbanised belts, including communities focused on tourism or which are home to industrial or service companies, and areas where commuters live.

8 Development in the percentage of people in gainful employment with tertiary-level education

Data: FSO



Migration

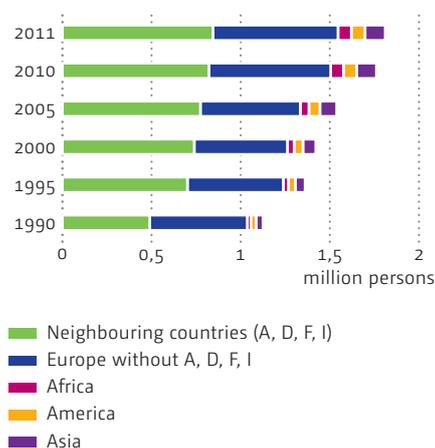
While the migration movements of young people are of key importance for the number of people requiring an education and hence also for the education system as the provider of education and training, the education system itself also has a decisive influence on equipping migrants for social integration and participation in society. Apart from the actual number of migrants, the linguistic, cultural and socio-economic composition of the migrant population is of major importance for the education system. This has undergone a clear change over the past few decades.

In 2011, 1.8 million (22.8%) foreign nationals were resident in Switzerland. Just under a fifth of these foreigners were born in Switzerland already, and, in the case of those with Italian nationality, the figure is 28.4%. For German nationals, however, most of whom have only arrived recently, only 7.2% were born in Switzerland. Some 15% of the resident population comes from non-European countries.

In the decades after the Second World War, the migrants who came to Switzerland had predominantly below-average educational and training qualifications compared with the level of education of the native resident population. Hence, in the 1990s, around 60% of the working-age migrants entering Switzerland each year lacked VET qualifications and only 10% had tertiary-level qualifications. This composition has undergone a fundamental change over the past few years. In 2009, around 60% of the new migrants had tertiary-level qualifications – a rate that is twice as high as that of Swiss citizens. This major difference must, however, be put into perspective, since there are limits to the extent to which qualifications issued by different education systems can be compared with each other. Many professions that are learned by completing an apprenticeship in Switzerland require a university qualification abroad. Despite the difference in their formal education, these graduates then work in Switzerland in the same occupations as Swiss citi-

9 Foreign residents in Switzerland by nationality

Data: FSO

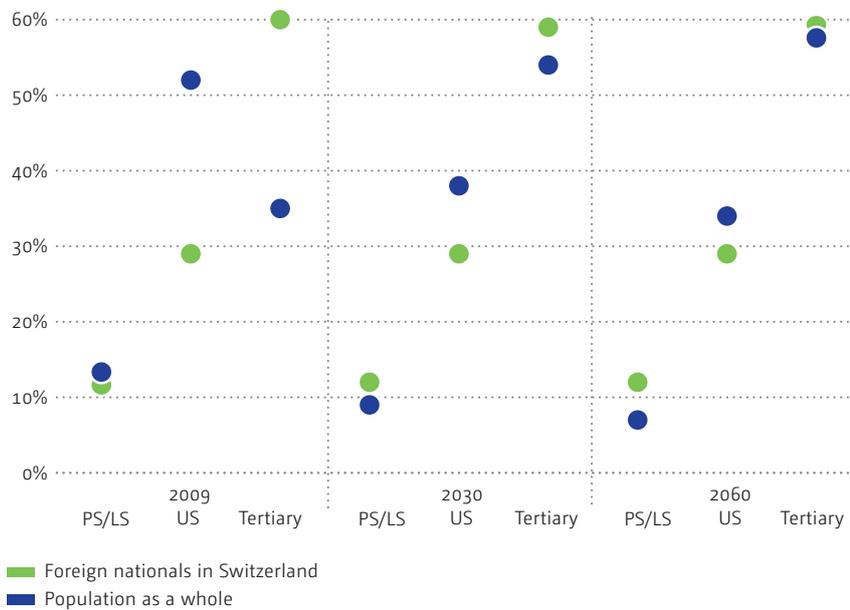


zens who, on paper, have a lower level of education and training than they do. This situation must be taken into account when interpreting the figures for the «new» migrants.

10 Education level of the population in 2009, scenarios for 2030 and 2060

Medium-growth scenario, 15 to 64-year-olds

Data: FSO



There are, however, major differences within this group of highly qualified migrants as a function of their country of origin. Highly qualified employees are recruited primarily in Asia or the EU-27 countries and, amongst these, first and foremost from the United Kingdom, Germany and France. These highly qualified migrants are attracted chiefly to the urban centres, such as Basel, Zurich, the Lake Geneva area or Bern (SAKE: Steiner & Wanner, 2011).

Family and living structures

Changing family and living structures also influence the prerequisites for participation in the education process. Depending on the type of family they come from, students will be endowed with a different level of financial, cultural and social resources. These, in turn, can have a decisive influence on the level of success they achieve in education.

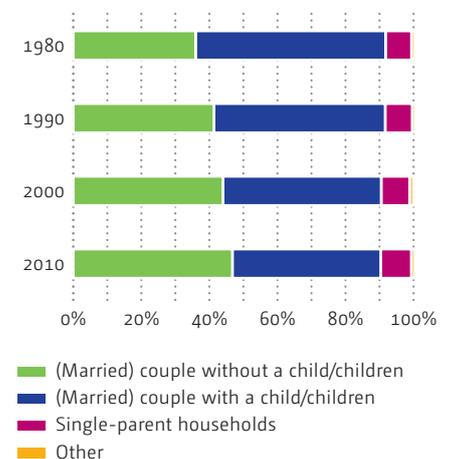
The classic family with two parents or a single parent and one or more children accounts for an ever-smaller proportion of so-called family households (see information text on the right) in Switzerland. Only around half of these still comprise a couple or a single parent with one or more children (→ Figure 11). The number of households comprised of couples without children is continuing to increase. The rise in the number of single-parent and child-free households has also meant that the average size of a household has fallen steadily over the years.

The family situation also has an influence on the risk of poverty. With two adults of working age (7%), the probability of being at risk of poverty is only half as high as for families with two children (15%; → Figure 12). In

A **family household** (→ Figure 11) is a household made up of at least a nuclear family, consisting of a couple with or without a child or children, or a parent with a child or children (FSO, Online-Definition). Single-person households are explicitly excluded.

11 Composition of family households in Switzerland, 1980 to 2010

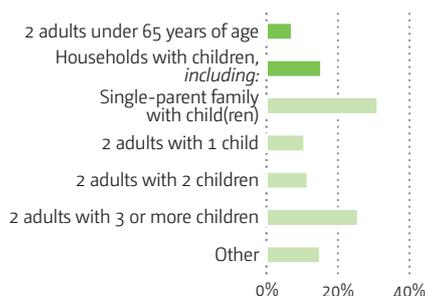
Data: FSO



The **at-risk-of-poverty threshold** is set by the EU at 60% of the median equivalised income. In 2011, the threshold in Switzerland for single-person households was 28,179 Swiss francs per year.

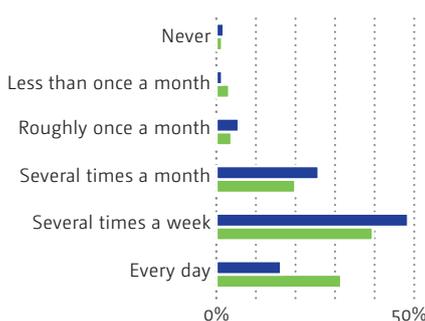
12 Risk of poverty by household type, 2011

Data: FSO



13 Parental assistance with homework

Data: COCON



Legend: 9-year-olds (green), 11-year-olds (blue)

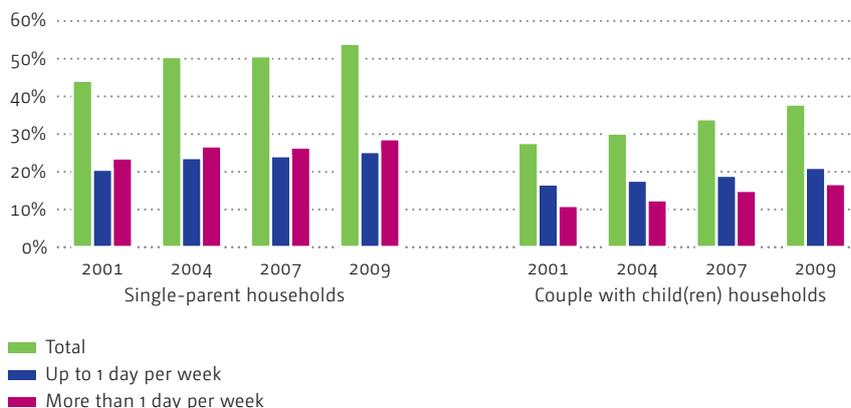
families with three or more children (25%), the risk of poverty increases by half once again, with the risk being highest for single-parent families (31%).

In addition to the economic situation, family size and structure affect the time resources available to parents for bringing up their children. Apart from the number of parents present and the number of children in a family, the number of years between the birth of each child, the position of the individual child within the family and the gender of an individual's siblings can play a role (see, for example, Heiland, 2009; Carneiro, Loken & Salvanes, 2010; Monfardini & See, 2012). Current studies show that, even with the same socio-economic background, students whose parents regularly read books with them when they were at primary school have a better reading ability at age 15 (OECD, 2011c). These results are, however, based on correlations and could be distorted by selection effects, thereby calling into question the causality of the effect of reading with parents. For Switzerland, «helping with homework» can be taken as an indicator of parents providing support for their children's education. A question on this was included in the Swiss COCON survey of children and young people. Just about half the eleven-year-old students in Switzerland said that their parents helped them with their homework several times a week (→ Figure 13).

Apart from the differences in the time resources that parents make available to their children, parents with different economic means also have different options open to them when it comes to buying in resources of this kind from outside the family (e.g. childcare to supplement family-based care). In Switzerland, the number of households using childcare outside the family has been constantly increasing over the past few years (→ Figure 14). The increase is also especially evident in families where more than one parent is present. This could be due to the fact that the greater ease in reconciling paid employment and looking after a family constitutes one of the main reasons for making use of childcare outside the family. This holds particularly true in the case of formal child-care facilities (child day-care centres) and applies less to informal arrangements (relatives, friends).

14 Childcare outside the family, 2001–2009

Data: FSO



Households which make use of informal care display virtually no differences compared with households that do not use any external help with childcare, as is shown by the data from the COCON survey of children and young people for children aged 6 (Schmid, Kriesi & Buchmann, 2011). All in all, the like-

likelihood of a family using formal childcare outside the family is all the greater the more hours per week the parents spend in gainful employment. Since mothers with a higher level of education, in particular, are also able to take up gainful employment and, indeed, wish to do so, the extent to which use is made of formal childcare also increases with the mother's level of education. When it comes to income, the effects are somewhat more difficult to determine, since a distinction has to be drawn between the income that is necessary to be able to pay for care outside the family and the income that results from the use of care outside the family, since it is only this care that makes a higher level of gainful employment possible in the first place.

Young people of school age

The role of the education system is to educate children and young people who, in turn, are subject to the influence of society and the parental home. Not only does the education system influence the young people, but the young people, in turn, exert an influence on the education system. Two topics that frequently feature at the centre of discussions in the media are young people's behaviour (delinquency, violence at schools, substance use, etc.) and also their motivation and attitudes towards academic achievement. A number of these issues (health, substance use and delinquency) will be looked at in more detail in what follows. The potential positive effects that the education system can have on undesirable behaviour are discussed in the *Chapter on Cumulative effects*, page 275. The following sections look into aspects of juvenile behaviour and the characteristics of young people as external framework conditions for the education system.

A fundamental problem here is that it is extremely difficult to trace developments in the characteristics of young people over time due to the lack of standardised, repeated surveys. In other words, it is difficult to say whether the young people of today differ from the young people of the past. In addition, there are very few reliable research results on the extent to which the behaviour or attitudes of young people actually affect or change the education process.

Health

Three factors that describe the health of students in Switzerland in an exemplary manner and which could thus influence their academic achievement or motivation are body weight, physical fitness and disabilities.

In addition to the physical consequences of being overweight, there can also be psychosocial effects. These can manifest themselves in the form of poor academic achievement, social exclusion and a lack of self-confidence. While a large number of studies reveal a positive correlation between being overweight and poor academic achievement (*Florin, Shults & Stettler, 2011; Crosnoe, 2007*), no clear-cut cause and effect relationship has been proven (*Kaestner & Grossman, 2009; Fletcher & Lehrer 2011*). For studies on an inverse relationship between education and weight, readers are referred, for example, to *Webbink, Martin & Visscher, 2010* (→ *Chapter on Cumulative effects*, page 275).

15 Overweight trends for children and young people

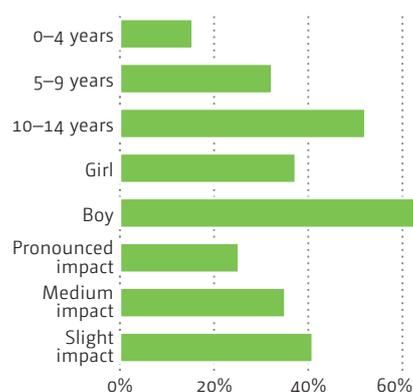
Source: Stamm, Frey, Gebert et al., 2012



Under the terms of the **Ordinance on the Encouragement of Sport**, the cantons are to make sure that at least three lessons of sport are provided each week of term at primary and lower-secondary level. In compulsory kindergartens and the first two years of eight-year primary schools, sport must be integrated in daily tuition. At upper-secondary level, at least 110 lessons of sport are to be provided in the course of the academic year (Ordinance on the Encouragement of Sport and Physical Activity of 23 May 2012).

16 Children with a disability in private households by age, gender and impact, 2007

Data: FSO



The data on obese and overweight students obtained through monitoring the student weight records kept by school medical services in the cities of Basel, Bern and Zurich, shows that the number of overweight or obese children has not increased significantly since 2005 (→ Figure 15). There are, however, differences in the way in which the number of overweight children is developing at the different age groups and levels of education. At the pre-school level, the number of overweight and obese children is tending to fall, while at primary and lower-secondary level the number has stabilised, and an increase in the problem is evident in upper-secondary education (Stamm, Frey, Gebert et al., 2012).

One of the ways in which the problem of overweight children is to be tackled is through sporting activities in school. It would be feasible for sports tuition not only to have a direct, positive impact on academic achievements (in sport and other subjects) but also to indirectly influence students' achievements via their weight. Both the direct influence of sports tuition on weight (Cawley, Frisvold & Meyerhoefer, 2012; Khambalia, Dickinson, Hardy et al., 2012) and its impact on academic achievement are, however, disputed. While a US study, in an experiment investigating the impact of sporting activity on overweight children and their academic achievements, has shown that mathematical achievements increase significantly with physical activity, no effect was ascertained for reading achievements (What Works Clearinghouse, 2012; Davis, Tomporowski, McDowell et al., 2011). Other studies fail to find any impact of sports tuition on students' achievements at all (Dills, Morgan & Rothoff, 2011; Cawley, Frisvold & Meyerhoefer, 2012; Cawley, Meyerhoefer & Newhouse, 2007).

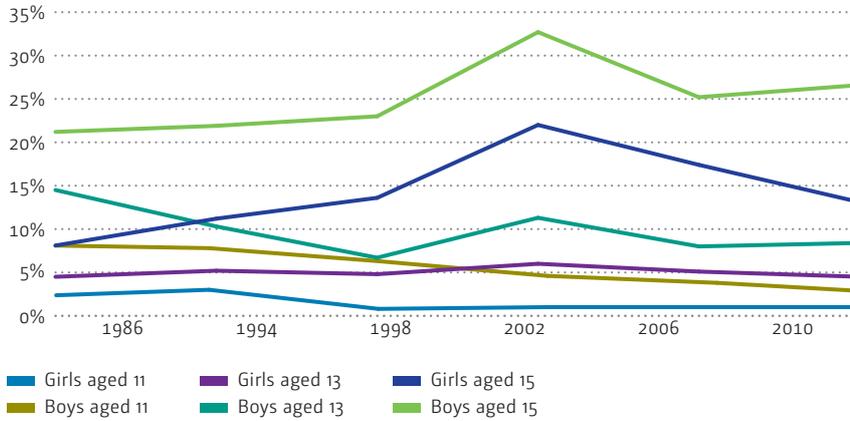
Physical and mental disabilities can affect students' academic achievements and opportunities. So far, however, there has not been a uniform definition of disability within Switzerland, and hence no straightforwardly comparable statistics are available on children and young people with a disability. In 2007 (the most recent figures available) there were 122,100 households with a handicapped child in Switzerland (FSO definition), corresponding to 8.4% of the households with children aged 0 to 14 (FSO, 2010b). Boys are affected by disability more frequently than girls, but the reasons for this have not been established (→ Figure 16). Since the characteristics cannot be correlated with school data, it is not possible to make any statements as to their impact on the children's educational path.

Substance use

The (excessive) consumption of alcohol and its consequences accounts for a considerable proportion of deaths among young people in Europe (Rehm & Gmel, 2002) in addition to slowing down brain growth and producing other structural changes in the hippocampus (Spear, 2002). These changes damage the brain irreversibly and thus have a negative impact on academic achievement. Apart from these health consequences, early access to alcohol and the frequency of alcohol consumption have a strong influence on problem behaviour among young people (Kraus, Metzner & Piontek, 2010). Problem behaviour of this type, in turn, can have a negative impact within the school setting and be manifested in poorer academic achievement (Balsa, Giuliano & French, 2011) – on this subject, see the discussion further below on cause and effect for academic achievement and cannabis consumption. In

17 Development in the percentage of young people who drink alcohol by age and gender

Source: Windlin, Kuntsche & Delgrande Jordan, 2011



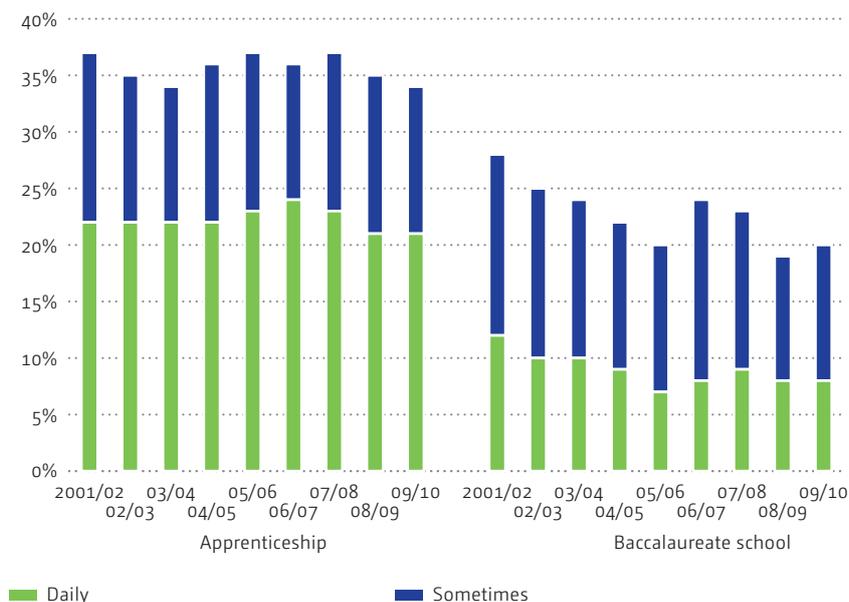
Switzerland, no significant change has been observed among young people over the past few years in terms of their consumption of either the majority of illegal psychoactive substances or legal substances (such as cigarettes or alcohol) (Windlin, Kuntsche & Delgrande Jordan, 2011) (→ Figures 17 and 18). Alcohol remains the most frequently consumed psychoactive substance among young people. The proportion of young people consuming alcohol on a weekly basis remains relatively constant between age 16 and 25 and is virtually independent of academic achievement (→ Figure 19).

With statistics such as these, it must be borne in mind that the data is based on a retrospective self-declaration in each case. A recent study conducted in the French-speaking part of Switzerland, however, shows that when a comparison is drawn between immediate and retrospective self-declarations, twice the level of consumption is seen (Kuntsche & Labhart, 2012). This does not, however, mean that a different form of measurement would reveal a different trend.

Among young people in Switzerland, more than 30 percent of females smoke, while the percentage for males is somewhat lower (Suris, Berchtold, Bélanger et al., 2010). Young people smoke their first cigarette at just under 15 years of age on average, while the average age for taking up regular smoking is just under 17 (data from the Swiss Household Panel 2010). Clear differences are seen between the individual school types when it comes to the proportion of young people who smoke: while there have always been some 35% of young people in vocational education who smoked, or had smoked over the past ten years, the percentage of students smoking at baccalaureate schools has fallen to around 20% (→ Figure 18).

18 Proportion of young people who smoke, by school type, over time

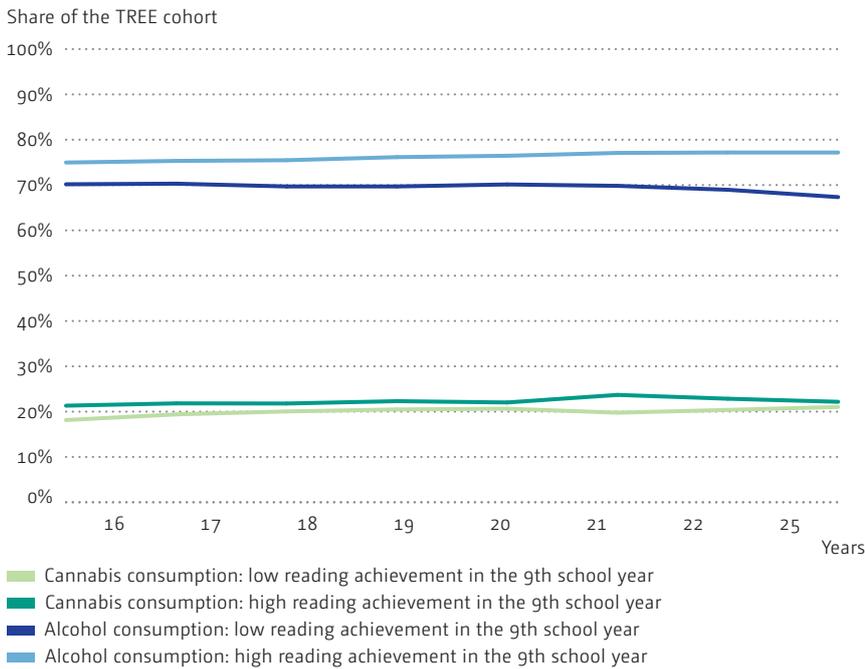
Data: Tabakmonitoring, Annual Report



In Switzerland, more than 20% of males and more than 10% of females between the ages of 16 and 22 consume cannabis (*Suris, Berchtold, Bélanger et al., 2010*). A number of studies show that increased cannabis consumption raises the risk of not achieving a school-leaving qualification at all, or of only achieving a low-level qualification (e.g. *Bray, Zarkin, Ringwalt et al., 2000*). Three potential correlations between the consumption of cannabis and academic achievement can be envisaged. Firstly, cannabis causes poor achievement. Secondly: cannabis consumption is a consequence of poor academic achievement. And thirdly, consumption of cannabis and poor academic achievement are not directly linked but share the same cause, such as the social setting. More recent studies have attempted to investigate this correlation between cannabis consumption and academic achievement with different methods in a bid to establish the causality (e.g. *Chatterji, 2006; Bessey & Backes-Gellner, 2009; McCaffrey, Liccardo Pacula, Han et al., 2010*). In the majority of cases, these studies show that cannabis consumption leads to a lower school-leaving qualification. For Switzerland, *Perini and Marti (2011)* show that young people who consume cannabis on a regular basis play truant from school on an average of two days more per month than non-consumers and that one day's truancy per month increases the likelihood of dropping out of school by 20%. Despite this, it is not clear whether cannabis consumption has a causal effect on academic achievement (*Hall & Degenhardt, 2009; Hall, 2009*). Analyses based on TREE data show that the proportion of young people aged between 16 and 25 who consume cannabis on a weekly basis remains roughly the same, irrespective of their reading achievement in the 9th school year (→ Figure 19).

19 Substance use by age and PISA reading achievement, TREE cohorts

Data: TREE; calculations: SCCRE



Juvenile delinquency

Juvenile delinquency can affect the educational prospects of both the victims and the perpetrators (Eriksen, Nielsen & Simonsen, 2012). The victims of juvenile delinquency, in particular, may suffer physical or mental damage, which can manifest itself in an unwillingness to attend school and/or a drop in academic achievement. Juvenile delinquents are generally less motivated at school than other young people (cf. Ribeaud & Eisner, 2009; Moret, 2006; Seeley, Tombari, Bennett et al., 2009). So far, no unequivocal evidence has been put forward to confirm whether or not delinquency has a causal influence on achievement at school (cf. Eriksen, Nielsen & Simonsen, 2012; Beran, 2009; Moret, 2006; Walser & Killias, 2009), on truancy (Stamm, Ruckdäschel & Templer, 2009) or on dropping out of school (Townsend, Flisher, Chikobvu et al., 2008).

Between 1999 und 2010, a pronounced increase in juvenile delinquency was registered in Switzerland (especially in convictions for violent offences) in the juvenile offence statistics (→ Figure 20). Since 2011, the number of convictions has, however, been declining again.

It is not clear whether the increase in convictions for violent offences is actually due solely to an increase in violent acts or whether it results in part from a higher reporting rate amongst victims (on account of the greater public awareness of the problem of violence, for example) or from the police solving a higher percentage of cases.

No up-to-date statistics are available that have been acquired through surveys on self-reported delinquency or through victim surveys. No firm conclusions can thus be drawn as to whether juvenile delinquency has, in fact, increased.

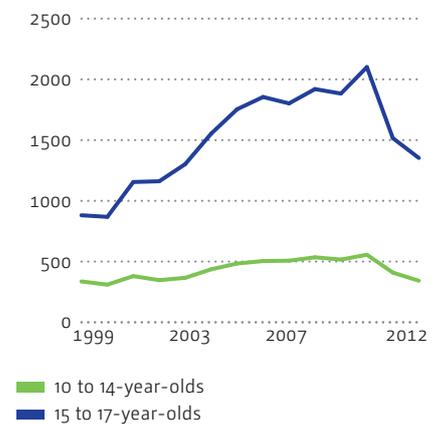
A study conducted in Canton St.Gallen (Walser & Killias, 2009) shows, on the basis of self-reported perpetrator experiences, that delinquency falls

TREE (Transitions from Education to Employment) is the first national longitudinal study into young people’s transition from school to adult life in Switzerland. The focus of the study is on the training and employment taken up after completing compulsory education. The TREE sample takes in about 6000 young people who took part in the PISA project (Programme for International Student Assessment) in 2000 and who completed their compulsory education in that same year.

20 Juvenile offence trends

Number of convictions for violent offences committed by juveniles (e.g. wilful homicide, coercion or robbery)

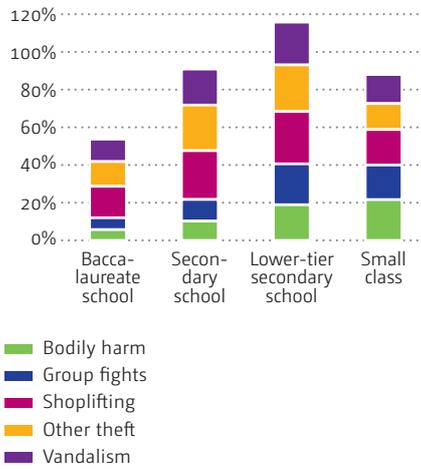
Data: FSO



The number of minors accused of violating the Swiss Penal Code has fallen over the past few years. Minors are most frequently accused of shoplifting, damage to property or «general theft» (FSO, 2012f). Minors (aged 10–17) are sentenced according to the criminal law relating to juvenile offenders and thus listed separately from young adults (aged 18–25 years) in the statistics.

21 Annual prevalence of perpetrator experiences in Canton St. Gallen by school type, 2008

Source: Walser & Kiliyas, 2009



The Confederation, cantons, cities and communities have launched local the **Youth and Violence Prevention Programme** for the period 2011–2015 in order to provide a basis for the prevention of violence, and especially violence perpetrated by young people (www.jugendundgewalt.ch). The effect on the problem behaviour of young people of prevention programmes aimed at influencing the behaviour of their parents is disputed (Gross, 2004; Hiscock, Bayer, Price et al., 2008). A current study for Zurich is unable to pinpoint any effects (Eisner, Nagin, Ribeaud et al., 2012).

consistently at higher school levels (with the exception of small classes). This, however, does not serve to prove that education has an influence on delinquency (selection effects at the different school levels) and, in addition, it can be assumed that education affects the likelihood of perpetrators reporting their experiences (→ Figure 21).

Irrespective of the precise development of juvenile delinquency, violence (bullying) committed both towards and by young people is also a reality in the educational context.² Studies from the cantons of St. Gallen (Perren, Dooley, Shaw et al., 2010), Vaud (Lucia, 2009) and Valais (Jaffé, Moody & Piguët, 2012) and also for Switzerland as a whole (Lucia, 2009) show that some 2–10% of students in the 5th to 9th school years are victims of bullying at least once a week. Boys have more frequent contact with bullying than girls, and there is more bullying in French-speaking Switzerland than in the German-speaking part of the country (Lucia, 2009). A new form of bullying has been increasingly observed in schools over the past few years: cyberbullying. This covers bullying conducted via technologies such as the internet or mobile phones (Li, 2006; Smith, Mahdavi, Carvalho et al., 2008). A significant correlation exists between cyberbullying and «conventional» bullying in Switzerland too (Perren, Dooley, Shaw et al., 2010).

Economic factors

Growth

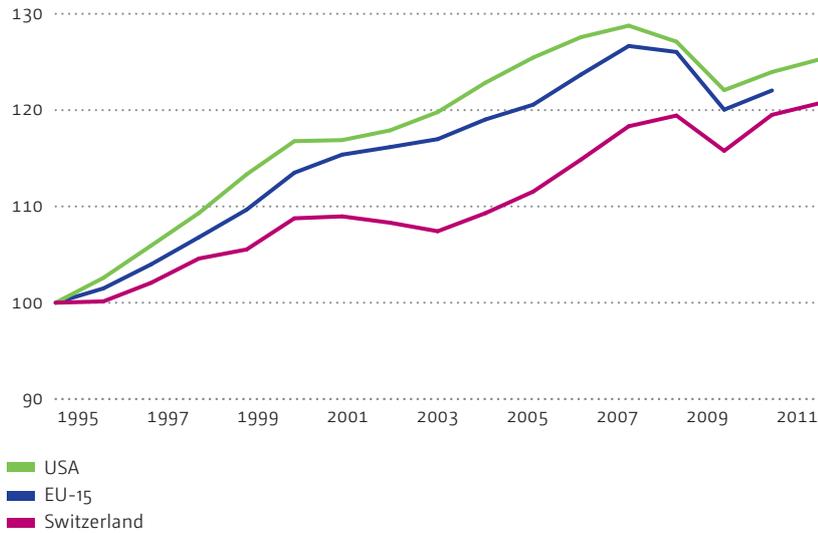
The gross domestic product (→ Figure 22) not only provides the basic foundation of resources for a country's development but naturally also serves to fund its education system. If an education system is publicly funded for the most part, then growth will be a necessary condition for the sound funding of education, but this in itself will not be sufficient, since the population must also be willing to finance public expenditure through taxes. In addition, the state of the public finances (debt ratio) will either extend or restrict the government's scope for action.

The international economic slowdown caused by cyclical factors only affected Switzerland very briefly and did not therefore exert a negative influence on the longer-term financing of the education system.

² A systematically conducted analysis of studies looking into a causal impact of bullying on the mental state of the victims and hence on their academic success reveals that a causal link does indeed exist (Ttofi, Farrington, Lösel et al., 2011). Different programmes are being applied to prevent bullying, and a systematic review has shown that these are having an effect (Farrington & Ttofi, 2009).

22 Per capita gross domestic product at 1995 prices

Data: OECD



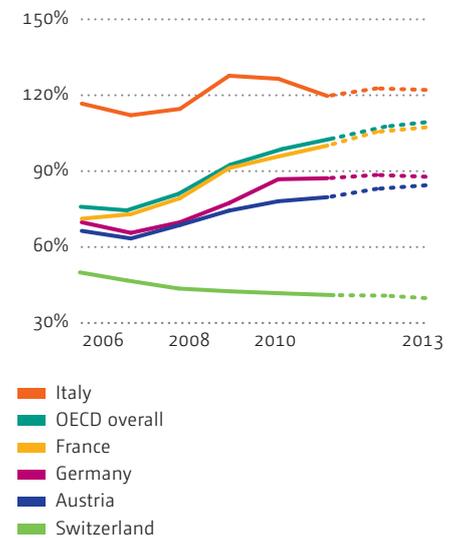
Debt development

When it comes to government debt measured in terms of GDP (→ Figure 23), Switzerland occupies one of the bottom places, with a ratio of just under 40%. The high government debt prevailing in most other industrial nations, by contrast, will have a longer-term influence on these countries' ability to fund education and research, since they will need to generate primary surpluses for many years to come if they are to significantly reduce their debt ratio. During this period, the ability of these countries to finance education will be permanently restricted, contrary to the case in Switzerland.

23 Government debt as a percentage of GDP

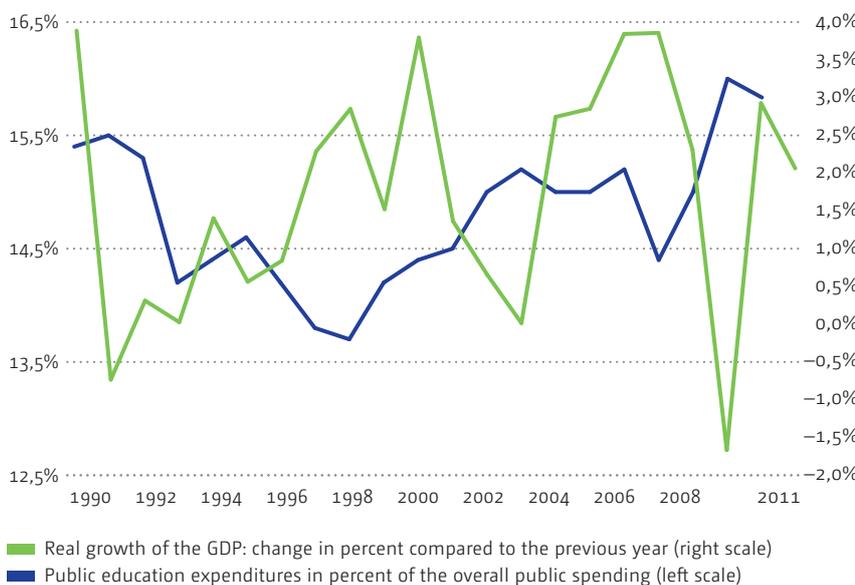
(as of 2011, forecast)

Data: OECD



24 Share of education expenditure in overall public spending and economic cycles

Data: FSO and EFV



Alongside the factors which make it possible for education to be funded with public resources (taxation income and debt ratio), the competition between the different areas that require funding from the public purse naturally also plays a role in determining the extent of funding that can be made available for education. Studies show that the demographic ageing of society has a negative impact on the willingness of its citizens to pay for education, and will continue to do so in future (*Cattaneo & Wolter, 2009*).

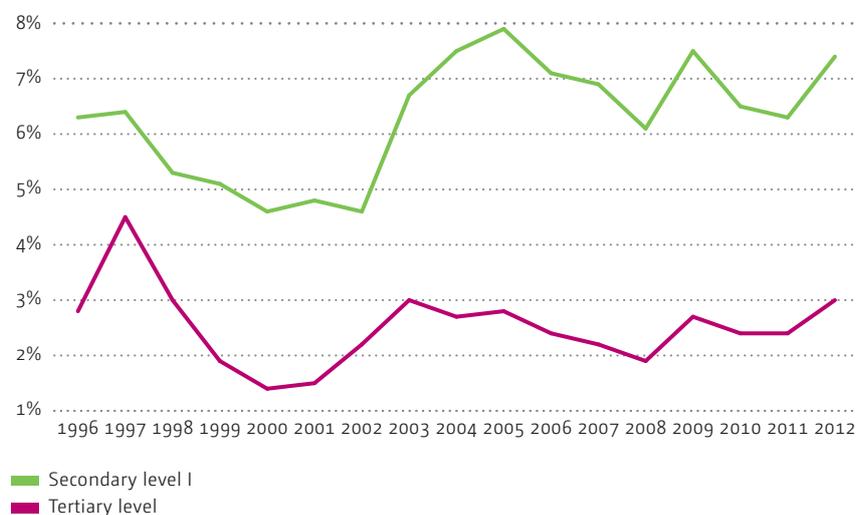
Job market and structure of the economy

Complex interactions exist between the structure of the economy and the job market, on the one hand, and the education system, on the other. The education system firstly determines to a large extent which skills are made available to the economy (not taking migration into account). This, in turn, determines, to a certain level, which particular economic activities can be expanded in Switzerland, which ones must be relocated abroad and which products and services have to be imported. In the other direction, the economy sends a message to young people and adults in the education process via signals of a shortage (labour shortages, sharply rising wages), and they are able to respond to these by opting for longer courses of education and training, or for courses with different contents.

The past two decades have shown that the job-market situation for people without post-compulsory education or training did not improve even during periods when the economy was doing well. On the contrary, during the phase of prolonged and strong economic growth between 2001 and 2007, unemployment rose among the less well qualified while remaining stable for those with tertiary level qualifications (→ Figure 25). In other words, the economic upturn was based primarily on well educated gainfully employed people. In terms of the minimum qualifications required to survive on the Swiss job market, post-compulsory education has thus become a necessity (→ *Chapter on Upper-secondary education, page 105*).

25 **Unemployment rate by education level, 2nd quarter of each year**

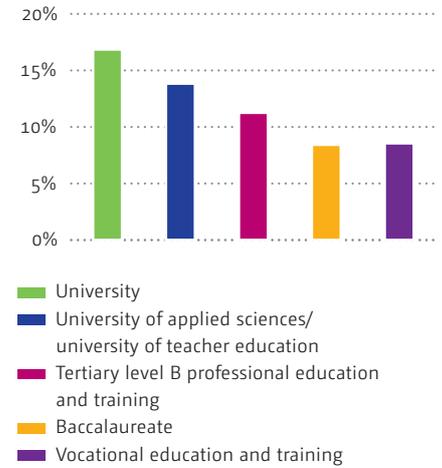
Data: FSO



Structural change is also reflected in the development of wages for those who have completed the individual education levels (→ Figure 26). The growth in real wages for people in gainful employment holding a university qualification was virtually twice as high as for people with an upper-secondary school-leaving qualification. As far as the latter are concerned, however, no differences in wage developments are evident as a function of whether the school leavers gained general or vocational qualifications. The higher growth in wages for people educated to tertiary level reflects the comparatively higher increase in demand for people with tertiary qualifications (in this case once again, for both academic and vocational education and training). It must also, however, be borne in mind that the wage gap not only continued to widen between the individual levels of education (→ *Chapter on Tertiary-level education, page 165*, → *Chapter on Upper-secondary education, page 105*, → *Chapter on Compulsory education, page 39*) but also within the different levels of education. As a rule, the wage differential between high earners and low earners with the same educational qualifications is greater the higher the education level (→ *Chapter on Cumulative effects, page 275*). In other words, demand on the job market is developing on a differentiated basis even among the sets of people who hold identical educational qualifications, and the high wages that are paid on average for higher school-leaving qualifications can also go hand in hand with a high variance in wages, i.e. a relatively high uncertainty as to the wages that can actually be obtained (*Glocker & Storck, 2012*).

26 Wage developments by educational qualification (real wages), 1998–2010

Data: FSO; calculations: SCCRE





Compulsory education

Issues affecting more than one level

System development at national level

27 Primary school and lower-secondary education in figures

Data: FSO

Pupils, 2011/12

| | |
|---------------------------------|---------|
| Pre-school/first-learning cycle | 149,660 |
| Primary school | 431,086 |
| Lower-secondary education | 283,503 |
| Special needs education | 36,159 |

Teaching staff, 2011/12

| | |
|--|--------|
| Compulsory education (double counting possible) | 90,242 |
|--|--------|

Percentage share of public expenditure on education, 2009

| | |
|-----------------------------------|-----|
| Pre-school | 3% |
| Primary/lower-secondary education | 50% |
| Upper-secondary education | 20% |
| Tertiary level education | 25% |
| Impossible to divide up | 2% |

Compulsory education, which encompasses pre-school or the first learning cycle, plus the primary and lower-secondary levels, has more than 900,000 pupils (2011/12) and in excess of 90,000 teachers. It accounts for more than 50% of expenditure on education (2009) and is the most sizeable part of Switzerland's education system. Responsibility for compulsory education rests with the cantons. The Federal Constitution, however, specifies that the cantons and Confederation, within the scope of their powers, must jointly ensure the high quality and accessibility of the Swiss education sector (Federal Constitution, Art. 61a, Para. 1).

The cantonal school systems that have evolved over time are characterised by structural and cultural diversity and differ greatly in their size (for example, there are 147,130 children in compulsory education in Canton Zurich compared with 2064 in Canton Appenzell-Innerrhoden). The biggest structural differences have been evident at pre-school level to date, with cantons offering either one or two years of kindergarten (three years in Canton Ticino), which may or may not be compulsory. Primary school has accounted for six of the nine years of compulsory education in the majority of cantons in the past, with the exception of Basel-Stadt and Vaud (four years), and Aargau, Basel-Landschaft, Neuchâtel and Ticino (five years). This has been followed by three years of lower-secondary school, with the corresponding deviations in the cantons mentioned above. In terms of content, the diverse nature of the different cantonal school systems has been reflected in their dissimilar curricula and the teaching resources that go with these. For some time now, endeavours have been underway to harmonise the cantonal school systems (see the section on the HarmoS Agreement).

The cantons are similarly responsible for the schooling of children and young people (up to age 20) who have special needs. When responsibility for special needs education for children and young people with disabilities was switched from the disability insurance scheme to the cantons, the focus was shifted from their disability to their educational needs. Small children with disabilities or developmental disorders are registered and given support as early on as possible (treatment programmes for the early years). During their compulsory schooling, either speech therapy, psychomotor therapy and special needs measures are available for them in regular classes, or special schools are provided. Where necessary, children can also be cared for in school-based day-care facilities or at boarding schools, and they are provided with transport to school and therapy venues. In addition to the support provided in the different types of special school for specific disabilities and also in special or small classes (with a reduced number of pupils) and preparatory classes (curriculum for the first primary-school class spread over two academic years), integration in regular classes with individualised support is also on the increase. Inclusive solutions are also implemented for especially gifted children. The support provided for giftedness and gifted children includes fast-tracking (starting school early, skipping a year, etc.), enrichment (e.g. more in-depth project work, additional offerings) and assistance for teachers (guidance, continuing education).

At pre-school or first-learning-cycle level and also at primary and lower-secondary level, some 95% of all children attend the state schools in the community in which they reside, or in a neighbouring community; slightly more

than 5% go to a private school. The close proximity of the schools to the children's place of residence and the fact that the schools are adapted to local needs have to be rated as positive aspects of the decentralised diversity of the education systems, but this does pose problems with regard to comparability, mobility and equity. In the «education articles» that were added in 2006, the Federal Constitution thus obliges the cantons to harmonise the education they offer in respect of key factors such as school entry age and compulsory schooling, the duration and objectives of the different levels of education, the transition from one level to another and the recognition of qualifications (Federal Constitution, Article 62, Para. 4).

HarmoS Agreement

With the Intercantonal Agreement on Harmonisation of Compulsory Education (HarmoS Agreement), the Swiss Conference of Cantonal Ministers of Education (EDK) in 2007 expressed its intention to implement the above objective that is laid down in the constitution. In structural terms, the agreement makes provision for compulsory education to be the same length in all the cantons. Children are to start school at the age of 4 (cut-off date 31 July), and compulsory education will consist of a total of eleven years, with a primary level (including pre-school or a first learning cycle) lasting eight years, followed by a lower-secondary level lasting three years. The HarmoS Agreement outlines the objectives of compulsory education in general form, specifies the time at which children are to start learning a foreign language and governs organisational measures, such as class hours and school-based day-care facilities. The educational objectives are to be harmonised through the adoption of identical curricula within the individual linguistic regions, and the teaching materials and evaluation instruments are to be coordinated within these same regions too. In accordance with Article 4 of the Agreement on the Coordination of Schools of 29 October 1970, the cantons that have signed the HarmoS Agreement will be taking part, together with the Confederation, in a systematic, continuous and scientifically-based monitoring scheme and will be regularly evaluating the developments and performance of compulsory education within this framework. One aspect of this will be verifying that the national educational standards have been met. A canton's accession to the HarmoS Agreement is subject to parliamentary decisions and generally also to an optional referendum. After ten cantons had signed the Agreement, it came into force in August 2009. The deadline of six years specified in the agreement for its implementation in the cantons thus runs out on 31 July 2015. Fifteen cantons had signed the Agreement by the end of 2012, while seven cantons had refused to sign, and deliberations were still ongoing in four cantons (→ Figure 28). The fifteen cantons that have signed (including all the French-speaking and bilingual cantons and Canton Ticino) represent 76% of the resident population in Switzerland (accession procedure for the HarmoS Agreement, as per 26 September 2010). At the same time as the HarmoS Agreement came into force in 2009, the cantons in the French-speaking part of Switzerland adopted the «Convention scolaire romande» to govern its implementation. This latter agreement takes up the HarmoS provisions and goes even further on a large number of points (CIIP, 2007).

28 Status of accession procedures to the HarmoS Agreement as per 1.1.2013

Data: EDK; Map: swisstopo



- Accession accepted
- Accession rejected
- Accession still undecided

Structural harmonisation

Independently of whether or not individual cantons have signed the HarmoS Agreement, all cantons have, at the legislative level, either introduced or taken the decision to introduce a harmonised duration of three years for their lower-secondary education. Canton Ticino is still maintaining the difference of one year, as set out in HarmoS. A duration of eight years for the primary level has not yet been harmonised at the legislative level. Those cantons that are signatories to HarmoS and Cantons Aargau and Thurgau either fulfil the key points already (cut-off date, two years' compulsory kindergarten attendance and hence an eight-year primary level) or are in the process of preparing the legal basis for the implementation of these. In the other cantons, differences still remain with regard to the cut-off date and the requirement to offer kindergarten, as well as in respect of whether attendance at kindergarten is compulsory or not.

The HarmoS Agreement postulates that children should be able to complete their first years of school with flexible timing, commensurate with their intellectual and emotional development. This is in line with the school models that were tried out in a project run by the EDK Eastern Switzerland and partner cantons from 2003 to 2010. What was tried out there were a four-year model (two years of kindergarten and two years of primary level), which children complete in three to five years, and a three-year model (two years of kindergarten and one year of primary level), which children complete in two to four years. In the scientific evaluation of the project, the first-learning-cycle models were seen to be suitable for offering a flexible, selection-free start to a child's educational path that is suitably adapted to the child in question. In terms of the cognitive, emotional and social development of the children, the models that were tried out with mixed age groups (spanning different levels) produced results that were at least as positive as the conventional models divided up according to level (*EDK-Ost, 2010*). In a number of cantons in German-speaking Switzerland, the individual communities were given the option of introducing first learning cycles of this type. Allowance is also being made for the trend towards defining longer learning cycles when compiling the curricula.

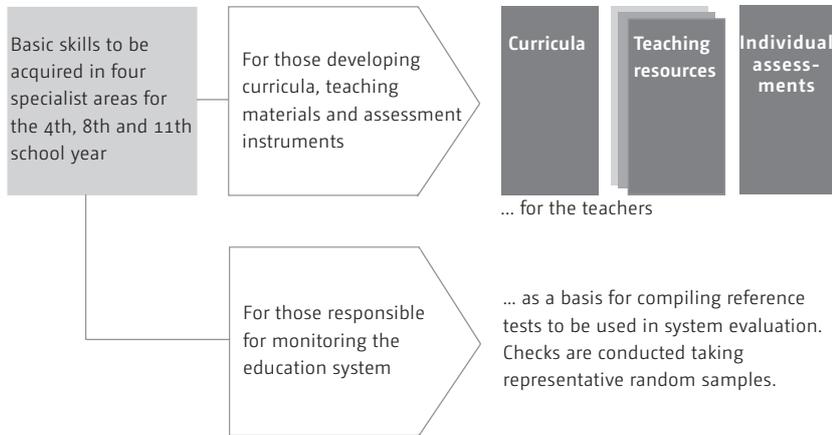
Harmonisation of objectives

The HarmoS Agreement sets out the overall objectives for compulsory education in five areas: languages; mathematics and the natural sciences; social sciences and humanities; music, art and design; and physical activity and health. The objectives are specified in curricula for the different linguistic regions, and, in addition to this, proposals were put forward regarding educational standards for the languages of instruction and foreign languages, as well as for mathematics and the natural sciences, on the basis of skills models. These set out the basic skills that pupils are to have acquired by the end of the 4th, 8th and 11th school years, and the foreign language skills they should possess at the end of the 8th and 11th school years (as per the HarmoS system of counting). These national educational objectives were approved by the EDK in June 2011. They are channelled into the curricula as targets and must also be taken into account when developing teaching materials and assessment instruments. Regular checks are conducted at national level

to ensure that the educational objectives have been attained. This is done in the framework of the education monitoring process (→ Figure 29; *EDK, 2011*).

29 Intended use of the national educational objectives

Source: *EDK, 2011*



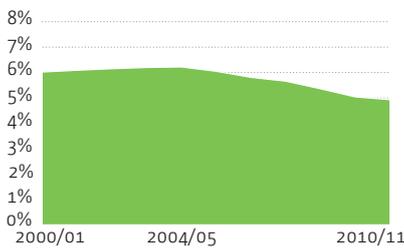
When it comes to foreign languages, the HarmoS Agreement reflects the national strategy for the further development of language teaching, which was adopted by the EDK in 2004. This corresponds to the Federal Law on National Languages and Understanding between the Linguistic Communities (SpG/LLC of October 2007), which calls for the upkeep of the language of instruction at all tuition levels, for the promotion of multilingualism and for the acquisition of skills in at least a second national language and one further foreign language by the end of compulsory education (SpG/LLC, Art. 15). The HarmoS Agreement specifies that the teaching of the first foreign language must start no later than the 5th school year and the second foreign language no later than the 7th school year (as per the HarmoS system of counting). One of the foreign languages is to be a second national language and the other English, and optional tuition should be available in a third national language where there is a demand for this. The Agreement leaves it up to the coordinators in the different linguistic regions to specify the order in which the foreign languages should be learned. These provisions have been implemented in a manner suitably adapted to the regional situation and have been put into practice or decided upon in all 15 signatory cantons to the HarmoS Agreement and eight further cantons.

Agreement on Special Needs Education

In order to coordinate the transfer of the tasks and expenses of special needs education to the professional, legal and financial competence of the cantons, the EDK adopted the Intercantonal Agreement on Special Needs Education in October 2007, which came into force at the start of 2011 after ten cantons had signed it. Irrespective of whether they are signatories to the Agreement or not, all cantons are required to draw up binding specifications for the special needs field, giving precedence to integrated education for disabled children where possible, in line with the approach set out in the Equal Opportunities for the Disabled Act (BehiG/LHand). These provisions not

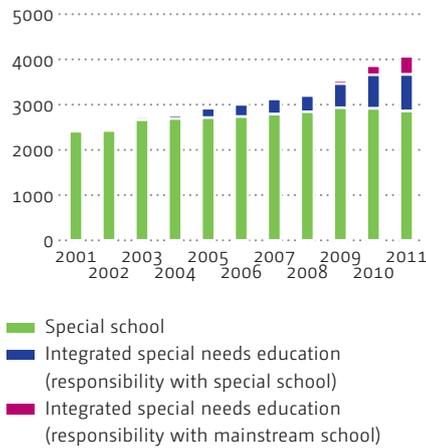
30 **Percentage of pupils in special needs education, 2001–2011**

Data: FSO



31 **Trend in the number of special needs pupils in Canton Zurich, 2001–2011**

Data: VSA Canton Zurich



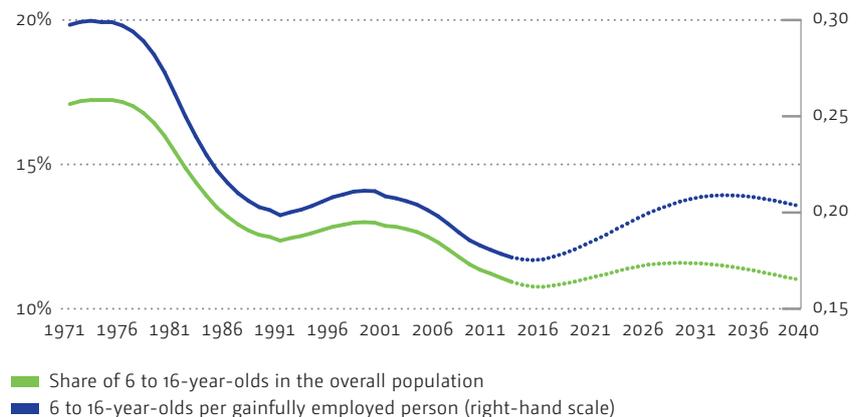
only comply with the principle of equality, they also take up the results of research which prove that integrated support has a positive impact not only on academic development but also on social and vocational development (Bless, 2007; Joller-Graf & Tanner, 2011; Klemm, 2009b; Eckhart, Haeberlin, Sahli Lozano et al., 2011).

The figures published by the Federal Statistical Office so far show that the proportion of pupils in classes or schools with a special needs curriculum has been steadily falling (→ Figure 30). No data on integrated education has been collected as yet, but, in the course of modernising the surveys conducted in the education sector, ways of depicting mainstream-school inclusion were also sought (SZH, 2011). Surveys of special needs education show that, at the same time as the number of children receiving support in special needs classes is falling in favour of integrated support, an increase is coming about in the number of children being supported through additional measures or being allocated the status of «special needs pupil» (→ Figure 31).

Development and forecast of pupil numbers

In planning compulsory education within the education system, allowance must also be made for demographic developments in addition to the above-mentioned agreements relating to structural development. In a large number of cantons, pupil numbers have been declining over the past few years, but they are already increasing again at the lower levels of compulsory education. The falling numbers of pupils could prompt hopes of savings on education. The trend in the youth dependency index (→ Figure 32), however, shows that the number of young people still receiving education and training, and hence occasioning costs, measured against the number of persons in gainful employment will tend to rise in future on account of the country’s overall demographic development.

32 **Change in the share of 6 to 16-year-olds in the overall population and number of 6 to 16-year-olds per gainfully employed person (aged 20–64), 1971–2040**



Further focal points of development at national level

A national competence centre was set up in January 2013 to provide support for schools and Universities of Teacher Education in the introduction of education for sustainable development (ESD). The competence centre is

working on all the different approaches to ESD (environmental education, global learning, learning about democracy and human rights, health, economics, etc.) under a single roof (EDK, 2012a).

In order to facilitate the transition from compulsory education to further education and to reduce the number of young people without post-compulsory education and qualifications, the EDK ran a project entitled «Optimisation of the transition from compulsory education to upper-secondary education» from 2006 to 2010, in conjunction with the Confederation and with organisations from the world of work. After the project had been completed, the EDK adopted recommendations on the transition from compulsory education to upper-secondary level. These cover inter alia cooperation between the school and parents or guardians, cooperation between the individual school levels and appropriate skills for teaching staff and experts at the transition point (EDK recommendations: Transition compulsory education – upper-secondary level, 28 October 2011). A number of cantons are thus reconfiguring the last academic year of lower-secondary education and preparing pupils more selectively for the transition to an apprenticeship or a higher-level school (→ *Chapter on Lower-secondary education, page 83*).

System development at regional level

Cooperation agreements

The increased cooperation between the cantons that is coming about in the area of compulsory education is not only taking shape at national level but, to a large extent, at the level of the different linguistic regions too. A legal framework has been established for this over the past few years. The *Convention scolaire romande* already mentioned above governs the coordination between those cantons that are members of the CIIP (Intercantonal Conference of the Public Education System in French-speaking Switzerland and Ticino) with regard to the implementation of the HarmoS Agreement, in particular. In addition to this, the *Convention scolaire romande* defines areas for regional cooperation. These relate specifically to the initial training and continuing education of teachers and to the training of management staff in the school sector, the joint examinations (*épreuves romandes communes*) and the compilation of individual knowledge/skills profiles for the end of compulsory education (CIIP, 2007).

The three German-speaking EDK regional conferences (for Eastern, Northern, and Western and Central Switzerland) have agreed to cooperate more closely and have teamed up to form the Conference of Cantonal Ministers of Education in German-Speaking Switzerland, D-EDK. In addition to the areas in which they have worked together in the past – for the «Curriculum 21», school television and support for gifted children, in particular – attention will now be focused on questions relating to the coordination of teaching materials and the measurement of academic achievement (D-EDK, 2010b).

In the German-speaking part of Switzerland, agreements have been concluded on closer cooperation within the Central Switzerland Education Area (cantons of Lucerne, Uri, Schwyz, Obwalden, Nidwalden and Zug) and also in the North West Switzerland Education Area (cantons of Aargau,

Basel-Landschaft, Basel-Stadt and Solothurn). While there has been a long tradition of cooperation in central Switzerland, covering the coordination of curricula, the introduction of English at primary school, the development of teaching and joint orientation studies, the developments that have been jointly implemented in the North West Switzerland Education Area since 2009 include the compilation of joint tests of academic achievement and a collection of test questions, points of reference for kindergartens, enrichment programmes, cooperation on the introduction of a curriculum and teaching materials as well as a joint school-leaving certificate. The North West Switzerland Education Area published its first joint report in 2012 (*Criblez, Imlig & Montanaro, 2012*).

In conjunction with the teaching of foreign languages, those cantons that have opted for French as the first foreign language to be taught (prior to English as the second foreign language) are cooperating with each other. They are coordinating their development work on this in the «Passepartout» project (which takes in curricula, teaching/learning materials, assessment instruments, tuition principles and teaching methods).

Curricula for the different linguistic regions

Drawing up and implementing the curricula represents a central task in all three linguistic regions. While the *Plan d'études romand* (PER) has already been implemented, the curriculum projects for Italian-speaking Canton Ticino (*Piano di studio della scuola dell'obbligo ticinese*) and the curriculum for the German-speaking cantons and parts of cantons (*Lehrplan 21*) are still in the process of being compiled. These are to be ready by 2014 and made available to the cantons. Special solutions are being sought for the trilingual canton of Graubünden in the framework of the *Lehrplan 21* curriculum.

The curricula, which are configured for eleven years of schooling, are divided into three cycles. The first cycle covers the first four years at school (including two years of kindergarten), the second cycle the second four years of primary school, and the third cycle the three years of lower- secondary education. The curricula define the skills to be acquired and describe how these skills are to be built up over the three cycles. In addition to the subjects in which education is to be provided, which are set out in the HarmoS Agreement, the curricula also address general skills and interdisciplinary topics forming part of a general education. All the curricula include the ability to work with others, communication skills, critical reflection skills, and the ability to learn and solve problems, even if these skills are not always referred to by the same name and are not delimited in precisely the same manner. The interdisciplinary topics that have been jointly adopted take in ICT and media, health and well-being, life planning and careers guidance, living together and democracy, the environment and resources, and economics and consumption (*CIIP, 2010; Tamagni Bernasconi & Vanetta, 2011; D-EDK, 2010a*).

Performance measurement

Regular monitoring is to be conducted to ensure that the educational standards adopted by EDK 2011 (basic skills) are attained; this will be done for the first time in the period from 2014 to 2017. At the end of 2012, the EDK

agreed to the setting up of a database of test questions to this end, and the parameters for the evaluation were laid down in the first half of 2013 (year in which monitoring is to be conducted, educational levels and subjects, size of random sample). Attainment of the basic skills is to be monitored in mathematics in 2016 (11th school year as per the HarmoS system of counting) and in foreign languages in 2017 (8th school year as per the HarmoS system of counting). The database of test questions is also to be used at the level of the linguistic regions in order to compile instruments for ascertaining pupils' individual progress (*Husfeldt, 2012*). By comparison to countries which conduct annual tests, the EDK is pursuing a circumscribed concept of system evaluation at national level and, in this context, has decided, as of 2015, to restrict its participation in PISA to the international comparison (*Chassot, 2012*). Education policy negotiations are ongoing to determine how performance measurements at cantonal or regional level can be integrated and co-ordinated within this system (*Marc & Wirthner, 2012; D-EDK, 2012*).

System steering at cantonal level

After taking a look at the steering and development elements that have been set up at national and (linguistic) regional level to coordinate the individual education systems, the focus in the section that follows is on the cantonal and local levels, which are of key importance in Switzerland. Over the past 20 years or so, compulsory education in most cantons has switched from exclusively input-orientated steering, based on detailed syllabus, time and funding specifications, to a form of steering that gives the individual school more freedom, while, at the same time, paying greater attention to the quality of the processes and results.

A closer look at the way in which the cantonal school systems operate ought to permit a distinction to be drawn between the individual system levels, players and areas of action. In the simplified presentation that follows, the differences between the individual cantons have been left out of account.

33 Levels, players and areas of action for cantonal education systems

Source: *Fend, 2008*, highly simplified

Cantonal level

Policy: laws, ordinances/target and framework specifications/resources

Administration: implementation concepts/organisation models/resource planning/supervision

Community level

Policy and administration: implementation/organisation/deployment of resources/infrastructure

Public authorities: strategic school management/human resources decisions/supervision

School level

School head and staff: operational management of school/quality and human resources

management/cooperation and development of teaching/parent participation

Tuition level

Teacher: tuition/class management/assessment and recommendation for educational path/contact with parents

Pupil: learning and building skills/social behaviour and personality development/decisions on educational path

According to *Fend (2008)*, the setting within which the players at any given level are able to act is determined by the next-higher level and the specific situation that prevails at their particular level. Other factors determining this setting are the perceptions and skills of the players. Hence teachers, for example, not only have to abide by legal specifications, curricula and other target requirements and education agreements, but must also make allowance for the characteristics of the school class, parental expectations and their own professional capacities and limits. The specifications of the next-higher level are thus «re-contextualised». If this process of re-contextualisation is taken into account, then it makes sense, when configuring the specifications, to include the next-higher level, the players at this level and also their perceptions and interests in the decisions taken. When monitoring the action, it similarly makes sense not only to consider the specifications but also the specific settings in which the action takes place.

The Federal Constitution and cantonal legislation now specify that the «concerted action» (*Fend, 2008*) of the players at the different levels is to lead to high-quality school and teaching processes, thus supporting the learning and development of the pupils while ensuring equality of opportunity. Switzerland's education systems thus verify the skills acquired by pupils and their well-being in this respect through international measurements of achievement, such as PISA, as well as through other evaluations, checks or examinations of learning progress at cantonal level. In addition, quality concepts for schools and teaching have been compiled in the cantons, and the implementation of these concepts is being verified in the course of internal and external evaluation processes. The information obtained in the context of the evaluation is used to report to those running the schools and also provides the staff with a basis for the further development of the school and its teaching. Expressed in terms of the different levels of the school systems set out above, the verification of quality in the overall context can be presented as follows:

34 Constituent elements of the verification of school and tuition quality

Source: own presentation based on *Huber & Büeler, 2009*

| Level | Internal elements | External elements | School inspectorate |
|-------------------|---|--|--|
| Pupils | <ul style="list-style-type: none"> – Self-assessment – Peer feedback – Assessment by teacher | <ul style="list-style-type: none"> – Standardised tests – Centralised exams | <ul style="list-style-type: none"> – Compliance with educational policy framework conditions – Regulatory management – Compliance with community specifications – Strategic management of the school |
| Teachers | <ul style="list-style-type: none"> – Reflection on teaching (e.g. due to pupil feedback or test results) – Feedback from colleagues – Target-oriented employee review by school head | <ul style="list-style-type: none"> – Employee assessment by the education committee in schools without a head | |
| Individual school | <ul style="list-style-type: none"> – Data-based internal evaluation | <ul style="list-style-type: none"> – External evaluation | |
| School system | <ul style="list-style-type: none"> – Results of the internal evaluation relative to the school system as a whole | <ul style="list-style-type: none"> – Independant system evaluation – Monitoring | |

The traditional school inspectorate monitors compliance with legal standards and also with procedural and budgetary requirements, while different

approaches to quality assurance are apparent in the country's individual linguistic regions.

The cantons in the French-speaking part of Switzerland have a system, of varying intensities, in which pupils take standardised cantonal tests at different points in time during their compulsory education. These tests are partly diagnostic and partly summative in nature, with the former being applied for the most part at primary level and the latter chiefly at secondary level (Marc & Wirthner, 2012). They are used to see where the pupils stand, to objectivise teacher assessment and for purposes of quality assurance in the schools (IRDP, 2012).

35 Cantonal tests in French-speaking Switzerland

Source: Marc & Wirthner, 2012

| School year | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|-------------|---|----------------|----------------|------------------|----------------|------------------|---|------------------|------------------|
| Canton | | | | | | | | | |
| Bern | | | | | | o | | | |
| Fribourg | | o | | o | | x | o | o | x |
| Geneva | | x | | x | | x | x | x | x |
| Jura | | | | o | | x | | o | |
| Neuchâtel | o | o | o | o | o | x | | o ¹ x | |
| Vaud | | x | | x | | x | | x | x ² |
| Valais | | o ¹ | o ¹ | o ¹ x | o ¹ | o ¹ x | | x | o ¹ x |

o = diagnostic tests

x = balancing tests

¹ = tests done for the teacher, on a voluntary basis

² = school test used in the context of certification

In Canton Ticino, an office (Ufficio del monitoraggio e dello sviluppo scolastico) has been set up with a view to creating a «learning schools» system which supports innovative school projects, accompanies the implementation of the HarmoS standards and their monitoring and provides indicators and other instruments for quality assurance and quality development. A self-evaluation manual for schools has been compiled for the «Scuola media» (Pedrazzini-Pesce & Tozzini Paglia, 2010).

In the German-speaking part of Switzerland, a system has been established that combines internal quality management with the external evaluation of schools. A large number of quality criteria have been worked out for differently-defined quality areas, and the implementation of these criteria is being monitored. The quality areas generally include processes within the school, such as organisation, leadership, human resources development, cooperation among the staff, the atmosphere within the school, external contacts, contacts with parents and school life, as well as aspects of teaching, such as fulfilment of the education mandate, configuration of teaching and learning arrangements, the teaching and learning climate, accompaniment of learning, assessment and class management. The criteria allocated to the quality aspects provide a reference framework for the schools' internal quality management and are taken as a basis for compiling the evaluation instruments (grids for strengths/weaknesses profiles, questionnaires, interviews, etc.). A similar basis has been used to work out the quality concepts and the reference framework (Zurich, 2011b; Brägger & Posse, 2007; Claude & Rhyn, 2008; Dubs, 2003; Helmke, 2008; Landwehr & Steiner, 2003; Meyer, 2004).

36 Progress on developing external school evaluation in German-speaking Switzerland and the Principality of Liechtenstein

Source: ARGEV, 2012

| | A | B | C | D | E | F |
|-------|----|---|---|---|---|---|
| AG | ■ | | ■ | | | |
| AR | ■ | | | ■ | | |
| BE | | | | | ■ | |
| BL | ■ | | ■ | | | |
| BS | ■ | | | | ■ | |
| FL | ■ | | | ■ | | |
| FR | | | ■ | | | |
| GL | ■ | | ■ | | | |
| GR | ■ | ■ | | | | |
| LU | ■ | | ■ | | | |
| NW | ■ | | ■ | | | |
| OW | ■ | | | | | |
| SG | ■ | | | | ■ | |
| SH | | | | | ■ | |
| SO | ■ | | | ■ | | |
| SZ | ■ | | ■ | | | |
| TG | ■ | | | ■ | | |
| UR | ■ | | | ■ | | |
| VS | ■ | | | | | ■ |
| ZG | ■ | | | ■ | | |
| ZH | ■ | | ■ | | | |
| Total | 18 | 1 | 9 | 6 | 4 | 1 |

- A statutory mandate for external school evaluation
- B second evaluation cycle completed
- C first evaluation cycle completed
- D cantonwide evaluation underway
- E pilot phase (abandoned in SH)
- F concept phase

The schools are evaluated every four to five years. Different procedures are employed to conduct these evaluations. Reports are drawn up to satisfy the requirement for accountability to the higher levels and, to some extent, to the public as well (in a suitably prepared form). Since the dividing line between supervision and evaluation differs in the individual cantons, it is not possible to make generalised statements regarding follow-up measures to the evaluations. The results are, however, always channelled into the further development of the school, with the higher-ranking system levels providing support where necessary, such as in the form of advice.

The Conference of Cantonal Ministers of Education in German-Speaking Switzerland, D-EDK, has set up a specialist conference with the name «Interkantonale Arbeitsgemeinschaft Externe Evaluation von Schulen» (ARGEV), to promote intercantonal cooperation and coordination in the external evaluation of schools. All the German-speaking and multilingual cantons with the exception of Appenzell Innerrhoden belong to this, as does the Principality of Liechtenstein. In addition to its responsibility for the appropriate training and professionalisation of school evaluation experts and for the networking of offices and experts within this field, ARGEV also has the task of conducting an annual survey among its member cantons in order to establish the progress made on developing external school evaluation (ARGEV, 2012; → Figure 36).

Seven cantons have made school evaluation reports accessible to the public. While these reports are not directly comparable, due to their dissimilar approaches, a number of general statements can, nonetheless, be made on this basis. The fulfilment of the education mandate is rated as good, as is the teaching and learning climate and class management. Pupils are also seen to have a high level of well-being, particularly at primary school. Any shortcomings reported in the configuration of teaching and learning arrangements relate to the handling of heterogeneity, individualisation, the activation of the pupils or assessment. The atmosphere in the schools and the school management are also deemed to be good on the whole. Any problems ascertained here relate to quality management and human resources development, which are, after all, areas that have only recently been taken up in schools as a working environment. In some cases, considerable differences are revealed between schools or even within individual schools. Where it was possible to make comparisons over time between the different evaluation rounds, quality improvements were noted (*Appenzell Ausserrhoden, 2010; Zurich, 2012a; Kramis, 2010; Nidwalden, 2008; Buholzer-Hodel, 2010; Schwyz, 2011; Steiner & Landwehr, 2011*).

In the German-speaking part of Switzerland, discussions are currently underway on linking external evaluations of schools with performance measurements for pupils, while, in western Switzerland, negotiations are being conducted to determine the relationship between cantonal tests and the joint reference tests provided for by the *Convention scolaire romande*. This raises, inter alia, issues of data privacy (*Armi & Pagnossin, 2011*), the extent to which the system can be burdened by evaluations (*Quesel, Husfeldt & Bauer, 2011*) and the use of results (*Bähr, 2006; Behrens, 2012*).

Human resources

In the publicly run compulsory education sector (without special needs), the human resources statistics for the 2011/12 academic year showed a total of

90,242 people. A large proportion of the teachers in compulsory education are women, with the percentage of women falling from the pre-school level (97%), via the primary level (82%), through to lower-secondary level (54%). While the percentage of women in Swiss pre-schools and primary schools matches the international reference values, the percentage at lower-secondary level is below the OECD average (68%) (OECD, 2012b). The share of teaching staff who are foreign nationals is very low at pre-school and primary level (3%) and somewhat higher at lower-secondary level (7%).

Switzerland faces the same problem as the EU and OECD countries in that more than 30% of its teachers are aged over 50 and, with pupil numbers growing again, there could be recruitment difficulties (→ Chapter on Universities of teacher education, page 221). Compared with the EU-21 countries, Switzerland has a lower share of 30 to 39-year-old and 40 to 49-year-old Swiss teachers, especially in the primary sector (→ Figure 37). This could be due to difficulties in reconciling family and work, which are frequently solved (in other occupational groups too) by women temporarily stopping work (Herzog, 2011).

The professional duties of a teacher include a large number of other tasks apart from teaching (EDK/IDES, 2011). These duties essentially cover four fields of work, with specific shares of the teachers' time being spent on each of these (figures for the cantons of Aargau, Basel-Landschaft and Lucerne are given here):

- Teaching: planning, preparing, conducting, evaluating, working with others on matters pertaining to teaching (85%)
- Pupils: advising, accompanying, assessing, communicating with parents, head of school and other persons (5%)
- School: shaping the education given, participating in school development projects, working together with other staff, cantonal offices and the authorities, assisting with school events, performing organisational and administrative tasks (5%)
- Teacher: evaluating and reflecting upon one's work, engaging in further development in educational terms and with regard to subject matter, taking part in continuing education (5%).

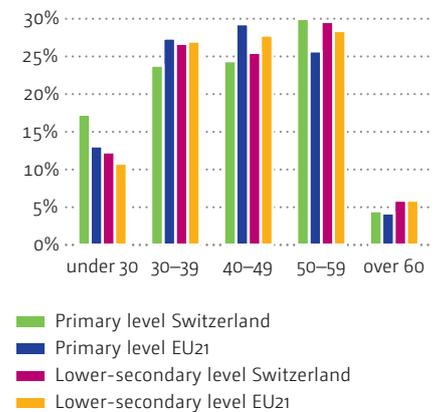
The specified number of hours to be worked in a full-time post is around 1900 per year, which is high by comparison to the OECD average of approximately 1680 hours (OECD, 2012b). The longer working week and the higher wage level in Switzerland in general, however, should be taken into account here.

In the 2010/11 academic year, the percentage of teachers working part-time was 64%. Part-time employment has increased steadily over the past few years. While the number of teachers employed in 90% to full-time jobs fell by 7% between the 2004/05 and 2009/10 academic years, the number of teachers with a small and medium number of hours rose by 4% and 2% respectively (→ Figure 38).

Changes within society and developments in the school environment itself (autonomy of schools, integration, etc.) are leading to a situation where people with different levels of training are being deployed in schools, and more diversified roles are emerging. Those working alongside teachers at schools include people qualified to support pupils with special needs, experts in speech and psychomotor therapy and school social work, classroom

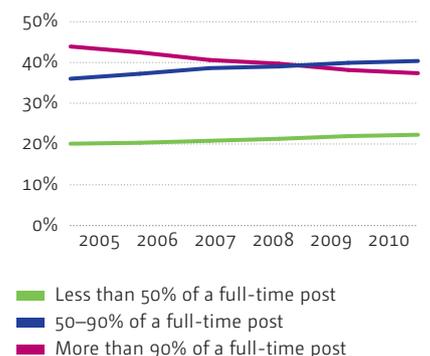
37 Teachers by age bracket, Switzerland and EU21,2010

Data: OECD



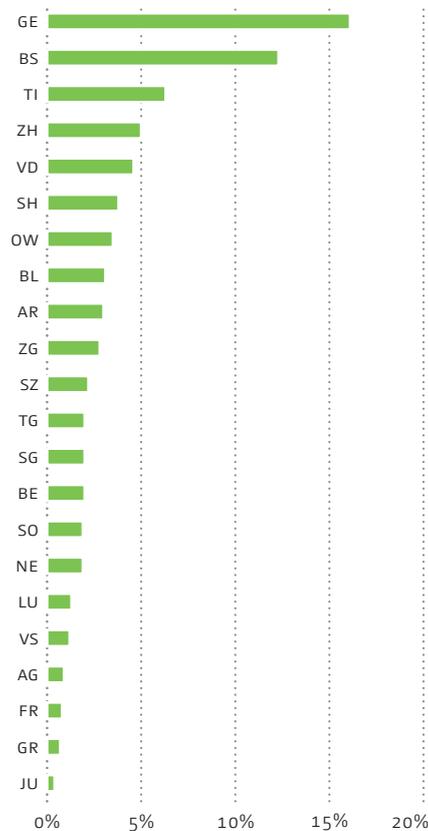
38 Teachers in compulsory education by percentage of a full-time post, 2005-2010

Data: FSO



39 Percentage of pupils in private schools, by canton 2010/11

Data: FSO



assistants and also care personnel (school-based day-care facilities). In addition to those running the schools, other people, such as those with responsibility for information technology, for supporting gifted children and for intercultural education, play a key role in the school fulfilling its mandate. And, if the growing share of part-time teachers and the interdisciplinary and functional diversity of the staff is taken into account, then the sheer complexity of working together, coordinating matters and managing a school becomes clear (*LCH, 2010*). The wide range of people working in schools will be reflected to a greater extent in the statistics too in future, since not only will the teachers be listed but heads of schools and those with special-needs qualifications will also be included under separate headings (*SZH, 2011*).

Attendance at private schools

In the 2010/11 academic year, 5.5% of pupils in compulsory education attended a privately-run school. Of these, 1.7% went to subsidised private schools and 3.8% to non-subsidised or only partially subsidised private schools. The highest share of pupils in non-subsidised private schools is to be found in the economically prosperous centres with internationally orientated companies and also in a number of border cantons (→ Figure 39).

The number of pupils attending schools with a pronounced ideological orientation is on the decline, while the international schools are attracting more children and young people.



Pre-school and primary school education

Context

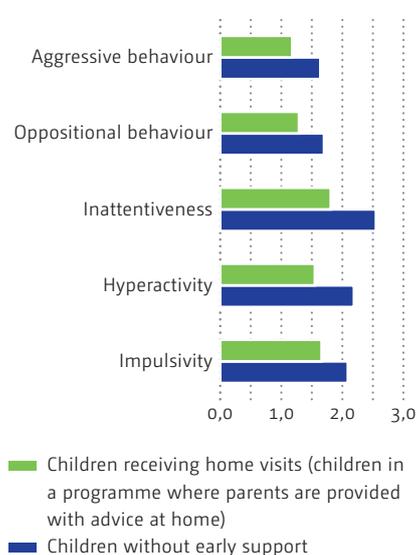
On the basis of the approach adopted in the HarmoS Agreement and the trend emerging in the majority of cantons, the primary level will last eight years in future and include pre-school or the first learning cycle. This chapter makes allowance for the two levels moving closer together by covering the pre-school and primary levels together. Even before they start their compulsory schooling, however, children are embedded in socialisation and educational processes, which then continue in parallel to their time at school. A look will first be taken at the situation prevailing both in the run-up to a child entering school and in the child's environment outside school.

Early childhood education and care

Embedded as they are in their social environment, children start learning from the very moment they are born. Early childhood is of major importance for a child's further development and educational biography, and parents or legal guardians play a key role during this time. The early support programmes developed by a number of cantons and cities thus focus on strengthening the children's parents and legal guardians (*Netzwerk Kinderbetreuung Schweiz, 2012*). These programmes are aimed, on the one hand, at reinforcing the ability of families to provide their children with a stimulating learning environment and, on the other hand, at putting in place facilities to supplement and support the family. Early support is provided for children in their learning process from birth up until the time they enter pre-school education. This takes the form of both general early support for children and their families (including advisory centres for mothers and fathers, playgroups, and child care outside the family in crèches and day-care centres, or with childminders) and special early support measures aimed at families with children who require a specific type of assistance to strengthen their resources (e.g. German courses for children with a different first language, early years therapeutic education, and special needs measures) (*Zurich, 2012b*). Since early years therapeutic education comes under special schooling, this is the responsibility of the state (Swiss Constitution, Art. 62 Para. 3); it is available for children with disabilities, delayed development, impaired development and those whose development is at risk, from birth up to a maximum of two years after they start school. In early years therapeutic education, the children and their parents are provided with support at home in their familiar surroundings. Many locations offer specific programmes for socially disadvantaged families, especially those with a migration background, which focus on the development of language skills for children with a foreign native tongue, the social integration of female migrants with their children, and parent advisory services that pay home visits. Evaluations that have been conducted of programmes of this type testify to their efficiency (*Diez Grieser & Simoni, 2008; Vogt, Abt, Urech et al., 2010; Tschumper, Gantenbein, Alsaker et al., 2012*) (→ Figure 40). General early support is available for all children from birth up to the point when they enter pre-school or the first learning cycle. The term «early childhood education and care», which is often used synonymously with general early support, relates to the close interaction of the child's own learning process (education), the provision of stimulating

40 Comparison of children receiving home visits with those who receive no early support: problematic behaviour

Source: Tschumper, Jakob, Baumann et al., 2012



learning environments (upbringing), and protective and supportive attention (care) from adults (Wustmann Seiler & Simoni, 2012). The fact that increasing attention is now being paid to early childhood education and care is due not least to the results of international research, which have revealed the correlation that exists between educational success and family background. These results have also shown the positive impact of high-quality facilities provided outside the family and in support of families on the cognitive and non-cognitive development of disadvantaged children in particular (Burger, 2010; NESSE, 2009; Felve & Lalive, 2012; for a critical overview, see also Schlotter & Wössmann, 2010).

Demographic, economic and social change, however, has also resulted in a steadily increasing demand for facilities offering early childhood care outside the family, so that adults can better reconcile work and family life (→ Chapter on General context, page 21). In order to alleviate the shortfall of childcare places, the Confederation launched a financial aid programme for childcare outside the family in 2003. This was initially to run for a period of eight years but has now been extended until 2015. In the nine years up to 2012, a total of 35,000 new places were created in the context of this stimulus programme, with some 18,600 of these in child day-care centres (as per February 2012). Expressed in terms of the number of available places per 100 children aged up to 4, these places are not distributed evenly amongst the different cantons; the highest growth has been recorded in the cantons of Basel-Stadt, Geneva, Vaud, Zug and Zurich, while Appenzell Innerrhoden, Graubünden, Obwalden and Uri have had the lowest growth (→ Figure 41).

Despite the increase in childcare places described above, low-cost institutional places, in particular, are still in short supply. This means that access to childcare facilities outside the family is more difficult for the socially disadvantaged (Schlanser, 2011; Schmid, Kriesi & Buchmann, 2011). A survey conducted of parents in Basel and the surrounding area by Keller and Grob (2010) showed that children with a migration background, who could benefit most from contact with German-speaking children, are the ones that have the least opportunity to access facilities provided outside the family (→ Figure 42).

There is not only a need for quantitative development in early childhood facilities, however, but for qualitative improvements too. This is due not least to the dichotomy that still prevails between education and care (Stamm, 2010a). The current trend is for greater attention to be paid to the educational side of care, and this has now become a key aspect of the quality debate. It similarly fits in with the international approach of early childhood «education and care». A report commissioned by the Swiss Conference of Cantonal Ministers of Social Affairs (SODK) shows clearly that considerable differences exist between the cantons with regard to the quality specified for childcare outside the family (Menegale & Stern, 2010). A greater number of specifications are issued for child day-care centres than for childminders. When it comes to the educational concept to be adopted by day-care centres, some cantons simply specify that such a concept should exist, while others set out the principles that are to be observed. To promote the quality of facilities for early childhood care, the SODK has put forward recommendations that relate to legal principles as well as to the planning, quality and funding, and also the additional aspects of social policy and family policy (SODK, 2011). The Association of Swiss Daycare Facilities (KiTaS) also has structural quality guidelines and is setting out to extend these with a quality label by 2014 (Stoffel, 2012). To make use of the opportunities offered by childcare at home

41 Distribution over the cantons of the places created in child day-care centres in the stimulus programme from 2003 to 2012, as per February 2012

Source: FSIO, 2012; Map: swisstopo

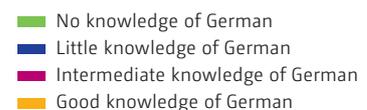
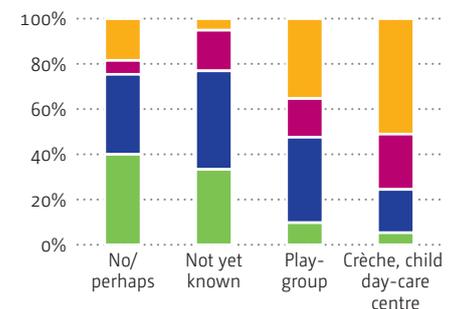


New places in child day-care centres per 100 children aged between 0 and 4



42 Use of childcare facilities outside the family and knowledge of German (Basel and surrounding region)

Source: Keller & Grob, 2010



Legend: The graph shows whether families with different proficiency in German intended to make use of childcare outside the family at the time of the survey, and which facility they were intending to use.

and outside the family and to enhance their quality, the Swiss Commission for UNESCO and the *Netzwerk Kinderbetreuung Schweiz* (Network Child-care Switzerland) have drawn up in 2012 a frame of reference for early childhood education and care in Switzerland (*Wustmann Seiler & Simoni, 2012*). This frame of reference is based on the learning and development processes of children. It adopts the integral approach to education and care that has already been mentioned and serves as a reference document for all adults who accompany children, irrespective of the institutional context.

Social segregation and educational opportunities

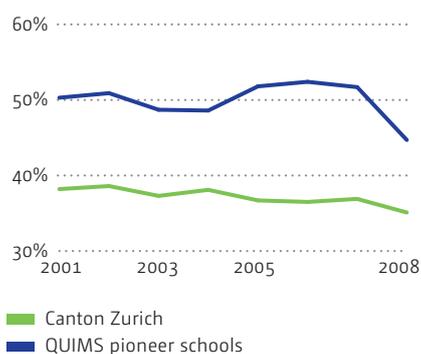
Social segregation and hence the concentration of people in difficult circumstances, e.g. those on low incomes and social security and disadvantaged migrants, in certain districts or communities, is also evident in Switzerland (*Heye & Leuthold, 2006; Ibraimovic, 2011*). For schools, this can lead to a social context that exerts a negative influence on the school atmosphere and the working climate (*Husfeldt, 2011*) as well as on pupils' performance (*Moser, Buff, Angelone et al., 2011*). At primary level, however, the social composition of classes has only a limited influence. The «Check 5» performance measurement conducted in the Canton of Aargau did not provide any evidence of such an influence (*Gut, Berger & Bayer, 2012*), while, in the Canton of Zurich, the assessments of academic achievement at the end of the 6th school year showed that the social composition of a class only had a positive effect when there was a very high proportion of privileged children. These latter assessments did, however, show that achievements fall as the share of children with German as a second language increases (*Moser, Buff, Angelone et al., 2011*). An analysis of the cantonal examinations in Geneva also showed that the school's social composition had an influence, with this being stronger in the fourth-year classes than in the second-year ones (*Soussi & Nidegger, 2010*). A study in Canton Bern amongst classes in the third school year likewise revealed an influence of the classes' socio-economic level on pupils' achievements, but was unable to establish any influence of the language or cultural composition (*Carigiet Reinhard, 2012*).

In order to cushion the influence of the social environment, a number of cantons allocate resources on the basis of a social index and provide those schools that are subject to a greater burden with additional resources. In the same way, cantons that have districts subject to a high burden in conurbations, such as Geneva, Zurich and St. Gallen, and also cantons in the north-west of Switzerland, have launched specific programmes to support those schools with a high proportion of multilingual children, in particular.

Evaluations are available for some of these projects. The Geneva project entitled *Réseau d'enseignement prioritaire* (REP) encompasses schools where at least 55% of the parents have a low socio-economic status and more than 60% of the children have a foreign native tongue, providing support if the staff agree to commit themselves to actively work on the project for three years. The schools receive more resources and are given greater autonomy through their own on-site school management. They similarly benefit from working together with the Youth Welfare Office and from the presence of social education workers to act as coordinators between the school and the parents. Initial evaluations showed a positive impact on the climate in the school. The importance of the social education workers to support pupils

43 Transition rate to section B/C at secondary level, Canton Zurich, 2001–2008

Source: *Maag Merki, Moser, Angelone et al, 2012*



in difficulty (Jaeggi & Osiek, 2008) also became clear. It did not, however, prove possible to establish any improvements in academic performance in the REP schools by comparison to schools in similar social settings (Jaeggi, Nidegger, Schwob et al., 2012). In the Zurich project on «Quality in multicultural schools» (QUIMS), which covers schools that have more than 40% of pupils with a foreign first language, school development has been improved (with professional learning communities), more intense support provided for reading and writing, the school climate improved and the participation of pupils and parents stepped up. The fact that the number of pupils from QUIMS classes switching to the less demanding B and C sections at secondary school level is higher than the cantonal average (→ Figure 43) is only to be expected, given the composition of the classes. In addition, even though academic performance in QUIMS classes is below average, as measured in the context of the Zurich assessments of learning outcomes, this cannot be interpreted as a failure of the project – which was aimed primarily at school development (Maag Merki, Moser, Angelone et al., 2012). Here again, though, in the same way as in Geneva, there is no evidence that the programme provides any added value in respect of the pupils' academic performance. In the «Language learning in multilingual schools» network, set up in 2004, schools in the cantons of Aargau, Basel-Landschaft, Basel-Stadt, Bern, Freiburg, Lucerne, Solothurn, Valais and Zurich have been working together in the field of language-oriented school and tuition development (Neugebauer & Nodari, 2012).

Changes in pupil numbers

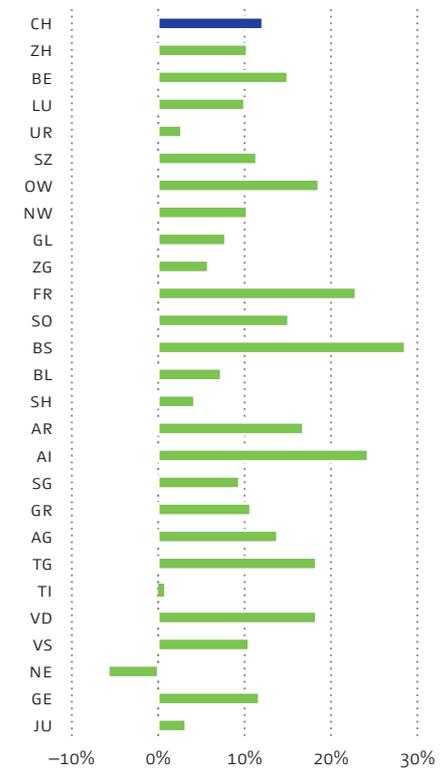
Since the end of the 1990s, pupil numbers have been declining in many cantons. This trend, which is still making itself felt in secondary education, has now been reversed at pre-school level in almost all cantons. The forecasts indicate a 12% increase in pupils between 2011 and 2021 for Switzerland as a whole (→ Figure 44).

At primary school level, falling pupil numbers are forecast until 2013 in a large number of cantons. Over the period 2013 to 2021, by contrast, an increase is predicted for virtually all cantons (→ Figure 45).

These demographic developments constitute a particular challenge in rural areas (Müller, Keller, Kehrle et al., 2011; Michelet 2012). Since communities wish to retain their school as a central factor in their cultural life, particular organisational solutions are required, which are the subject of controversial discussions (Périsset, Steiner & Ruppen, 2012). Mixed-age and mixed-level learning in multi-class schools are approaches being adopted, especially for the pre-school level, or first learning cycle, and at primary level. They offer educational opportunities and constitute a challenging area of work for the teaching staff (Raggl, 2011). Growth in pupil numbers as of 2013 ought to alleviate the situation with regard to these challenges in a number of regions at least.

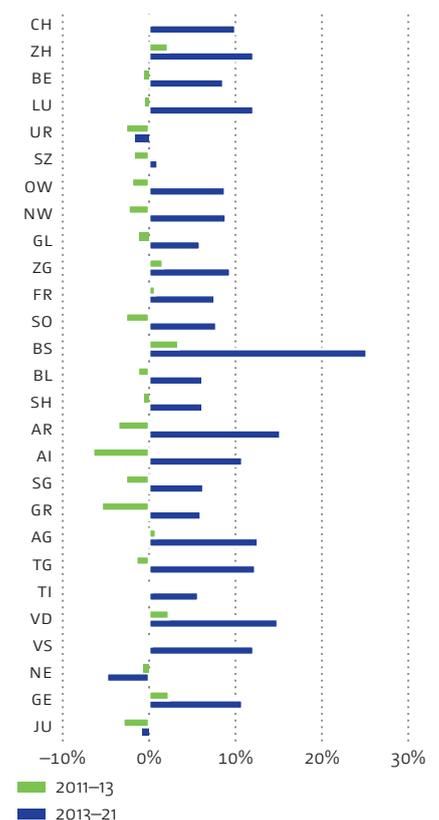
44 Change in pupil numbers, pre-school level, 2011–2021

Data: FSO (reference scenario)



45 Change in pupil numbers, primary level, 2011–2013 and 2013–2021

Data: FSO (reference scenario)



Institutions

This sub-section describes structural aspects, the objectives in terms of content and the associated framework conditions, such as the available tuition time, class sizes, pupil-teacher ratios and the different kinds of personnel available. When looking into institutional aspects, allowance must be made for the non-synchronised development within the federal system, which is undergoing major structural reform with the harmonisation of compulsory education (HarmoS Agreement). When it comes to the concepts employed, a number of problems arise on account of the different structures that currently exist and the developments in conjunction with the HarmoS Agreement. Hence, in the HarmoS Agreement, the education level described here is referred to as the «primary level, including pre-school or the first learning cycle». Employing the international classification, this means that part of level ISCED 0 and level ISCED 1 have been taken together. At the time this report was written, a distinction was made in the majority of German-speaking cantons between the pre-school level or kindergarten (ISCED 0) and the primary level, or primary school (ISCED 1). To reflect this situation and also to ensure that the international allocation is observed, use is made of the designations pre-school (kindergarten) and primary level (primary school) in what follows, except in cases where reference is made to specific developments concerning the HarmoS Agreement.

Increased merging of pre-school and primary level

In line with the HarmoS Agreement, the French-speaking cantons decided in the Convention scolaire romande (CIIP, 2007) that compulsory education would be subdivided into two levels (primary level and lower-secondary level) with two four-year cycles at primary level. This is reflected in the structure of the joint curriculum (*Plan d'études romand* [PER]) and also in the way the school years are counted (years 1 to 4 and 5 to 8). The curriculum compilation guidelines for Canton Ticino make provision for a division into a first cycle lasting five years (including the first, voluntary year of the *Scuola dell'infanzia*) and a second cycle at primary level lasting three years, which are to be followed by a third cycle at lower-secondary level lasting four years (Tessin, 2012). In German-speaking Switzerland, differences still remain at the start of compulsory education (→ *Chapter on Compulsory education*, page 39). The common curriculum (*Lehrplan 21*) is to cover a total of eleven school years, divided up into three cycles of two times four years and one times three years. The first cycle is to make allowance for the differences that currently exist in the configuration of the first learning cycle. The curriculum is to be such that it can be implemented in systems with a two-year or one-year kindergarten, as well as in systems with a three-year or four-year model for the first cycle.

Central teaching concepts and content objectives

In the new curricula, the first part of the primary level cycle aims to achieve a balanced development of social skills and ensure the step-by-step acquisi-

tion of the fundamentals of academic learning. Language skills are strengthened. Pupils are introduced to systematic learning in a manner commensurate with their development status. The children's interest and curiosity is to be fostered, paving the way for their subsequent development steps. The teachers' ability to diagnose the development and learning progress of the individual child and tailor their teaching to this is important here (see, for example, *Urech, 2010*).

For the second part of the first cycle and the whole of the second cycle of the primary level, the new curricula define subject learning areas and competency targets. The learning areas are specified in the HarmoS Agreement in outline form. These are supplemented by general skills targets and interdisciplinary subjects. The curricula for the different linguistic regions include a systematic description of skill building and define the minimum requirement for each cycle, i.e. the skills level that pupils (except for those with adapted learning objectives) must achieve by the end of the cycle in question. In the subjects of the school's language of instruction, foreign languages, natural sciences and mathematics, the minimum requirement is based on the national educational standards (basic skills). The heterogeneous nature of the classes calls for sound subject knowledge, specialist subject teaching and educational skills as well as competent class management (*Schönbächler, 2008; Grossenbacher, 2010; Reusser, 2011; Wannack & Herger, 2011*).

To provide an idea of how tuition time can be divided over the subject areas, the chart showing the number of lessons per year adopted by the two Basel cantons for kindergartens and primary schools in summer 2012 is set out here (→ Table 46).

46 Number of lessons per year at primary level in Canton Basel-Landschaft (BL) and Basel-Stadt (BS)

Source: www.schulharmonisierung-bs.ch/paedagogik/lehrplaene-und-studentafeln

| | | As of academic year 2015/16 | | | | | | | | | |
|---|--|---|--------------------------|-----|-----|----------------|-----|-----|-----|-----|--------------|
| | | 1st cycle | | | | 2nd cycle | | | | | |
| | | Kindergarten | | | | Primary school | | | | | |
| | | School years | | | | | | | | | |
| Education areas as per the HarmoS Agreement | Specialist areas as per the «Lehrplan 21» curriculum | Subjects and subject areas | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th | 8th | |
| | | 45-minutes lessons | | | | | | | | | |
| Languages | Language of instruction | German | | 6 | 6 | 6 | 6 | 5 | 5 | 5 | 5 |
| | 1st foreign language | French | | | | | 3 | 3 | 3 | 3 | |
| | 2nd foreign language | English | | | | | | | 2 | 2 | |
| Mathematics and natural sciences | Mathematics | Mathematics | | | 5 | 5 | 5 | 5 | 5 | 5 | 5 BS 6 BL |
| Social sciences and humanities | Nature, humankind, society | Nature, humankind, society | | | 6 | 6 | 6 | 6 | 6 | 6 | |
| Music, art and design | Design | Creative and textile arts, technical design | | | 4 | 4 | 4 | 5 | 5 | 5 | 5 BS 4 BL |
| | Music | Music | | | 2 | 2 | 2 | 2 | 2 | 2 | |
| Physical activity and health | Physical activity and sport | Sport | | | 3 | 3 | 3 | 3 | 3 | 3 | |
| | | Religious tuition (by the church) | As per local regulations | | | | | | | | |
| | | Total compulsory lessons per week | 26–29½ BS | 26 | 26 | 26 | 26 | 29 | 29 | 30 | 30 |
| | | | 22–25 BL | | | | | | | | |

Improvement of standard German, multilingualism and STEM (science, technology, engineering and mathematics) skills

Since language skills constitute a key element in academic learning, great importance is attached to improving them. In the light of the difference between Swiss German and standard German, the use of standard German is promoted right from the start of kindergarten in German-speaking Switzerland. Following a referendum, however, kindergartens in Canton Zurich have had to switch back to using predominantly Swiss German. At primary level, children with a foreign first language receive support in learning the school's language of instruction through the provision of specific measures (German as a second language), and, in some cases, courses are also provided to support them in their native language and culture. Teaching staff are made aware of the fact that socially disadvantaged children who are proficient in the territorial language may have difficulty with the «educational language» used in school (*Isler & Künzli, 2011*).

After a start was made several years ago on teaching a foreign language at primary level already, the learning of a second foreign language was then also brought forward to this same level. The first foreign language is now taught as of the third primary class (5th school year in the HarmoS system of counting) at the latest and the second foreign language as of the fifth primary class (7th school year in HarmoS). The order in which foreign languages are learned is subject to coordination in the different language regions (→ Table 47). The objective of foreign language teaching is to enable pupils to become functionally multilingual (*De Pietro & Elmiger, 2009; Hutterli, 2012*).

Increasing importance is also being attached to promoting interest in technical and scientific issues at an early age and to strengthening the skills of teaching staff in this respect (*Leuchter, Saalbach & Hardy, 2011; Zurich, 2011a*). A number of initiatives have been launched to this end (including Kids-Info, explore-it), along with a major school development project (SWISE) (*Stübi & Labudde, 2012*).

To improve pupils' media skills and their handling of information and communication technologies, these skills have been included as a general education subject (*formation générale* in the PER) in the new curricula.

Inclusive schooling

For children with special needs, integrative measures such as therapeutic education programmes, speech therapy or psychomotor therapy are available to begin with, as well as additional support in the school's language of instruction and support for giftedness and gifted children. Schools are generally allocated collective resources on a global basis (i.e. according to pupil numbers) for these measures, which they can deploy under their own responsibility. Individually tailored resources can be assigned to specific pupils following an assessment and a decision to allocate funds, and these can be used to provide more intensive measures in either a mainstream or a special school. The basis on which collective resources are calculated differs – what is worked out is how many hours support are required for a specific number of pupils, or what proportion of full-time-equivalent posts is provided per 100 pupils. As a rule, more resources are available at pre-school and primary level than at lower-secondary level. While it is still possible to offer prepara-

47 Order in which foreign languages are learned in the cantons and regions

Data: EDK

German / English

BE-f, GE, FR-f, NE, JU, VD, VS-f

French / English

BE-d, BL, BS, FR-d, SO, VS-d

English / French

AG, AI, AR, GL, LU, NW, OW, SG, SH, SZ, TG, UR, ZG, ZH

GR: second national language (German, Italian or Romansch) / English

TI: French / German / English

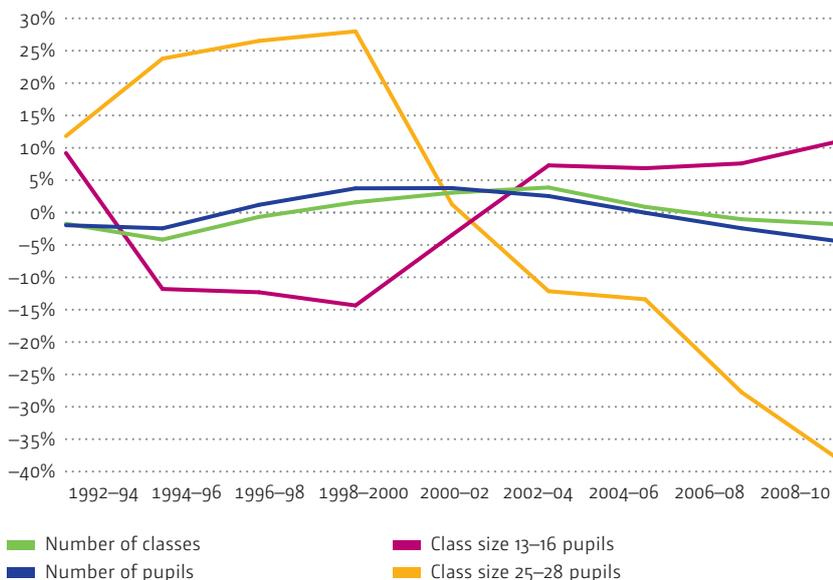
tory classes and special needs classes, these classes are being phased out in favour of the provision of support in mainstream education. No systematic comparisons of what is being offered and the funding are available, since the autonomy and scope for manoeuvre of the individual communities means that considerable differences can result even within one and the same canton.

Class size and pupil-teacher ratio

The class size or pupil-teacher ratio is an important factor in teaching. OECD figures put the class size at primary level (ISCED 1) in state-run schools in Switzerland at 19.1 in 2010, while the OECD average was 21.3 persons (OECD, 2012b). The pupil-teacher ratio was 14.9 pupils per teacher and the OECD average 15.8 children per teacher (*ibid.*). These figures have hardly fluctuated over time in Switzerland (cf. SKBF, 2010). Looking at the development in pupil numbers and class sizes at primary level between 1992 and 2010 (→ Figure 48), however, it can be seen that, while pupil numbers in the 1994/1995 academic year (429,658) were roughly equivalent to those in 2008/2009 (427,628), there is a striking difference in the distribution of the number of big and small classes. A comparison of the school years referred to above shows a reversal in the share of big and small classes. As pupil numbers rose around 1995, the number of pupils in each class increased, resulting in more bigger classes. When pupil numbers were declining, the number of small classes increased. Although the number of pupils and classes developed in the same way over this period (2008/2009: 22,129 classes, 1995/1996: 21,506 classes), there was a dramatic change in the composition of the classes in size terms.

48 Change in pupil numbers and class sizes, primary level, 1992–2010

Data: FSO



The graph shows the deviation from the mean value for the years 1992–2010 in percent. The mean values for two years were used for this in each case (moving average). The share of big classes in relation to all classes averaged out at 7% over the period 1992–2010, 9% (+28%) over the period 1998/2000, and 4.5% (–38%) over the period 2008/2010. The percentage of small classes was 13% on average over the period 1992–2010.

On the one hand, this is due to the fact that any alignment to accommodate changing pupil numbers is conducted via the number of pupils in each class in the first instance, because the education system cannot react to increasing or falling pupil numbers over the short term with more or fewer staff or buildings. Only at a later stage, if the upward or downward trend persists,

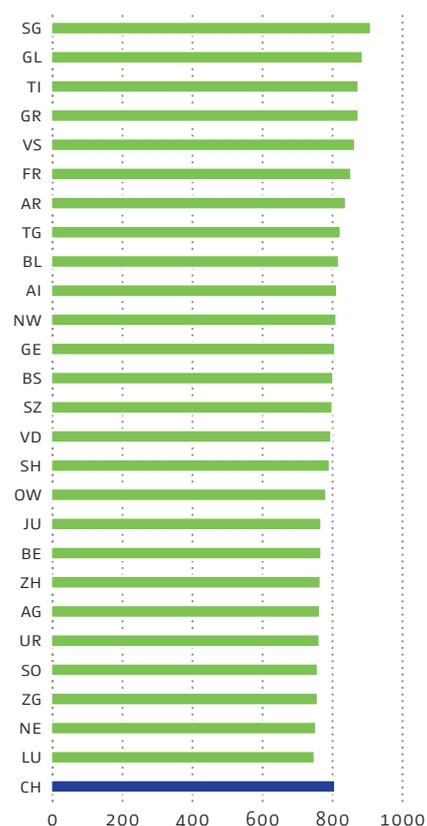
will new classes be opened or existing ones closed. There can also be educational reasons for smaller classes (e.g. share of children with a foreign first language or the integration of special needs pupils in mainstream education). Changes of this type, however, have a very rapid and clear impact on the costs of education (→ *Efficiency/costs*, page 74).

Tuition time

The set number of tuition hours for pupils is defined in the annual timetable. For the pre-school level (kindergarten), the teaching time is specified on a global basis, and frequently also within certain ranges, while, at primary level, lessons are allocated to subjects or fields of study. The average annual tuition time varies from one canton to another both in terms of total time (→ Figure 49) and per subject or field of study. The number of hours ranges from 751 to 911 hours per year, with an average of 809 hours. The average for Switzerland is somewhat higher than the mean teaching time for seven to eleven-year-olds of 798 hours reported by the OECD (*OECD, 2012b*). The differences between the cantons are also due to the fact that lessons do not last 45 minutes everywhere, and the school year is not 38 weeks in all cantons. In the cantons of Basel-Landschaft, Freiburg, Glarus, Graubünden and St. Gallen a lesson lasts 50 minutes. In Basel-Landschaft, St. Gallen, Thurgau and the two Appenzell cantons, the school year is 40 weeks. Cantons Ticino and Valais, by contrast, have a school year of only 36.5 and 37 weeks respectively, but a large number of lessons are given there each week (*EDK/IDES, 2012*).

49 Average annual tuition time in hours, primary level, 2011/12

Data: EDK/IDES



Comments: The pre-school level was not taken into account. For cantons where primary school lasts less than six years, only 4 (BS, VD) or 5 (AG, BL, NE, TI) primary school years were taken into account.

School-based day-care facilities

Changes in the forms of gainful employment and family patterns are prompting a growing demand for childcare facilities outside the family, especially for younger schoolchildren. School-based day-care facilities are thus increasingly being set up at pre-school and primary level. These are primarily additive forms of coordinated school hours (with at least four hours in the morning) and midday meals, which are made available where demand exists for them, rather than actual all-day schools (*EDK/IDES, 2012*). A survey conducted amongst the cantons (*ibid.*) revealed that 14 cantons have introduced coordinated school hours, with at least four hours in the morning, on a 100% basis, and four additional cantons have introduced them to between 70 and 100%. At primary level, 17 cantons have fully introduced coordinated school hours and three have largely introduced them. Midday meals are less widespread. Only three cantons have introduced midday meals on a more than 50% basis at pre-school level, and only seven on this same basis at primary level. These pragmatically implemented day-care facilities in schools provide an opportunity for additional support alongside the support already offered at school (e.g. additional interest-based programmes, and supervision and assistance with homework). The quality specifications of the Swiss Association for School-based Day Care (Schweizerischer Verband für schulische Tagesbetreuung) has thus put forward corresponding educational concepts for school-based day-care facilities (*Flitner, Grossenbacher-Wymann, Mauchle et al., 2010*).

Personnel, personnel development and the role of the school management

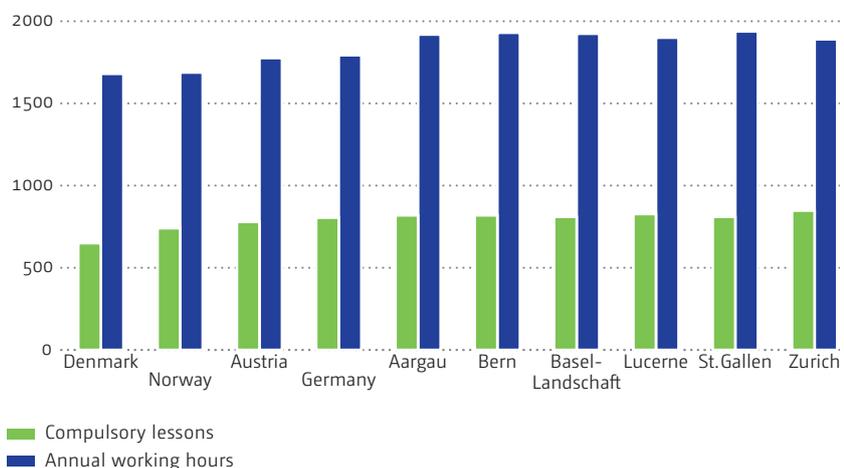
If the idea of a flexible school entry phase is to be implemented without any structural changes – in the form of mixed-age entry models – then this calls for suitably trained personnel with skills to cover the entire age bracket from four to eight years old. Hence only five Universities of Teacher Education currently still offer study courses dedicated solely to the pre-school level (→ *Chapter on Universities of teacher education, page 221*).

When it comes to providing support for children with special needs in mainstream education, teachers who have received the corresponding further education and are suitably specialised are deployed wherever possible. A shortage of teachers is evident in the area of therapeutic education, but no precise figure can be put on this (as yet), since no statistics have been kept. The schools are not only extending their teaching resources through personnel development in the case of special teaching measures, however, but are similarly widening these resources for other support programmes (*Bonsen, 2010; Appius, Steger Vogt, Kansteiner-Schänzlin et al., 2012*). Specialised teachers have been supporting pupils with a foreign first language in the acquisition of the school's language of instruction for a long time. Social work within schools is also widespread, and the introduction of day-care facilities is bringing care specialists and other experts into the schools (*Speck, Olk & Stimpel, 2011*). Part-time work is very common at pre-school level, and particularly at primary level (→ *Chapter on Compulsory education, page 39*). Special functions and part-time work are increasing the range of different personnel within schools and necessitating more consultation and cooperation.

Comparing compulsory lessons and the annual working hours of teachers as specified in their professional contract, these are in virtually the same ratio in all the countries and cantons observed (→ *Figure 50*). Taking teachers' annual working hours, which correspond to the standard number of hours worked in administrative posts or in business at national or cantonal level, a conversion factor is applied to allow for the time involved in preparations and the follow-up to teaching, and the number of compulsory lessons derived in this way.

50 Compulsory lessons and annual working hours of teachers in selected cantons and countries

Data: OECD; Calculations: SCCRE



The role of the school management is gaining increasing importance for coordinating those working within the school, and especially part-time staff, specialist subject teachers and other specialists (special needs education, support for gifted pupils, care and therapy, etc.), and the requirements placed on their competences in respect of coordination, working together and communication are growing (*Gather Thurler, 2010*).

Transitions between different levels, delaying progression, skipping a year, repeating a year

Taking the education level that is being described here, three transitions can be expected (within traditional structures): admission to pre-school (kindergarten), the transition from pre-school to primary level, and the transition from primary to lower-secondary level. All three transitions are handled differently in the individual cantons and are often linked to selection decisions.

Children are admitted to the pre-school level on the basis of their age and development status. As a rule, parents may apply for early or delayed admission, stating the reasons. It is then generally the school supervisory authorities at community level who take the decision, requesting expert opinions from the school medical or psychological service if necessary.

For the transition from pre-school to primary level, the cantons specify readiness for school as the main criterion (*EDK/IDES, 2012*) (→ Table 51). Here again, early and delayed admission are possible or, in a number of cantons, allocation to a preparatory class. In taking such decisions, consideration is given to the assessment of the pre-school teacher, the parents' view and, where appropriate, assessments by the school psychological service. The actual decision is taken by the school supervisory authorities or the school management. With the new primary pre-school and the first learning cycle, this transition will be handled more flexibly or eliminated altogether.

For the transition from primary level to lower-secondary level, it is the teachers' overall assessment (performance, behaviour) that is decisive, with comparative examinations or orientation tests being included in some cases (→ Table 51). The parents' view is similarly taken into account, as is the opinion of the pupils themselves. In some cantons, a request may be made for a transition examination where there is doubt. Within the individual levels, pupils have the opportunity to skip a year or repeat a year. Both these measures depend on the pupil's development status and performance. It is more common for pupils to repeat a year, however, than to skip a year (→ *Chapter on Lower-secondary education, page 83*).

51 Transition criteria

Data: EDK/IDES

Pre-school – Primary level

No statutory regulation: AR, NE, NW, SZ, VD

Age on cut-off date: BE, BL, BS, JU, TG

Readiness for school: AG, AI, FR, GE, GL, GR, LU, OW, SG, SH, SO, TI, UR, VS, ZG, ZH

Primary level – Lower-secondary level

Overall assessment plus comparative examinations or orientation tests: AI, BL, GE, FR, JU, NE, NW, SO*, VD

Overall assessment: AG, AR, BE, BS*, GL*, GR*, LU, OW, SG, SH, SZ, TG, TI*, UR, VS, ZG, ZH*

* In BS and TI, automatic transition to the «Orientierungsschule» or «Scuola media»; in GL, GR, SO and ZH, pupils may only transfer to the six-year/lower baccalaureate school if they pass the examination.

Effectiveness

Only a few findings are available on effectiveness at pre-school and primary level. This is due, on the one hand, to the situation where decisions have been taken on the basic skills that are to be attained in a binding manner (educational standards), but have not yet been brought into effect and, on the other hand, to the fact that Switzerland does not take part in interna-

tional performance comparisons at this level (such as PIRLS). Longitudinal assessments of academic performance have only been conducted in Canton Zurich so far. The research results that are available on effectiveness are thus isolated results and not comparable, or simply relate to the assessment of individual programmes.

Long-term effects of attending pre-school

In the PISA assessments, pupils are regularly asked about the length of time for which they attended pre-school. Young people who stated that they had attended kindergarten for more than a year achieved significantly higher values in the 2009 PISA reading tests in almost all countries than young people who stated that they had not attended kindergarten. Even if these differences cannot be interpreted on a purely causal basis, the difference in Switzerland, after making allowance for the young people's socio-economic background, is some 60 performance points in favour of the pupils who attended kindergarten for longer – compared with an OECD average of 33 points (OECD, 2011b). An internationally orientated research review also reveals positive long-term effects of attending kindergarten (Ruhm & Waldfogel, 2011).

Skills development in the first learning cycle

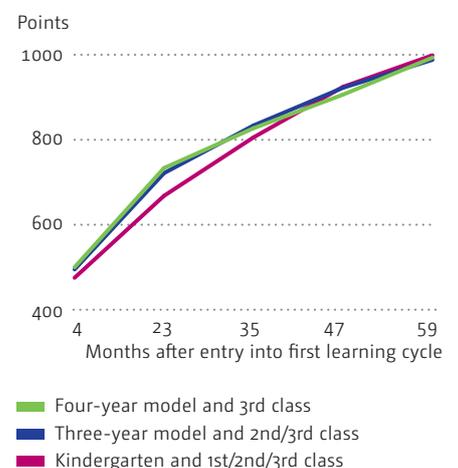
As part of the three and four-year models tried out for the transition from pre-school to primary school, the children's learning progress was recorded in the areas of phonological awareness, reading, writing and mathematics. This showed that, in the first two years after entering the first learning cycle, the children in the three and four-year models had made greater learning progress than those in the kindergarten classes (→ Figure 52). These latter children, however, made greater progress in the third year (1st primary class), which meant that the differences became less pronounced before disappearing altogether in the fourth year (EDK Ost, 2010). The parents' assessment as to the well-being of their children, which was more positive for children in kindergarten than for classes in the three and four-year models, similarly became more aligned over the course of time (*ibid.*). A study of the development of skills of relevance for school readiness showed that initial differences between kindergarten children and those in the four-year model had been overcome by the time the kindergarten children had entered primary school (Roebbers, Röthlisberger, Cimeli et al., 2011).

Achievement of objectives in primary school: performance, motivation, well-being

The Zurich assessment of learning outcomes that accompanied a portion of the pupils over the course of their educational path, recorded inter alia the attainment of the curricular objectives at the end of the primary level. The assessment showed that 17% of the pupils did not achieve the curricular objectives at the level of basic requirements in German, and 18% did not achieve the curricular objectives in mathematics in that part of the curriculum the pupils are examined in; 35% (German) and 36% (mathematics) achieved the

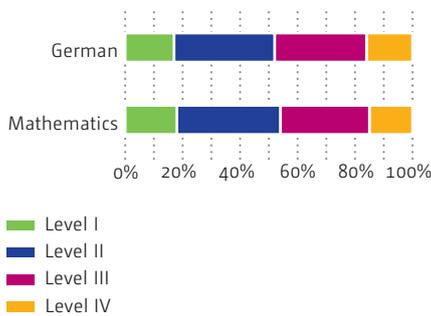
52 Learning progress (in reading) during the first learning cycle by model

Source: EDK-Ost, 2010; data: Bayer, IBE



53 Assessment of academic achievement, 6th school year, Canton Zurich: percentage of pupils by level, 2009

Source: Moser, Buff, Angelone et al., 2011



curricular objectives at the level of advanced requirements, and 16% (German) and 15% (mathematics) exceeded the set curricular objectives (Moser, Buff, Angelone et al., 2011) (→ Figure 53). Compared with the assessment at the end of the third class (Milič, 2008), there was an increase in both the proportion of pupils who exceeded the set curricular objectives and the proportion who failed to achieve them, i.e. performance at the two ends of the spectrum drifted apart in the course of primary school.

In the voluntary Check 5 conducted in Canton Aargau, completed by 92% of the classes in 2011 at the start of 5th school year, 92% of pupils attained at least Level I in mathematics and all the pupils attained this level in German, thus showing that the curricular objectives of the preceding 4th school year had been fulfilled (Gut, Berger & Bayer, 2012).

An analysis of the results achieved by Vaud pupils in the 2006 and 2007 comparative examinations held in the canton showed that just under half the pupils had fully acquired the basic skills set out in the curriculum (Ntamakirilo & Moreau, 2011).

In Canton Geneva, the success rate in the 2009 cantonal tests at the end of the 6th school year was between 76% and 79% for the subjects of the school's language of instruction, mathematics and foreign language (German) (SRED, 2011). Since the success threshold is fixed at 60–70% of the total number of test points, on the basis of the curricular objectives and pre-test results, it can be assumed that only a good half of pupils fulfilled the curricular objectives in their entirety.

The studies referred to are based on different reference frameworks and approaches; they cannot therefore be compared with each other.

The Zurich assessment of learning outcomes took in not only performance in German and mathematics, but also motivation and learning-related emotions (Moser, Buff, Angelone et al., 2011). It revealed that the initially high sense of competence in German and mathematics and also the importance that the pupils ascribed to these subjects (value beliefs) declined in the course of their time at school, particularly among those young people who switched to the less demanding sections of lower-secondary education after the 6th school year. While the young people questioned scarcely experienced any fear during learning in the case of these two subjects, their enjoyment of learning was limited. In view of the relatively high importance that the pupils attached to the two subjects, however, the researchers did not consider this to be cause for concern (*ibid.*).

Some of the cantons also collected data on the pupils' well-being in their external school evaluations. Canton Lucerne's monitoring report for the period 2005–2009, for instance, shows that 88% of the pupils and 91% of the parents rated the children's well-being as good, very good or excellent, with the mean values being higher for the primary level than for the lower-secondary level (Kramis, 2010). Similar results can be found in the annual report issued by the Zürcher Fachstelle für Schulbeurteilung (Zurich, 2012a). The report on the quality of schools in Canton Appenzell that had undergone external evaluation also notes a high level of well-being among pupils (Appenzell Ausserrhoden, 2010).

Effectiveness of support measures: spoken and written language

Since both spoken and written language skills are of central importance for all learning at school, and an action plan to support these skills was decided on at education-policy level after the 2000 PISA assessment, the question arises as to the efficiency of the corresponding support measures. After the 2009 PISA results had been announced, the Swiss Conference of Cantonal Ministers of Education suggested a pooling of experience between research and practice and between the individual cantons (*EDK, 2013*).

Support in the development of language skills at pre-school level is taken here to mean promoting language skills in general, the acquisition of the standard form of the language and also the skills of those with a foreign first tongue in the school's language of instruction. Children with language acquisition or language development disorders receive assistance from a speech therapist as part of the basic special needs measures provided. Major differences are found at the start of the pre-school level in respect of linguistic and literal skills (*Moser, Stamm & Hollenweger, 2005*); careful assessments of the individual child's stage of development and the provision of programmes that are suitably coordinated with their different cognitive, motivational and social skills is thus indispensable (*Juska-Bacher, Bertschi-Kaufmann, Knechtel et al., 2011*). For support tailored to speech acts to be effective it must cover language skills (hearing, speaking, reading, writing) and language levels (semantics, grammar, prosody and pragmatics), make use of everyday situations and specially configured learning environments, aim to extend the child's vocabulary, and ensure correct use of the language and linguistic reflection, while also involving the child's first language (*Baumann Schenker & Schneider, 2010; Selimi, 2010; Bayer & Moser, 2011*).

Research results that are of central importance for the development of language skills show, amongst other things, that when standard German is used in kindergarten, this is highly and sustainably effective in promoting the consistent use of standard German in groups with only minimal knowledge of the school's language of instruction. It has this same effect in groups that already have good knowledge of the school's language of instruction, providing it is deployed selectively on a situational basis (*Gyger, 2005; Gyger & Leuenberger, 2010*).

The teaching in native languages and culture that has been introduced in a large number of foreign languages for primary school children with a migration background, and comparable interventions at kindergarten, have been seen, in several studies, to be effective to some extent for the development of the children's first language. The expected transposition effects to the school's language of instruction, however, were only proven to a very limited extent (*Moser, Bayer & Tunger, 2010; Caprez-Krompàk, 2010*). This is attributed to the insufficient intensity of the interventions (*ibid.*) or to the insufficient integration of this teaching and the persons providing it in the mainstream school (*Caprez-Krompàk, 2010; Steiner, 2010*).

Combining learning to read with learning to write and configuring learning environments so that children can experience the use of reading and writing as means of communication, serves to support the acquisition of written language skills in the first learning cycle (*Saada-Robert & Christodoulidis, 2012*).

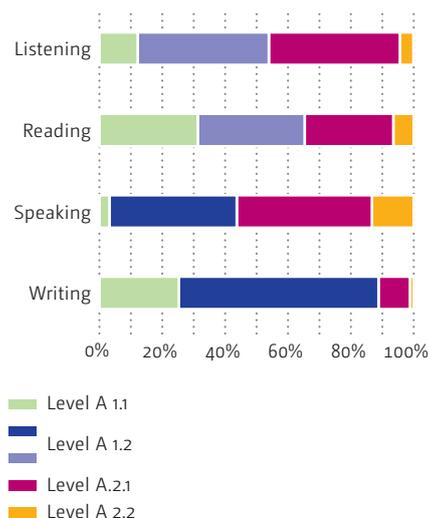
When it comes to the development of reading skills, teaching pupils reading strategies (theme identification, restructuring, summarising) was

seen to be highly effective in promoting the understanding of texts in addition to antecedent skills and basal reading processes (Philipp, 2012a). Apart from supporting the development of reading skills, it is also important to promote literary socialisation. The availability of reading models (role models), the reinforcement of a child's self-concept as a reader, and the availability of a wide variety of freely selectable reading materials and follow-up communication were seen to be important supporting factors (Philipp, 2011). The support provided at school for increasing reading skills includes reading out loud and reading a great deal, as well as strategy training and reading animation, and should also be implemented in other subjects in addition to language teaching (Gold, 2010; Rosebrock, 2012).

A meta-analysis of studies on support for increasing writing skills shows that the most effective elements of this support are imparting self-regulation strategies for writing, knowledge about texts and their compilation, working together with peers and feedback from adults for younger pupils. The traditional teaching of grammar proved to be less effective (Philipp, 2012b).

54 Performance in English of pupils in the 6th school year, Canton Lucerne, 2011

Source: Gnos, 2012



The level designations relate to the outline targets set out in the timetable and correspond to the levels defined in the Common European Framework of Reference (CEFR) and the European Language Portfolio (ELP). Matt colours denote the percentage of pupils who did not achieve the required curricular objectives.

Achievement of objectives in foreign language tuition

A number of cantons have already conducted evaluations of the foreign language tuition which is now given as of the 3rd school year at primary level. In the two Appenzell cantons, as well as in Schaffhausen, St. Gallen and Zug (plus the Principality of Liechtenstein), pupils were tested in their comprehension of spoken and written English and also in speaking after two years of English tuition and were asked about motivational and emotional aspects. The study revealed positive results in respect of both the skills and the attitudes of the pupils. Motivation and absence of stress make for better performance, as does the fact of being female and coming from a family with a higher level of education; multilingualism, by contrast, had no influence on performance (von Ow, Husfeldt & Bader-Lehmann, 2012).

A survey of pupils in the 6th school year in Canton Lucerne showed that, after four years of English tuition, almost all pupils had achieved the curricular objectives for spoken English and 75% had achieved the objectives for written English. For listening and reading, by contrast, only 46% and 35% of the pupils respectively had achieved the curricular objectives (→ Figure 54). It must be noted here that the curricular objectives in Canton Lucerne are not as demanding in the productive areas (speaking, writing) as in the receptive ones (listening, reading). More girls than boys achieved the curricular objectives in reading and writing. German-speaking children additionally achieved a better performance in one area (reading) than children with a foreign first language. The study also showed massive differences between individual classes, which were not attributable to the proportion of children with a foreign first language in the class (Gnos, 2012).

A survey of primary school teachers (3rd and 4th school years) who teach German as a foreign language in Canton Vaud, points out that the number of hours specified for teaching German had not always been observed in full (Sieber, Lys & Gieruc, 2010) and that the teachers predominantly favoured a playful approach to the foreign language (*ibid.*). The teachers questioned rated the children's enjoyment and curiosity in respect of the foreign language as very high and felt that children with a foreign first language had no greater difficulty in learning German than children whose first language was

French (*ibid.*). The Swiss findings to the effect that children with a foreign first language do not experience more problems when learning another foreign language also tally with the results of the DESI study (German English Student Assessment International) for Germany (*Klieme, 2006*).

School-based day-care facilities

An international meta-analysis of pre-school day-care facilities showed that all-day kindergartens have a positive effect on children's cognitive development. It was not, however, possible to provide any evidence of a positive impact on the children's socio-emotional development (*Cooper, Batts Allen, Patall et al., 2010*). In Switzerland, research has been conducted into the impact of day-care facilities in primary schools by comparison to a traditional school setting where some of the tuition is given in smaller learning groups – referred to as «half-class tuition» (*Schiipbach, 2010*). The results indicated that day care in the form of coordinated class hours does not differ from traditional settings in respect of the influence it has on the children's cognitive and socio-emotional development or on the development of their everyday skills. The sole exception is that children in the coordinated-class-hours model displayed better language performance. Where intensive use was made of day-care facilities in the form of all-day schools, however, this had a positive impact on school performance in language (but not in mathematics), in various areas of socio-emotional development and in the development of everyday skills by comparison with the traditional setting. The study additionally indicated that all-day schools have a compensatory effect in a number of areas (everyday skills, self-concept in mathematics) for children from disadvantaged families (*ibid.*). These findings tally with those from the StEG project in Germany, which confirm the potential of all-day schools for increasing performance and motivation, provided that the teaching at school and the programmes to complement school are of a high quality (*Fischer, 2012*).

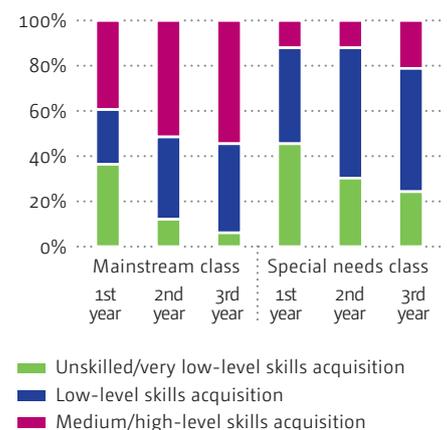
Effects of inclusive schooling

The effectiveness of integrating special needs pupils (those with learning difficulties) in mainstream education in terms of the improvement in their academic achievement was proven during the 1990s already (*Bless, 1995*), and a follow-up study has now revealed long-term positive effects on their post-school educational path too (→ Figure 55). In the three years after completing their compulsory education, young people with a poor academic performance who had been integrated in mainstream education more readily found follow-on training with a higher level of requirements than comparable pupils from special needs classes (*Eckhart, Haeblerlin, Sahli Lozano et al., 2011*).

Integration in mainstream education has a positive impact not only on children's academic achievement and the educational path but also on leisure behaviour and social contacts. *Grimaudo (2012)*, for instance, shows on the basis of a survey of pupils conducted in the cantons of Uri, Schwyz, Obwalden and Nidwalden, that children integrated in mainstream education engaged in more active leisure behaviour and more intensive social discourse than children who had been educated in special schools. In terms of well-be-

55 Access to training for young people with a poor academic performance in the 1st to 3rd year after completing school

Source: *Eckhart, Haeblerlin, Sahli Lozano et al., 2011*



Legend: more than 50% of the young people who had formerly had a poor academic performance at mainstream school had found a medium to high-level skills acquisition programme in the third year after completing school, compared with only 20% of the pupils with a poor academic performance from special needs classes.

ing too, those children with learning difficulties and behavioural problems who received a mainstream education report the same positive experience as their fellow pupils who did not require support (Venetz & Zurbriggen, 2011).

Studies into inclusive schooling in Switzerland have so far focused primarily on children with learning difficulties. Integration in mainstream education is also a practicable alternative for mentally disabled children of primary school age, if sufficient special needs support is available (Sermier Dessemontet, 2012). The integration of physically handicapped children and those with a sensory impairment also succeeds, if barrier-free access and support in the form of advice and accompaniment is provided (Audeoud & Wertli, 2011; Schwere, 2011; Knecht, 2012). In the case of children with hearing impairments, however, the observatory commissioned by the CIIP (OPERA project) identified considerable differences in the support offered in the participating cantons (French-speaking cantons and Canton Ticino) (Alber, Tièche Christinat, Ayer et al., 2012).

A research review covering integrated and separate support for children with behavioural problems makes it clear that while teachers regard the integration of these children as meaningful, they also find it difficult. No clear-cut statements can be made on effectiveness, but there are indications that separation, and hence the concentration of pupils with behavioural problems in special classes and schools, ought to be avoided in the interests of those concerned (Liesen & Luder, 2011).

Teachers in mainstream schools regard the success of integrative support for children with learning difficulties to be conditional upon a relationship of trust with the parents, the provision of information to everyone in the vicinity of the integrated pupil, a sufficient level of resources which not only makes integration possible but is also seen as a token of appreciation, and the development of a sound relationship with the integrated child, which also includes knowledge on the appropriate support to be provided for this child (Joller-Graf, Tanner & Buholzer, 2010).

Effectiveness of the teachers' professional knowledge

The teachers' professional knowledge and ability is of particular importance for the quality of the teaching and hence for the pupils' progress (Hattie, 2008; Baumert, Kunter, Blum et al., 2010; Blömeke, 2011). As part of the international TEDS-M study, the skills and conviction of future teachers in mathematics was recorded in the German-speaking part of Switzerland for the first time too (Oser, Biedermann, Brühwiler et al., 2010). This study shows that, in an international comparison, primary school teachers in Switzerland have good subject skills in mathematics. Taking primary school teachers as a whole, those teaching at the lower level have somewhat poorer skills (*ibid.*). The same applies for teaching skills in the specialist subject (*ibid.*). In this same study, primary school teachers in the German-speaking part of Switzerland stated that they felt that they had received below-average preparation for dealing with heterogeneity and for reflecting on and optimising their teaching (*ibid.*) (→ Chapter on Universities of teacher education, page 221).

According to Buchmann and Kriesi (2010), the **transition quality** at the transition from kindergarten to primary school is measured by the way in which a child is able to take on the role of a schoolchild, build a relationship with the teacher and cope with homework and everyday life at school.

Stable repetition means repeating an academic year in the same type of school and with the same subject material while **mobile repetition** means repeating the school year in a more demanding type of school.

Transitions between levels and from class to class

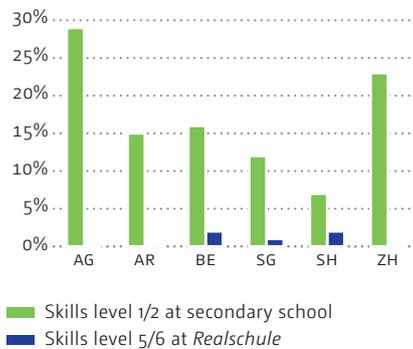
From a sociological point of view, transitions within the education system are institutionalised status passages which, as critical events, can exert an influence on a person's further development. *Buchmann and Kriesi (2010)* were able to show that the quality of the transition to primary school has an independent influence on academic performance in the 3rd year of school. Children with a high transition quality revealed a better performance than those who had greater difficulty in assuming the role of a schoolchild. The most important factors influencing transition were seen to be conscientiousness and prior school knowledge, as well as a learning and social disposition conducive to schooling, which is closely linked to the parents' level of education.

The proportion of pupils repeating a year in the Federal Statistical Office figures published up to the 2009/10 academic year has remained constant at 2.4% since 2004, taking compulsory education as a whole, and is made up of stable repetition and mobile repetition in a ratio of 2:1. The percentage is lower at primary school level than at secondary school level, and mobile repetitions still play a negligible role at primary level. The percentage of repeats was 1.6% for the 2009/10 academic year, varying in the individual cantons from 0.5% (Appenzell Ausserrhoden) to 3.3% (Vaud). Detailed evaluations show that in all the cantons, with the exception of Solothurn, the repeat rate was higher for boys than for girls (*Criblez, Imlig & Montanaro, 2012*). The Indicator Report published by Canton Vaud shows that, alongside boys, a considerably higher proportion of foreign pupils also have to repeat a year (*Stocker, 2010*). After earlier studies (*Bless, Schüpbach & Bonvin, 2004; Daepfen 2007*) had not revealed any positive or even negative long-term effects of repeating a class, a survey conducted in Canton Vaud of subjective appraisals of repeating a year showed that only half of those who were kept down a year at primary level felt that this had been effective over the long term, and many reported that they had felt discouraged and belittled as a result of having to do the year again (*Daepfen, 2011*). Taking national and international data for Germany, *Klemm (2009a)* also arrives at a critical assessment of the effectiveness of repeating a year.

In Switzerland, the transition from primary to lower-secondary school is governed by specifications that differ from canton to canton and is also subject to varying framework conditions. On the one hand, different weightings are accorded to the assessment of academic achievement, the evaluation of interdisciplinary skills and parental expectations, and, on the other hand, the way that the lower-secondary level is structured also plays a role (→ *Chapter on Lower-secondary education, page 83*). Hence no general studies are available in Switzerland on the transition from primary level to lower-secondary level. A study in Canton Bern (*Neuenschwander, Gerber, Frank et al., 2012*) revealed that taking the child's stage of development and working and learning conduct into account tended to give girls a slight advantage for the transition. When greater focus is placed on academic performance, however, the boys benefit more, leading to a clear increase in the number of boys at the higher levels of education (*ibid.*). This same study also showed that 20% of young people were allocated to a different lower-secondary level than could have been expected on the basis of their marks. Allocation to a lower level was more likely if there was a lack of stimulation at home or behavioural problems, and allocation to a higher level was due primarily to the parents being insufficiently informed (*ibid.*).

56 **Share of young people with a low skills level at secondary school and with a high skills level at schools with only basic requirements (*Realschule*) (PISA 2009)**

Data: PISA 2009



The performance overlaps at lower-secondary level could provide an indication of the extent of incorrect allocations at the transition to the next level. These performance overlaps can be found in a number of cantonal portraits drawn up in the context of the PISA assessments. While only a few highly able young people are allocated to or remain in the school type with only basic requirements (*Realschule*), young people with a low level of skills apparently gain access to the school type with advanced requirements (secondary school) and also succeed in remaining there (→ Figure 56).

Efficiency/costs

Due to the lack of consistent data on output (performance, personality development, socialisation) and the difficulties encountered in recording the input (time and personnel resources) in a suitable manner, it is not actually possible to make any statements regarding efficiency for the pre-school and primary level. Hence, only the costs are depicted and analysed here. A look is also taken at a number of measures implemented in schools with regard to their efficiency.

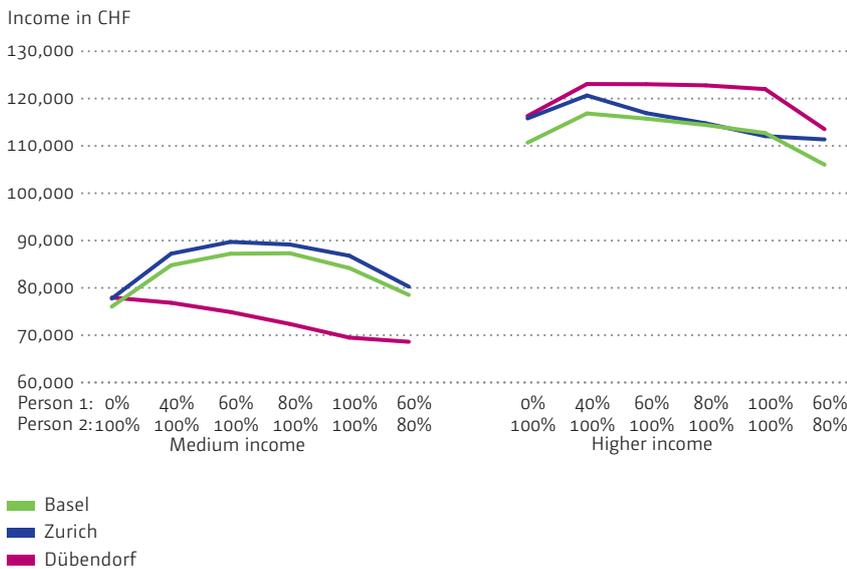
Costs of early childhood education and care

The benefits derived by individuals and society as a whole from investments in early education (*OECD, 2012d*) have to be set against high private costs, which can either reduce the extent to which early care and support are taken up at all or which have a negative impact on the gainful employment of parents. The private costs have been set out in a model calculation by the OECD, taking Zurich as an example, in a study on family, social and education policy measures (*OECD, 2011a*). This shows that almost the entire second wage of an average dual-earner couple with two children aged two and three has to be invested in childcare. Similar results were obtained from a comparison of tax and tariff systems in Basel-Stadt and Zurich, which set out to establish how much income remains to married couples with two children aged up to three after deducting childcare costs and tax and to see whether it is worthwhile for the second spouse to engage in gainful employment (*Schwegler, Stern & Iten, 2012*).

The presentation (→ Figure 57) shows that, depending on where they live, it is not really worthwhile for the second spouse of a medium-income couple to work, or would only be worthwhile up to a certain limit. For higher-income couples, in particular, this limit is very low, and there is virtually no incentive for the second spouse (with a lower income) to take up work.

57 Disposable income of couple households with small children (medium and higher income) with allowance for care costs and taxes

Source: Schwegler, Stern & Iten, 2012



Expenditure on the elementary and primary sector in an international comparison

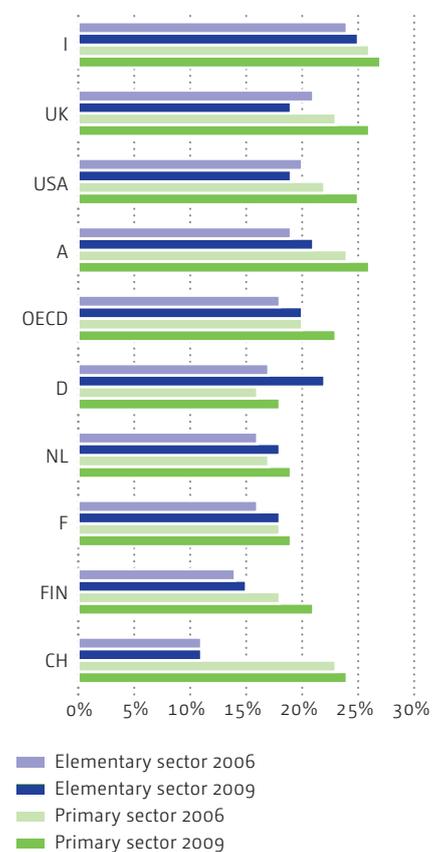
OECD education indicators show that, in 2009, Switzerland spent 5147 US dollars (PPP-adjusted) per pupil in the elementary sector and 10,597 US dollars per pupil in the primary sector. On the basis of the OECD indicators, Switzerland spends comparatively little per capita in the elementary sector (children as of age 3) in proportion to its GDP. The figures for the primary sector, however, are somewhat higher than the OECD average (→ Figure 58). In the period between 2006 and 2009, this expenditure rose in most of the countries listed here (due, in some cases, to a declining GDP in the individual country) while the percentage remained the same in Switzerland. In respect of the OECD presentation, it should be borne in mind that, for Switzerland, the only expenditure taken into account in the elementary sector is public expenditure, and the elementary sector in the OECD data takes in children as of age three, while the pre-school facilities provided in Switzerland are generally only open to children aged four to five. This accounts, to some extent, for the much bigger difference between the expenditure listed here in the elementary and primary sectors in Switzerland. It must also be borne in mind that the deployment of resources says nothing about how effective or efficient this expenditure was.

Expenditure on the primary sector in an intercantonal comparison

The educational expenditure statistics show the annual expenditure on salaries for teachers and other personnel, as well as on materials and other current obligations and also on investments for cantons and individual communities. In what follows, the expenditure on teachers' salaries in each canton is expressed in terms of the number of (primary level) pupils in that canton. Since no figures are available for Canton Aargau, this canton has been left out.

58 Annual expenditure on education per pupil in relation to per capita GDP, 2006 and 2009

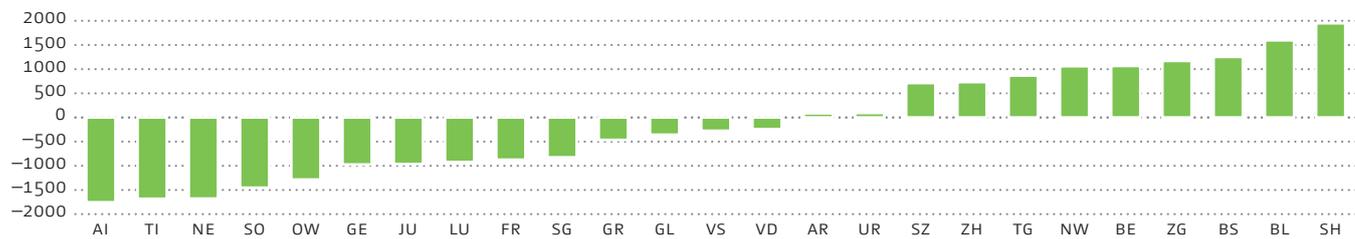
Data: OECD



59 Annual public expenditure of cantons and communities (only teachers' salaries) per pupil, primary level, by canton (2010), deviation from mean value (around CHF 9200)

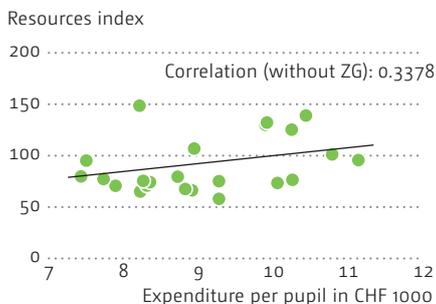
Data: FSO, EFV; calculations: SCCRE

Deviation from mean value in CHF



60 Annual expenditure on teachers' salaries (primary level) per pupil, by canton and resources index, 2010

Data: FSO, EFV



According to the Federal Statistical Office's definition, the resources index compares the potential of a canton's inhabitants (multiplied by a factor of 100) with that of all Switzerland's inhabitants. The resources index for Switzerland as a whole is 100. Cantons with a resource index in excess of 100 count as strong, and those with an index below 100 as weak.

The figures reveal considerable differences between the cantons. The gap between the canton with the highest expenditure on teachers' salaries and the lowest expenditure amounts to 40% of the average expenditure of some 9200 Swiss francs. The differences can be attributed to a range of factors. If a canton has a high wage level overall, this can increase the expenditure on personnel in schools too. In peripheral regions, by contrast, a high proportion of small classes can push up costs. Differences in the age structure of the teaching staff, in the charges imposed on labour or in the educational programmes offered, are also potential explanations.

The differences can similarly be influenced by the financial strength of the individual cantons. A financially strong canton can thus afford to spend more on education than a financially weak one. A comparison of expenditure on salaries per pupil with the resources index confirms this assumption to some extent (→ Figure 60). It is not, however, clear from the higher expenditure whether this actually leads to greater investment in real terms or whether financially strong cantons simply have to pay more to obtain the same input quality.

Developments in public expenditure on education

Since 1990, the Federal Statistical Office has published figures for public expenditure on education by cantons and their communities at the individual levels of the education system. It is the nominal values that are specified here. These figures show that public expenditure on human resources and materials at primary school level rose by 500 million Swiss francs between 1990 and 2000 and by a further 800 million Swiss francs between 2000 and 2010 (→ Figure 6i). If allowance is made for inflation, however, expenditure actually fell in real terms between 1990 and 2000 and only rose by just under 500 million Swiss francs between 2000 and 2010. Hence, in this second decade, 60% of the increase represents a real increase in costs, while 40% is accounted for by inflation.

It must also be borne in mind that the rise in pupil numbers between 1990 and 2000 should also have led to an increase in costs if per capita expenditure had remained constant (demographic effect). Since this rise in pupil numbers was absorbed by increasing the size of classes, however, a reduction in per capita expenditure actually resulted in real terms over this period. Compared with this, the decline in pupil numbers from 2000 to 2010

(which should have led to a cost reductions) had precisely the opposite effect, since the reduction in numbers was absorbed by increasing the number of small classes. Over the past decade, considerable cost increases have thus come about in real terms, and the demographic benefit that the politicians had been partially expecting has failed to materialise. (For developments in pupil numbers and class sizes → Figure 48.)

The recent increase in costs is doubtless not only due to class-size effects but also, to some extent, to the new tasks taken on by the cantons and communities. These include the provision of an increased range of school-based day-care facilities and taking over responsibility for special needs measures which had previously been co-financed by the Confederation (invalidity insurance) in the past.

Efficiency of educational measures

If educational measures that generate additional costs prove to be not very effective, they ought to be rejected on efficiency grounds. Hence one of the reasons why the three and four-year entry model was abandoned, which entailed a 20% to 50% increase in human resources expenditure over the traditional model, was probably because the increase in performance and the improvement in equity was not considered sufficient to warrant the additional outlay (*Zurich, 2012c*). If this principle were to be applied consistently to all existing measures, however, then having pupils repeat a year and providing support for children with learning difficulties and disabilities in separate schools would also have to be reconsidered (*Klemm, 2010; OECD, 2011e*).

Equity

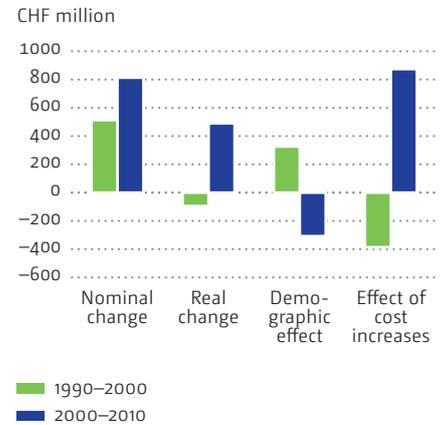
Equity is considered here from the angle of equal opportunity for accessing education and developing academic performance and also equal opportunity in respect of the educational path followed.

Compensating for unequal opportunity through care outside the family and early attendance at pre-school

Attending pre-school or school as of an early age can increase the educational opportunities of disadvantaged children, because the influence of the family, which largely determines these opportunities, is replaced to a certain extent by high-quality educational programmes (e.g. *Deming & Dynarski, 2008*). For Switzerland, *Bauer and Riphahn (2009)* were able to confirm, on the basis of the different kindergarten facilities provided in the cantons, that the correlation between a young person's educational qualifications and those of their father is less pronounced in cantons where children enter kindergarten at an earlier age (→ Figure 62). In those cantons with early kindergarten entry and a high proportion of 4 and 5-year-olds at school, intergenerational educational mobility was seen to be significantly higher than in cantons with late kindergarten entry. A further analysis revealed that this increased edu-

61 Change in public expenditure on education by cantons and communities (primary level; expenditure on HR and materials), 1990–2010, nominal and real

Data: FSO; calculations: SCCRE



62 Probability of a high-level secondary education as a function of the father's level of education and the kindergarten facilities in the canton

Source: *Bauer & Riphahn, 2009*



The difference (t) between the probability of high-level secondary education for a person whose father has a high level of education and this same probability for a person whose father has a low level of education

is reduced

2 if the average kindergarten age is lower than the average for all cantons

4 in cantons with early kindergarten entry

is increased

3 if the average kindergarten age is higher than the average for all cantons

5 in cantons with late kindergarten entry

cational mobility is most evident for children with a migration background (Bauer & Riphahn, 2012).

For Germany, Felfe and Lalive (2012) were able to show that, while privileged children were the most likely children to have access to high-quality institutional facilities for early childhood education and care, they were also the ones that derive comparatively little benefit from this. Early access to a child day-care centre is seen to be beneficial in terms of cognitive, social and motor-skill development especially for boys, children with a low birth weight (risk of delayed development) and children from families with a low social status. This is ascribed to a shorter but more stimulating period of contact between the mother and the child (*ibid.*).

A study based on a US health promotion programme concluded that a combination of family counselling in the first year of life and intensive, top-quality care outside the family in the second and third years of life is a suitable way of fully eliminating differences in cognitive development due to family background and of largely maintaining this positive effect up until the child is of school age (Duncan & Sojourner, 2012).

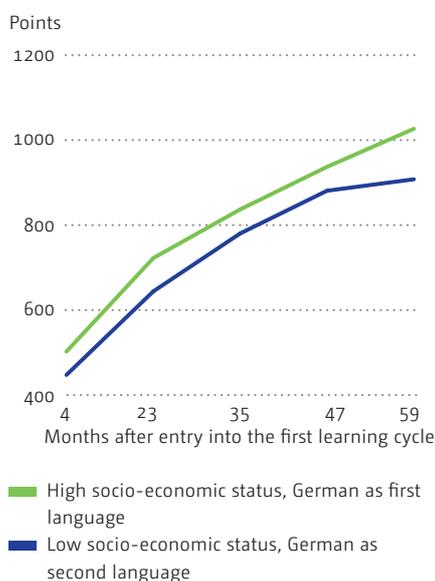
Havnes and Mogstad (2012) investigated the causal effect of pre-school attendance on academic achievement when Norway opened up pre-schools to 3 and 4-year-olds in the 1970s. They were able to show that earlier entry into pre-school and hence a longer period of time spent there had positive effects for disadvantaged children right through to their earnings opportunities as adults.

Access to kindergarten and care outside the family at kindergarten age

Due to the limited amount of data available, it is still not possible to confirm or refute on an overall basis the assumption (SKBF, 2010) that children from socially disadvantaged families are less able to make use of voluntary kindergarten facilities than others. The COCON survey of children and young people has, however, revealed that working parents in higher-income jobs with children of kindergarten age are in a better position to make use of formal care outside the family and school (all-day kindergartens, day-care centres, childminders), and middle and low-income families have to have more recourse to informal care (relatives, friends). This inequality in access is in greater evidence if there are no formal facilities directly at the family's place of residence (Schmid, Kriesi & Buchmann, 2011).

63 Development of reading performance in the first learning cycle by social origin and language

Source: EDK-Ost, 2010; data: Bayer, IBE



Development of ability to perform at school according to social background

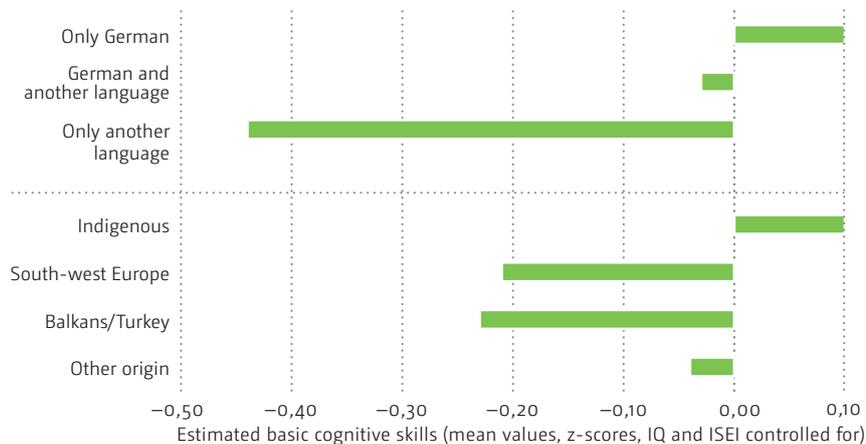
The summative evaluation of the trials with three and four-year pilot classes by the EDK-Ost and partner cantons shows that, when first starting school, children with dissimilar social backgrounds made comparable learning progress from the level of their different starting skills. The different learning situations at the outset are thus not balanced out but carried forward. In addition, there are indications that the development of academic performance in both language and mathematics drifts further apart during the children's time at school (EDK-Ost, 2010; → Figure 63). This finding is confirmed in the Zurich longitudinal assessment of the development of academic perfor-

mance at primary school. The Zurich assessment shows that where parents have a lower level of education, this has a negative influence on the performance development in both German and mathematics of the children tested, thus further widening the performance gap between socially privileged children and those with a disadvantaged background (*Angelone & Ramseier, 2012*). Although the development of a child's ability to perform at school is influenced to a major extent by their family background and the availability or lack of support and motivation from their parents, the longitudinal study comes to the conclusion that a considerable portion of the variation in performance improvement is also attributable to class-specific or school-specific factors (*ibid.*).

Little research has been conducted into the family and school-based processes that give rise to this dissimilar development in performance. Apart from observing different learning and social behaviour as a function of social background, which will be either more or less commensurate with the learning and behaviour requirements expected at school, a key role is also played by the different levels of proficiency in the school's language of instruction (see, for example, *Jünger, 2008; Isler & Künzli, 2009*). When it comes to preparing pre-school children for the language of instruction to be used at school, research has shown that there is a need for development in pre-school teaching methods (*Thévenaz-Christen, 2005; Künzli, Isler & Leemann, 2010*).

64 Teacher's assessment of pupils' basic cognitive skills according to the language spoken at home and origin, Canton Bern

Source: *Carigiet Reinhard, 2012*



Example: Teachers underestimate the intelligence of pupils from certain countries and of those who do not speak German at home even if they have the same IQ and the same socio-economic origin as their indigenous schoolmates and as those speaking only German at home.

Disadvantaged children with a foreign first language and a migration background are confronted with particular difficulties in respect of the school's language of instruction. A high proportion of multilingual children at class level and a higher social burden on the school are factors that can add up and put multilingual pupils at a disadvantage (*Dittmann-Domenichini, Khan-Bol, Rösselet et al., 2011*). The research literature thus calls for targeted language support for multilingual pupils (*ibid.*) and for consistent language support over all the different levels and subject areas (see, for example, *Gogolin, Dirim, Klinger et al., 2011*). This would require good diagnostic skills on the part of the teachers, however. These skills were examined in a study of third-year primary classes in Canton Bern (*Carigiet Reinhard, 2012*), and it was seen

that teachers underestimate the ability of multilingual pupils in the subject of German, especially if they do not speak German at home. The basic cognitive skills of multilingual pupils were also underestimated by teachers, especially if the pupils came from the Balkans or Turkey (*ibid.*; → Figure 64). This underestimation of pupils with a migration background and from disadvantaged families is one of the reasons why they are underrepresented in the support programmes for giftedness and gifted children (*Stamm, 2009*).

Development of ability to perform at school by gender

In the longitudinal study conducted in Canton Zurich, girls made greater learning progress in reading and mathematics than boys in the course of primary school. Their initial lead in reading increased, while they caught up somewhat in mathematics, having been behind to begin with (*Moser, Buff, Angelone et al., 2011*). At the end of primary school, the girls' reading performance was still better than the boys', and in mathematics, the boys' performance was better than that of the girls. These findings tally with those of the Check 5 conducted in Canton Aargau (*Gut, Berger & Bayer, 2012*) as well as with the results of the cantonal comparative tests in Geneva (*SRED, 2011*) and Vaud (*Ntamakiliro & Moreau, 2011*). In overall terms, however, the differences in performance by gender at the end of primary education can be said to be small (*ibid.*).

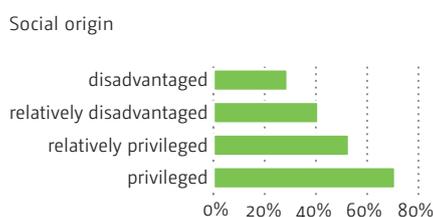
Transition opportunities

It is at the transitions in the education system, and particularly the transition between primary and lower-secondary levels that inequality of opportunity is manifested most strongly (*Maaz, Baumert, Gresch et al., 2010*). Hence the transition rates of disadvantaged groups can differ from those of privileged groups even when individual characteristics such as achievement and intelligence are taken into account. At primary level, it is chiefly the effects of a child's origin that have an effect (differences in performance due to different degrees of support and different styles of upbringing), while, at the transition to secondary level, secondary effects of origin (different educational aspirations) play a central role (*Neuenschwander, Gerber, Frank et al., 2012*). The fact that equity is being violated is borne out, for example, by the Zurich assessment of academic achievement, which shows that, for children with the same academic performance, those from privileged social backgrounds were more likely to transfer to the six-year baccalaureate school or the more demanding Section-A secondary level after the sixth year of primary school than children from less privileged backgrounds (→ Figure 65). The decisive criteria for the transition are academic achievement and the results of the transition examination. The graph shows that the probability of a girl with a grade of 5,5 transferring to the six-year baccalaureate school differs greatly as a function of her social origin. The same also holds true for boys, however, since gender does not have any impact on the transition to the six-year baccalaureate school. If pupils have either the maximum grade (6) or grades below 5,5, however, social origin has virtually no influence. Additional advantages are gained upon transition if (privileged) parents fund tutoring outside school to prepare their children for exams (*Moser, Buff, Angelone et al., 2011*).

65 Probability of transfer to the six-year baccalaureate school for well-performing girls by social origin, Canton Zurich

Girls with a grade of 5,5 in German and mathematics

Source: *Moser, Buff, Angelone et al., 2011*

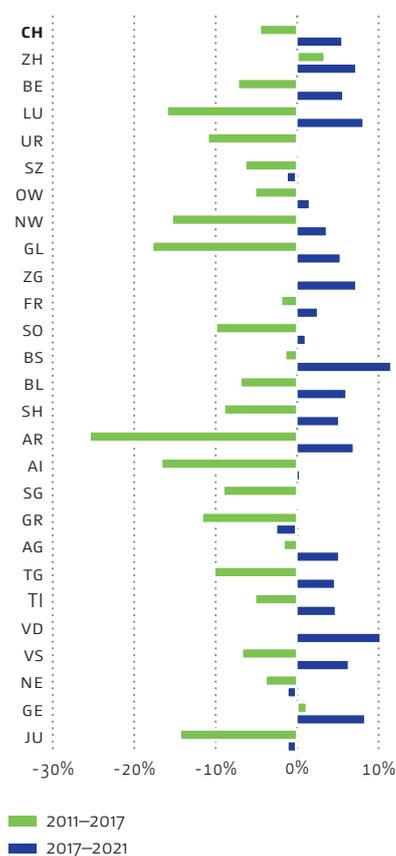




Lower-secondary education

66 Forecast changes in pupil numbers in lower-secondary education, 2011–2017 and 2017–2021

Data: FSO reference scenario



The Federal Office of Statistics applies the term «**very heterogeneous school classes**» to classes with a proportion of at least 30% of pupils from other cultures, taking both the national and linguistic background of the pupils into consideration.

Context

The impact of demographic developments on primary education in the years to come has already been discussed above, and these demographic developments will be affecting lower-secondary education too. The forecast is that the increase in pupil numbers in pre-school and primary education will make itself felt in lower-secondary education from 2017 onwards (→ *Chapter on Pre-school and primary school education, page 55*) (FSO, 2012g).

Pupil figures and the consequences

The forecast drawn up by the Swiss Federal Statistical Office (FSO) shows that overall pupil numbers will continue to decline by a mean of 3% in Switzerland up until 2017 and will then have reached their lowest level in the majority of cantons (→ Figure 66). The pattern will, however, differ from canton to canton. Between 2011 and 2017, the number of pupils in lower-secondary education is going to decline by approximately 14% and 23% in the cantons of Appenzell Innerrhoden and Appenzell Ausserrhoden respectively, and also by roughly 14% in the cantons of Glarus und Lucerne. Over this same period of time, the number of pupils at lower-secondary level in the cantons of Basel-Stadt, Geneva, Vaud, Zug and Zurich will continue to rise.

Between 2017 and 2021, pupil numbers in lower-secondary education will increase by a nationwide mean of 7.5%. The overall long-term situation, however, is that the pupil numbers will remain stable at a relatively low level, despite a certain amount of growth. In the short term, the change in pupil numbers is going to have an impact on the size of classes in lower-secondary education. As a consequence, it has to be assumed that, in some regions, there will be further closures of classes and amalgamations of schools up until 2017. Those cantons that have a multi-strand system at lower-secondary level are going to find themselves faced with greater challenges due to declining pupil numbers. In the cantons of Appenzell Ausserrhoden and St. Gallen, for example, the fall in pupil numbers has already triggered a structural debate on this issue. Maintaining the even smaller schools that are necessary if multiple strands are to be offered means a massive investment in infrastructure, and even merging schools of different types would only partially suffice to keep such schools in existence.

In addition to structural and/or organisational adaptations to allow for the changed pupil numbers, internal measures within the schools are generally to be observed as well. Attempts are being made to compensate for fluctuating pupil numbers through pedagogical, didactic and substantive measures. These include more learning in mixed age groups, acceptance of a more heterogeneous level of performance in classes, more internal differentiation and new forms of teachers working together, such as team teaching.

Composition of the pupil population

It was shown in the 2010 Education Report that the proportion of very heterogeneous school classes at lower-secondary level is distributed unevenly

amongst the various cantons. Due to the data reorganisation currently taking place at the Federal Statistical Office, no more recent figures are available.

As far as pupil composition is concerned, the data from the PISA studies shows that it is especially the socio-demographic characteristics of pupils with a migration background that have undergone a pronounced change over the first decade of the millennium (→ Table 67). The reason for this is the shift in Switzerland's immigration policy from the mid-1990s onwards. Whereas the policy had previously concentrated virtually exclusively on poorly qualified members of the workforce, it was replaced with a new policy from 1995 onwards, which as good as guaranteed freedom of movement to potential employees from the European Economic Area, while immigrants from all other countries were subjected to restrictions and were only granted work permits in exceptional cases after that date. The new immigration policy, which was complemented by the agreement with the European Union on the free movement of persons, made it easier for highly qualified specialists with the corresponding formal educational qualifications to immigrate, which then had an impact on the socio-demographic composition of Swiss schools. A comparison of the PISA random sample from 2000 – when the new policy had not yet had its full effect – with the random sample from 2009 (Cattaneo & Wolter, 2012) shows these changes very clearly already, although those first-generation young migrants who were tested in PISA 2009 represent only the first year that came in after the shift in Switzerland's immigration policy. It is thus to be expected that forthcoming PISA tests will show further changes and improvements amongst migrants.

67 Change in the socio-demographic characteristics of first-generation migrants, comparison of the PISA 2000 and 2009 random samples, percentages

Source: Cattaneo & Wolter, 2012

| Pupil characteristics | PISA sample 2000 (N = 678) | PISA sample 2009 (N = 1095) |
|--|-------------------------------|--------------------------------|
| Parents with a tertiary qualification | 25 | 45 |
| First language not the language of tuition | 80 | 66 |

Quite apart from the shift in socio-economic origins, the new migrants also brought about a reduction in the proportion of young persons whose first language is not the language of instruction, which also had an advantageous impact on the composition of schools. In many lower-secondary schools, the proportion of pupils whose first language was not the language of instruction fell below the 20% threshold (→ Figure 68), above which a negative influence on school performances is to be feared (Coradi Vellacott, Hollenweger, Nicolet et al., 2012). That being so, the proportion of classes with a high degree of heterogeneity of origin is more likely to have fallen, despite the increase in the percentage of young persons with a migration background, which climbed from 20.7% to 23.5% (OECD, 2011c).

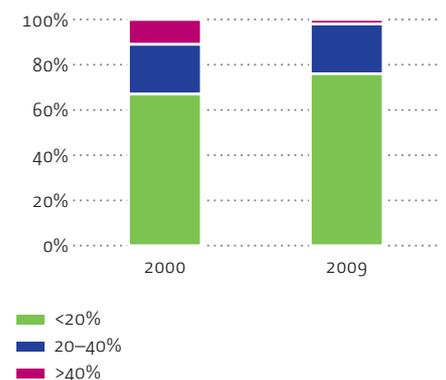
A heterogeneous population of pupils in terms of both culture and first language is one of the biggest didactic and social challenges facing schools and calls for differentiated and individualised tuition. As a general rule, support measures also require additional resources. In Canton Zurich, for example, additional financial resources are being channelled in as part of the QUIMS project (quality in multicultural schools). A comparable project also

Migration background

People with or without a migration background can be defined in many very different ways. Table 67 concentrates on first-generation migrants. These are individuals who were born abroad, as were both their parents. Those migrants and first-generation migrants are classified as **being of a foreign tongue** if the language spoken at home is not the same as the language used in the PISA test (language of tuition).

68 Schools with a low, intermediate and high proportion of pupils whose first language is not the language of instruction (PISA 2000 and 2009)

Source: Cattaneo & Wolter, 2012



exists in Geneva schools, known as «Réseaux d'enseignement prioritaire» (REP) (priority teaching networks). In order to attain the objective of reducing school failures, the so-called REP schools have additional capacities made available to them, especially for human resources (→ *Chapter on Pre-school and primary school education, page 55*).

Institutions

The aims of lower-secondary education can be described as the continuation of basic education and instilling in pupils a readiness to engage in lifelong learning (*EDK, 1995*). At the same time, the pupils in lower-secondary education are to be prepared for upper-secondary education, be this dual-track vocational education and training, a school that provides a general education (upper-secondary specialised school or similar) or a full-time vocational school.

In most cantons, lower-secondary education spans the period from the 7th to the 9th school year. In the framework of the HarmoS Agreement, a structural change has been planned, and this has been implemented by some cantons already (→ *Chapter on Compulsory education, page 39*). For those young people who fail to move directly into upper-secondary education after completing their compulsory schooling, various bridge-year courses are available, such as a 10th school year or a number of other interim solutions (→ *Chapter on Upper-secondary education, page 105*).

Diversity of models in lower-secondary education

In Switzerland, the structure of lower-secondary education varies from canton to canton and, sometimes, there are even different structural models within one and the same canton. The existing models can be summed up as follows:

- Integrated model: no selection of core classes but with streamed courses, where the differentiation is based on either requirements or performance.
- Cooperative model: the total population of pupils is divided over two types of core class and is also assigned to streamed courses differentiated according to requirements or performance.
- Streamed model: two to four school types run separately, each with their own classes, teachers, curricula and teaching resources.

Faced with declining pupil numbers, certain regions are also organising their lower secondary level with mixed-age classes.

When gathering data on the models used in each of the cantons, the following school types were taken into consideration: *Untergymnasium, Bezirksschule, Sekundarschule, Weiterbildungsschule, Realschule, Oberschule*. Special-needs classes were not included.

Diversity of models

The canton leaves it up to the authorities at the location in question to choose between the different models. In the cantons of AI, GL, LU, SH, SZ and ZH, the model divided up by school types predominates over the cooperative or integrated model. In the cantons of AR, BE, GR, OW and TG, the cooperative model predominates while, in the cantons of NW, UR and VS, the integrated model is the most widespread.

69 Lower-secondary models permitted by cantonal legislation, 2013

Source: cantonal laws

| One model per canton | |
|----------------------|---|
| Integrated | JU, TI |
| Cooperative | ZG (plus Untergymnasium) |
| Two strands | VD |
| Three strands | AG, BL, FR, GE (two strands in 1st year, three in 2nd and 3rd year), NE, SO |

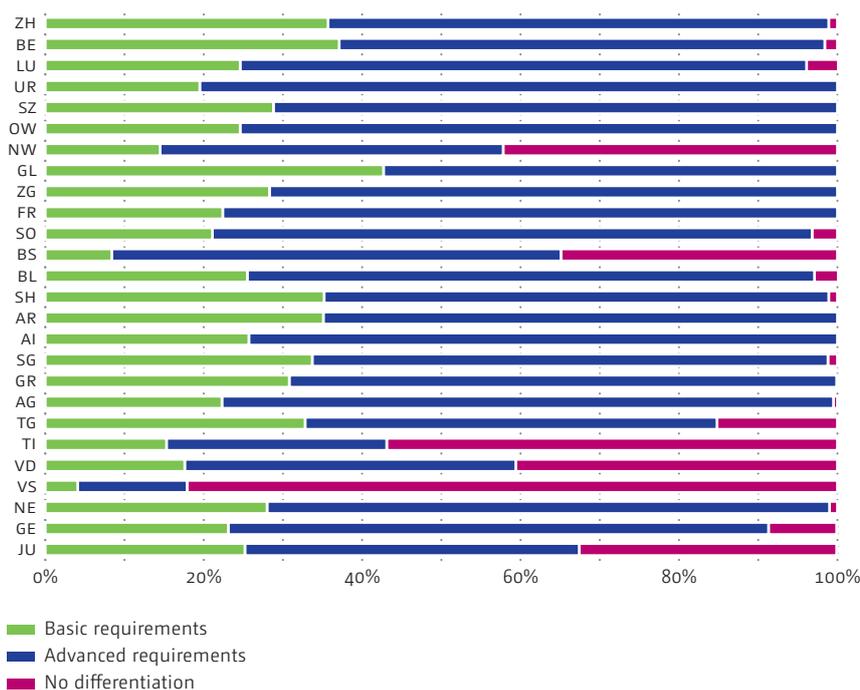
| Diversity of models | |
|--|---|
| Integrated and cooperative | NW (plus Untergymnasium), OW (plus Untergymnasium), TG |
| Segregated and cooperative | GR (3), SG (2), SH (2), SZ (2) ZH (2 or 3 plus six-year baccalaureate school) |
| Segregated and integrated | BS (3), AI (3), VS (2) |
| Integrated, cooperative and segregated | AR (2), BE (2 or 3), GL (4), LU (3), UR (3) |

Requirement profiles

Figure 70 shows the distribution of the cantonal pupil populations over the various requirement profiles. It emerges clearly from this data that not only does the cantonal heterogeneity have an impact on the structure of the lower-secondary level but also that assignment to the individual models varies greatly in practice. In the case of three-strand models, the two higher requirement profiles as well as the preparatory schools for baccalaureate schools and the six-year baccalaureate school are placed in the category of «advanced requirements» in the statistics. Both public and private schools are included in the figures (7th–9th school years). That also explains why cantons with a multi-strand model over the whole of their territory nonetheless have some pupils in the category of «no differentiation between levels» (for example Aargau and Vaud), since only a limited number of private schools practise such a differentiation. By contrast, the cantons of Jura and Ticino, which have an integrated lower-secondary level nonetheless have certain pupils in the categories of «basic requirements» and «advanced requirements». This is because they also run certain advanced courses within their integrated model. In Canton Ticino, for instance, the pupils in the 8th and 9th school years are taught

70 Lower-secondary pupils broken down by requirements profile and canton, 2011/12

Data: FSO



in performance-based groups. A similar situation exists in the cantons of Appenzell Innerrhoden and Appenzell Ausserrhoden, Glarus, Obwalden and Uri, where, alongside the structured models, the integrated model also exists.

School models and academic success

The question as to whether providing support for secondary pupils in developing their skills succeeds better in homogenous or heterogeneous learning groups, or whether it makes no difference, continues to be a highly controversial issue. Research findings show that academic performances turn out to be similar and are largely independent of the particularities of the school models. That explains why the differences between the models tend to be only minor in those characteristics that are crucial for the development of performance. Even integrated models do not get by entirely without some tuition in homogenous groups based on performance. Despite the integrated school form, pupils are often taught in groups based on their talents and skills in mathematics and foreign languages and sometimes in the language of instruction too (Moser, 2008).

Whereas the influence of various school models on the mean performance of a class or the heterogeneity of performance within a class tends to be rather low, various studies show that segregation-based school models correlate with a greater homogeneity of performance, for which the causes are socio-demographic. So this could constitute an equity problem (Betts, 2011; Perini, 2012).

Reorganisation of the 8th and 9th school years

With the aim of optimising the transition to upper-secondary education (→ *Effectiveness, page 89*), most cantons have initiated a reorganisation of their lower-secondary level and some have already completed it (EDK-IDES, 2012). The principal focus in this is on issues such as individual support for skills in one subject or across subjects, improvement of the career preparation process, measures to improve the motivation of young people during lessons, reinforcing each individual's own responsibility for the transition process and, all in all, optimising the use made of the final phase of compulsory education. These changes mainly affect the 8th and 9th school years. In order to obtain an improved individual stocktaking in the 8th school year, many cantons are using the «Stellwerk» adaptive test of learning attainment. In roughly half the German-speaking cantons «Stellwerk» has been made compulsory. In other cantons, its use is voluntary. A comparable test called EVA has been introduced in Canton Geneva. The test results and consultations with the parents then point to the individual support measures in sufficient time for their outcomes to take effect before the pupil makes the transition to upper-secondary education (Moser, 2006). In order to facilitate targeted individual support, various cantons have decided to reduce the volume of compulsory work in the 9th school year and to make up for this by introducing a period of individual learning. In this process, greater emphasis ought also to be placed on general skills (for instance through project work and year-end assignments) in addition to the classical skills based on school subjects (Obwalden, 2010; Zurich, 2010).

Annual number of tuition hours

In Switzerland, the mean annual duration of tuition in lower-secondary education is close to 960 hours (→ Figure 71). There is a range of more than 200 hours, from 902 or 951 hours of tuition (depending on the requirement profile) in Canton Neuchâtel to approximately 1100 hours in Canton St. Gallen. The computations are based on the sum of compulsory subjects and compulsory options. It must be borne in mind that, at lower-secondary level, there may be both individual differences and differences between school types even within one and the same canton on account of the compulsory options.

Those cantons (St. Gallen and Appenzell) with the largest number of hours of tuition have 50-minute lessons, and their school year comprises 40 school weeks with a mean of 33 or 34 lessons per week. In nine cantons (Bern, Basel-Landschaft, Basel-Stadt, Glarus, Jura, Neuchâtel, Schaffhausen, Schwyz and Zurich) the school year lasts 39 school weeks and the length of a lesson is 45 minutes. The difference between the maximum and minimum mean amount of hourly tuition in these nine cantons is 156 hours for basic-requirements classes and 93 hours for advanced-requirements classes; this can be explained by the number of lessons per week (29 to 34).

If the differences in the numbers of hours of tuition between the requirement levels are analysed, it is seen that, in twenty cantons, the specified tuition hours for the basic-requirements and advanced-requirements classes are identical (the preparatory classes for baccalaureate schools and six-year baccalaureate schools are not included here). In the cantons of Aargau and Appenzell Innerrhoden, the German-speaking part of Canton Bern, and Nidwalden and Zug the mean annual number of hours of tuition is, however, less for basic-requirements classes than for advanced-requirements ones. In the cantons of Basel-Landschaft and Neuchâtel it is the other way round.

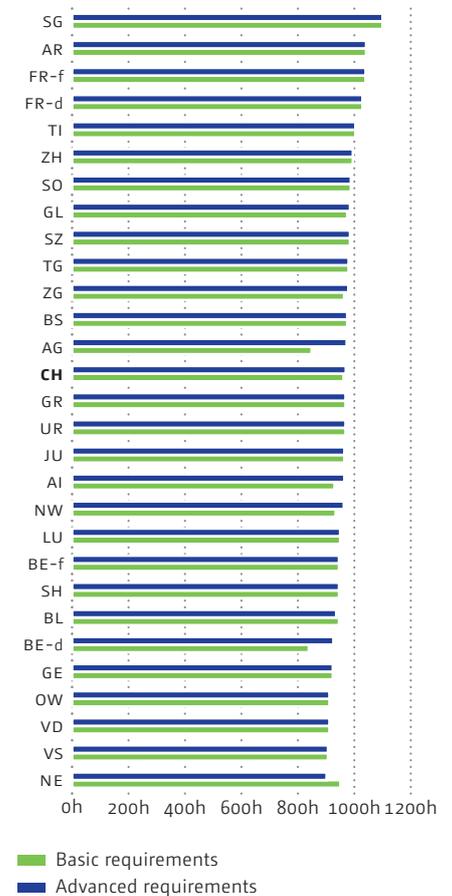
In view of the average of 38.5 school weeks and 32 lessons of 45 minutes per week, one school week makes a difference of more or less 24 hours per year. One lesson more per week thus results in a difference of approximately 29 hours per year. The biggest difference, however, is caused by the duration of lessons. If the lesson lasts five minutes longer, while the number of school weeks and weekly lessons remains the same, then the total duration of annual tuition will be roughly 103 hours more. Although no research results are available on this particular point, it would nonetheless seem to be a reasonable assumption that the impact on academic performance would not be identical if the effects of extending the length of lessons were to be compared with those of increasing the number of lessons.

Effectiveness

In order to judge the effectiveness of education at lower-secondary level, it is essential to consider the targets set for academic performance in the cantonal curricula. Along with performance in the core academic subjects, such as mathematics, native language and first foreign language, the general targets, such as problem-solving skills, social skills and personality development, form part of the education mandate of compulsory education. It follows that judging the outputs at the end of lower-secondary education calls for check-

71 Mean annual number of hours of tuition in lower-secondary education, 2012/2013

Data: IDES



ing the attainment of multiple goals. Moreover, a successful transition from lower-secondary to upper-secondary education also provides a yardstick for judging the effectiveness of lower-secondary education.

Tuition time and academic performance

Given the differences in the number of hours of tuition (→ Figure 71), the question has to be asked as to whether those pupils who receive more tuition achieve a better performance. Comparing countries on the basis of the data from the 2006 PISA study shows only a moderate correlation between effective tuition time and PISA performance (*Lavy, 2010; OECD, 2011d*). The only moderate impact of tuition time on academic performance that it is possible to establish empirically could perhaps be accounted for by schools making adaptations as reactions to the teaching time available in each instance when faced with given learning objectives. In an empirical analysis performed in Maryland, *Marcotte and Hemelt (2008)* succeeded in showing what happens if that adaptation is not made. Pupils at schools where teaching time was lost on account of the weather (and thus could not have been planned for in advance) achieved noticeably poorer performances at the end of the school year than pupils at schools where there was no such loss of tuition time. By way of contrast to the observed variations in tuition time and academic performance between the different school systems, the change in available tuition time came as a «shock» in this particular case, leaving teachers with little possibility of adapting their teaching style and tuition plans to the changed teaching time (while the learning objectives remained unchanged). This resulted in teaching time having a much greater impact on academic performance than if more time had been available to adapt to the changed framework conditions.

It must be added that, if tuition time does have an impact on academic performance, then this in itself does not permit any conclusions to be drawn as to whether a longer tuition time also represents an efficient form of improving academic performance (→ *Efficiency/costs, page 96*).

Reading performance in PISA

The PISA study makes it possible to carry out international and intercantonal comparisons (and to a limited extent, comparisons over time) of pupils' performance in a limited number of academic skills. The 2009 PISA survey made it possible for the first time to carry out a comprehensive comparison of the reading performance of 15-year-olds at two points in time, since reading was one of the main focuses for both the 2000 and 2009 tests. It is also possible to compare performances in mathematics, the main focus of the 2012 PISA measurement, with the performances in mathematics for the 2003 PISA measurement.¹

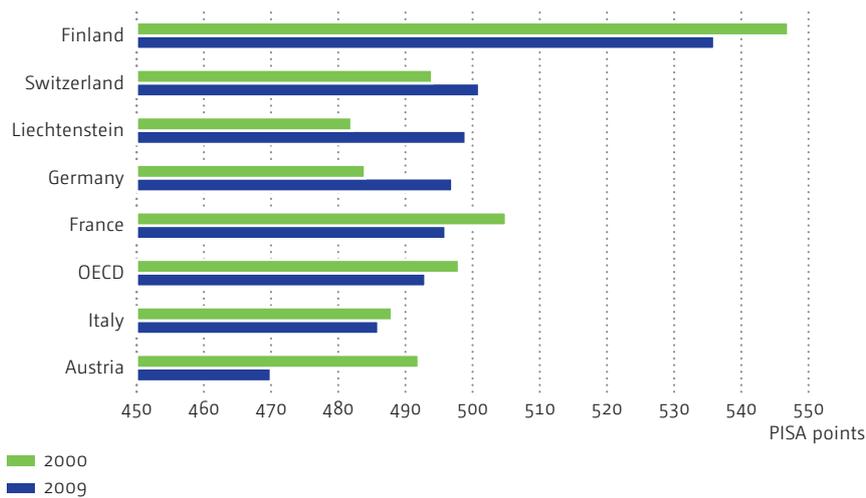
The Swiss mean for reading performances went up from 494 points (2000) to 501 points (2009). This improvement is not, however, statisti-

¹ The data from the 2012 PISA survey was, however, not available at the time this report went to print.

cally significant. By comparison with 2000, the Swiss result for 2009 was clearly above the OECD mean (493), which is linked to the fact that a larger number of non-OECD countries with generally poor test results participated. While Switzerland improved, albeit not to a statistically significant extent, the changes in reading performances in three out of five of Switzerland's neighbouring countries were significant: Germany (+13), Liechtenstein (+17) and Austria (-22).

72 International comparison of PISA reading performances in 2000 and 2009

Data: OECD

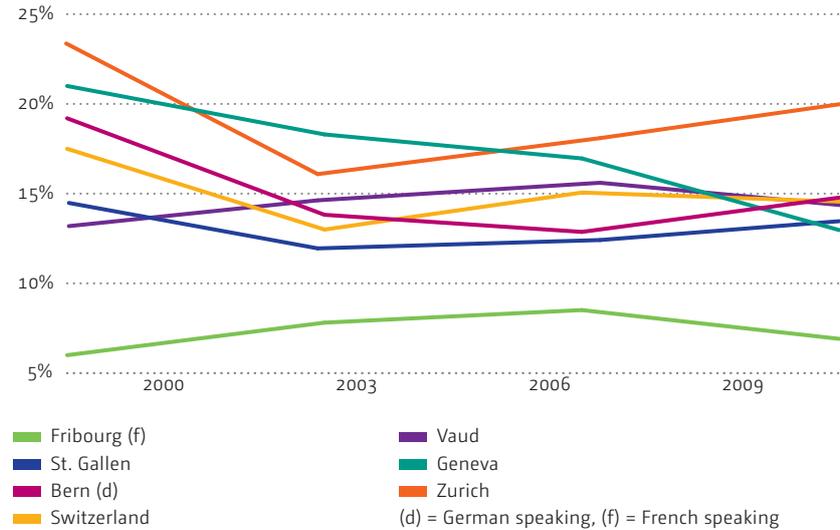


The most noticeable point as far as Switzerland is concerned is the narrowing of the performance differential between young people with and without a migration background from 86 to 48 points (*OECD, 2011c*). Roughly three-quarters of the improvement in performance, which primarily concerned first-generation migrants (i.e. young people who were not born in Switzerland) can be ascribed to the shift in socio-economic origin (*Cattaneo & Wolter, 2012*; → *Chapter on General context, page 21*, → *Equity, page 100*).

The five benchmarks for general and vocational education and training created as part of the European Union's 2003 Lisbon Objectives include the target that the proportion of 15-year-olds with poor reading performance should be reduced by at least 20% between 2000 and 2010. In 2009, the European Union set new benchmarks, including bringing down the proportion of pupils with a weak performance to below 15% (*European Commission, 2011*). For this purpose, a poor reading performance is defined as the attainment of a skill level of no better than 1 in PISA. If Switzerland had had the same objectives as the EU countries, then the proportion of pupils with a weak reading performance would have had to fall from 17.5% in 2000 to 14% in 2010. Switzerland just about reached this target, even though the reduction was not linear over time and very big differences were seen between the individual cantons, with some of them even recording an increased percentage (→ *Figure 73*). What is striking here is that cantons that tended to have rather low rates to begin with displayed increases up until 2006, but then their values fell again over the period up to 2009. Amongst those cantons with representative samples, the French-speaking part of Canton Fribourg displays a statistically significant lower proportion than the other cantons, even after controlling for the pupils' origin characteristics.

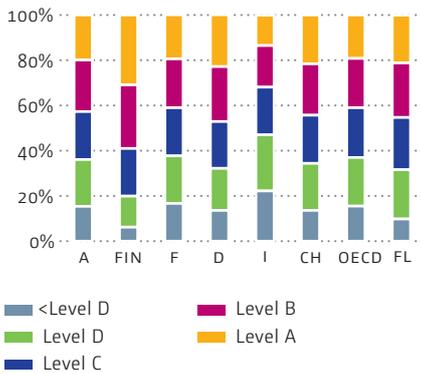
73 PISA results in reading: proportion of pupils with low reading skills (level ≤1)

Data: OECD



74 Environmental knowledge of 15-year-olds, PISA 2006

Data: OECD



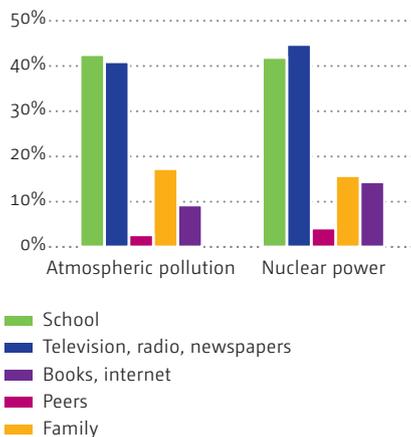
A = Austria FIN = Finland F = France
 D = Germany I = Italy CH = Switzerland
 FL = Liechtenstein

Environmental knowledge of 15-year-olds

In the framework of the PISA study, not only are reading performances and skills in mathematics and natural science tested but also other skills, on a rotational basis. The 2006 survey included testing 15-year-olds' knowledge of climate change, emissions and scarcity of raw materials. The young people in Switzerland obtained values that were slightly above the OECD average. The proportion of those with inadequate knowledge (below skill level D) stands at 14% in Switzerland, which is slightly lower than the OECD mean (16%) (→ Figure 74). Asked about the sources of their knowledge, around 40% of pupils in Switzerland stated school and the media (→ Figure 75). In the international mean, however, school emerges more clearly as the principal source of information on the environment (60–80%) (OECD, 2012c).

75 Sources of knowledge indicated by Swiss young people, PISA 2006

Data: OECD; computations: SCCRE



Cantonal assessments of academic achievement

Only a few cantons measure the performance of under-15s. It is primarily cantons in the French-speaking part of Switzerland that stage examinations during the 8th or 9th school year or at the end of both of these years → Chapter on Compulsory education, page 39). The test results from Canton Geneva are set out below by way of example.

In the framework of a research project in Canton Geneva, the results of the cantonal assessment of academic achievement in French were compared with the results of diagnostic tests of reading difficulties (N = 600). The analysis shows that the two tests with different orientations (one summative and the other formative) lead to complementary, yet also coherent results. In the highest requirement profile («regroupement A») 76% of the pupils tested satisfied the minimum requirements in all four sub-areas examined (vocabulary, syntax, reading comprehension and word recognition). A small proportion of 2% passed the minimum requirements in only one of these sub-areas or in none of them. In the lower requirement profile («regroupement B») 24% passed in all four sub-areas, while 16% attained the minimum

requirements in only one sub-area or in none of them. In heterogeneous classes, the figures were 59% and 7% respectively (Soussi & Nidegger, 2009).

At the end of compulsory education, Canton Basel-Stadt also examines and marks pupils' abilities on a standardised basis (Keller & Moser, 2012). Other German-speaking cantons, some applying the «Stellwerk» adaptive test of learning attainment and some not, make so-called orientation tests available to their teachers. The aims of these assessments of academic achievement are to take stock for each individual and to decide on targeted individual support for the young people's subject-specific skills. These results are, however, only made available to the pupils, their parents and the teachers and hence do not permit any conclusions that can be harnessed for an evaluation of the system.

Up until now, Switzerland has not had any standardised scheme of monitoring its education system by means of performance tests at the end of compulsory education. A scheme of this type is, however, envisaged through a check on the attainment of educational standards in the framework of HaroS and also in the *Convention scolaire romande* in French-speaking Switzerland. Its practical implementation is currently at the planning stage.

In Switzerland, it is otherwise rare and sporadic for further-reaching learning objectives to be tested outside the core subjects. In one example, pupils' political knowledge was examined in the context of two international studies (1999 and 2008). In 2008, this was found to be statistically significantly above the international mean amongst 14-year-olds in Switzerland (Biedermann, Oser, Konstantinidou et al., 2010). The improvement noted between the two survey dates is, however, primarily due to a changed composition in the participating countries. There is no detectable difference between the sexes as regards national political knowledge in Switzerland, which contrasts with nearly all other countries. In most countries, girls score much better on this subject.

General objectives

The pupils' integration in the school community, the social skills required for that purpose and the development of their personalities are autonomous objectives also anchored in law, and attaining them also forms part of the school's remit alongside the subject skills (see, for example, the cantonal school laws of Nidwalden, Vaud and Ticino). For this reason, the external evaluation of schools performed by the canton also includes defined quality criteria relating to aspects of the school and the teaching climate, such as dealing respectfully with one another, developmental possibilities, and wellbeing; these are checked regularly and in some cases comprehensively (→ *Chapter on Compulsory education, page 39*). In Switzerland, cantonal reports on school evaluations have only occasionally been made accessible to the public. Moreover, they only partly distinguish between the results of lower-secondary education and primary education. It is, however, impossible to draw any comparisons between these evaluations on account of the different quality matrices and survey designs employed (→ *Information box on the right: sample results from the cantons of Lucerne and Zurich*).

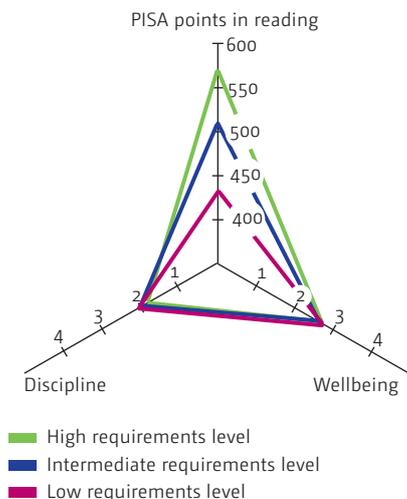
The importance of the school and the teaching climate is emphasised in various international studies, which establish a positive correlation between both the school climate and the class climate and pupils' performances (for

Results regarding wellbeing in the cantons of Lucerne and Zurich

In both cantons, 90% of pupils said they experienced a sense of wellbeing or intense wellbeing at school, and, in individual schools, the percentage was even higher. Primary school pupils rate their wellbeing more positively on average than pupils in lower-secondary education. In both Zurich and Lucerne, big differences exist between schools in some cases (Kramis, 2010; Zurich, 2012a).

76 Discipline, wellbeing and performance in the class, PISA 2009

Data: OECD; computations: SCCRE



example: Brookover, Schweitzer, Schneider et al., 1978; Benner, Graham and Mistry, 2008). Whether or not the school or class climate has a direct causal impact on the pupils' performances is nonetheless a matter of controversy. It is also conceivable that good pupils feel better on account of the better performance (reverse causality), but it is also conceivable that a good school and class climate create a necessary precondition, but not one that is sufficient in itself, for good school performances (in this case, however, the correlation would be very small). Finally, it is also conceivable that factors in the school environment or the teachers' behaviour could influence both the school and class climate and the learning performances, and hence that the correlation between climate and performances would not be a causal relationship.

One fundamental problem encountered in the empirical observation of these matters crops up in the definition of climate already. There is admittedly agreement that it is a matter of subjective perception (Cohen, 2006; Gorard, 2012), but there is no consensus as to how to draw the line between this and other forms of sensitivity. Along with the questions of definition, there are also questions of operationalization (i.e. how the school or class climate should and could be measured).

For Switzerland, there is only really one representative set of data that would allow any pronouncement on this subject. The PISA surveys contain both individual data on academic performance and an assessment by the pupils and the school managements of the school and class climate. This data shows that while pupils' performances in the 9th school year do vary between the requirement levels, there is practically no indication of differences as regards discipline and the «climate of wellbeing» between the classes with different performance levels (→ Figure 76). From this data, it is thus neither possible to deduce that there is a trade-off between the climate of wellbeing and performance nor that a feeling of wellbeing is a sufficient precondition for good performance.

Transition to upper-secondary education

The effectiveness of education at lower-secondary level also has to be judged in terms of the success of the transition to upper-secondary education (vocational education and training or higher-level schools). Whether or not young people completing compulsory education possess the skills and knowledge that are demanded for a successful transition to upper-secondary education is a question that it is not easy to answer at present, given the nature of the available data. At the same time, it is not possible to conclude automatically from every successful transition that academic performance is good and vice versa, since it is not only academic performance that plays a role, but also other equally important factors, such as social skills, which are not necessarily formed in school.

Entry into post-compulsory education is associated with difficulties and delays for a quarter of the young people completing compulsory education. It is particularly pupils from basic-requirements classes who experience difficulties with the transition. They find themselves significantly more frequently in a bridge-year course or find no immediate follow-on solution at all (Hupka-Brunner, Meyer, Stalder et al., 2011; → *Equity*, page 100).

The objective adopted by the Confederation, the cantons and the social partners in 2006 of having 95% of 25-year-olds with an upper-secondary

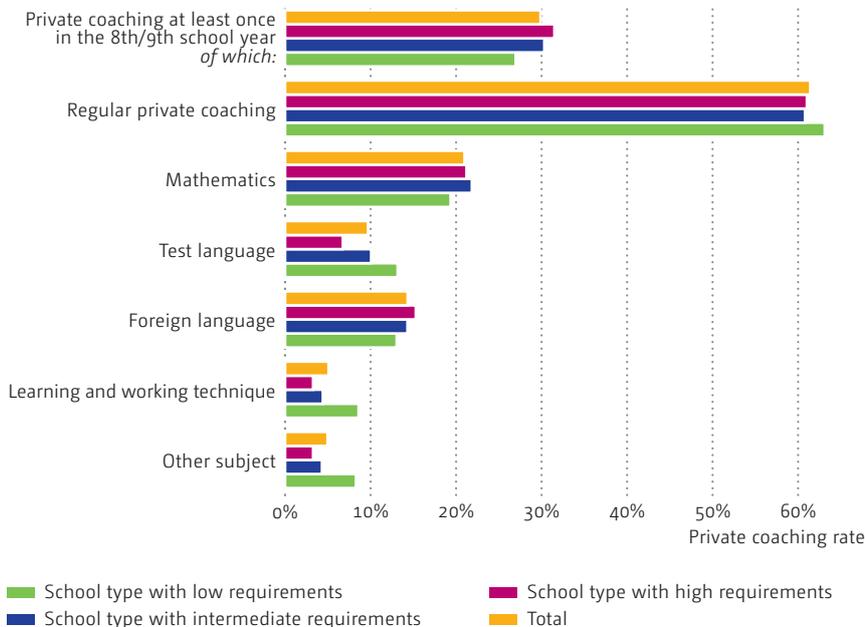
qualification by 2015 was supported from 2006 to 2010 by the «Nahtstelle» («Transition») project of the Swiss Conference of Cantonal Ministers of Education and, since 2008, has been supported by the «Case Management Vocational Training» project launched by the Confederation (→ Figure 77). The principal component of these initiatives is the coordination of the support measures provided in the cantons for young people with a view to improving the transition from lower-secondary to upper-secondary education. Twenty-four cantons have already introduced case management on a comprehensive basis (figure for 2013). The original project description (*OPET*, 2007) specifies that young people whose transition to upper-secondary education might potentially pose problems ought to have been identified in the 7th and 8th school year already. The majority of the cantonal case-management concepts, however, concentrate on the 9th school year, and only isolated ones on the 8th school year (*Landert*, 2011).

Private coaching outside of school

When it comes to judging the effectiveness of school, it is important to consider how many academic skills are acquired not at school but elsewhere. Although there is no direct answer to this question, the detailed results that are now available for Switzerland for the first time on paid learning support outside of school (private coaching) show that a by-no-means negligible percentage of pupils have regular and intensive recourse to it (→ Figure 78).

78 Paid private coaching outside of school at lower-secondary level, broken down by subject and requirements profile, PISA 2009

Source: *Hof & Wolter*, 2012



In the 2009 PISA survey, young people were asked whether or not they had received paid private coaching in the 8th or 9th class. Nearly one in three answered that they had done so at least once in the 8th and 9th classes, and almost one pupil in five had done so regularly and over a prolonged period

77 Educational situation of the young people in the case-management project, percentages

Sources: *Haller, Hümbelin, Erzinger et al.*, 2012; *Haller & Hümbelin*, 2011; *Bachmann Hunziker*, 2012
There is no data available for Switzerland as a whole.

| | BS | VD | ZH |
|---------------------------|----|----|----|
| Lower-secondary education | 48 | 22 | 25 |
| Interim solutions | 13 | 23 | 6 |
| Upper-secondary education | 7 | – | 7 |
| In gainful employment | – | 6 | – |
| Not in education | 32 | 42 | 61 |
| No answer | – | 7 | – |

Introduction of the case-management project:
BS 2008
VD 2010
ZH 2010

of time (*Hof & Wolter, 2012*). As far as the success of the transition to upper-secondary education is concerned, it emerges that it is especially young people who are planning a transition to a general education or a full-time-school solution at upper-secondary level who make use of paid private coaching (→ *Chapter on Baccalaureate schools, page 139*).

Efficiency/costs

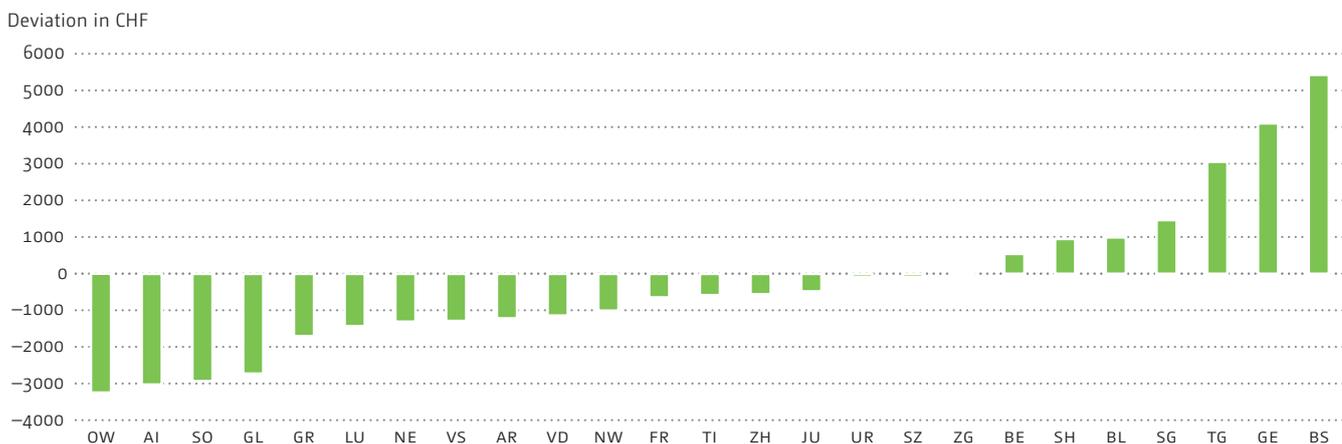
«Efficiency» means achieving an educational policy objective with the lowest possible deployment of resources or with a maximum output measured in terms of the resources deployed. Efficiency can be considered both in terms of real inputs (teachers' qualifications, quality of the curricula, teaching hours, etc.) and monetary inputs. Very few comparative statistics are available that cover the real inputs in the educational system, which is why input measurements are nearly always based on monetary parameters.

The statistics on educational expenditure show how much the cantons and communes spend annually on the remuneration of teachers and other personnel, expenditure on equipment or other on-going commitments and investments. Given that some of the cantons do not disclose their data, Figure 79 is limited to the expenditure on teachers' remuneration (and even this item is not available for Canton Aargau).

79 Educational expenditure per pupil, deviation from the Swiss mean, teachers' remuneration only, 2010

Data: FSO; computations: SCCRE

Excluding Canton Aargau



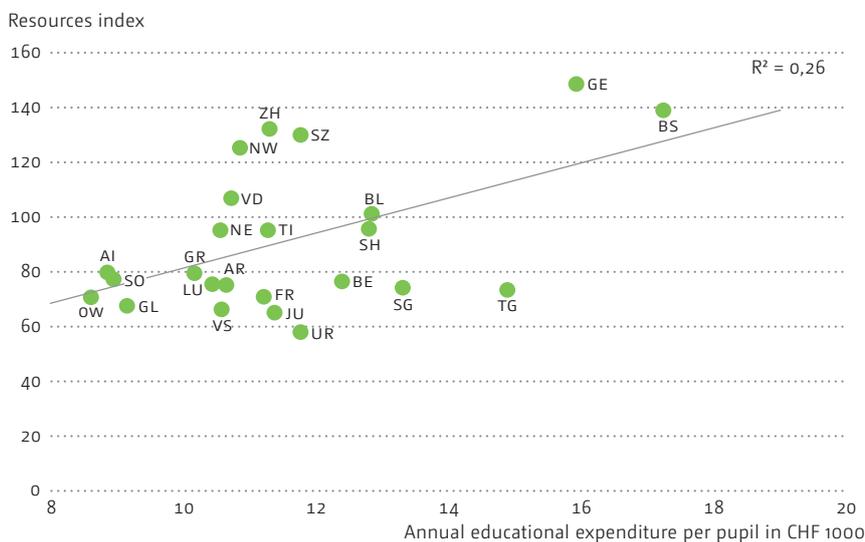
The cantonal figures display considerable differences. The canton with the highest expenditure spends approximately 45% more than the average for Switzerland, while the one with the lowest expenditure spends roughly 30% less than the Swiss average, which is approximately 11 800 Swiss francs per pupil. Various factors need to be considered in order to explain these differences. A generally high level of pay in one canton, for instance, may affect personnel remuneration in the schools. Other explanations may be the age structure of the teachers employed, differences in social-security charges

or differences in the forms of pedagogical support on offer in the school. It is also possible that a canton's financial strength may affect its level of educational expenditure, since this is an indicator of how much expenditure a canton can afford at all (including consideration of the equalisation payments received by the cantons). Partial confirmation exists for this assumption. An analysis of just the resources index (→ *Information text on the right*) as an influencing factor furnishes an explanation for a quarter of the variance in the expenditure (→ Figure 80). To what extent the different monetary amounts spent per pupil in the individual cantons reflect actual differences in the real inputs into the school operation (such as teachers' numbers of hours of teaching) or only price differences in the inputs is something it is unfortunately impossible to say on the basis of the available data.

The Federal Statistical Office defines the **Resources Index** as an index to compare the potential of the inhabitants of a canton (multiplied by a factor of 100) with the potential of all Switzerland's inhabitants. The resources index for Switzerland as a whole is 100, cantons with a resources index in excess of 100 count as strong and those with a resources index below 100 as weak.

80 Educational expenditure per pupil and resources index, teachers' remuneration only, 2010

Data: FSO, FFA; computations: SCCRE

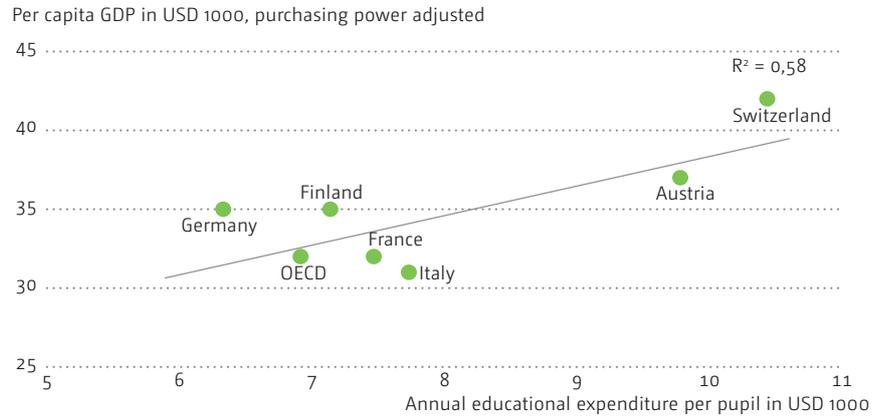


Costs by international comparison

A similar picture to that of the intercantonal comparison emerges if an attempt is made to compare the mean expenditures in Switzerland with those in other countries (→ Figure 81). Richer countries (on the basis of per capita GDP) spend more on education, but also have higher input prices (especially wages) and spend correspondingly more money for each real investment in education. Apart from wage levels, input differences, such as class size or the number of lessons per pupil and per teacher also play a part. Since Switzerland does not, however, differ very much from the comparator countries in terms of the real inputs, the main explanation lies in the different input prices.

81 Per capita GDP in relation to the annual educational expenditure for 6-to-15-year-old pupils

Data: OECD (PISA 2009)



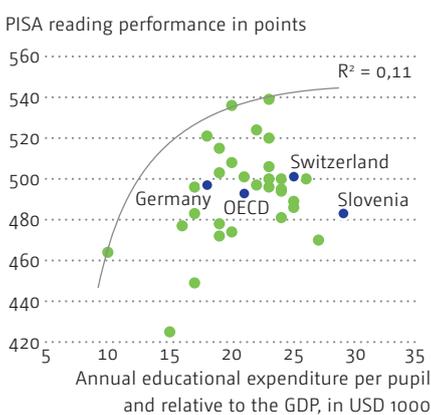
Effect of the deployment of resources

The comparison of costs does not, in itself, provide any measure of efficiency. That is only obtained by combining the costs with the outputs, i.e. with pupils' skills. Efficiency differentials can arise in three different ways. Firstly, a differential can result when the same resource is deployed but has a different impact. In other words, one educational unit (school, canton or country) may be better at converting the available inputs into academic performance (output). The second source of differences in efficiency stems from different input mixes, which nonetheless add up to the same total. In this instance, efficiency benefits may arise, for instance, if one educational unit makes a better choice (in terms of effectiveness) from amongst the individual inputs. The third way in which efficiency advantages may arise is if the same output is achieved with fewer resources, typically by bringing down costs through marginally increasing class sizes, provided that this is not accompanied by any negative impact on academic performance – which is borne out by the bulk of international research literature (*Hattie, 2008*).

If PISA reading performances are considered in combination with the monetary expenditure on education, then very considerable differences are seen to exist between the countries. The comparison shows that Switzerland spends roughly one-and-a-half times as much per pupil as Germany (normalised on the basis of the national GDP and hence also on the national price level). There is, however, hardly any difference between the two countries as far as performance is concerned (→ Figure 82). There is one important limitation to the comparison in that it is only meaningful if all the countries allocate the same proportion of their educational expenditure to the school inputs that are actually used for the measured PISA performances. These comparisons include, for instance, countries that channel virtually no resources into teaching foreign languages and which either save the resources released in this way or divert them into the subject measured (language of tuition), thus falsifying the comparison of efficiency. Consideration must also be given to the origin of the pupil population. If there is a large proportion of pupils whose first language is not their language of instruction, it cannot be expected that the same reading performances will be attained in the test language for the same input.

82 PISA reading performance in 2009 and annual educational expenditure for 6-to-15-year-old pupils

Data: OECD (PISA 2009)



Relationship between hours of tuition and performance

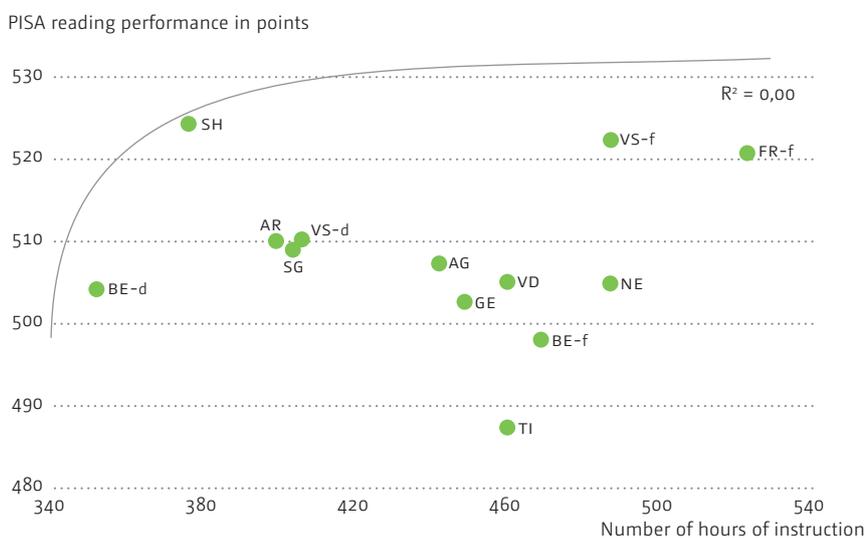
Given that it is very difficult to interpret the relationship between monetary inputs and the output in terms of academic performance in efficiency analyses, an alternative approach is to draw up efficiency analyses based on the real inputs. Figure 83 illustrates the accumulated deployment of tuition hours in the test language and the pupils' reading performance. In order to enhance the comparability of the cantons, the average PISA scores for the cantons take various influences into consideration, such as the proportion of pupils whose first language is not their language of tuition, young people with a migration background, the gender breakdown, age and the breakdown of socio-economic origins. In addition to this, the allocation of tuition-hours and reading performance were correlated separately for each requirement profile and, in a second step, were weighted as a function of pupil distribution by requirement profile (it was not possible to include the cantons of Jura and Zurich here due to a lack of data).

The presentation of the results shows clearly that simply providing more tuition in the test language does not automatically improve reading performance. It also emerges that the reason for the lack of correlation between input and output is due to the fact that too many of the observation units (cantons in this case) display an inefficient ratio between input and output. In this analysis, all the cantons are shown to be more or less inefficient compared with the most efficient canton, namely Canton Schaffhausen. However, even if, for unknown reasons, Canton Schaffhausen were to be a statistical outlier in this presentation, and if the efficiency line were to be determined by the cantons of Berne (German-speaking [d]) and Valais (French-speaking [f]), all the other cantons would still be more or less inefficient in the use made of their school lessons.

The graph showing the efficiency of the deployment of resources in tuition hours does not, however, make it possible to put forward any statement as to the reasons why some cantons are more efficient than others and thus what might be done to improve the efficiency of the inefficient cantons.

83 PISA reading performance in 2009 and number of hours of instruction in the test language, 7th–9th school year

Data: FSO, EDK/IDES; computations: SCCRE



Different lengths of time to complete compulsory education

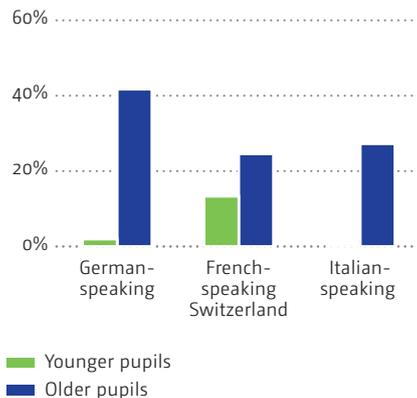
The duration of compulsory education is nominally nine school years; in reality, however, some of the pupils need longer. One yardstick for measuring the efficiency of school is thus not only the resources deployed in the course of a school year in relation to the skills acquired by the young people, but also the total duration of schooling. Adopting this approach, the most efficient school model is the one in which the skills are acquired in the shortest period of time.²

There is a slight variation between the cantons as regards nominal age at the end of compulsory education, which can be worked out from the statutory cut-off date for starting school. The nominal age of school leavers in Canton Ticino ought thus to be between 14.5 and 15.5 years. In the French and German-speaking parts of Switzerland the nominal age of school leavers is between 15 and 16 years. Delays occur when children start school late or repeat a school year. Where secondary education is divided into different requirement levels (→ *Institutions, page 86*) a distinction is drawn between so-called stable repetition (same class, same level) and mobile repetition (same class, more demanding level).

The analysis of the 2009 PISA data shows that, in German-speaking Switzerland, approximately 42% of the pupils are older than the nominal age when they leave school (only some 2% are younger), whereas in the French-speaking part of the country many more pupils are younger and a lot fewer are older.³ In Canton Ticino, three-quarters complete their compulsory education within the nominal age range, and roughly 27% are older. These big differences between the language regions show that, in comparing PISA performances at the end of compulsory education for purposes of analysing the efficiency of school from the pupils' perspective, the number of school years completed and the pupils' age ought always to be fed into the computation too (→ Figure 84).

84 Younger and older pupils at the time of the 2009 PISA survey

Measured relative to the nominal age
Data: FSO, EDK/IDES; computations: SCCRE



Equity

Several criteria need to be taken into consideration for judging equity in lower-secondary education. The principal issue is whether young people are able to participate in education successfully and develop their skills regardless of their social background and gender. The PISA data furnishes extensive material that can be used for documenting equity at the end of lower-secondary education. Given the cross-sectional character of the data, however, it is generally not possible, where infringements of equity do occur, to establish if the root cause happened before or during the school career.

² Consideration must also be given to the fact that pupils whose school career is delayed are able to leave compulsory education after nine years at school, while still in the 8th school year, i.e. without attaining the performance level envisaged for the 9th school year.

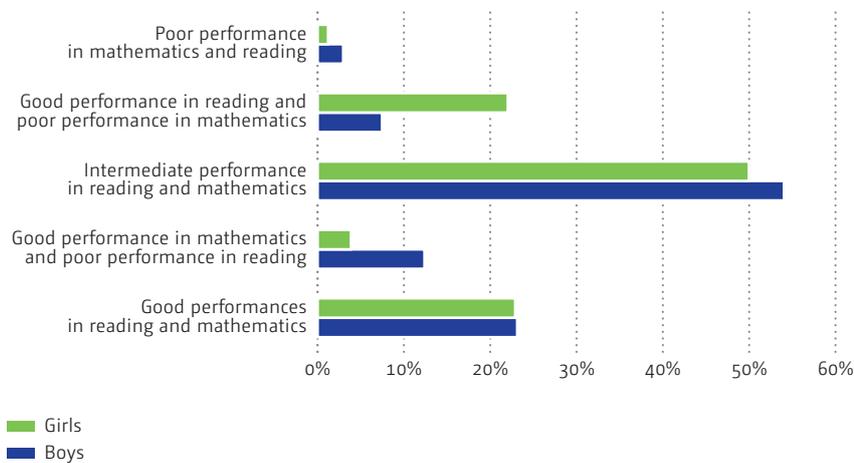
³ Since the PISA data does not give any indication of the number of school years completed, it is not possible to ascertain whether the majority of the high number of pupils who are «too old» are ones who have repeated school years or ones who started school late.

Competence scores broken down by gender

In the PISA study, boys in Switzerland perform worse at reading on average than girls (as is the case in many other countries too). Girls, on the other hand, display poorer performances on average in mathematics. If it is assumed that neither girls nor boys have different gender-specific potential as regards reading or mathematics, then such results point to an infringement of equity. If the results in mathematics and in reading are combined with one another, boys are, moreover, often shown to have a very lopsided skill in mathematics (very good performances in mathematics at the same time as poor language performances), while girls are much more often shown to have a lopsided language skill (→ Figure 85), which affects the different gender-specific mean results.

85 Performance in reading and mathematics by gender, PISA 2009

Source: Hof & Wolter, 2012



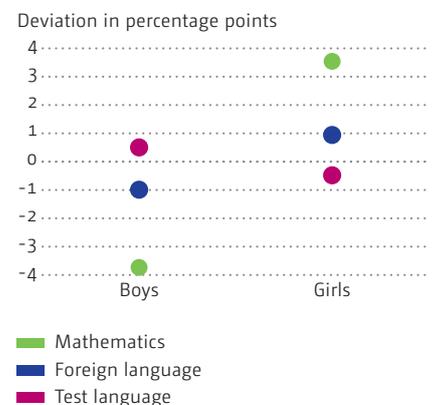
If the gender-specific performance differences described above are examined in relation to the extent of private coaching, it is seen that where there is a lopsided language skill (more girls), very much more frequent use is made of private coaching in mathematics. If, on the other hand, there is a lopsided mathematics skill (more boys), pupils do not make more frequent use of private coaching in the language of instruction (→ Figure 86). One possible explanation for these different strategies adopted by the genders to overcome a deficit might be that girls with a lopsided language skill need the better mathematics performance to be able to fulfil their wish for a transition to a general school at upper-secondary level, whereas boys with a lopsided mathematics skill tend rather to be aiming for technical/industrial vocational education and training, and apparently do not consider that they need any improvement in their language skills for this.

Performance differences broken down by migration status

A look at the PISA reading performance of young people with a migration background (at least one parent born abroad) shows that these pupils obtained a mean of 37 points more in 2009 than in 2000. In the case of young people without a migration background, the mean performance rose by only

86 Difference compared with the mean rate of private coaching by gender, PISA 2009

Source: Hof and Wolter, 2012

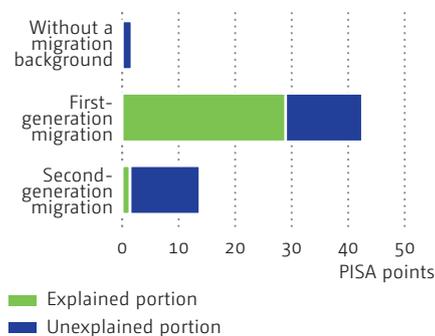


Example:

The proportion of boys receiving private coaching in mathematics is four percentage points below the mean.

87 Improvement in the reading performance of young people with and without a migration background, PISA 2000/2009

Source: Cattaneo & Wolter, 2012



Without a migration background

Individuals who were born in Switzerland as were both their parents

First-generation migrants

Individuals who were born abroad as were both their parents

Second-generation migrants

Individuals who were born in Switzerland of parents both born abroad

Example:

Out of the performance improvement of 43 PISA points for first-generation young people with a migration background, 30 points can be ascribed to the improved socio-demographic characteristics of the parents. Around 13 points cannot be explained in that way and might thus have been brought about by improved reading support for immigrants.

around two points. The performance differential between the two groups is nonetheless 48 points (*OECD, 2011c*). A somewhat closer look at young people with a first or second generation migration background (→ *Context, page 84*) shows that there are clear differences in the improvement in their reading performance. What is particularly noteworthy is the 43-point improvement in the performance of first-generation migrants. *Cattaneo and Wolter (2012)* ascribe nearly three-quarters of the improvement in this group's performance to observable changes in its socio-economic background (→ *Figure 87*) and thus confirm earlier investigations which already showed, using the 2000 PISA data, that the differences in academic performance between indigenous pupils and those with a migration background are almost entirely due to socio-demographic factors concerning their family (*Meunier, 2011*). In other words, if indigenous young people had had a similar socio-demographic origin to young people with a migration background, they would not have obtained any better academic results in PISA tests. As far as equity is concerned, it can thus be concluded that the reasons for differences in school opportunities are to be sought not so much in the migration background but, to a much greater extent, in socio-demographic and economic origin.

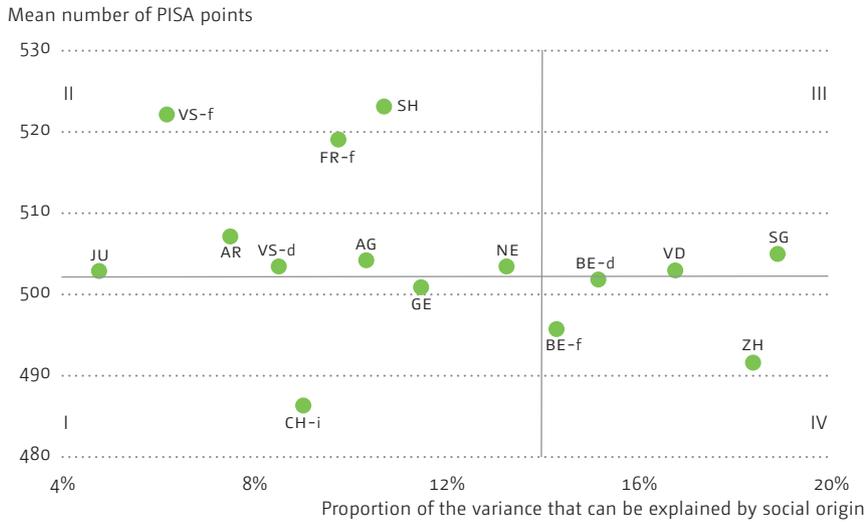
A child's migration status does, however, influence whether or not he or she is given paid private coaching. The language spoken at home is also decisive for comparing young people with and without a migration background. Migrants who do not speak the test language at home display the highest rate of private coaching (*Hof & Wolter, 2012*). The difference in the rate of private coaching between those migrants who do not speak a foreign language at home and young indigenous people can be explained by educational aspirations for post-compulsory education. Migrants whose first language is not a foreign language more frequently intend to send their children to a general school at upper-secondary level and, for that reason, are thus willing to invest in paid private coaching (→ *Chapter on Baccalaureate schools, page 139*).

Socio-economic background and performances in PISA 2009

In Switzerland, there has been no significant change in the influence of pupils' social origin on their reading performances in the PISA tests since the 2000 survey (*OECD, 2011c*). There are still clear differences between the cantons as regards the influence of the socio-economic origin on individual performance (→ *Figure 88*). The correlation between pupils' social origin and the PISA results tends to be less pronounced in the cantons of French-speaking Switzerland and Ticino. The greater influence in the German-speaking cantons is to be explained in part by the specificities of the migrant population – in other words, the influence of social origin declines when native language is considered. Cantons that display a big performance variance due to socio-economic origin, do not, on average, obtain the best performances. What is thus particularly problematic are the results of the Quadrant-IV cantons, where there is an above-average socio-economic influence on individual performance at the same time as a below-average cantonal performance.

88 PISA reading performance and the impact of social origin on performance, by canton, 2009

Data: FSO, EDK; computations: SCCRE



Transition to upper-secondary education

When it comes to equity and the objective of increasing to 95% the rate of young people completing upper-secondary education with a qualification (→ *Effectiveness*, page 89), the question has to be asked as to whether equal opportunities for a successful transition to upper-secondary education exist for all young people, irrespective of their individual characteristics. Results of the Swiss TREE study show that performances (PISA results) do indeed count as far as the transition is concerned, but that both individual and structural characteristics play a part as well. Hence, the chances of a direct transition to upper-secondary education (for an identical academic performance) are higher for boys and for young people from socio-economically better-off families. In addition, pupils who have completed a lower-secondary school type with a lower requirement level stand less of a chance of making a direct transition to upper-secondary education than those who have attended one with a higher requirement level, despite an identical performance (*Hupka-Brunner, Meyer, Stalder et al., 2011*). It would be wrong to interpret these results as automatically pointing to discrimination against the first group, since the probability of transition also depends, inter alia, on social skills, which are only inadequately covered in the PISA test and which might possibly explain the differences in cases where the PISA test scores are identical.



Upper-secondary education

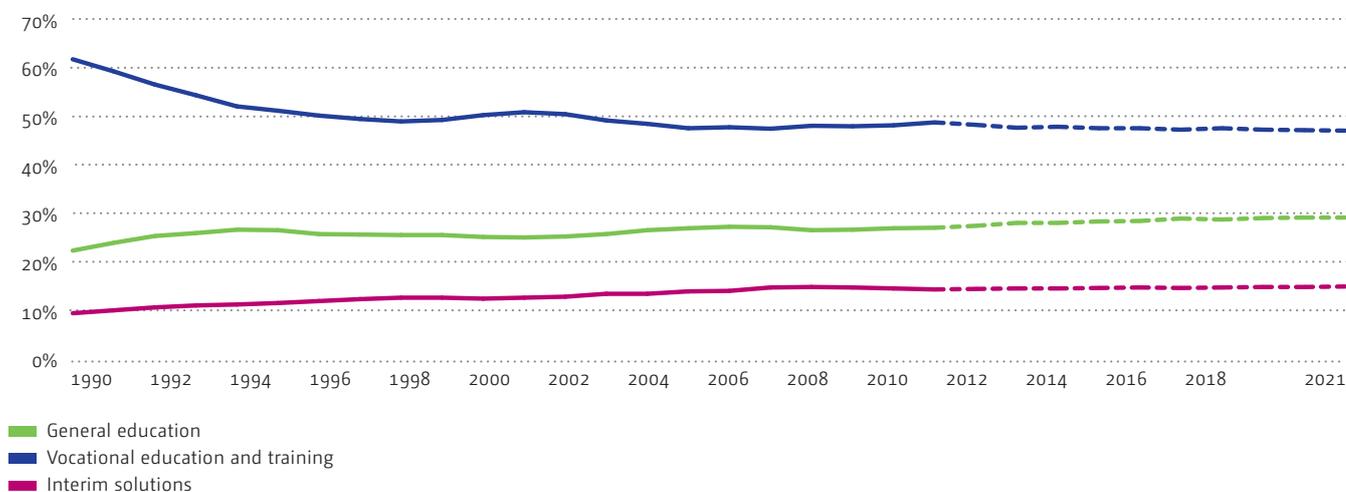
Issues affecting more than one school type

Upper-secondary education constitutes the first stage of post-compulsory education. The principal types of education offered here are vocational education and training (VET), baccalaureate schools and upper-secondary specialised schools (in order of numerical importance). This overview chapter also covers interim solutions (which are sometimes also known as transitional solutions or bridge-year courses). These are taken up by young people who do not succeed in making the direct transition (immediate transitions, → Figure 89) from compulsory education to the post-compulsory system or who have not yet been able to make up their mind as to which form of education and/or training they wish to pursue at upper-secondary level.

89 Percentages of immediate transitions into upper-secondary education and interim solutions, forecast figures for 2011 and thereafter

Proportion of pupils in the ninth school year, in lower-secondary education, beginning post-compulsory education the following year (estimated percentages)

Data: FSO



Overall, the FSO reference scenario is based on a **reduction in the number of pupils at upper-secondary level** up until 2019, followed by an increase up until 2021 (BFS, 2012g).

While the proportion of pupils moving directly from compulsory education into a general upper-secondary education or an interim solution has increased, the numbers moving into vocational education and training have fallen. The reference scenario drawn up by the Swiss Federal Statistical Office (FSO) is based on a continuation of the trend to date – in other words, a decline in the rate of direct transitions to vocational education and training and an increase in the rate of transitions to baccalaureate schools, upper-secondary specialised schools and interim solutions. The continuing high percentage of upper-secondary qualifications obtained in vocational education and training (more than 60% of the total) can be explained by a considerable subsequent intake of young people who initially started an interim solution or who have dropped out of the school types offering a general education.

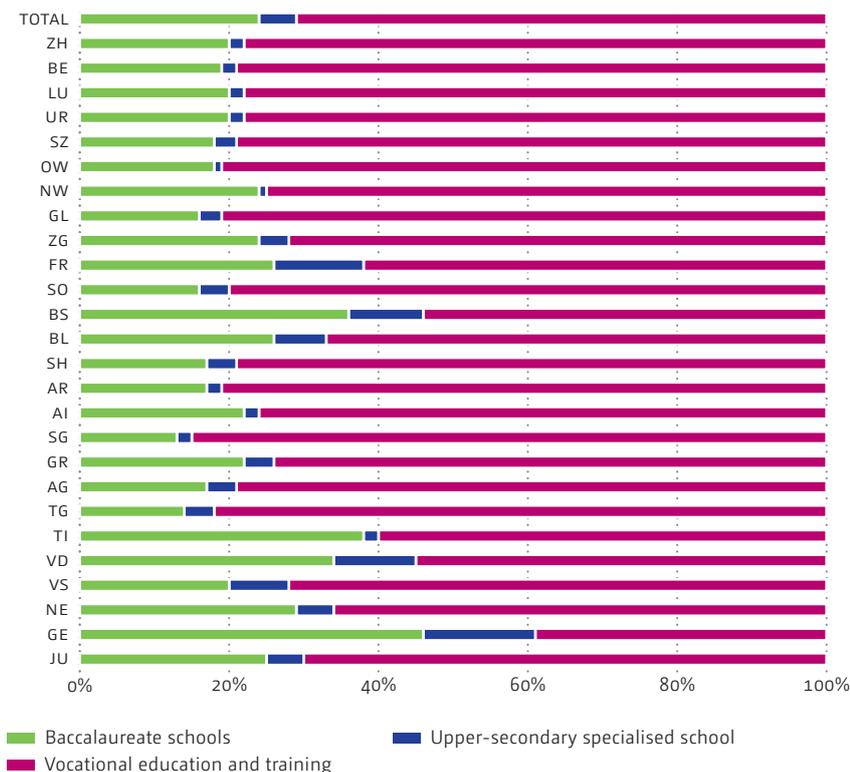
Quite apart from the relative distribution, the absolute number of pupils completing compulsory education is declining (→ *Chapter on Compulsory education, Seite 39*), and this might have an impact on the student numbers in the different school types in upper-secondary education. There are, however, huge regional differences in the demographic fluctuation. According to the FSO's reference scenario, for instance, a marked reduction is to be expected in the cantons of Thurgau and Glarus through to 2021, while this selfsame scenario assumes an increase in the cantons of Zurich, Aargau, Basel-Stadt, Vaud and Geneva, for example.

Vocational and general-educational options

Upper-secondary education follows on from the period of compulsory education and includes both general and vocational (school-based or work-based) education and training. The largest group of young people in general education attends baccalaureate schools, with the second largest group going to upper-secondary specialised schools (FMS). In Switzerland, however, a clear majority of young people in their first year after compulsory school (just on 60% in 2011) attend an work-based (dual) VET course. Taking the dual and school-based forms of VET together, these add up to as much as two-thirds of the whole. Considerable differences exist between the cantons (→ Figure 90). In French-speaking Switzerland and in Basel-Stadt the proportion of young people starting a general school is considerably higher than the Swiss mean. Geneva is the only canton where there are more young people in general education than in vocational education and training.

90 Breakdown of pupils by school type and canton¹

Data: FSO

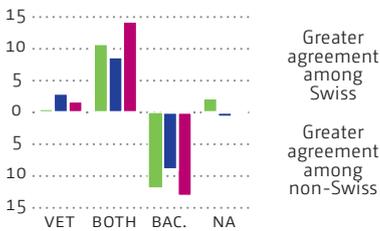


¹ The Figure shows the breakdown of students over the various school types. This data does not, however, show the number of students entering each type of school, but reflects the situation following various numbers of dropouts from the different types of education in the first year at this level, and especially early dropouts. Nor does it represent the breakdown of successful conclusions to upper-secondary education. It does not, for instance, cater for those young people who drop out of a baccalaureate school but go on to complete vocational education and training. Those cantons with high baccalaureate percentages, in particular, have proportionately more students in baccalaureate schools in the first year of upper-secondary education than those with a lower baccalaureate percentage, but they also have more dropouts (→ *Chapter on Baccalaureate schools, page 139*).

91 What educational qualification would parents like their children to obtain?

Data: representative survey (July/August 2012) of 2800 individuals carried out by the GfS, commissioned by the University of Berne

Difference in agreement indicated as percentage points



- Parents with low level of education (none or only compulsory school)
- Parents with intermediate level of education (upper-secondary)
- Parents with high level of education (tertiary)

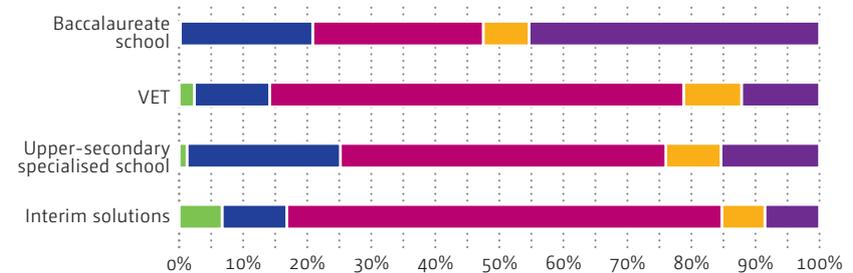
VET = vocational education and training
 BOTH = both strands regarded as possible
 BAC. = baccalaureate school
 NA = No answer or don't know

Which solution pupils aspire to after compulsory school is not simply a matter of chance. Girls and young people with a migration background have a significantly less frequent desire to take up vocational education and training than boys and young Swiss nationals (PISA 2009). These divergences in aspirations between students with and without a migration background when it comes to vocational training or full-time school-based education are also moulded by the parents. Even though the majority of parents (more than 60%) indicate, when stating their educational wishes for their children, that both vocational education and training and baccalaureate education are options for them, there is a very noticeable difference between foreign and Swiss parents when it comes to the preference for a baccalaureate school. Irrespective of their own educational background, foreign parents in Switzerland wish their children to complete their upper-secondary education with a baccalaureate qualification significantly more frequently than do Swiss nationals (→ Figure 91).

When choosing a follow-on solution from compulsory education, what is decisive, of course, is not only the pupils' own preferences or those of their parents, but also the competence level they have attained by the end of their compulsory education (→ Figure 92). Most pupils with high competences in both mathematics and the language of instruction opt for a baccalaureate education. In addition, young persons who just have competences in language often opt for education in an upper-secondary specialised school and less frequently for vocational education and training.

92 Follow-on solution broken down by PISA competence level at the end of compulsory school

Data: OECD (PISA 2009); computations: SCCRE



- Low competence level in mathematics and language of instruction
- High competence level in language of instruction
- Intermediate competence level on both scales
- High competence level in mathematics
- High competence level in mathematics and language of instruction

Completion rates in upper-secondary education

In adopting the guidelines of the «Nahtstelle» («Transition») project in 2006, the Confederation, cantons and social partners agreed on the objective that, by 2015, 95% of 25-year-olds in Switzerland should be in possession of an upper-secondary education qualification (EDK, 2006). This intention was confirmed in the joint educational policy objectives of the Confederation and cantons in 2011 (without specifying a target date).

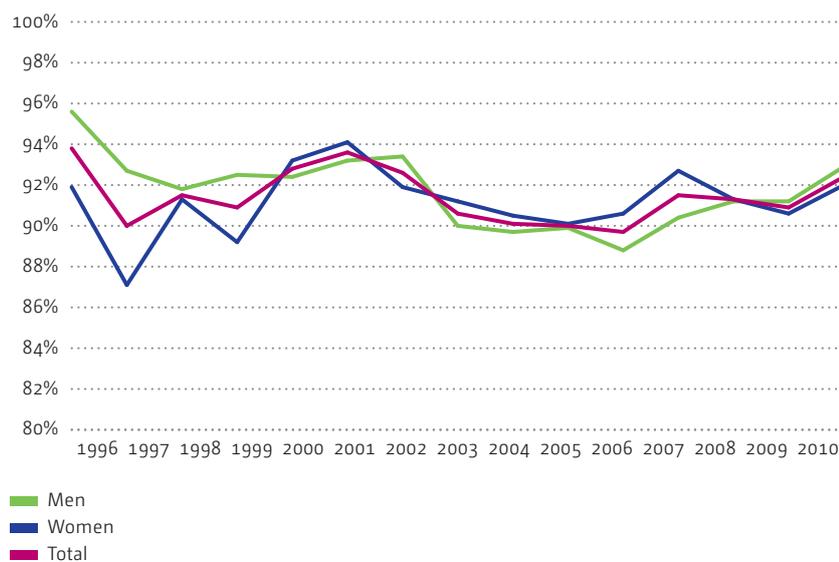
The rates for completion of upper-secondary education in 2010 stood at around 92.4%, with the rate for women being slightly below the average

(→ Figures 93 and 94). Since the mid-1990s, the percentage of individuals in possession of an upper-secondary education qualification has been between 90% and 94%. It is not possible to calculate these completion rates with a high degree of precision at present, nor is it possible to indicate them for individual cantons.

94 Upper-secondary qualifications by gender, 1996–2010, percentages

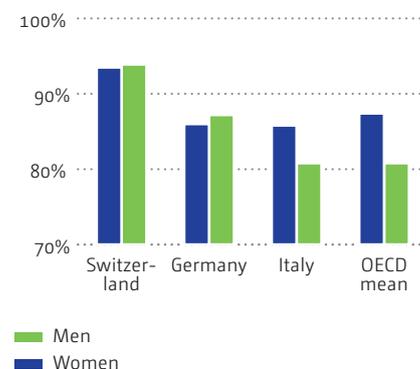
Proportion of the 18–24-year-old members of the resident population attending or having completed upper-secondary education

Data: FSO



93 International comparison of upper-secondary qualifications, 2010, percentages

Data: Eurostat

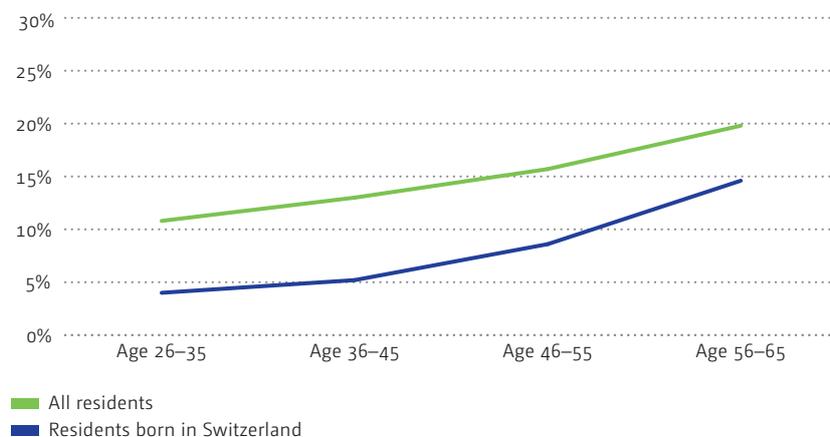


The qualification rate calculated by the FSO is arrived at by comparing the number of upper-secondary qualifications obtained with the number of young people in the age bracket within which the upper-secondary qualification should theoretically have been achieved.

Another approach to calculating the qualification rates is to take the self-declared highest educational qualification as indicated in the Swiss Labour Force Survey (SLFS). These rates can only be calculated reliably for individual age brackets. In other words, for the youngest age bracket considered here (26–35) they also include those individuals who obtained their upper-secondary qualification after the age of 26 (although this is only a relatively small proportion). Comparing the various age cohorts over the years shows that the proportion of individuals without post-compulsory education has fallen from cohort to cohort (→ Figure 95). The older cohorts, however, include many migrant workers who arrived in Switzerland before the change in immigration policy in the 1990s and who, on average, are less well qualified than the indigenous population. By concentrating solely on those who were born in Switzerland (regardless of their nationality), this effect can, indeed, be filtered out, but there is still a tendency to overestimate the percentage who hold an upper-secondary qualification, since no consideration is given to those individuals who, while not having been born in Switzerland, have spent part of their time in education, or even all of it, in Switzerland. It is, however, clear that the target rate for upper-secondary qualifications has now been met by the group of individuals born in Switzerland, with a score of 95% for the youngest cohort.

95 Proportion of the resident adult population with no post-compulsory, upper-secondary education, by geographic origin, 2011

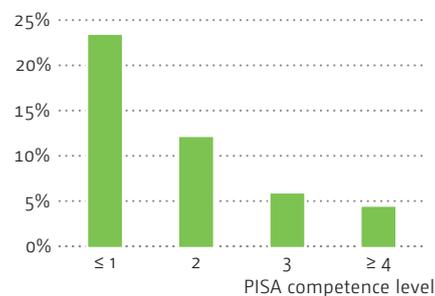
Data: FSO (SLFS)



Competences at the end of compulsory education and success in upper-secondary education

96 Proportion of 25-year-old adults with no upper-secondary qualification broken down by competence level in the 9th school year

Data: TREE; computations: SCCRE



With the exception of the 2000 PISA cohort (TREE project), it is still too early to say if there is a correlation between academic competences at the end of compulsory education and success in upper-secondary education. Of the young people belonging to this cohort, who were aged around 21 in 2006, 16% had (still) not obtained an upper-secondary qualification by that date. Moving on to 2010, when that cohort had reached the age of 25, 90% had successfully completed upper-secondary education. This cohort, which covers all young people, i.e. including those not born in Switzerland, achieves a qualification rate which is practically the same as that calculated for the population as a whole applying other statistical methods.

The competences measured in the PISA test, along with other factors, play a part in determining the risk of not having obtained an upper-secondary qualification by the age of 25. Young people with level 1 competences and below run more than twice the risk. On the other hand, of the young adults who already displayed very good competences (≥ 4) at age 15, more than 95% managed to obtain an upper-secondary qualification by the age of 25 (→ Figure 96).

Interim solutions

Interim solutions are chosen at the interface between compulsory school and upper-secondary education by individuals who do not manage a direct transition into upper-secondary education. At present, there is no uniform definition of interim solutions applicable throughout Switzerland. In most cases, their function is to improve the students' chance of obtaining a demanding education. Those young people who are in interim solutions are thus pursuing very different forms of solution for a wide variety of reasons. Interim solutions include pre-vocational school years, motivation semesters

and a 10th school year, and may even include years engaged in social service, language courses or au-pair stays (EDK/IDES, 2010).

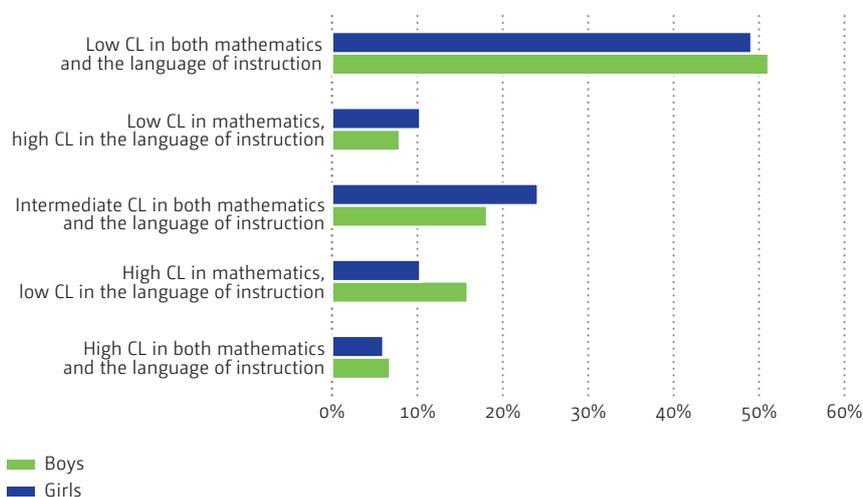
The rate of immediate transitions from compulsory school to upper-secondary education fell during the 1990s, in particular, and, since the middle of the last decade, has remained reasonably stable at around the 75% mark (→ Figure 89). Roughly 15% of students find themselves in an interim solution affiliated to the overall education system immediately after their compulsory education. These interim solutions include the 10th school year (lower-secondary education), another form of school offering a general education (for instance a non-recognised commercial college) or a pre-apprenticeship. A further 10% of young people leave the formal education system and may find themselves in informal interim solutions, such as a motivation semester or a language stay or even in gainful employment, without having undergone post-compulsory education.

The intentions announced by pupils in the 2009 PISA survey regarding the type of follow-on education that they would be pursuing after their compulsory schooling showed that around 20% of school leavers were planning an interim solution. To be precise, this group includes both those 15% that continue to be covered by the education statistics as well as some of those young people who no longer figure in the education statistics for the reasons mentioned (a number of them only for a short period of time).

If the young people are next considered in relation to their competence level (in mathematics and reading) in PISA 2009 (→ Figure 97), it emerges that approximately half the pupils with low performances in both mathematics and reading are planning an interim solution. On the other hand, young people with a good competence level in both mathematics and reading only plan an interim solution extremely rarely, with no gender difference in this respect. On the whole, more girls than boys would like to go in for an interim solution. If competence levels are considered, however, there is generally a balance between the genders, except for the case of young people with a middle-of-the-range overall competence level and those with a high performance in mathematics coupled with low competences in the language of instruction.

97 Competence level (CL) and choice of an interim solution to follow on from the 9th school year, 2009

Data: OECD (PISA 2009); computations: SCCRE



Cantonal comparison of the frequency of interim solutions

The proportion of students pursuing an interim solution varies quite considerably from canton to canton (SCCRE, 2010) both as regards the absolute level and in terms of the trend over the past ten years. In the canton of Basel-Landschaft, for instance, the figure has risen by more than 100%, while in the canton of Nidwalden it has fallen (FSO figures). At the time of writing, no explanations for these varying developments have emerged, since neither the absolute levels nor the developments over time can be explained through factors such as youth unemployment (which might indicate a shortage of apprenticeship places), the economic cycle or mean cantonal academic performances at the end of the period of compulsory education. It does, nonetheless, seem feasible to assume (particularly in the case of the 10th school year), that the use of interim solutions is partly supply-induced. In other words, they are taken up because they exist. Another factor making it more difficult to find explanations is the fact that in some instances there are big differences between the FSO figures and those produced by the cantons.

Effectiveness of interim solutions

A number of studies for Switzerland have examined whether students found a follow-on solution after their interim solution and how good their chances of success are in upper-secondary education. A study carried out in Canton Geneva shows that roughly half of those who have completed an interim solution have still not found a place in education or training a year later and that, six years after the interim solution, only 25-30% of them can show a successfully completed education (Rastoldo, Davaud, Evrard et al., 2012). Taking the TREE data for Switzerland as a whole, it can be ascertained that around 70% of those who take up an interim solution do find a follow-on solution a year later. Roughly 20% go on to a second interim solution after completing the first one.



Vocational education and training (VET)

Context

Vocational education and training (VET) is governed by exogenous factors to a greater extent than general education. Company-based VET programmes, in particular, which account for the majority of programmes, are heavily dependent on economic trends (structural change and the economic climate), since these influence the number of firms that are potentially willing to offer apprenticeships. Alongside this, the provision of vocational education and training is conditioned by demographics in the same way as for other types of education and, in the final instance, the various VET options have a reciprocal effect on upper-secondary education too, since they are, to a certain extent, targeting the same pupils as they emerge from compulsory education. This also impacts on the provision and quality of the available apprenticeships, since the prospective training companies also attempt to influence the young people's behaviour as far as they can.

Structural change

There are various facets to economic structural change, which influence multiple aspects of vocational education and training. On the one hand, individual economic sectors and occupations are subject to constant change, and quantitative shifts between the different sectors and occupations usually also bring about relatively quick shifts in the provision of apprenticeships. This rapid impact can fundamentally be regarded as positive in cases where structural changes are involved and not just swings of the economic cycle, since it avoids training more young people than the job market requires. Young people who have to abandon their original choice of career on account of these shifts are similarly protected, as this signal from the job market saves them from having to train for years for a vocational occupation which then offers few prospects. In addition to the purely quantitative shifts that come about between occupations and sectors, qualitative changes within individual occupations are also reflected relatively quickly in the qualifications required. Education ordinances (→ *Institutions*, page 120) are reformed and the content adapted to the new activities and skill requirements within an occupation.

Under certain conditions, this structural change may also impede the efficient allocation of young people to individual programmes. The danger is particularly pronounced if the economy itself is locked in an excessively slow process of structural alignment. In such a situation, young people are trained for a structure which will be subject to major changes in just a couple of years' time. Such trends can then be further intensified if the demographic situation creates an oversupply of applicants for apprenticeships, allowing even structurally weak businesses and sectors to fill their apprenticeship places and thus preserve their structures (see *Krueger & Kumar, 2004*, regarding this criticism). In the light of the current demographic situation, it can be assumed that no such danger exists at present. As far as the pace of structural change is concerned, it is not quite clear whether the structure-retaining effect of vocational education and training could perhaps be an advantage. This would be the case if it allowed certain economic activities to be maintained that would otherwise have been over-hastily relocated to other countries,

had just the requirements of those seeking training had been taken into account. A new Swiss study containing company data on innovation activities (see *Hollenstein & Stucki, 2012*) also shows that innovation and vocational education and training need not be mutually exclusive.

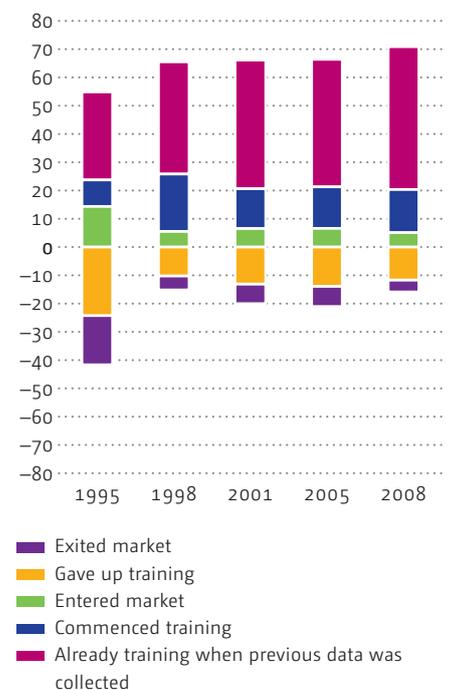
Fundamentally, it can be said that the potentially negative consequences of structural change for workers with a vocational education also depend to a decisive extent on how far their skills are specific to an individual occupation and how many of the skills acquired during their vocational education and training could also be deployed in other occupations. It may be difficult to provide an empirical answer to this question, but research shows that, in the case of a change of occupation at short notice, the majority of skills are also transferable to other occupations following an apprenticeship (*Müller & Schweri, 2009*, or *Pfeifer, Schönfeld, Wenzelmann, 2011*).

Finally, mention must also be made of the structural change in the company landscape in terms of the number and size of firms and their degree of specialisation. An increasing division of labour between firms, a greater trend towards self-employment or small enterprises, and other factors too, can lead to a marked change in the number of companies suitable for providing an apprenticeship. This can then have an adverse affect on the willingness of certain sectors or occupations to train apprentices. In their analysis of companies' readiness to offer apprenticeships, which they conducted on the basis of the business census, *Müller and Schweri (2012)* find that the decline in the training rate from 23% (1985) to 18.4% (2008) can be partly ascribed to strong growth in the number of very small businesses over this same period. A major demographic change in the company landscape (large numbers of new start-ups and large numbers of bankruptcies) also has a slight detrimental impact on the readiness to train apprentices. The big training rate differential between newly established companies, which have a rate of only 6.5% during the first four years, and companies that have been in existence for more than ten years, which notch up 23.8%, can only be partly ascribed to the age of the company. In most cases, other factors come into play. There are also a fair proportion of businesses that switch in and out of training apprentices (→ Figure 98). In other words, contrary to frequent conjecture, when the company landscape is viewed over time, it does not divide up on a stable basis into businesses that provide apprenticeships and those that do not.

The geographic location of companies can also have a negative impact on their willingness to offer apprenticeships, such as where there are a large number of firms engaged in identical economic activities over a limited geographical area. While this clustering may be economically advantageous and may offer qualified workers the opportunity to put their skills to use with various employers, it does increase the risk for companies interested in training apprentices of «losing» their investment when people they have trained at great expense are enticed away. In such regions, a negative influence on the readiness to offer apprenticeships can be seen in those occupations which tend to incur net costs on average for the business offering the apprenticeship (see *Mühlemann & Wolter, 2011*).

98 Training companies over time, 1985–2008

Initial pool of training companies 1985:
72,744 companies; changes always by
comparison with the previous data collected
Source: *Müller & Schweri, 2012*



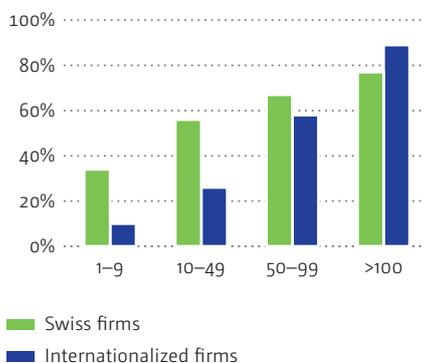
Example: In 1995, 55,000 businesses offered apprenticeships, corresponding to a reduction of 18,000 businesses compared with 1985. Of the firms offering apprenticeships in 1985, however, 40,000 had disappeared from the apprenticeship programme either because they had left the market or had given up training apprentices. A little over half of these withdrawals had been replaced with newly established firms, or firms that were not previously engaged in training.

Probability of foreign firms in Switzerland offering apprenticeships

An analysis of the willingness of Swiss firms and foreign firms in Switzerland to offer apprenticeships (see *Mühlemann, 2013*) shows that the readiness only differs for companies with fewer than 50 employees (→ Figure 99), that there is no difference in the extent of apprenticeships offered by the companies and that in the event of a change of ownership there is not generally any discernible change in the apprenticeship strategy over the short term.

99 Training rates for Swiss and internationalized firms in Switzerland by size of firm, 2009

Source: *Mühlemann, 2013*



Economy and demography

As *Mühlemann, Wolter and Wüest (2009)* have already established in their empirical analysis of available apprenticeships, demographic change, and hence the number of prospective apprentices in Switzerland, has a much greater impact on the number of apprenticeship places than the economic climate. Contrary to the case in other countries, the impact of the economic climate is cushioned in Switzerland by the fact that apprenticeship places are available in almost every sector of the economy, and hence cyclical shocks in one sector can be partly offset by additional places in other sectors. During the most recent economic recession (2008–2009), two factors cushioned effects on the apprenticeship market. Firstly, the number of pupils in the cohorts leaving school was falling and, secondly, the increased demand for health care apprentices compensated for the loss of places in industry, with its more pronounced export orientation. If nothing else, these are the reasons why no greater imbalance came about in the apprenticeship market during the last recession. The number of newly concluded apprenticeship contracts fell by only 2.8% in 2009 and rose again by 2.3% the following year.

Globalisation

Another form of structural change is the internationalisation of the company landscape as a consequence of economic globalisation. As most companies acquiring Swiss firms in Switzerland or establishing a subsidiary here come from countries that do not have a big tradition of company-based vocational education and training (VET), it is necessary to examine whether this form of structural change has a negative impact on the companies' readiness to offer apprenticeships. Current analyses show that, even though small foreign companies are primarily established in sectors in which Swiss companies also have a low training rate, there is nonetheless a significant difference compared with Swiss firms in their willingness to offer apprenticeships (→ Figure 99). Where bigger companies are concerned there is no difference between foreign and Swiss firms in respect of corporate qualification structure and the readiness to take on apprentices. This is probably due to the fact that companies with high recruitment requirements are not in a position to bypass a country's education and training structure, since it would be difficult to find the requisite employees on the domestic job market, and a massive recruitment drive conducted solely abroad would quickly become very expensive. Other studies are now required in order to show whether smaller foreign companies differ from Swiss firms in their inclination to provide training on account of the fact that their work requires fewer people with a VET background, or whether this reveals a different attitude to vocational education and training.

Relationship to the general education sector

At times when pupil numbers are declining for demographic reasons, competition between general education and VET options becomes tougher. Even if the Federal Statistical Office (FSO) is assuming a moderate rise in the baccalaureate quota in its forecasts (→ *Chapter on Upper-secondary education,*

page 105), it is not possible to conclude from this that the rivalry has been eliminated, since average values mask the fact that this competition only prevails within a highly specific section of the skills range for those completing their compulsory schooling. It is only where pupils have the skills to transfer to a baccalaureate school or an upper-secondary specialised school that they are required to decide for or against vocational training. Taking the transitions to upper-secondary level for the TREE cohort (pupils who were tested in PISA 2000), the performance of 15-year-olds in maths shows that the test performance of the top 25% of pupils entering the highest three categories of dual-track VET programme (→ *Information text on the right*) was above the average for the young people entering a baccalaureate school. (The results for the test language convey a similar picture.) In other words, in these three categories of occupation, the companies offering apprenticeships have attracted at least a quarter of apprentices with qualifications above the average for pupils attending baccalaureate school. In addition, more than a quarter of baccalaureate school pupils had mathematical knowledge below the median of that for apprentices in the top three occupation categories (→ Figure 100).

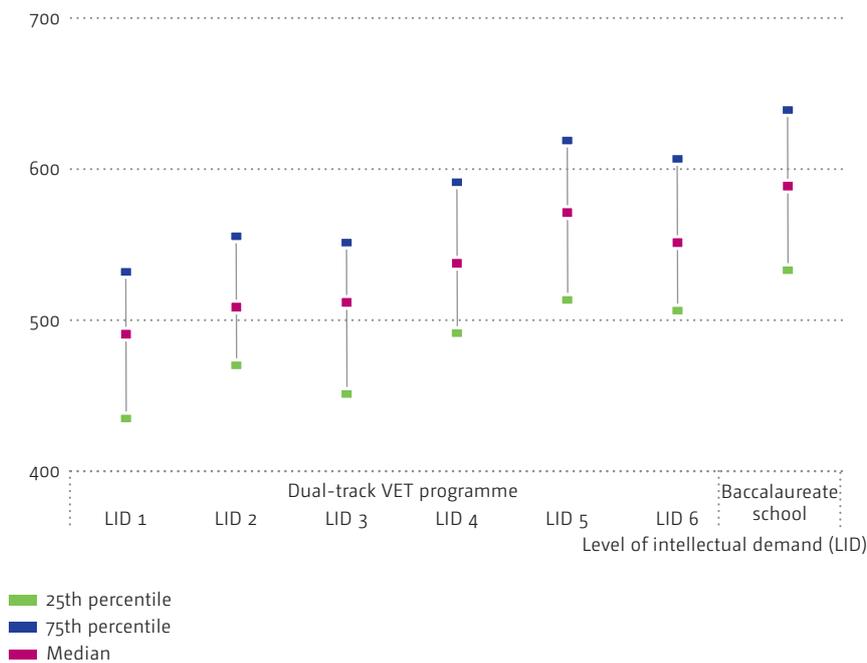
Dual-track VET programme requirements

Figure 100 divides occupations into six categories as adopted by *Stalder (2011)*. The occupations are categorised according to the intellectual demands deemed to be necessary for successful completion of the apprenticeship. Examples of occupations at the top three levels are electronics engineer or commercial employee (Level 6), optometrist and medical laboratory technician (Level 5) and car mechanic and nursery nurse (Level 4).

100 PISA points in mathematics and upper-secondary education

Data: TREE; computations: B. Müller

PISA 2000 mathematics points



The marked overlap between the skill requirements for general education and those for a number of VET occupations is an indication that there may be problems associated with re-orientating these pupils as far as both types of education are concerned. The August 2012 apprenticeship barometer indicated the intensified competition, reporting 7,000 unfilled apprenticeships, corresponding to 8% of the available apprenticeships, and also showed that vacancies were predominantly in Level 4–6 technical apprenticeships, with 60% of firms stating that the main reason for places not being filled was that they had received no suitable applications. Another 25% even reported not having received any applications at all.

While occupations with lower requirements in terms of academic ability might not be in direct competition with the general education sector, the situation prevailing there is largely determined by the success of the companies in the first three categories. If these first three categories are not very successful in finding apprentices, they will try and attract at least some of the pupils who would previously have opted for the occupations with a lower requirement profile and thus simply pass on a (large) part of the pressure of competition.

Institutions

The Confederation, the cantons and the professional organisations cooperate in running VET in Switzerland. Central, national management by the Confederation takes account of the fact that vocational and professional education and training is intended to train young people who will then be mobile throughout the Swiss job market (and, wherever possible, beyond it) and who are therefore dependent on the greatest possible degree of standardisation in their qualifications. The Confederation furthermore is attentive to efficiency, because devising, piloting and implementing educational ordinances for 230 types of apprenticeship (Federal Vocational Diploma and Federal Vocational Certificate) is highly cost-intensive, and hence regional or cantonal concepts would soon reach their limits. Cantonal implementation not only guarantees alignment to the regional job markets (sectors, occupations, etc.), but is also decisive for interaction with compulsory education and the other types of upper-secondary education, as well as with the job market and social services (→ *Vocational and professional education and training case management, page 121*), since it would be impossible for work of this type to be centrally managed and organised. As far as the influence exerted by professional organisations is concerned, this is comparatively high in Switzerland by international comparison (see *OECD, 2010*) and, at the same time, is more standardised than in countries where it is primarily the individual employers who carry great weight. The Swiss solution guarantees, on the one hand, a high match between learning content and the skills required on the job market and, on the other hand, a high mobility of trainees on the job market. This is achieved by the «organised» channelling of the employers' influence, rather than by having companies influence the learning content individually. Both these factors are similarly decisive for the appeal of company-based VET programmes for those completing their compulsory education.

In recent years, the further development of vocational education and training at the institutional level has been concentrated on the outer boundary of the skill spectrum. This has included increased efforts to integrate academically weaker learners into VET (→ *Vocational and professional education and training case management, page 121*, and *Two-year federal vocational education and training certificate undergoing further expansion, page 122*), making it easier for people without post-compulsory qualifications to obtain a qualification by validating the skills they have acquired non-formally or informally (validation of educational achievements → *Efficiency/costs, page 131*), and also creating attractive options for highly talented

students (→ *Federal Vocational Baccalaureate – economic climate and gender, page 130*). In addition, reforms of the existing educational ordinances are being implemented at a hitherto unseen pace, not least as a consequence of the implementation of the new Federal Vocational and Professional Education and Training Act (2002). These reforms are, however, also necessary in order to ensure that learning content is commensurate with job market requirements and maintains the attractiveness of vocational education and training for potential training companies and learners. At the same time, the reforms are required in order to ensure the smoothest possible transition at the second threshold, i.e. the move from apprenticeship to the job market.

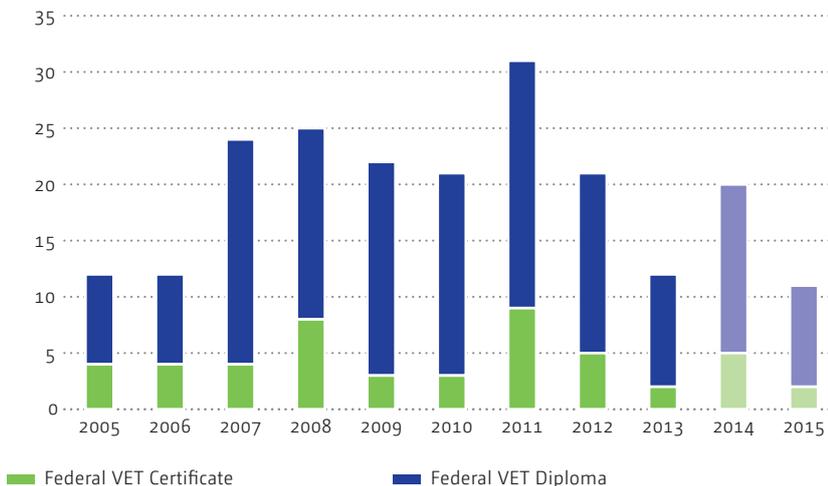
Rapid pace of educational ordinance reform

Since 2005, an average of 20 new or reformed educational ordinances have come into force each year (→ Figure 101), and the last reformed ordinances should be in force by 2015. Both the professional organisations, who determine the content, and the cantons, responsible for implementation, have put a great deal of work into these reforms, which are designed to ensure that the vocational ordinances satisfy the statutory requirements and also that they can be adapted to the changing demands placed on programmes more rapidly and easily. These major reform activities of the past ten years should thus also represent an investment in vocational education and training, which can then be adapted more flexibly and swiftly to radical economic and technical changes and thus to the job profiles.

101 Number of new educational ordinances that have come into force since 2005

Planned from 2014

Data: SERI



Vocational and professional education and training case management

The «Vocational and Professional Education and Training Case Management» project marks an attempt by the various state players (schools, employment offices, social security departments, educational administration, etc.) to better coordinate their tools and procedures for integrating young people in post-compulsory programmes leading on to certified qualifications. They

also wish to ensure that their tools and procedures can be deployed more effectively and efficiently. The philosophy underlying the case management project is that the activities are to be focused on those young people whose transfer to upper-secondary education is jeopardised. This transfer will not then be planned or dealt with primarily from the viewpoint of just a single government authority. The Confederation has promoted the introduction of case management in the individual cantons through a subsidy of 20 million Swiss francs (2008–2011), while responsibility for implementing and operating the case management system rests solely with the cantons. An initial assessment, however, has revealed that the system is being implemented and run in a highly heterogeneous manner – and not always in keeping with the objectives (*Landert, 2011*). The results of the efficiency evaluations conducted of case management to date (in just a few cantons) are difficult to assess. This is because the evaluations do not generally include a counterfactual situation as a benchmark, i.e. it is not known what would have happened to the young people if they had not been included in the case management system.

Two-year federal vocational education and training certificate undergoing further expansion

In addition to new programmes, the two-year vocational education and training certificate has partly superseded the previous one or two-year uncertified apprenticeships and the previous two-year federal VET diploma courses through a form of qualification which not only facilitates entry to the job market, but is also intended to make it easier for people to gain a follow-on qualification in a three or four-year federal VET diploma course. The number of occupations that can be learnt with two years of VET (42 occupations as of February 2013) is continuing to grow and, with it, the number of newly concluded apprenticeship contracts. The apprenticeship contract figures also clearly show that the two-year VET certificate has done more than just supersede the uncertified apprenticeships. While there were 4,700 apprentices in uncertified apprenticeships in 2004 prior to the introduction of the two-year VET certificate, a total of 8,650 two-year VET certificate apprenticeship contracts had been concluded in 2010/2011, and a further 2,000 uncertified apprenticeships were running alongside these. In terms of the expectations placed on the introduction of the two-year VET certificate, the growth in the number of two-year VET certificate programmes can, however, only be ascribed in part to the better inclusion of young people who are now able to join a certificated programme after their post-compulsory education thanks to the availability of the two-year VET certificate. The growth is also largely due to reorienting young people away from the previous two-year federal VET diploma to the federal VET certificate. Initial evaluations of federal VET certificates (*SCCRE, 2010*) have already shown this to be the case in the composition of apprentices. These evaluations revealed that the apprentices corresponded more to the profile of federal VET diploma apprentices than to the uncertified apprenticeships profile, even though the proportion of foreign apprentices in federal VET certificate programmes is more than twice as high as in federal VET diploma programmes (see *Stern, Marti, von Stokar et al., 2010*, for example).

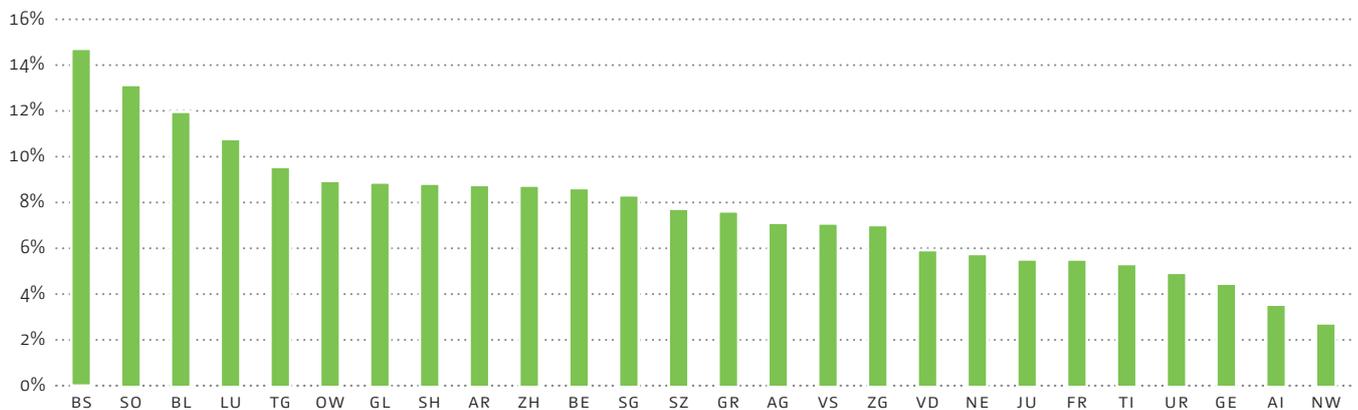
In 2011, the success rate for federal VET certificate examinations was a little over 94% and thus slightly above the success rate for federal VET di-

ploma examinations (91%).¹ Figures from an evaluation in Zurich (*Kammermann & Hättich, 2010*) and from Geneva (*Davaux & Rastoldo, 2012*) show that a good quarter of those who obtain a federal VET certificate follow this up with a federal VET diploma course, while this was the case for only 10% of those who completed an uncertified apprenticeship in Zurich. Due to a lack of data, it is not yet possible to say whether these transition rates also apply to the rest of Switzerland. On average, initial evaluations also reveal better job market prospects for holders of a federal VET certificate than for those who have completed an uncertified apprenticeship (see *Kammermann, 2010*).

As far as the further spread of the federal VET certificate is concerned, the marked differences between the cantons remain striking; the values range from less than 3% of all new apprenticeship contracts (2011) to almost 15% (→ Figure 102) and cannot be easily explained by either the spread of VET or other factors (cf. also *Stern, Marti, von Stokar et al., 2010*).

102 **Proportion of new Federal VET Certificate apprenticeships to new Federal VET Diploma apprenticeships, 2011**

Data: FSO



Viewed from the perspective of the companies, it appears (see *Fuhrer & Schweri, 2010*) that an average training company can derive a net benefit from providing training leading to a federal VET certificate too, although here again, as with the three or four-year training period required for a VET diploma, there are big differences between the individual occupations. The cost-benefit study also finds a significant influence on the gross costs of training, however, in cases where the company had problems finding a suitable applicant. This indicates that there are economically-based limits to the integration of academically very weak pupils into a federal VET certificate programme.

Reform of the Federal Vocational Baccalaureate Ordinance

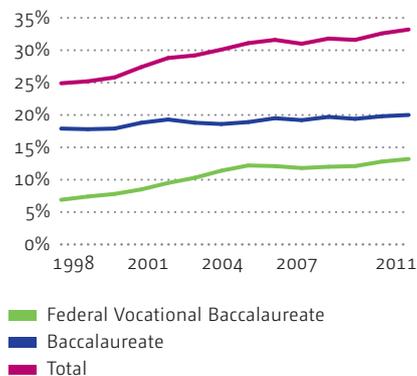
The Federal Vocational Baccalaureate, which entitles students to continue on to a university of applied sciences without sitting an examination (and

¹ This does not, however, take into consideration drop-outs before the final examination.

75% of the overall growth of the baccalaureate rate in Switzerland is due to the Federal Vocational Baccalaureate.

103 Baccalaureate rates, 1998–2011

Data: FSO



which can also give them access to a conventional university if they take the «Federal Vocational Baccalaureate – University» examination, also known as the «University Aptitude Test») can be obtained either on a part-time basis, i.e. during the apprenticeship, or during an additional year of schooling after completion of the apprenticeship. It is always acquired in addition to the VET qualification. The federal vocational baccalaureate provides for a minimum of 1,440 lessons on a part-time basis, which corresponds to roughly 36% of the average number of lessons at a Swiss baccalaureate school.² The Federal Vocational Baccalaureate Ordinance underwent a complete overhaul as per 1 August 2009, and the first cohorts to be trained according to the new ordinance will start in summer 2015. The revised framework curriculum provides for five specialisations, which take their titles from the fields of study at the universities of applied sciences, with similar requirements in terms of ability to study. The intention is that interdisciplinary work should also be promoted in addition to developing specialist skills (→ *Effectiveness*, page 125).

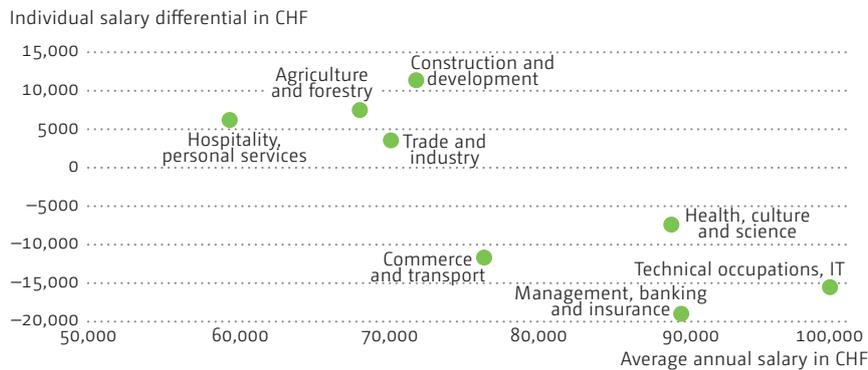
Teacher recruitment

In the same way as the trade and professional organisations in Switzerland play a much bigger role in shaping vocational training than in other countries, Switzerland also has its own specific approach to vocational schools and their practical orientation. Unlike teacher training in other countries that provide VET and PET, Switzerland requires prospective vocational teachers to have received a formal education in the occupation that they will be teaching and, together with this, to have a certain measure of experience on the job (since it is mainly tertiary level B professional education and training that is involved here). Teachers for VET/PET courses thus join the vocational schools as a second career after working in their trade or profession for several years. This ensures that the teachers who are training the next generation of skilled personnel have sound vocational and professional experience in the occupation that they are teaching. This institutional peculiarity in the recruitment of teaching staff naturally raises the question as to what kind of people, aged 40 on average, are prepared to move from the trade or profession they have been practising into teaching? Are they average specialist workers or professionals, people with above-average talents, or rather gainfully employed people who have been unsuccessful in their trade or profession and are now retraining?

² As far as VET is concerned, however, it must be borne in mind that between 1,400 and 2,000 or more vocational school lessons must be added to this, depending on the particular apprenticeship, plus an unknown number of hours of company and inter-company tuition.

104 Salary differential in former occupation compared to employees who have not switched to teaching as an occupation, by sector

Source: Hof, Strupler & Wolter, 2011



An analysis of those studying at the Swiss Federal Institute for Vocational Education and Training (see Hof, Strupler & Wolter, 2011) shows that a prospective teacher from a sector which had an average wage of below 75,000 Swiss francs per annum had earned more, on average, in his or her occupation than colleagues. If the prospective teacher came from a sector with a higher wage level, they earned less on average than their colleagues in their old occupation. The analysis thus shows that, in view of the fact that teachers all earn the same irrespective of their former occupation, the prospects of attracting gainfully employed people into teaching is also governed by wage levels in the sector they come from.

Effectiveness

It is necessary to view the effectiveness of vocational education and training at both a systemic and an individual level. At a systemic level the question arises as to whether vocational and professional education and training contribute more to a country's social and economic development than other forms of education and training. A conclusive decision cannot be taken on this at the moment, since this is not a question that can simply be answered with yes or no (→ *Information text on the right*). Systems that offer the best mix of education programmes probably attain the greatest effectiveness, since they cover the abilities and inclinations of those seeking education as well as the requirements of the economy as a whole, plus the needs of individual firms.³ What currently distinguishes Switzerland from many other countries is the fact that pupils finishing their compulsory schooling actually have a choice of different educational formats to match their abilities, and that these educational options are all of a similar quality with regard to the specific objectives they pursue.

VET or general education: a natural experiment

There has only been one previous academic study (whose transferability to other countries may be limited) which allows a causal relative comparison of an «either-or» situation. Malamud and Pop-Eleches (2010) examined the impact of the complete abolition of VET in Romania and its replacement with general education in 1973. They found that people who had received pre-reform VET were just as successful economically as people with a general education post-reform, even at a time of rapid technological change in the post-Communist era.

³ The optimum mix of education formats also influences the productivity and innovativeness of individual firms and not just those of the global economy (see, for example, Parrota, Pozzoli, Pytlikova, 2012).

The question of effectiveness also arises at the individual level in respect of whether vocational education and training corresponds to an individual's inclinations, preferences and abilities by comparison to other forms of education and training. It is also necessary to establish whether the skills learned can be optimally exploited in terms of work, wages and satisfaction, etc.

Desired apprenticeship

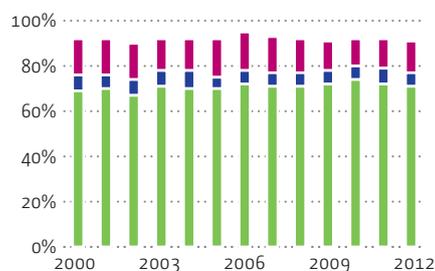
Desired apprenticeship – constant number over time

The satisfaction of young people who embark on VET after compulsory schooling remains practically unchanged over time. A very small number (approx. 6%) have not found their desired occupation, and roughly twice as many would have preferred another form of education or training. The majority, however – consistently between 70% and 75% – have found their desired apprenticeship.

Particularly in the case of an education system that requires young people to take far-reaching educational decisions at a very early age, the question arises as to whether the young people themselves are satisfied with their choice, or whether the education system forces them into programmes that do not correspond to their preferences. The apprenticeship barometer analyses this question on a recurring basis, and testifies to the fact that vocational education and training is quite effective in offering educational programmes that meet the young people's preferences. Young people in vocational education and training are seen to be the most satisfied by comparison with young people in other forms of education and training, and with those who have failed to make a direct transition to post-compulsory education (→ Figure 106).

105 Satisfaction with choice of apprenticeship: evaluation by young people

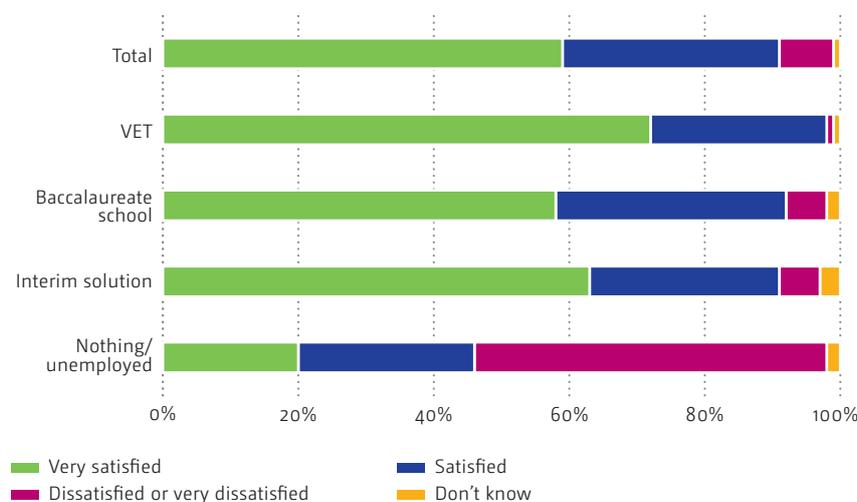
Data: OPET (Apprenticeship barometer as of 31 August for different cohorts), LINK



■ Desired profession
■ 2nd choice occupation
■ Apprenticeship as 2nd choice
■ Dissatisfied or very dissatisfied

106 Satisfaction at end of compulsory schooling depending on follow-on solution, 2012

Data: OPET (Apprenticeship barometer, August 2012), LINK



The apprentices' satisfaction with the apprenticeship they have found is also stable over time and remains at a high level (→ Figure 105). As in previous years, there is a strong (positive) correlation between regional differences and the spread of company-based VET.

Productivity during an apprenticeship

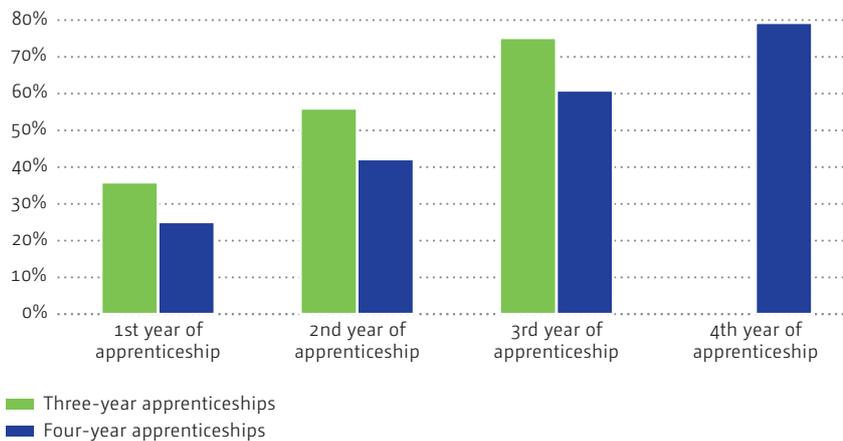
There is no known objective and universally valid means of measuring the effectiveness of vocational education and training. It also cannot be measured as easily as effectiveness at the end of compulsory education by employing tests like PISA. This is because the skills that need to be acquired

differ too greatly from one apprenticeship to another and hence separate measurements would be required for each vocation (see *Winter & Achtenhagen, 2009*). Learning success can therefore only be measured either indirectly, such as via success on the job market, or subjectively by means of expert assessments. These expert assessments ultimately constitute the grades for the final apprenticeship examinations.

While there is a relatively high level of standardisation in VET and PET when it comes to assessments within the individual occupations, assessments of this type cannot be readily compared across different occupations. Another form of expert assessment involves those responsible for training evaluating the productivity of apprentices in the individual years of their apprenticeship in relation to workers who have already received their training. Although these assessments are likewise individual, and therefore subjective, they can be compared across a particularly wide range of occupations, as they have a comparable reference parameter. This relative productivity, which expresses both selection in VET and the skills acquired during the training period, was measured in three cost/benefit studies conducted in Switzerland in 2000, 2004, and 2009. Productivity has remained stable over the years, always reaching 75% of the productivity of a trained worker midway through the final year of the apprenticeship. The fact that apprentices always attain a comparable productivity in the final year of their apprenticeship, regardless of the vocation and the duration of the apprenticeship, shows the efficiency with which the duration of the apprenticeships is determined (→ Figure 108).

108 **Relative productivity of apprentices per year and duration of apprenticeship, 2009**

Source: *Strupler & Wolter, 2012*



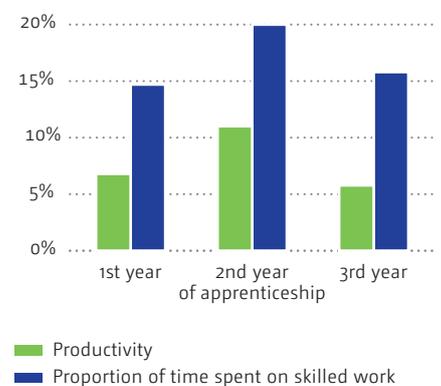
Assessing the learning outcomes of the general education provided at vocational schools is more difficult, even though this evaluation is doubtless channelled to some extent (but only to some extent) into the productivity assessment conducted by the person responsible for training. The fact that major scope for improvement exists in some places is borne out by the evaluation of commercial apprentices' (Profile E) knowledge of foreign languages shortly before the final apprenticeship examination (→ Figure 109).

Can work increase skills?

There is no easy answer to the question of whether working in a company promotes the acquisition of skills. What is decisive here is whether apprentices are replacing skilled or unskilled workers in the work they do. A study which investigated the effect of the German labour market reform on companies' attitude to training provides an indication of the positive impact of work on skills acquisition. Since the reform obliged companies to involve apprentices in the company's production process to a greater extent, periods spent training were replaced by periods spent working. A comparison of the trend in the productivity of German apprentices over time (2000–2007) shows clear increases in skills in all the individual years of an apprenticeship. A comparison with the productivity of Swiss apprentices (who served as a control group, because the framework conditions in Switzerland did not change over this period of time), shows that the Swiss values were matched in 2007 (→ Figure 107).

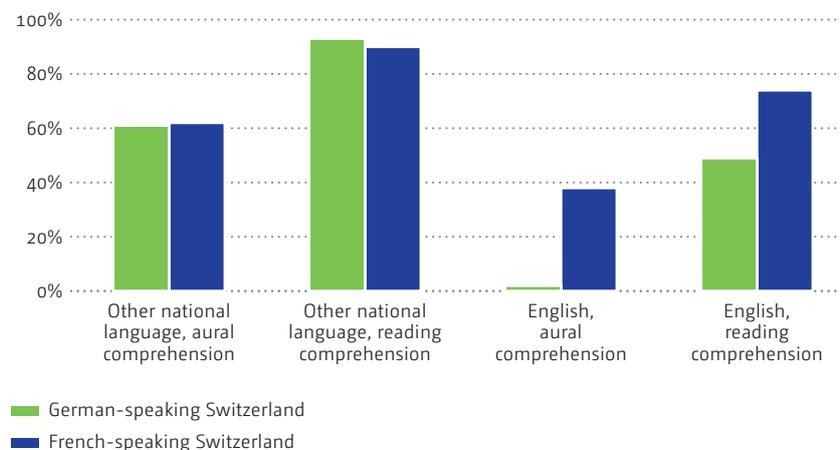
107 **Increases in productivity of German apprentices relative to Swiss apprentices and relative changes in proportion of time spent on skilled work in percentage points, 2000–2007**

Source: *Jansen, Strupler Leiser, Wenzelmann et al., 2012*



109 Proportion of students not achieving minimum targets in knowledge of foreign languages shortly before the final apprenticeship examination

Source: Péquignot & Balzer, 2011



One option for making foreign language teaching more efficient would be to make greater use of exchange programmes with other linguistic regions in Switzerland. According to the evaluation by *Landert and Panchaud (2013)*, only 11% of VET trainers in the training companies would be against such exchanges. At the same time, however, this evaluation also shows that only a few companies exploit such opportunities at present. It is precisely small enterprises that consider another national language to be important for apprentices, but attach less importance to a knowledge of foreign languages for their own company's competitiveness due to its local orientation. At the other end of the company spectrum, there are a number of companies with branches abroad that are already offering international exchange programmes for apprentices.

Successful completion of apprenticeship

Passing the examination at the end of the apprenticeship is a necessary, even if, in itself, insufficient condition for a successful and hence effective apprenticeship. Despite the fact that some apprentices drop out during the programme, the final examination failure rate is relatively high, at around 10%, with differences between the individual language regions. This does not, however, mean that this 10% never completes an apprenticeship, because some of them try again after a further year of apprenticeship. The failure rates also differ according to occupation, and there are big differences between the cantons. The strong, negative correlation between the success rate and the baccalaureate rate (taken as representative of the entire general education section of the cantonal education system, → Figure 110) can, however, be interpreted as showing that the failure rates for the final apprenticeship examinations indicate a uniform standard throughout Switzerland for the final examinations.

The PISA data has shown that the average performance of pupils who take up an apprenticeship differs greatly between the cantons – as a function of the proportion of young people who choose a general education option. If it is further assumed that apprentices receive equal support everywhere as a function of their abilities, and that their skills thus develop in proportion to

their initial skills on average, then, if there were to be a standardised Swiss final examination for each occupation, the success rate could also be expected to be (positively) influenced still by the young people's average skills upon commencing the apprenticeship.

Job market success following an apprenticeship

Assessing success on the job market after an apprenticeship is not easy, since it would be necessary to consider a person's entire professional career after they had completed their apprenticeship. Comparing younger employees with employees nearing retirement, however, only makes sense if different age cohorts, who undertook their education and training at completely different times, are truly comparable. A cross-section today would thus compare a generation embarking on their careers, for example, with people from a period in which there existed neither a federal vocational baccalaureate nor universities of applied sciences.

It must also be borne in mind that an assessment of the job market success of a VET qualification not only has to be undertaken in absolute terms, but above all in relation to other options (no education or a general education option). As soon as relative comparisons are made, however, it must be borne in mind that people with different talents and abilities choose different education and training options, and simple comparisons thus have little information value if no correction is made for this selection. This is also the main reason for the relatively small amount of literature on the topic (cf. *Wolter & Ryan, 2011*).

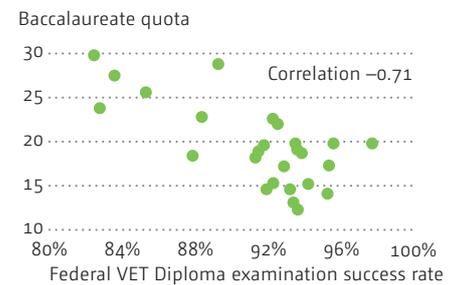
From the available evidence it can be concluded today that people with a vocational education have an advantage when starting out on the job market. During their first few years of work, they are well placed with regard to their employment rate and income relative to other types of education and training. In the final decade of employment, the picture mostly shifts in favour of people with general education qualifications. Even if it is not entirely clear whether and to what extent this latter difference can really be ascribed to the original choice of education and training and is not a consequence of an industry or occupation-specific effect, it must also be considered that different investments in CET are also made in the thirty years after completion of formal education (→ *Chapter on Continuing education and training (CET), page 259*). The longer-term job market success of employees with VET must therefore be considered, above all, in terms of both mobility towards tertiary qualifications (universities of applied sciences and tertiary level B professional education and training), and integration into life-long learning.

Unrestricted occupational mobility

A person's longer-term success in the job market is also determined to a decisive extent by whether that person is in a position to respond to economic and technological shifts by changing occupations. In Switzerland, 2.3% of employees (see *Eymann, Müller & Schweri, 2011*) change jobs within a given year, and 5.3% change company without changing occupation. Critics of vocational and professional education and training repeatedly complain that, unlike people with a tertiary qualification, those with VET/PET qualifica-

110 Success rate for final apprenticeship examinations by canton, 2011, and baccalaureate quotas, 2009

Data: FSO; computations: SCCRE



As there is an absence of longitudinal data, the **probability of a change of occupation during a lifetime's employment** can only be poorly approximated. If the annual 2.3% rate for change of occupation was proportionally distributed across all employees, an employee would change their occupation a little less frequently than once in their lifetime. It is, however, more likely that some people will change occupation several times, whilst others will remain in the same occupation for the whole of their gainful employment. Even taking a uniform distribution and assuming that people remain in each occupation they exercise for the same length of time, the average individual duration in an occupation would still be more than 20 years. The challenges for education lie in the fact that most employees are trained in an initial occupation which they will be working in for a long period of time. On the other hand, skills must be conveyed in both the initial education and CET which will permit employees to voluntarily or involuntarily change occupation, even after the age of 40.

tions are not in a position to cope with a change of occupation. It has been difficult to prove this reproach to date and it also cannot be readily refuted, since the data that would be required for an investigation is lacking. In order to assess this issue, it would be necessary to have a means of accurately distinguishing between cases of forced and voluntary mobility, for example. In other words, the question arises as to whether people are immobile because they lack the skills that would allow them to move to other occupations or companies (forced immobility), or whether mobile people are mobile because, due to unsuitable skills, they have not been able to find a job that corresponds to the occupation they originally learned (forced mobility).

With regard to job changes, it can be stated without further analysis of the reasons for mobility that people with a university education change professions more frequently in life than those who have pursued company-based VET, and that people with a tertiary level education (general and PET) change company more frequently than any others (*Eymann, Müller & Schweri, 2011*). To establish whether these were voluntary or forced changes of occupation, it would be necessary to analyse the higher number of occupational changes by university graduates in greater depth.

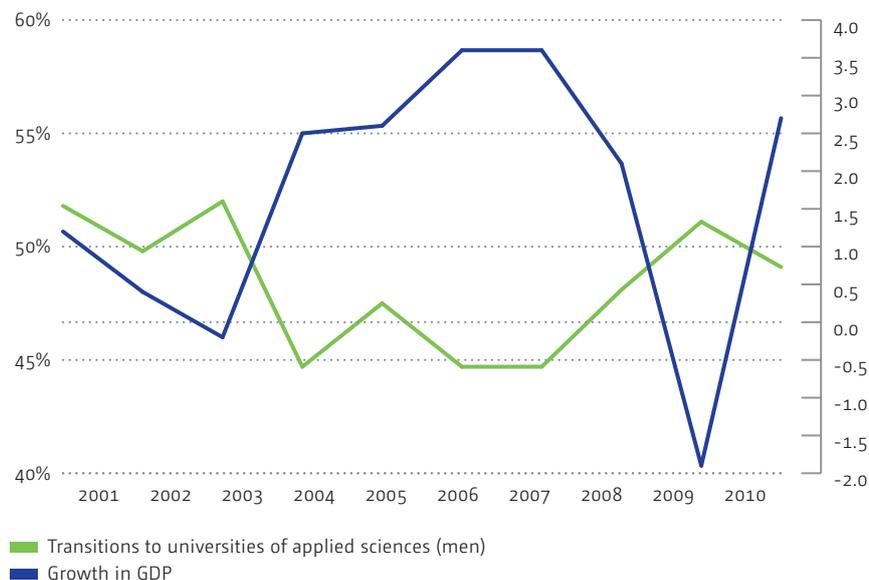
Viewed over the short term, the high number of students who change company after their apprenticeship (more than 50% according to the TREE data) must be rated as a sign that VET does not inhibit mobility between companies.

Federal Vocational Baccalaureate – economic climate and gender

For holders of a federal vocational baccalaureate, transition to a conventional university is much less common than for holders of baccalaureates. This could be due to the fact that, once they have completed their apprenticeship, holders of federal vocational baccalaureates can move straight into the job market, which would then make the opportunity costs for a degree course higher for them over the short term. With just over 50% transitions to universities of applied sciences, effectiveness would thus be limited if it were confined to this transition. A major difference also exists between the genders – to the detriment of women – by comparison to the baccalaureate. While two-thirds of men pass on to a university of applied sciences (2007), the last increase in the rate for women brought the figure up to 40%. This gender differential can be explained to some extent by the fact that the federal vocational baccalaureate specialisations with the highest transition rates, i.e. technical and natural science courses, are the ones that are mainly taken by men. While transition rates for women have consistently risen over the past decade, the transition rates for men vary greatly as a function of the economic climate (→ Figure 111). In other words, it has to be assumed that the wage levels indicating a lack of skilled workers have not made a sufficient impact on this group of potential university students to stop them from opting for a short-term profit (immediate entry into the job market) instead of making a longer-term investment in education at times when the economy is prospering. No statistics have been kept as yet on the number of federal vocational baccalaureate graduates who have used their qualification to gain admission to a PET college.

111 Transitions to universities of applied sciences (men) and growth in GDP (immediate transitions and transitions after one year, cumulated to year of entry)

Data: FSO, Seco



Efficiency/costs

As in every other area of education, very little can be said in overall terms about the efficient use of funds in vocational education and training (VET). This section will therefore look mainly at the costs and the cost/benefit ratios. Light will also be shed on two other topics that are directly connected with efficiency. These are, on the one hand, the greater ease with which non-formally or informally acquired skills can be taken into account for the formal qualification of a completed apprenticeship (*validation des acquis*). From the individual's point of view, at least, this improves the efficiency with which a qualification is obtained, because it avoids duplication in the acquisition of skills and hence does not cause unnecessary time and costs. On the other hand, the premature termination of apprenticeship contracts represents a partial inefficiency in the system. In the case of avoidable terminations, the investments made by the apprentices and by the company and the state could have been kept lower.

Public VET expenditure

Almost 3 billion Swiss francs per year are spent on VET from the public purse (2011). The cantons bear the majority of the expenditure, although from 2004 onwards, the Confederation successively increased its share of the costs from an initial 16% to the current 25% (VET/PET as a whole) as set out in the Federal Council Dispatch on Education, Research and Innovation 2013–2016. Some ten percent of this is accounted for by expenditure on Confederation-financed third-party projects, and the remaining 90% is paid as subsidies to the cantons. Striking differences can be seen in the cantonal

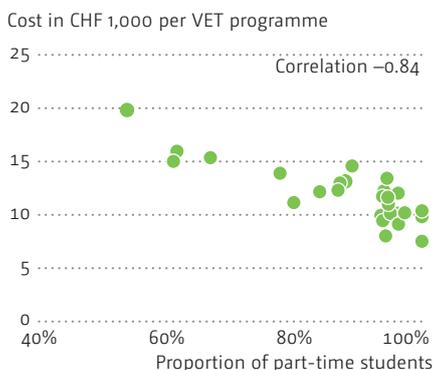
Corporate commitment and public finances

The cantons of Zurich and Geneva provide a good example of the major impact that companies have on keeping down public finance costs through their involvement in VET (→ Figure 112). If the canton of Zurich were to lose around one third of its companies that provide training and had to offer the corresponding apprenticeships at state institutions of full-time education, its public expenditure on VET would rise by 160 million Swiss francs per year, which equates to an increase of 38%. If, conversely, the canton of Geneva were to gain new companies willing to provide training and was thus able increase its share of part-time programmes from the current level of 54% to 75%, it would save 43 million Swiss francs per year, which would equate to 23% of current expenditure.

112 Comparison of cantonal expenditure for VET programmes depending on form of part-time (dual) apprenticeship, 2011

The costs per VET programme have only been calculated for the expenditure on VET.

Data: SERI



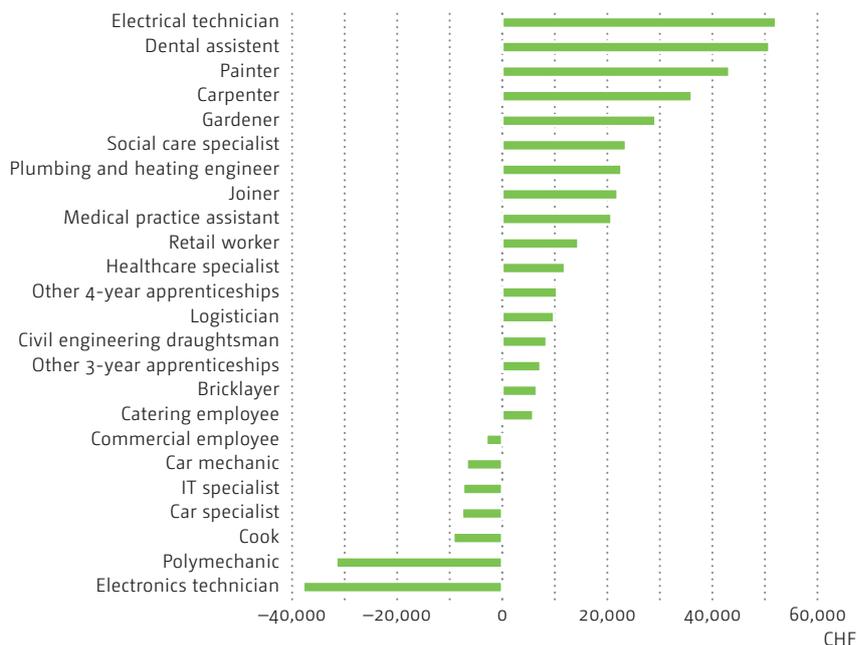
expenditure per apprenticeship contract, depending on the number of full-time programmes offered in schools or apprentice workshops, which are more expensive for the cantons to set up than company-based (dual) programmes.

Net costs of company-based VET

More than 5.3 billion Swiss francs per annum (2009) are spent by companies on VET in addition to the 3 billion Swiss francs from public funds (*Strupler & Wolter, 2012*). It must be borne in mind, though, that 2.5 billion Swiss francs of this are spent on apprentices' wages; company investment in VET programmes is thus 2.8 billion Swiss francs per year. As far as the training company is concerned, it is not simply the costs which are decisive, since the apprentices also make a contribution to production, in the form of work, which exceeds 5.8 billion Swiss francs per year. On average, viewed over the apprenticeship as a whole, a company providing training makes a net gain on each apprenticeship contract, although these cost/benefit ratios differ greatly from one occupation to another (→ Figure 113).

113 Net benefit of an apprenticeship for training companies, per VET student, over duration of apprenticeship, 2009

Source: *Strupler & Wolter, 2012*

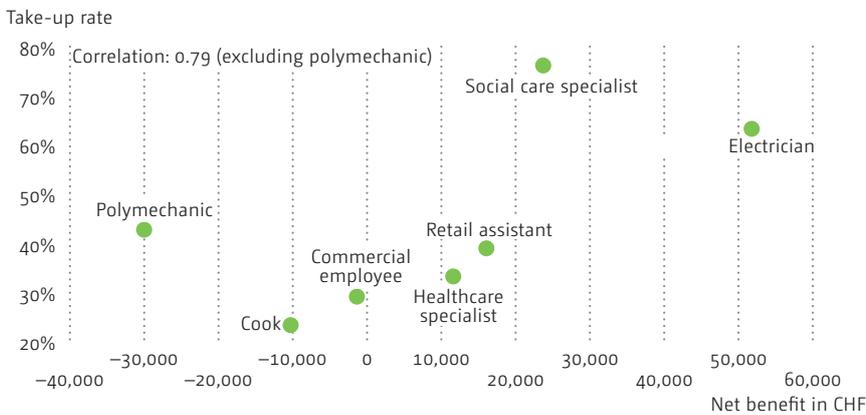


The post-apprenticeship benefit is decisive for those occupations that are shown as occasioning net costs during the actual apprenticeship period. Hence, by employing an apprentice it has trained, a company with more than 100 employees can save more than 16,000 Swiss francs in recruitment and induction costs over the short term – money it would have had to spend on recruiting a new, qualified worker from the job market. Various factors come into play regarding which aspect of the benefit is more important for a programme: the apprentice's contribution to productivity during the apprenticeship or the savings on recruiting qualified workers from the job market.

Specific factors here include whether it is possible to make productive use of the apprentice during the apprenticeship, the availability of specifically trained qualified workers on the job market and a company's ability to retain the apprentices it has trained at the end of the apprenticeship.

114 Net benefit and take-up rates for participation in training, 2009

Source: *Strupler & Wolter, 2012*



Net costs reduce willingness to offer training programmes – but not always!

On average, the net benefits from training apprentices increase companies' willingness to actively provide training. Courses for electricians and social care specialists show response rates in excess of 60% (→ Figure 114) in view of the very high net benefit, i.e. more than 60% of companies able to offer training do actually offer it. But net costs do not always reduce the willingness to provide training; there are exceptions (in this case training as a polymechnic), such as if training provides skills as the result of company-specific training that would otherwise be completely unavailable on the job market. In such cases many training companies are also still willing to provide programmes and incur high net costs.

Validation of education and training attainments

Since also people who do not have a formal education and a corresponding qualification learn both in their leisure time and in the occupation they are exercising, the view has prevailed for some time now that the validation of such non-formal or informally acquired skills could increase the efficiency of the education and training system, on the one hand, and its effectiveness, on the other, since the opportunity for validation might also induce people who would not otherwise have gained a formal qualification to do so. The validation of skills can be performed in individual areas – by people not having to complete parts of formal education and training or not having to sit certain parts of examinations – or can be performed on a global basis, with the validation replacing the entire formal education and training process, plus the associated examinations. In addition to the 20 occupations with validation processes, all apprenticeship programmes provide opportunities for the recognition of formal, non-formal or informally acquired skills as a substitute for parts of the education and training given, or for examinations.

Following a pilot phase (2007–2009) during which the cantons and professional organisations were able to acquire experience in validating education and training attainment, the validation process in VET/PET was introduced by OPET as of 2010 in accordance with the criteria contained in a national directive. On behalf of the education management authorities, *Salini, Petrini and Voit (2012)* prepared an overview of the validation methods in current use, together with their advantages and disadvantages. No current evaluations exist of the effectiveness of the validation methods, i.e. analyses of whether education and training qualifications achieved through validation processes enjoy the same acceptance on the job market as those achieved by formal methods. In view of negative experiences in the USA with the validation of non-formally acquired high-school qualifications (*Heckman, Humphries & Mader, 2011*), such evaluations would doubtless be advisable

in Switzerland, even if not until substantial case figures have been collected with validation processes. In 2011, 702 Federal VET diplomas, i.e. just over 1%, were awarded on the basis of a validation process (*Salini, Petrini & Voit, 2012*); more than 60% of these were awarded for just two occupations (healthcare worker and logistician).

Premature termination of apprenticeship contracts – a puzzle with too many missing pieces

Only an analysis from the canton of Ticino (*Allidi, 2011*) has been added to the studies from the cantons of Bern (*Schmid, 2010*) and Geneva (*Rastoldo, Amos, Davaud, 2009*) mentioned in the 2010 Education Report. As there are marked differences in the reasons for and consequences of premature termination of apprenticeship contracts not only between occupations, but also between the cantons, a representative analysis at pan-Swiss level would be necessary to obtain the data required for improved system efficiency. Until it is possible to calculate the precise premature termination rates for apprenticeships the Federal Statistical Office is therefore abstaining from publishing the number of premature contract terminations.

Premature termination of apprenticeship contracts

At present, statistics are only available for prematurely terminated apprenticeship contracts and failed apprenticeship examinations. With the modernisation of the educational statistics, i.e. the use of an identifier for each individual student, it will soon be possible to better track the consequences of the premature termination of an apprenticeship contract. Only in very few cases does this lead to a complete breaking off of education and training, since most terminations are followed, either immediately or after a short interval, by a new apprenticeship contract. Continuation may be in the same occupation, but with a new training company, or in the same company, but in a different apprenticeship. In the latter case it is partly a question of finding an apprenticeship to suit the apprentices' performance level, i.e. there may be a switch to an apprenticeship contract for a less demanding apprenticeship (sometimes also from a federal VET diploma to a two-year VET programme) or, conversely, a switch to a more demanding apprenticeship. Efficiency is unimpaired as long as these changes of apprenticeship contract do not waste time; efficiency can even be improved as the new apprenticeship contract is generally a better fit and is thus seen as positive for both the apprentices and the training companies. When, however, apprenticeship contracts are prematurely terminated due to inadequate preparation for the choice of occupation or other factors, or a new apprenticeship is only embarked upon after a lengthy interruption, inefficiencies are generated which would doubtless have been avoidable to some extent.

Equity

Access to apprenticeships

Although potential training companies often invest a great deal of time and resources in selecting their apprentices, the extent to which they consider the applicants' objective performance when awarding their apprenticeships is not always clear. Failure to consider this may lead to a violation of equity, since, if applicants had an identical performance, they would be discriminated against on the basis of their origins or gender (see, for example, *Fibbi, Lerch & Wanner, 2006*). An analysis of the TREE data (see *Müller & Wolter, 2013*) shows that, when awarding apprenticeships, companies do indeed take information on «objective» performance into account. In the process, however, they try to ward off applicants who objectively have worse academic skills than one would expect from their backgrounds. Despite the inclusion of information about the applicants' «true» academic performance, i.e. even if it is not merely academic grades that are taken into consideration, nationality or performance at lower-secondary level continue to play a role in the

chance of finding an apprenticeship at the end of compulsory education for applicants who have identical test scores in the PISA test. Further research is required to show whether this is discrimination against certain young people by the employers, or whether the employers have more information at their disposal which justifies this discrimination.

Compensatory support or efficiency?

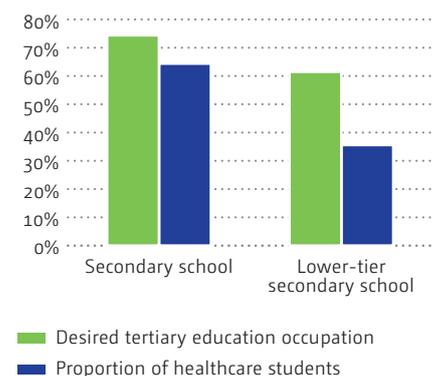
If apprentices with different talents and abilities find an apprenticeship, the question also arises as to whether training companies provide the same support for all apprentices. Basically, the training companies have the option of providing all apprentices with the same level of training, irrespective of their needs and abilities, or they can either develop talented students more or, conversely, compensate for less talented students with the provision of more support. Empirical analyses (Mühlemann, Brändli & Wolter, 2013) show that companies tend to resort to a more compensatory training strategy for occupations in which apprentices can be trained with a net benefit on average. Treating apprentices differently attempts to achieve equity with regard to the successful completion of the apprenticeship. It is possible to show, by contrast, that in occupations in which company training incurs high net costs on average (especially technical and industrial occupations) the training companies tend to promote the talented apprentices if they have apprentices with different abilities. This training policy, which significantly increases the risk of apprenticeships being broken off in the case of weaker apprentices and thus leads to inequality of opportunity as far as the apprentices are concerned, is rational from the training firm's point of view. This is because the company only intends to step up the high net investment in those apprentices that it wishes to keep after they have completed their apprenticeships. These varying strategies for dealing with differently talented apprentices also make it clear that framework conditions guaranteeing training with net benefits for a large number of training companies represent the best strategy for supporting weaker apprentices.

Creation of development opportunities through vocational and professional education and training

Vocational and professional education and training can also contribute to equity, if it facilitates young people's access to further, tertiary-level qualifications. Such an option would probably have remained closed to them in an education system that relied solely on general education options on account of their academic performance during compulsory education. Further research needs to be carried out into this aspect of vocational education and training, but the effect is evident from a study of healthcare apprenticeships (Trede & Schweri, 2012). Over one third of apprentices (with reference to German-speaking Switzerland only) came from the lower tier of compulsory education (Realschule). Despite their low level of performance during compulsory education, when they completed their apprenticeships more than 60% of these apprentices expressed the desire to obtain a tertiary-level qualification in the medium term (generally training as a nurse at a PET college or university of applied sciences) (→ Figure 115). The somewhat lower rate

115 Students in healthcare apprenticeships and desired occupation on completion of apprenticeship

Source: Trede & Schweri, 2012



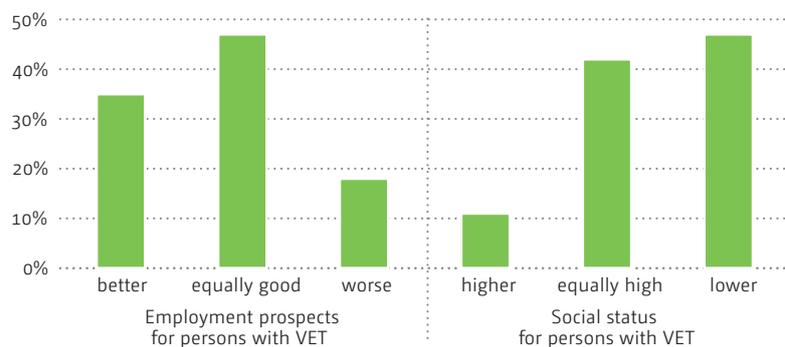
by comparison to apprentices who have attended secondary school can be almost fully explained by the fact that the latter achieved a better qualification at the end of their apprenticeship and are thus better equipped for a tertiary qualification after the apprenticeship. It also means that if apprentices from the lower-requirements sections of lower-secondary education perform well during their apprenticeship, the same opportunities are open to them as to apprentices who performed better during compulsory education.

The issue of social status as an equity problem?

Equity can also be assessed in relative terms between different education and training options. If young people with the same abilities and talents change to different types of education, they ought to be able to expect the same outcomes, irrespective of the type of education, because otherwise young people in one type of education would be disadvantaged by their choice in comparison to young people in another type of education. Such outcomes may conceal different factors, not all of which can be determined with objective data. In a relative comparison of VET and baccalaureate schools, a representative survey of 2,800 Swiss adults shows that 35% of respondents are of the opinion that those who have completed VET/PET have better employment prospects than those with a general education. The exact opposite is true when asked about social status. Just 11% are of the opinion that people with vocational and professional education and training would have a higher social status than people who went to a baccalaureate school, and almost half of respondents are even of the opinion that social status is lower after an apprenticeship than after completing a baccalaureate.

116 Agreement with statements regarding relative chances of successful employment and social status. Comparison of VET programmes (apprenticeship, universities of applied sciences, tertiary level B professional education and training), with general education (baccalaureate schools, universities), 2012

Data: University of Bern, Centre for Research in Economics of Education





Baccalaureate schools

Context

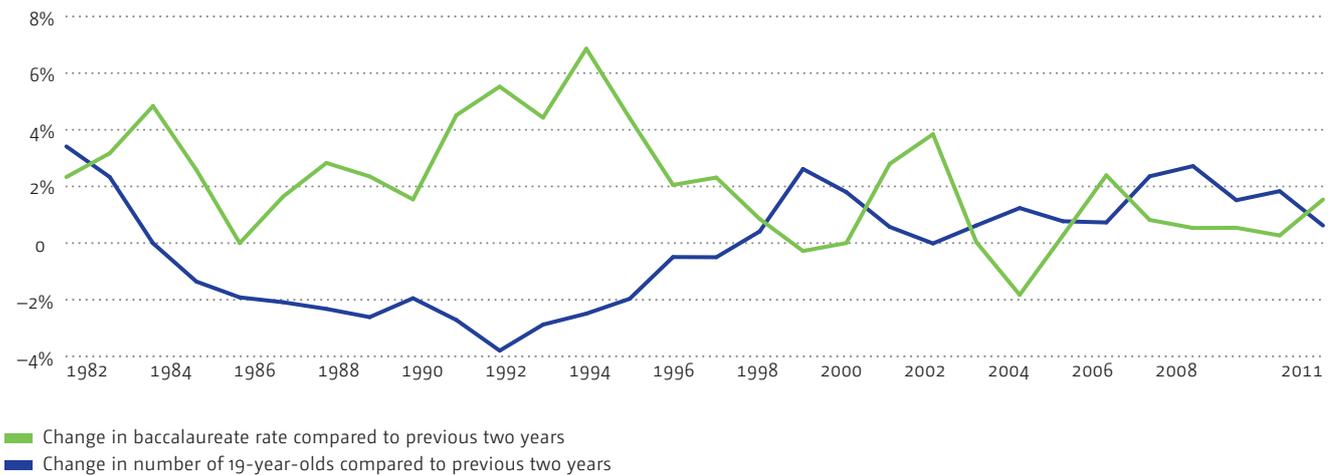
The **bacculaureate rate** expresses the number of bacculaureates obtained at bacculaureate schools as a percentage of the number of 19-year-olds permanently resident in Switzerland.

Compared with the changes in the eighties and nineties, the expansion of bacculaureate schools has proceeded at a slower pace over the last ten years. The fastest growth during this former period occurred in 1991–1996. In 2011 the average bacculaureate rate for Switzerland as a whole topped 20 percent for the first time. The first wave of expansion came as an education policy response to technological progress and the concomitant shift in demand for qualifications (*Criblez, 2011*), but as the bacculaureate rate continued to climb educational ambition became an additional driving force. The increasing availability of bacculaureate education (schools in new locations, infrastructure, teaching staff etc.) has remained a factor behind the steady rise in the bacculaureate rate, and this is reflected by the fact that the rate has usually spiked when the young population declines for demographic reasons and, by the same token, has held good when the size of the young population expands (→ Figure 117).

117 Bacculaureate rate and number of 19-year-olds, 1981–2011

Values smoothed by moving average of two years

Data: FSO



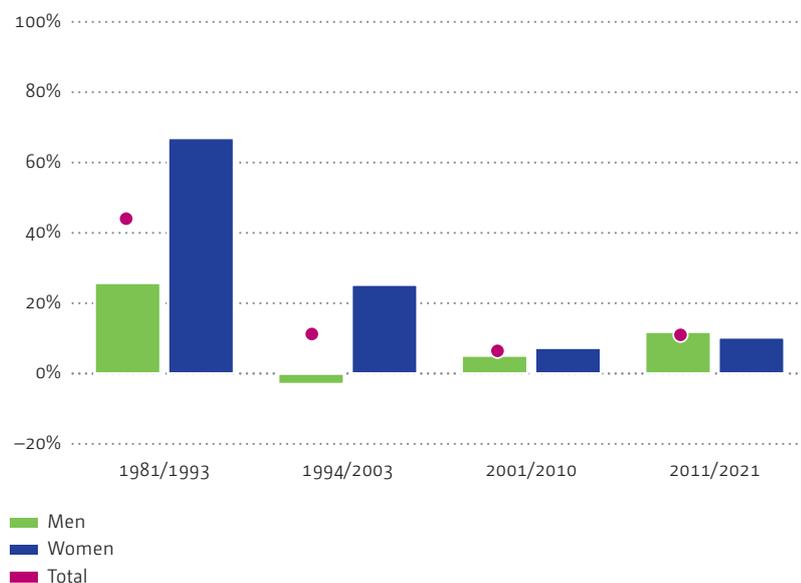
The feminisation of bacculaureate schools: demographic trends

The rising bacculaureate rate has been flanked by the increasing participation of young women (→ Figure 118). What began as a catching-up process as women closed the gap on men took on a new significance from 1993. That was when the female bacculaureate rate first overtook the male rate. The Federal Statistical Office has generated three scenarios to forecast the rate for bacculaureates in the years until 2021. The reference scenario assumes that the bacculaureate rate for women will increase to 25.7% and the rate for men to 18.8%. By comparison, the higher scenario predicts a rate of 26.9% (19.5%) for women (men), while the lower scenario envisages 24.4% (18.0%). Compared with the reference scenario for 2017 published in the previous Education Report, the bacculaureate rate is down from 23.2% to 21.4%. By 2021, the proportion of 19-year-olds permanently resident in Switzerland who complete their bacculaureate school education is expected to be 22.2%.

118 Growth in baccalaureate rate disaggregated by gender

Reference scenario, forecast after 2012

Data: FSO; Computations: SCCRE



The proportion of female pupils at baccalaureate schools has fallen slightly again in recent years, standing at 57% in 2011. However, the figure can fluctuate considerably from one canton to another. There has never been an in-depth investigation into the factors underlying these cantonal differences in the share of women. Drawing on the PISA data (2009), however, we can show that girls are significantly more likely to want to attend a baccalaureate school than boys with the same educational attainments. If more girls are transferring to baccalaureate schools, this cannot, therefore, be attributed solely to superior attainment in lower-secondary schools. There is evidence, however, that girls with a bias towards language skills are more likely to achieve the transition to a baccalaureate school by making up for their deficiencies in mathematics, whereas boys with a one-sided talent for maths do not similarly seek to compensate by working on their language skills (→ *Chapter on Lower-secondary education, page 83*).

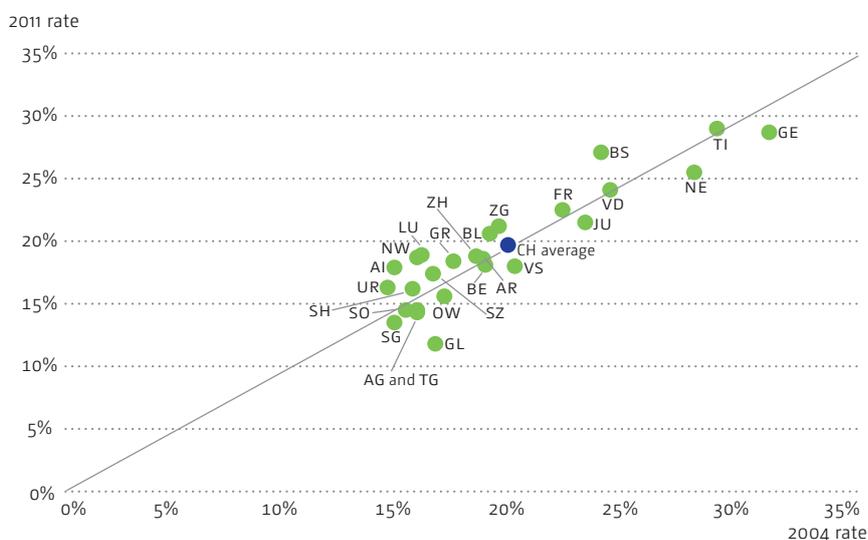
Differences between cantons

The growth in cantonal baccalaureate rates, which began in the eighties, has continued more or less proportionately in recent years (→ Figure 119). In other words, the rise in the baccalaureate rate for Switzerland as a whole is not due to cantons with below-average rates closing the gap; in most cases, the original differences that existed between cantons before the strong growth in the early eighties have remained.

119 **Baccalaureate rate from baccalaureate schools by canton, 2004 and 2011**

The graph uses averages for the years 2002–2004 and 2009–2011 to smooth occasionally considerable annual fluctuations.

Data: FSO



To date, there have been no empirically verified explanations for the persistently high differences in baccalaureate rates between cantons and language areas. These differences could be demand-driven (in that pupils express a preference for baccalaureate schools), but they could also be supply-driven (political targets for the provision of places). One factor that should not be contributing to the sizeable gaps is the differing needs of the local (cantonal) labour market, since pupils at baccalaureate schools are expected to enter higher education and subsequently to become nationally and internationally mobile. In other words, even in the individual cantons, the baccalaureate rate should at least be geared to the needs of the labour market throughout Switzerland. On the other hand, the local labour market might play an indirect role if demand for tertiary graduates is low and there is consequently not much political will to expand baccalaureate school capacity.

An opinion poll conducted in 2012 shows that the local baccalaureate rate usually exerts a strong influence on opinions about the desirable baccalaureate rate for Switzerland. The higher the cantonal baccalaureate rate, the more frequently interviewees assess the Swiss baccalaureate rate as too low, while the lower the cantonal rate is, the more frequently those polled describe the national quota as just about right or else too high (→ Figure 120). This could be an explanation for the persistently wide gap between baccalaureate rates in the different cantons.

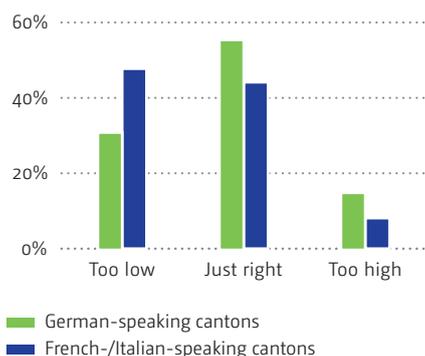
According to FSO forecasts, pupil numbers and the percentages of pupils attending baccalaureate schools in the various cantons will continue to develop more or less proportionately.

The baccalaureate rate and competition for baccalaureate schools

The different baccalaureate rates in the cantons also influence how easy or difficult it is for pupils with the same attainment levels to gain a place at a baccalaureate school. Whereas very good pupils have almost no problems

120 **Opinion poll of the current Swiss baccalaureate rate in German and French/Italian-speaking cantons**

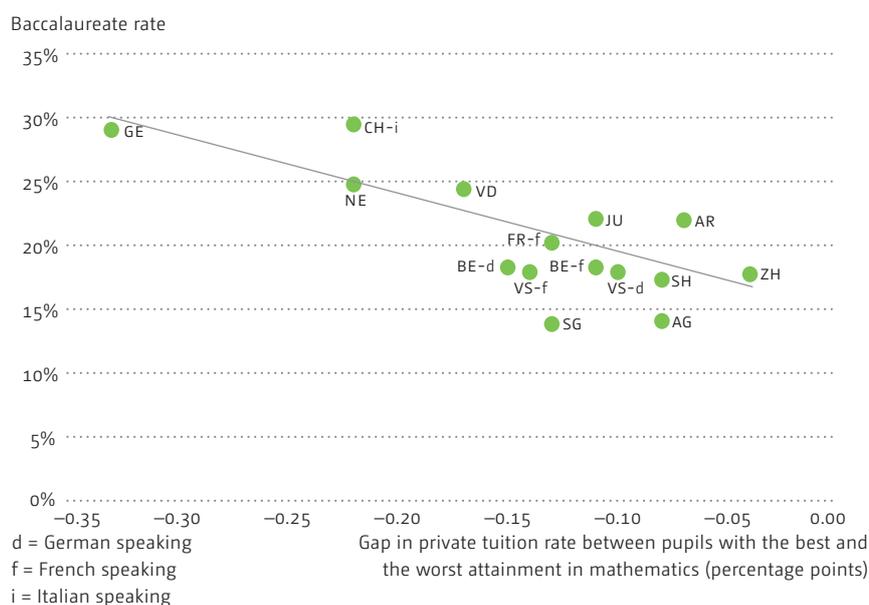
Data: Representative GfS survey (July/August 2012) commissioned by the University of Bern (n=2800)



making the transition to a baccalaureate school in cantons where the rates are on the higher side, this transition may be uncertain even for good pupils in cantons with very low rates, because there is greater competition for fewer places. One symptom of these different starting points is the paid private tutoring taken by very good pupils. Whereas in cantons with higher baccalaureate rates good pupils (unlike very poor pupils) take almost no private tutoring (in mathematics) (→ Figure 121), in cantons with lower baccalaureate rates they make use of this option almost as often as pupils with a very poor attainment in mathematics (*Hof & Wolter, 2012*).

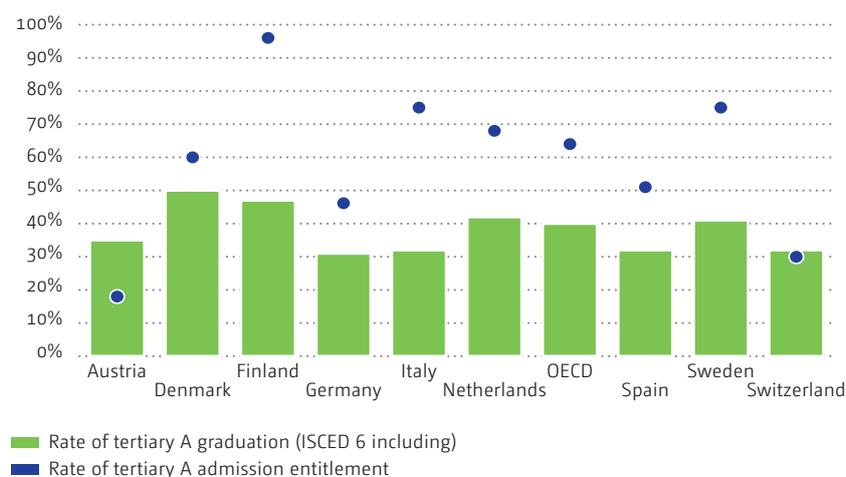
121 Correlation between private tutoring rates for very poor and very good pupils and the baccalaureate rate, by canton

Source: *Hof & Wolter, 2012*



International comparability

To compare the rate at which school students in Switzerland qualify for university admission with the rates in other countries, the rate for baccalaureates from baccalaureate schools must be added to the rate for federal vocational baccalaureates (ISCED 3A), since other countries do not usually distinguish between such categories, even if the single qualification they offer does not necessarily entitle the holder to enter every university or every type of tertiary A education. The Swiss rate (sum of baccalaureates, federal vocational baccalaureates and specialised baccalaureates) for 2009 is 32% and hence below the international average, since the OECD average lies above 60% (→ Figure 122). Germany and Austria also display a below-average rate of tertiary A admission qualifications.

122 **International comparison of tertiary A eligibility and graduation, 2010**Source: *OECD, 2013b*

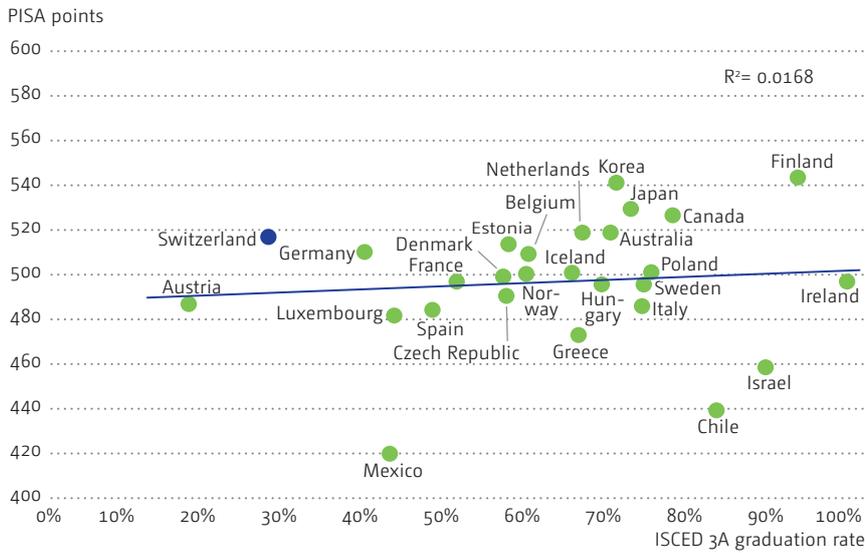
When drawing these international comparisons, it should be remembered that the nature of a qualification entitling the holder to enter higher education varies very much from one country to another. In most countries with very high rates, the baccalaureate is not just the only certificate awarded on completion of a general upper-secondary education, but frequently the only option available at upper-secondary level, as the vocational alternative is either not very widespread or not recognised as an educational qualification. It should also be noted that, in other countries, a baccalaureate usually only grants theoretical entitlement to higher education, as universities are free to define additional admission requirements. This may result in a large percentage of those entitled to study not actually being granted a place.

Apart from the fact that Switzerland constitutes an exceptional case in the international arena with regard to universal exam-free access to tertiary A study (except for courses in medicine at the Universities of Basel, Bern, Fribourg and Zurich and to some extent in the sciences of sport and movement science) (→ *Institutions*, page 145 and *Effectiveness*, page 149), the odds of successfully completing a degree are not the same in all countries (→ *Chapter on Universities*, page 183). The tertiary A graduation rate reflects the cumulative impact, i.e. additional selection procedures prior to entering higher education, selection effects while studying and voluntary drop-outs. If the graduation rate of a country is read alongside the admission entitlement rate (→ Figure 122, blue dots), it emerges that the number of baccalaureates awarded says virtually nothing about the future number of successful tertiary A graduates in a country. In Finland, for example, the rate of entitlement to tertiary A education is over 90%, and yet the rate of tertiary A graduation is about 30%, similar to the rate for Switzerland.

Moreover, the PISA tests – which permit international comparison – indicate that the levels of attainment required in order to attend a school that prepares pupils for a baccalaureate must vary widely between countries, as absolutely no correlation can be identified between the average PISA performance in a country and its baccalaureate rate (→ Figure 123). Countries such as Australia and the Netherlands, for example, achieve practically the same PISA results as Switzerland and yet their baccalaureate rates are more than twice as high.

123 Graduation rates at ISCED level 3A and PISA scores, international

The PISA scores are the country averages for mathematics, reading and sciences in 2009
Data: OECD



Institutions

The Regulation on the Recognition of the Baccalaureate adopted in 1995 (MAR 95) had been implemented in all cantons and all schools by 2003. MAR 95 abolished the old-style types of baccalaureate, and pupils were offered a greater choice of options and new profiles to allow for specialisation. In each profile, the nine subjects include seven compulsory subjects based on the regular curriculum, plus another subject selected for specialisation and a second supplementary option. A baccalaureate essay must be submitted on a theme chosen by the pupil. For the regular components, 30–40% of time is allocated to languages, 25–35% to maths and natural sciences, 10–20% to the humanities and social sciences and 5–10% to arts (Art. 11, MAR 95 Regulation as amended in 2007). The special subject, second supplementary option and essay account for 15–25%.

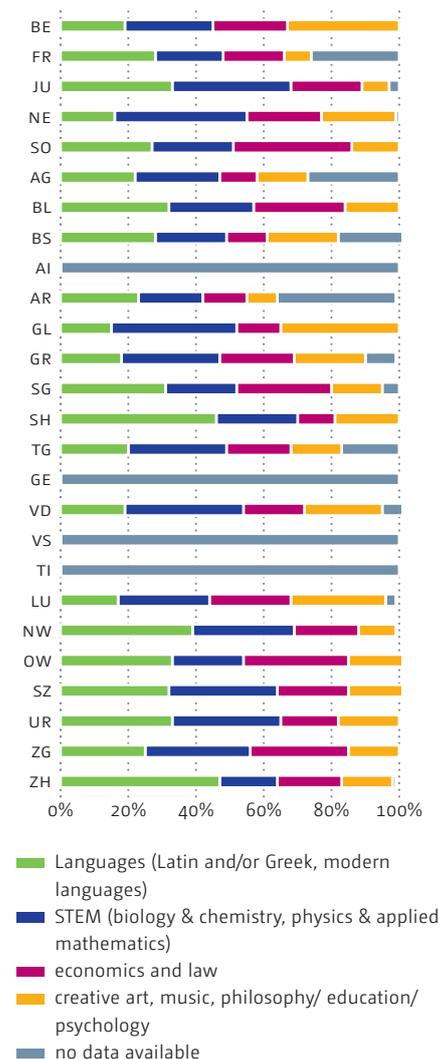
Apart from the national languages featuring as regular or special subjects, a third Swiss language must be available as an option (Art. 12, MAR 95 Regulation). Pupils who do not choose English as one of their baccalaureate subjects must at least be offered a basic course in English (Art. 17, MAR 95 Regulation).

Special subjects

All pupils choose one of the following subjects or subject clusters (Art. 9, MAR 95) for specialisation: a) classical languages (Latin and/or Greek), b) a modern language (a third national language, English, Spanish or Russian), c) physics and applied mathematics, d) biology and chemistry, e) economics and law, f) philosophy/education/psychology, g) creative art, h) music. The cantons determine which subjects are to be provided, and as a result

124 Distribution of special subjects across the cantons, 2010/11

Data: FSO



there are relatively big differences in the pupil percentages for each specialisation depending on the canton (→ Figure 124). Within cantons, however, the pupil distribution across special subjects does not fluctuate much over time.

The long-term and the short-term baccalaureate schools

By the time pupils obtain a baccalaureate from a baccalaureate school they have been in education for at least 12 years (excluding the first learning cycle as defined in the Intercantonal Agreement on Harmonisation of Compulsory Education (HarmoS)). The final four years are to be designed as a baccalaureate course, and the first of these four years can take the form of preparation for a baccalaureate school during the lower-secondary cycle (MAR 95, Art. 6). Structurally, a distinction is made between the long baccalaureate cycle (six years, two of which are at a preparatory school) and the short baccalaureate cycle (four years). Entry to the long cycle takes place immediately after primary school. The short cycle begins at lower-secondary level following the 8th or 9th school year. The long cycle is common in Zurich and cantons in Central and Eastern Switzerland (LU, NW, OW, UR, ZG, AI, GL, GR, SG, ZH). Three cantons (NW, OW, UR) only make provision for the long cycle. In French and Italian-speaking Switzerland, by contrast, baccalaureate schools are organised around the short cycle.

At least **12 years of school are required to obtain a baccalaureate** (Graubünden and Uri). In most cantons it takes 13 or 14 years. In a few cantons education lasts 15 years prior to obtaining the baccalaureate (Aargau, Fribourg and Geneva). This extended duration occurs where cantons have established an eight-year primary cycle including a pre-school or first learning phase, as defined by HarmoS (→ *Chapter on Compulsory education, page 39*).

125 Simplified typology of admission to the short-term baccalaureate school

Source: *Eberle & Brügggenbrock, 2013*; IDES

| Type 1: Typically requires a leaving or entrance exam | Type 2: Typically does not require a leaving or entrance exam |
|--|--|
| AG | BE |
| AI | BL |
| AR | BS |
| GL | FR |
| GR | GE |
| SG | JU |
| SH | LU |
| SZ | NE |
| TG | NW |
| ZH | OW |
| | SO (since 2013) |
| | TI |
| | UR |
| | VD |
| | VS |
| | ZG |

Admission requirements

Requirements and entry procedures for admission to baccalaureate school differ considerably from one canton to another. Basically all pupils from the type of feeder school with the most stringent requirements are eligible to take part in the entry procedure. The two Basel Cantons, for example, are an exception, as pupils from the type of school with the second highest attainment level are provisionally eligible if they have obtained certain marks. In simplified terms, cantons apply two types of entry procedure. Under Type 1, a leaving or entrance exam usually determines admission to baccalaureate school. Type 2 characteristically does not entail a leaving or entrance exam but relies, for example, instead on previous attainment records.

In addition to this, baccalaureate schools can confirm or rectify an admission after a probation period or periodic review, and the time scale for both varies in duration. In Canton Jura, for example, a one-year probation period can be applied if the candidate does not quite meet all the entry requirements (*Eberle & Brügggenbrock, 2013*). Zurich has run a trial with a test of general cognitive skills in addition to the centralised written examination for baccalaureate school candidates. This test involved no specific subject knowledge or teaching materials, but it was not introduced definitively following the pilot. In no canton can a clear-cut link be demonstrated between admission requirements and the baccalaureate rate, although the cantons in Western and Southern Switzerland, where the decision is made by the feeder school, often display higher baccalaureate rates than the German-speaking cantons. As described above for the baccalaureate rate, however, there are signs that the attitude of Swiss residents to admission requirements for baccalaureate schools are strongly influenced by the procedures applied in their own canton. About 70% of interviewees in cantons with a Type 1 procedure

(entrance exam) find entrance exams acceptable, whereas in cantons without an entrance exam (Type 2 procedure) about 45% of interviewees would reject the idea (→ Figure 126).

Pupils' prior knowledge on transition to baccalaureate school

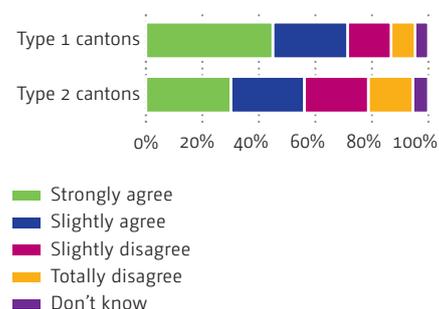
The one-off evaluation of the revised Regulation on the Recognition of the Baccalaureate (EVAMAR II) generated data about the competences of pupils completing their education at a baccalaureate school which, among other things, indicates a negative correlation between the baccalaureate rate and skills. It is not clear whether these differences measured at the end of baccalaureate school are the result of different attainment gains during baccalaureate school or different prior knowledge at the time of transition to baccalaureate school or both together. Although the available data cannot provide a definitive answer to this question, the results of the PISA 2009 assessment demonstrate a wide variation between cantons with different baccalaureate rates in the prior knowledge levels of pupils seeking admission to baccalaureate schools. In simplified terms, the assumption would be that aspiring baccalaureate pupils¹ taking the PISA tests should achieve at least competence level 4.²

Whereas in cantons with a low baccalaureate rate (→ Figure 127) fewer than 10% of pupils fail to achieve competence level 4 in both reading and maths prior to entering a baccalaureate school, the figure in cantons with high baccalaureate rates is about 30%. At entry into baccalaureate school, young people can thus have very different average skill levels depending on their canton. If – regardless of the baccalaureate rate – pupils taking their baccalaureates are to display comparable levels of attainment at exit, the alternative to a compensatory effort during baccalaureate school is for poorer pupils to leave before completing the course. Due to a lack of individual data and standardised review mechanisms, we cannot determine the extent to which these two measures actually do result in comparable baccalaureate attainment among baccalaureate school leavers throughout Switzerland regardless of the baccalaureate rate in their own canton.

If all cantons «only» allowed the 20% of pupils with the highest performance to move on to baccalaureate school (→ Figure 128), the attainment gap for the subject «test language» between cantons with different baccalaureate rates would almost vanish, whereas in mathematics and the natural sciences it would be smaller, but still visible.

126 Support for entrance exams to baccalaureate school

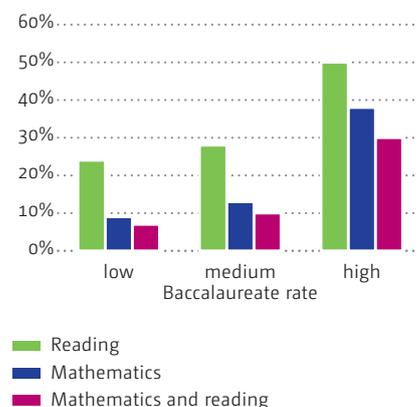
Data: Representative GfS survey (July/August 2012) commissioned by University of Bern (n=2800)



127 Pupils in the 9th school year with a PISA competence level below 4 aspiring to enter baccalaureate school, by cantonal baccalaureate rate

The cantons included took part in an additional random sample in PISA 2009; divided into low (average 15%), medium (average 19%) and high (average 26%) baccalaureate rates.

Data: OECD (PISA 2009); Computations: SCCRE

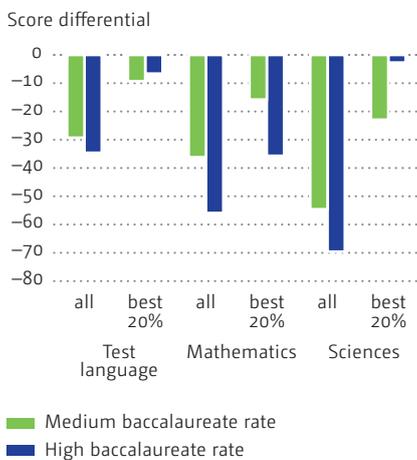


1 The 9th-year pupils interviewed indicate that they wished to transfer to a baccalaureate school after the summer holidays. Although these pupils will not be precisely the ones to make that transition, the assumption does seem realistic, because the PISA survey is conducted just before the summer break when intentions come closest to actual transitions.

2 Students who achieve competence level 4 in reading are «able to locate and organise several pieces of embedded information. The meaning of nuances of language in a section of the text must be interpreted by taking into account the text as a whole» (Nidegger, Moser, Angelone et al, 2010).

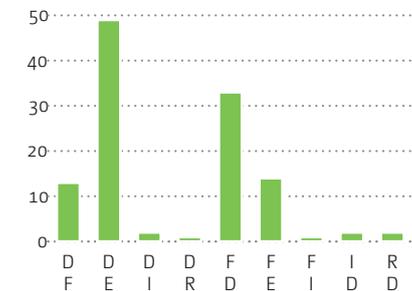
128 Average PISA score differential compared to cantons with a low baccalaureate rate

Data: OECD (PISA 2009); Computations: SCCRE



129 Number of Swiss baccalaureate schools offering immersion teaching, 2012

Data: SBFI



Top row = original language
 Bottom row = target language
 D = German, E = English, F = French,
 I = Italian, R = Romansh

New qualifications: bilingual baccalaureate, International Baccalaureate

Article 18 of the Regulation on the Recognition of the Baccalaureate allows cantons to offer a bilingual baccalaureate (with a second official language of Switzerland or English). For this bilingual baccalaureate to be recognised, the requirement since 1 January 2013 has been that at least three (formerly two) subjects must be taught in the immersion language selected and that the overall number of hours taught must be at least 800 (formerly 600) (Regulation adopted by the Swiss Baccalaureate Commission on 16 March 2012 on the Recognition of Cantonal Bilingual Baccalaureates). There is a choice of two models. Model A with partial immersion teaching at the home school includes both the immersion teaching at the home school and an optional stay in the relevant language area. Model B is founded entirely on immersion teaching at a host school. Pupils must spend at least one academic year in the relevant language area. Immersion teaching is widespread and is provided at more than 70% of baccalaureate schools in Switzerland; the most common combination is German and English (→ Figure 129).

Unlike the bilingual baccalaureate, the International Baccalaureate (IB) is an internationally recognised qualification granted upon completion of an upper-secondary education, but which does not fall within the scope of Swiss baccalaureate regulations. Tertiary A institutes in Switzerland recognise the IB under certain conditions, but every university is free to establish its own additional admission requirements, such as a minimum number of points achieved in the IB or an additional entry exam (www.crus.ch). There are 35 schools in Switzerland offering a Diploma Programme leading to an International Baccalaureate (www.ibo.org).

Current projects to ensure exam-free access to the universities

The Federal Department of Economic Affairs, Education and Research (EAER) and the Swiss Conference of Cantonal Ministers of Education (EDK) have launched five projects as part of a programme designed to ensure exam-free access from baccalaureate schools to conventional universities in the long term (media release of 11 April 2012). Project 1 will define basic subject-related study skills for baccalaureate schools. Project 2 describes support options for schools/cantons wishing to organise more joint testing (→ *Effectiveness*, page 149). Project 3 seeks to build communication between baccalaureate schools and the tertiary level A institutes and place it on a more permanent footing. Project 4 outlines options for improving study and career advice at baccalaureate schools and reducing high drop-out rates and levels of course switching. Project 5 is to follow this up by examining a nationwide harmonisation of the duration of education leading to the baccalaureate.

Effectiveness

To assess effectiveness, the performance of the system must be measured against defined education objectives. According to Article 5 of the Regulation on the Recognition of the Baccalaureate (MAR 95), the tasks of baccalaureate schools are to guide pupils towards the level of personal maturity required for tertiary A study and to prepare them for demanding functions in society. In other words, the purpose of pursuing a baccalaureate at a baccalaureate school is to obtain a «deeper social maturity» (*Eberle, Gehrler, Jaggi et al., 2008*) and, in particular, to achieve the «ability to study». This second objective, the ability to study, is broken down in the framework curriculum into general targets and fields of learning on the one hand and subject-related and cross-cutting skills on the other. The ability to study embraces all the skills required in order to tackle a tertiary A degree successfully. The baccalaureate certificate attests this ability to study; tertiary A institutes are required to recognise it as an indication that the holder is ready to study there and should therefore enable the holder to begin a degree course of any kind. Whether this actually happens was the subject of the EVAMAR II Study (*Eberle, Gehrler, Jaggi et al., 2008*). It showed not only that pupils from different classes, schools and profiles do not demonstrate the same proficiency, but also that they received an attestation of their general ability to study despite sometimes quite considerable inadequacies in their attainment levels. The impact of the problem is only limited if the baccalaureate holders concerned go on to choose a degree course in which the subject for which they show inadequate proficiency does not play much of a role.

Drawing on EVAMAR II, the target «ability to study» is being defined more precisely for maths and the first language by determining basic subject-related study skills. The federal and the cantonal authorities decided in March 2012 that the framework curriculum for baccalaureate schools will incorporate these provisions from 2014.

Apart from approving the work to define basic subject-related study skills, the EDK's Plenary Assembly has decided to initiate the project on joint testing. By making it easier to compare baccalaureates from different schools, exam-free access to conventional universities is to be ensured in the longer term. The project describes support options enabling baccalaureate schools to design and test joint periodic assessment throughout the baccalaureate school curriculum, and also joint baccalaureate examinations, in the different fields of study.

Special subject and choice of study

A baccalaureate certificate attests that the holder has attained a general ability to study. However, if – depending on the choice of special subject – skills in other subjects are fostered to different levels during baccalaureate school, it is possible that the criteria for this general ability to study are not being met in practice, as the choice of profile has rendered successful study in certain other fields impossible, and the specialisation places de facto constraints on potential study options.

An analysis of study choices in 2012 only reveals (→ Figure 130) that the correlation between the special subject chosen at baccalaureate school and

Basic subject-related study skills are the fundamental skills which, while not sufficient in themselves, are key to studying most subjects at university level. The first step will be to define basic subject-related study skills for the first language and for mathematics (*EDK, 2012b*).

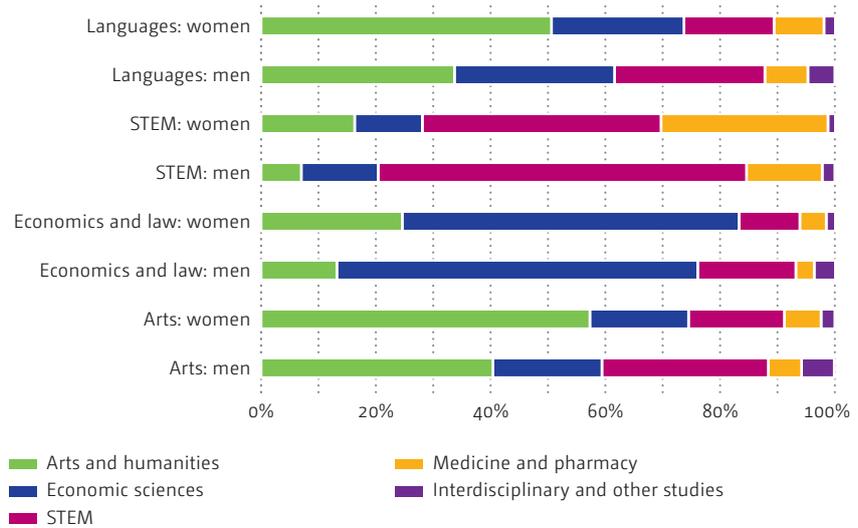
STEM stands for science, technology, engineering and mathematics. The baccalaureate school profiles physics & applied mathematics and biology & chemistry have been defined as STEM specialisations.

the selected degree course is usually strong, but this may also be due to a particular interest that had already been reflected in the choice of profile at baccalaureate school and is expressed once again through the choice of the degree course, having merely been reinforced by the attention it received at baccalaureate school.

130 Special subject and choice of study (from the university perspective), 2012

The special subjects «classical languages» and «one modern language» were combined as «languages», «physics & applied mathematics» with «biology» and «chemistry» as «STEM» and «philosophy, education & psychology» with «creative art» and «music» as «arts».

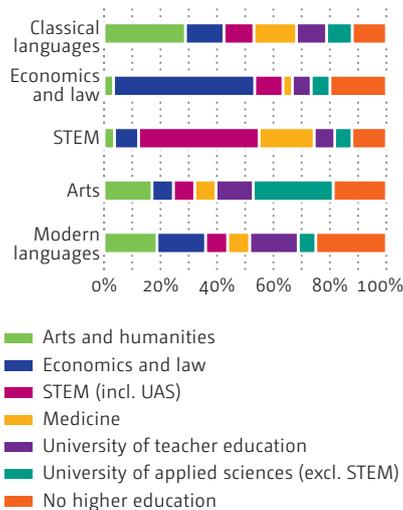
Data: FSO (SHIS); Computations: SCCRE



131 Special subject and choice of study (from the baccalaureate school perspective), 2010–2012

Data provided by Schaffhausen Baccalaureate School

Data: SCCRE



This analysis conducted from the university perspective can only indicate the profiles from which the student intake has been recruited. In other words, the sample consists entirely of baccalaureate holders who have opted to study in a conventional university. To establish the distribution among the totality of baccalaureate school leavers, we would require individual data which we do not have for Switzerland as a whole, and so Canton Schaffhausen will serve as an example here (→ Figure 131).

Of the totality of baccalaureate school leavers, over half of those with an artistic profile chose not to study at a conventional university, but either to enter a university of applied sciences or teacher education or not to pursue tertiary A education at all. This subset would not be included if the analysis were confined exclusively to those entering a university.

Shortage of skilled MINT labour

Complaints about the lack of skilled workers in STEM professions (→ *Chapter on Tertiary-level education, page 165*) prompt questions as to which baccalaureate school pupils express an interest in studying a STEM discipline.

About 60% of the student intake on STEM degree courses had chosen a STEM subject for specialisation at baccalaureate school (→ Figure 132). On average, only 20–30% of baccalaureate school pupils (→ *Institutions, page 145*) select these subjects, so access to STEM degree courses is already limited by the choice of profile at baccalaureate school.

Multivariate analyses (→ *Information text on the right*) show that the odds of choosing a STEM degree are significantly greater if a STEM specialisation has already been selected at baccalaureate school, i.e. profile dependence is not derived from other factors such as gender. Young women who chose a STEM profile at school are much less likely to choose a STEM degree than their male counterparts, even if their proficiency in maths is the same. However, that gender gap vanishes altogether when medicine and pharmacy – subjects requiring similar skills to many STEM disciplines – are included in the STEM definition.

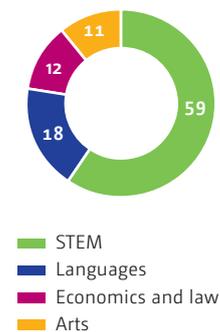
The research goes on to note a positive link between the probability of beginning a STEM degree and the baccalaureate mark obtained for mathematics. In other words, very good proficiency in maths exerts a positive impact on the probability of choosing a STEM degree. On the other hand, baccalaureate school leavers from STEM profiles who scored badly in maths are less likely to select a STEM degree. For those who completed another profile, a good mark in maths only correlates positively with a degree course in languages or in psychology, education or philosophy. The impact is nevertheless quite small and does not even offset 40% of the negative profile-specific effect.

The principal route to increasing the number of STEM students in tertiary A education under the current system is to increase the number of school students pursuing a STEM profile. Raising the baccalaureate rate across the board would have little impact if only a minority choose to specialise in a STEM subject at baccalaureate school. Reinforcing the maths component in other special subjects would probably also have only limited effect, as in these profiles even good proficiency in mathematics only slightly increases the odds of starting a STEM degree.

The **multivariate analyses** are based on two different datasets relating to baccalaureate school leavers: one came from a representative survey in nine German-speaking cantons in 2006 and the other from a full survey of the 2010, 2011 and 2012 cohorts at the Cantonal Baccalaureate School in Schaffhausen.

132 Student intake on STEM degree courses by special subject at baccalaureate school, 2012

Data: FSO (SHIS); Computations: SCCRE



A **STEM degree** refers to a STEM subject studied at a university or a university of applied sciences. The subjects include IT, technology (e.g. mechanical engineering), construction (e.g. architecture), natural sciences (e.g. chemistry, biology) and exact sciences (e.g. physics).

The transition from baccalaureate school to tertiary A education

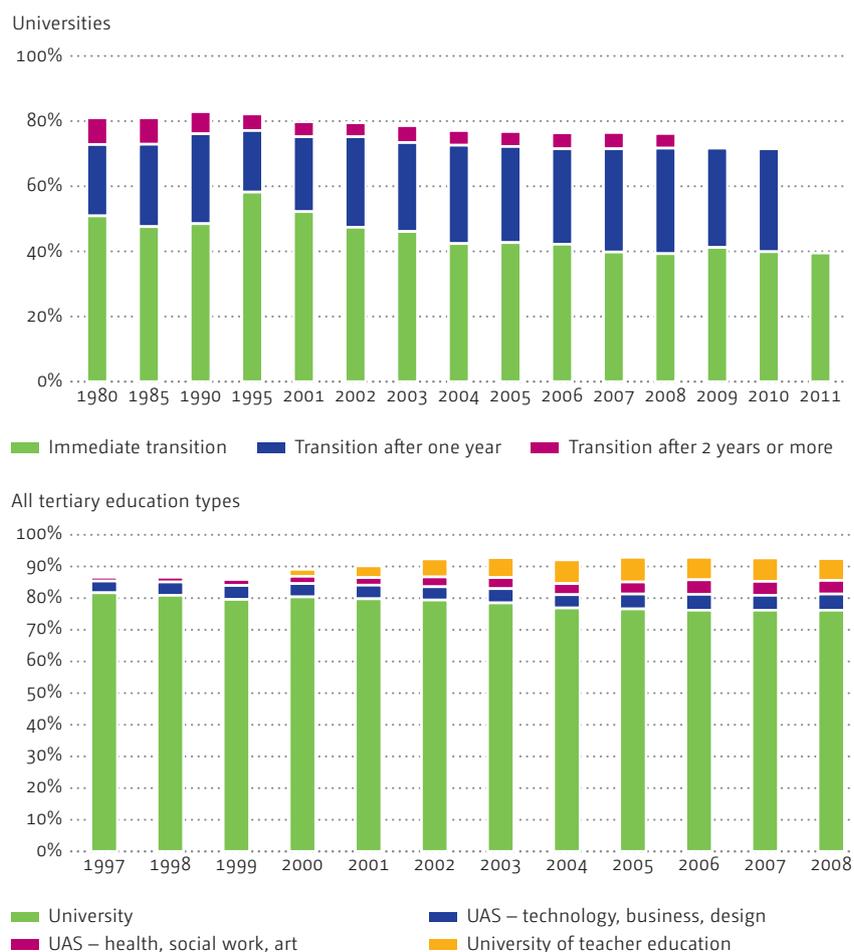
Transition rates must be treated with caution as measures of baccalaureate school effectiveness, because in Switzerland everyone who leaves a baccalaureate school with a baccalaureate certificate must be admitted to tertiary A education (exception: degrees in medicine at the Universities of Basel, Bern, Fribourg and Zurich and in some cases degrees in the sport and movement sciences).

Three-quarters of those who leave baccalaureate school with the qualification go on to university: 40% do so the same year, a little over 30% the following year. After that university transition rates fall to single-digit percentages. The rate for immediate transitions has dropped considerably over the last ten years, while the percentage of baccalaureate holders who wait a year has increased (→ top part of Figure 133). This delay in commencing studies has cancelled out the effect of shortening the baccalaureate cycle in many cantons, which had lowered the average age of students.

Women move from baccalaureate school to a conventional university at a much lower rate than men. That is because women opt more frequently for tertiary education outside the conventional universities, notably with a view to working as teachers or in the health sector. If this tertiarised training is factored in, then the transition rate to tertiary education is virtually the same for men and women, which, overall, is more than 92% (→ bottom part of Figure 133).

133 Transitions to tertiary education, 1980–2011 and 1997–2008

Data: FSO (SHIS)



Efficiency/costs

As with any education cycle, it is difficult to assess the efficiency of baccalaureate school education. Three problems arise when measuring efficiency and all of them are exacerbated in the case of baccalaureate schools. Firstly, we have no nationwide measurements of attainment at baccalaureate schools that might serve as output values. Secondly, not even outcomes such as transition to tertiary education or baccalaureate school drop-out rates can be used as a yardstick of effectiveness because pupil self-selection into different profiles or schools upon entry into the baccalaureate cycle already introduces variation into the conditions framing the performance of these schools. Thirdly,

for baccalaureate schools as for other education cycles, it is relatively difficult to compare canton inputs, whether in real or monetary terms. This prevents conclusions about the efficient or inefficient use of inputs from being drawn.

Annual investment

Despite reservations about comparability, the available financial data do permit the conclusion that investment in baccalaureate education varies greatly from one canton to another (→ Figure 134).

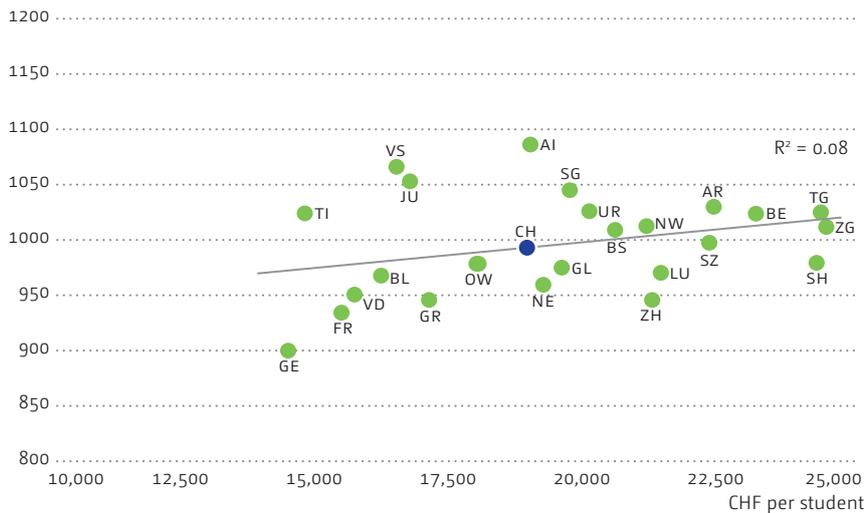
When extrapolated across the entire duration of the cycle, these big variations in spending generate cost differences per baccalaureate in the upper five-digit range. The differences are not easily explained. Presumably high spending suggests high input costs such as teachers' pay and vice versa. On the other hand, no correlation can be demonstrated between spending and the annual number of tuition hours in each canton (→ Figure 135).

135 Cantonal expenditure on baccalaureate schools and annual hours taught

Data: FSO, EDK-IDES

without Canton Aargau

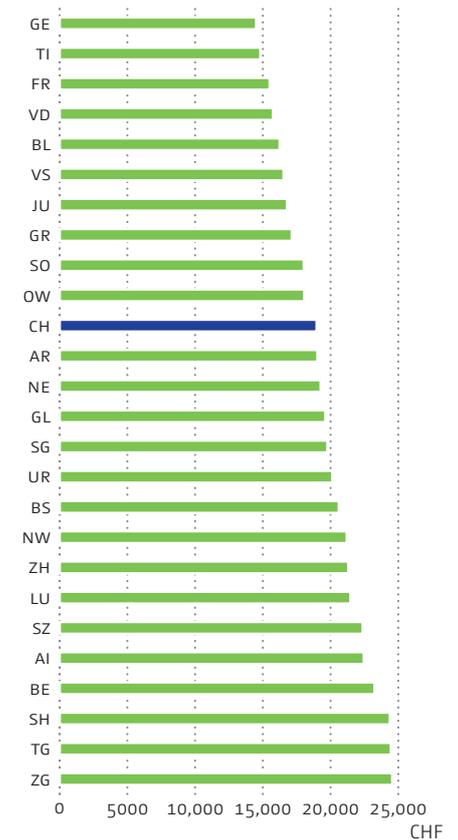
Hours taught in 2011/2012



134 Average expenditure per baccalaureate obtained, 2007

No data is available for Canton Aargau.

Data: FSO



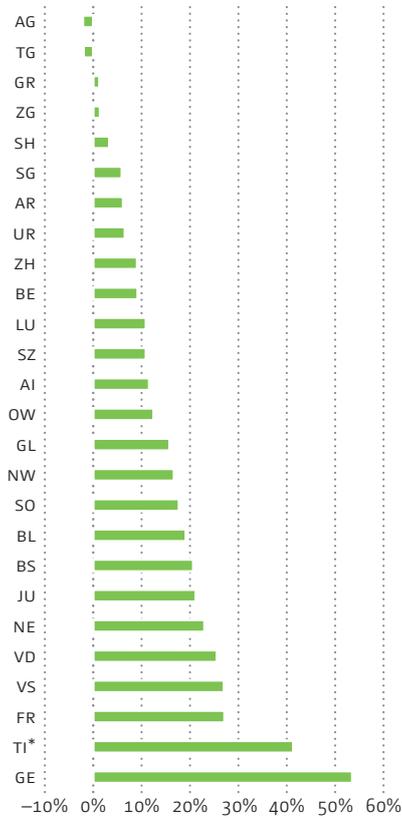
Premature exit from baccalaureate school

Premature exits from baccalaureate school suggest an inadequate match between the pupil and the school which is rectified by the exit. We cannot conclude automatically from this that baccalaureate schools with low drop-out rates encounter less problems with matching. This apart, drop-outs signify an efficiency loss for the individual concerned (more time spent in education) and for society (higher education costs) which might be avoided if the probability of drop-out could be reduced by improving selection at entry to baccalaureate school.

Switzerland does not keep systematic statistics on premature exits at baccalaureate school level. Accordingly there are no representative quantitative studies which investigate this phenomenon in Switzerland. Existing figures

136 **Premature exit from baccalaureate school**

Average of 8 cycles
Data: FSO



* According to calculations in the Canton of Ticino, the de-facto dropout rate is something like 25%. One reason for the overvalued figure shown above might be the fact that many students repeat the first year.

and estimates do show, however, that some cantons have a very high rate of baccalaureate school drop-outs. A study of Canton Vaud, for example, revealed an average rate of 20–30% (Stocker, 2006). Estimates of drop-out-rates can be made by comparing the number of pupils in the first year at a school with the number of baccalaureates awarded after an approximate standard duration (→ Figure 136).³ According to these calculations, the two cantons with the highest baccalaureate rates also have the most pupils leaving baccalaureate school without the qualification. In Canton Geneva about half the pupils entering the first year of a baccalaureate school do not complete their baccalaureate, and in Canton Ticino the figure is more than 40%, whereas in Canton Aargau virtually as many pupils complete the baccalaureate as began it. The slightly negative values can be attributed to arrivals from other cantons and other education establishments (such as upper-secondary specialised schools) after the first year of the cycle.

A survey in German-speaking Switzerland indicates that achievement problems are of secondary importance in the eyes of those who drop out (Stamm, 2010). The causes most frequently designated are motivation, conflicts with teachers or fellow pupils, and reorientation (Stamm, 2010).

Equity

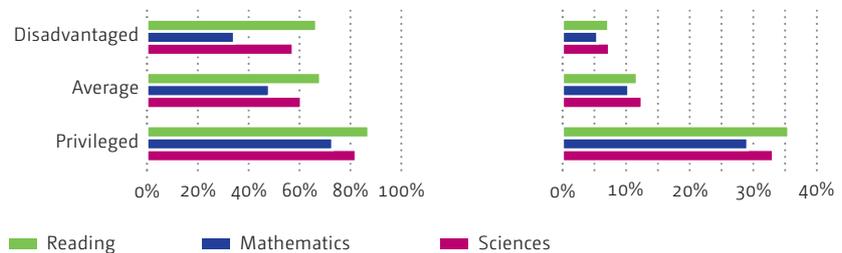
Equity can be examined at entry to baccalaureate school, within the cycle or at entry to tertiary education. At entry to baccalaureate school, the primary and secondary effects of educational disparity are of relevance. The primary effects derive from the socio-economic and cultural origins of pupils, which have a direct impact on attainment. The secondary effect of educational disparity manifests itself when, even with comparable levels of attainment, pupils from a certain social demographic or socio-economic category are under or over-represented (→ Figure 137).

137 **Socio-economic origin of pupils with very high (left) or broadly low (right) skills seeking transition to baccalaureate school after the 9th school year**

Data: PISA; Computations: SCCRE

Legend

About 80% of pupils with very high attainment levels in natural sciences who come from socio-economically privileged families wish to attend a baccalaureate school after their 9th school year. For pupils with the same attainment from disadvantaged families, the figure is just 60%.



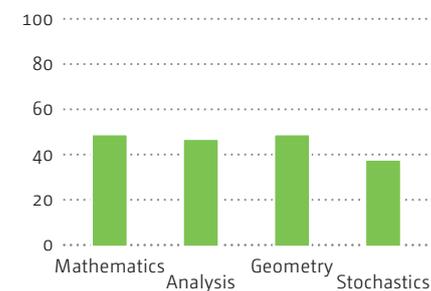
3 Major distortions in cantonal drop-out rates will only arise if cantons continually experience a big inflow or outflow of pupils from other cantons or schools (e.g. a specialised school, → Chapter on Upper-secondary specialised schools, page 157) between the first and last year at a baccalaureate school. However, calculations from individual data (pupil pathways) carried out by Cantons Geneva, Vaud and Zurich indicate similar drop-out rates to those shown here. It should be noted that these figures can fluctuate considerably depending on how the entry point is defined (e.g. first day at school or when the probation period ends).

Equity issues that might arise during the baccalaureate cycle due to different intensities of support, e.g. for boys and girls, are currently difficult to diagnose due to the lack of individual performance and longitudinal data.

Although EVAMAR II (→ Figure 138) showed that girls perform much worse than boys in mathematics at the end of the baccalaureate cycle, the reasons for the differences are not really clear, as they might result as much from different preferences as from different teaching input. Different abilities, on the other hand, can be virtually ruled out, especially as various studies have also revealed that girls often score worse than boys in maths exams even when they have the same level of mathematical proficiency (*Jurajda & München, 2011; Niederle & Vesterlund, 2010*). The potential for encouraging maths skills in girls has been demonstrated by recent research in Denmark, which showed that additional maths teaching produced a substantial improvement in the mathematical proficiency of girls compared with boys in the baccalaureate cycle (*Joensen & Nielsen, 2013*). This study showed that an improved understanding of mathematics in girls was later reflected in the form of better career prospects and higher pay. In other words, an equity problem arises because the current gap in mathematical skills, which can demonstrably be reduced, has a negative impact on educational and labour market prospects for women.

138 Boys' average score advantage in mathematics in EVAMAR II

Data: SERI (EVAMAR)





Upper-secondary specialised schools

Like the baccalaureate schools, upper-secondary specialised schools (FMS) form part of the general education system. Their forerunners were the *Diplommittelschulen* (DMS), upper-secondary schools leading to a certificate known as a diploma. These in turn had their roots in the old *Töchterschule* (for girls) and *Handelsschule* (commercial colleges). In the 1980s, guidelines for the recognition of DMS certificates together with the introduction of framework curricula led to the standardisation of this type of school (EDK, 1989). The name was changed as a result of the Federal Vocational and Professional Education and Training Act adopted in 2002 (BBG, 2002), which stipulates that only tertiary-level qualifications can be called diplomas.

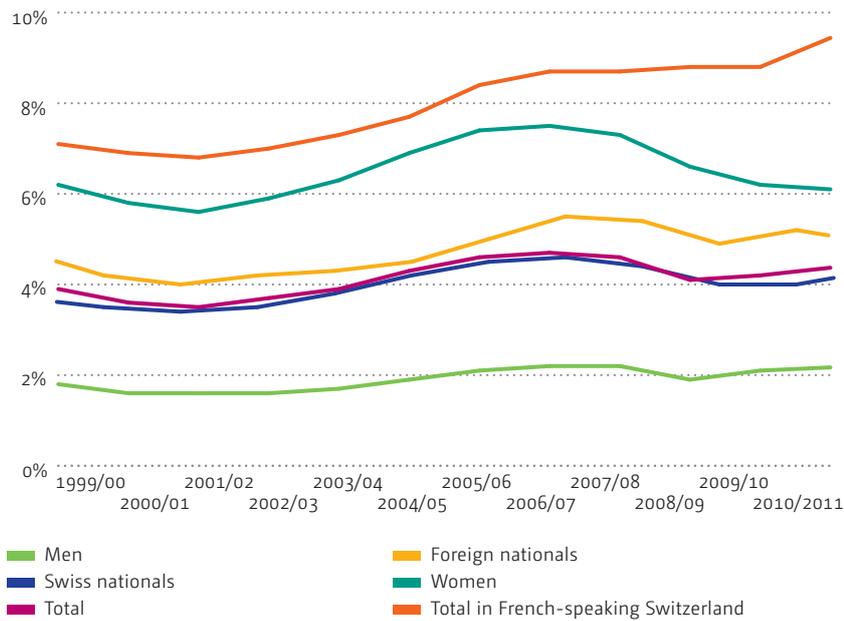
A general education with a diverse vocational focus

The old DMS functioned largely as a stepping stone to non-university tertiary training for pre-school teachers, paramedics and social workers (who cannot start training until they turn 18 years of age) (EDK, 1989), but once vocational training in the fields of health, social work and the arts (GSA) 2004 became the responsibility of the Confederation, and hence fell within the scope of the Vocational and Professional Education and Training Act, the training landscape for various GSA occupations shifted within the upper-secondary and tertiary sectors. At the same time, courses in health and care work opened the door for 16-year-olds to begin vocational training for employment in the health and social care systems (OPET 2012a). With GSA occupations largely relocating to the tertiary sector and access to GSA occupations now possible via vocational education formats, there was a need to modernise the old DMS approach. Today the upper-secondary specialised schools combine the strong earlier focus on general education with a variety of opportunities to consolidate knowledge in relation to specific occupations. This diversification of available subjects and profiles is primarily designed to secure access to tertiary level B professional education and training in a related field, but also to the universities of teacher education and applied sciences.

There are no up-to-date figures to show what schools young people attended before arriving at an upper-secondary specialised school. In 2008, two-thirds of the students entered straight from lower-secondary level. Most of these had been learning in a class with more advanced requirements. At the time, the proportion of students who had begun their upper-secondary education before transferring to a specialised school was almost 20%. Presumably a not inconsiderable number of these students came to the specialised school from a baccalaureate school. In Canton Bern, a study was carried out to compare the health specialisation at upper-secondary specialised schools with the 3-year course provided by VET colleges leading to qualification as a health assistant (*Fachangestellte Gesundheit, FaGe*). Over 95% of those who successfully completed the health specialisation had previously attended a lower-secondary class with advanced requirements. Among those who completed the VET training, about half had passed through a class with standard requirements at their lower-secondary school (Battaglia & Pfister, 2012).

139 Percentage of upper-secondary students attending specialised schools, 1999–2010

Data: FSO; computations: SCCRE



About 4% of all upper-secondary school students (basic vocational training and general education) attend a specialised school (→ Figure 139). In the French-speaking cantons, the proportion is significantly higher (9%), and it has continued to rise over the last decade. In other words, the region's preference for fully school-based options at upper-secondary level is reflected not only in enrolment figures for school-based initial vocational training and for baccalaureate schools, but also in enrolment figures for specialised schools.

The fact that the majority of those attending specialised schools are female derives from the vocational profiles to which these schools have hitherto been geared, most of which were traditionally women's occupations. The spectrum of profiles is broader nowadays. Nevertheless, in the 2010/11 academic year, about three-quarters of the students were female. Foreign nationals are also slightly over-represented at the specialised schools compared with their share of the overall upper-secondary population. It is, moreover, evident from the 2009 PISA data that young people whose parents come from one of Switzerland's neighbouring countries are more likely to attend a specialised school.

Upper-secondary specialised schools and their profiles

There are 59 upper-secondary specialised schools in Switzerland offering full-time general education (figure for January 2013). In 13 cantons these schools are attached to a baccalaureate school; this applies to two-thirds of all specialised schools.

140 Geographical distribution of upper-secondary specialised schools

Source: www.fms-ecg.ch; map: Swisstopo

Cantons with

| | |
|--------------------------|----------------------------|
| □ No specialised schools | ■ 2–4 specialised schools |
| ■ One specialised school | ■ 5–10 specialised schools |

According to the rules for the recognition of upper-secondary specialised schools adopted by the Swiss Conference of Cantonal Ministers of Education (EDK), which were a driving force behind the introduction of the FMS format and – since August 2007 – the replacement of the old DMS format, the specialised schools are to pursue the following objectives:

- expand on a student’s general education,
- encourage character formation by strengthening social and personal skills,
- offer subjects related to vocational fields,
- assist with career choices,
- prepare students to enter non-university tertiary education, and
- award a specialised school leaving certificate and a specialised baccalaureate geared to a specific vocational field or a specific course in non-university tertiary education (EDK, 2003).

The task of the upper-secondary specialised schools is thus both to provide a more in-depth general education and to prepare students for the vocational fields associated with social work, information and communication, design and art, music and theatre, applied psychology or education science. With these occupations in mind, the specialised schools offer a variety of courses. The content is set out in the Framework Curriculum for Upper-Secondary Specialised Schools (EDK, 2004). The guidelines for the baccalaureate in education science were revised in 2011 and partially reformulated to reflect competence-based approaches. Minor adjustments were also made to examination procedures. The new version entered into force in 2013 (EDK, 2012c).

Attendance at a specialised school leads, after three years, to a leaving certificate in one of the six vocational areas. This leaving certificate entitles the holder to admission to an appropriate PET college at the next level. It

takes another 8 to 12 months to obtain the specialised baccalaureate (EDK 2003, 2004). This grants access to specific degree courses at the universities of applied sciences, and it has now also been established at federal level as one option for fulfilling the admission criteria set out in the new Act on Funding and Coordination of the Higher Education Sector (HFKG, 2011).

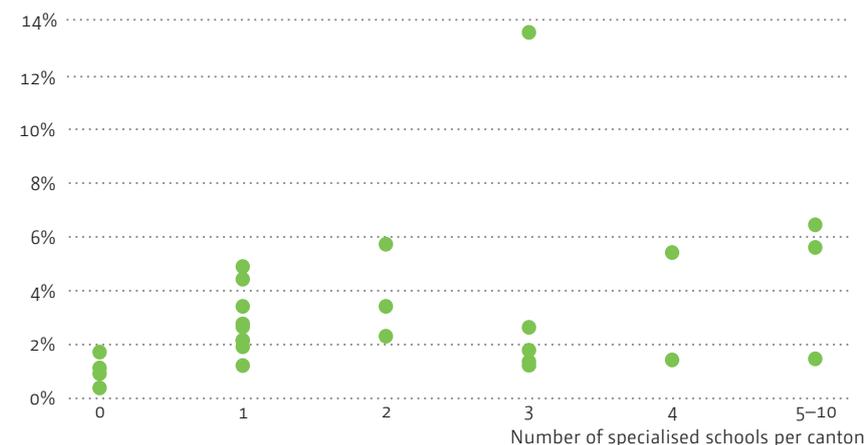
There are usually two ways to qualify for admission from an upper-secondary specialised school to a university of teacher education: either by taking the specialised baccalaureate in education science or by obtaining the specialised school leaving certificate and then «demonstrating baccalaureate equivalence by passing a supplementary examination prior to commencing studies» (EDK, 1999). Using the specialised baccalaureate in education science to gain access to training as a pre-school teacher, and to some extent as a primary school teacher, without taking an examination is now the standard practice in many places. The exceptions are the cantons of Geneva, Ticino and the German-speaking area of the canton of Bern (Battaglia & Pfister, 2012).

The health, social work and education profiles are offered in all cantons barring a few exceptions (four cantons do not have any specialised schools: AI, NW, OW, UR). Pathways into the other three vocational fields, or at least into one of them, are only available in half the cantons. Specialised school provision, and in particular courses leading to the specialised baccalaureate, has expanded considerably in recent years. In 2009, the specialised baccalaureate was only available in 14 cantons. In 2013, seven cantons offered a specialised baccalaureate in at least four vocational fields, while only one of the 22 cantons where specialised schools operate had no provision for the specialised baccalaureate.

141 Specialised school certificates as a percentage of all upper-secondary certificates

Data: FSO, Swiss FMS

Certificates from specialised schools

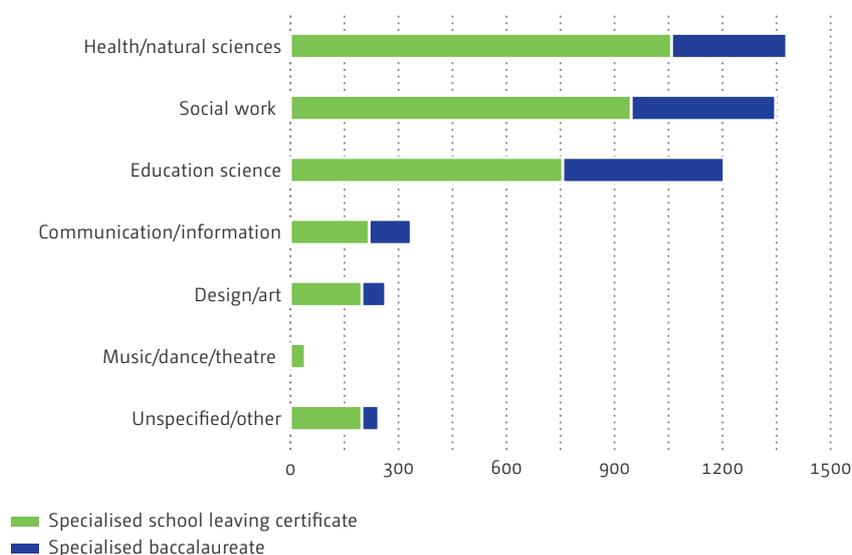


The number of specialised school certificates as a percentage of all upper-secondary certificates in a canton ranges from 0.5% to almost 14% (→ Figure 141). Most of the certificates are awarded in the health, social work and education profiles, which – as outlined above – are available almost everywhere (→ Figure 142). It is unclear for the time being whether the different levels of provision in the cantons influence the percentage of young people obtaining a certificate (for the geographical distribution of upper-secondary specialised schools → Figure 140).

142 Number of specialised school leaving certificates and specialised baccalaureates broken down by vocational field, 2010

The data for 2011 was not used due to incomplete data from some cantons.

Data: FSO



In the last decade, between 86% and 98% of students who sat the specialised school leaving examination passed it, with a consistent gap between German-speaking and non-German-speaking Switzerland. Given that the certificates are not standardised, and that there is no way to monitor student selection at entry, high pass rates cannot automatically be read as an indication that the training is more effective in the German-speaking areas. Nor is it possible, given the lack of individualised data, to evaluate how frequently an exam failure results in a drop-out from upper-secondary education or what percentage of the cohort entering a specialised school or any other form of upper-secondary education ultimately obtains a post-compulsory qualification.

The objective pursued by specialised schools of preparing students for courses in non-university tertiary education and awarding the appropriate certificates is the key to assessing the effectiveness of the education they provide. However, because of gaps in the data on individual pathways, it is impossible to draw conclusions for Switzerland as a whole as to whether a majority of students move on to courses in non-university tertiary education after completing their education at an upper-secondary specialised school. The cantons of Aargau, Bern, Geneva and Schaffhausen serve as examples to show that the upper-secondary specialised schools do perform a function in providing prospective students for the universities of applied sciences and the universities of teacher education.

Among the 150 students who obtained their leaving certificate after three years at an upper-secondary specialised school in the canton of Aargau in 2012, 70% intended to stay on at the specialised school in order to work for their specialised baccalaureate. Among the 44 students who left a specialised school with the leaving certificate, three-quarters intended to transfer to a baccalaureate school to complete their baccalaureate. The others opted to enter a PET college or to begin vocational training. Of those who had obtained their specialist baccalaureate, four-fifths began a course in tertiary education.

About half of these intended to transfer directly. Teaching was the most popular choice of vocation, followed by social work → Figure 143; *Aargau, 2012*).

In the canton of Bern in 2009, 78% of students who left a specialised school with the leaving certificate (N = 54) had begun tertiary training within eighteen months (university 43%, university of applied sciences 20%, university of teacher education 17%). It should be borne in mind that specialised schools in the canton of Bern do not offer education science as a vocational option, which might explain the relatively low percentage entering teacher training. Two percent had transferred to a baccalaureate school (*Gnos, 2011*).

In Canton Geneva in 2009, 70% of students who left a specialised school with a leaving certificate (N = 503) were in training 18 months later; 16% reported that they were in employment and another 13% were either unemployed or did not respond. Of those in training, about half had acquired a specialised baccalaureate between obtaining the leaving certificate and the time of survey and were continuing their training at a university of applied sciences. The other half were engaged in basic vocational training (26%), attending an upper-secondary specialised school in order to acquire a specialised baccalaureate (17%), had entered a PET college (2%) or were enrolled in unspecified tertiary education (5%). Of those who had obtained a specialised baccalaureate 18 months previously (N = 121), 70% were attending a university of applied sciences. 12% were in training at a PET college and 5% were in employment. The remaining 13% were engaged in unspecified training or looking for work or else did not respond. Of those among the surveyed population who were enrolled at a university of applied sciences, 75% were studying social work. As the specialised baccalaureate does not entitle holders to enter teacher training in Canton Geneva, unlike in other cantons, teacher training does not feature in the statistics (*Davaud & Rastoldo, 2012*).

About 70% of the students who obtained a leaving certificate from an upper-secondary specialised school in Canton Schaffhausen in 2011 or 2012 (N = 65), wished to follow this up with a specialised baccalaureate. The biggest group of those who had left was ultimately planning to train at a university of teacher education (31%), and the second-biggest group hoped to enter a university of applied sciences to study social work (22%).

It is very difficult to perform any analysis of how effectively outcomes such as labour market success were achieved. This is due to the low numbers of students attending the upper-secondary specialised schools. Analyses based on random samples (such as the Swiss Labour Force Survey) include too few subjects who completed an education at these schools to draw robust conclusions.

As there are currently no figures available on the costs of training, the efficiency of the upper-secondary specialised schools cannot be ascertained.

The only statistics on equity are those from the 2009 PISA study. Of those students who indicated that they would like to enter an upper-secondary specialised school, 40% came from privileged families and 30% each from families in the lowest two categories of socio-economic status (SEI). In terms of socio-economic origin, the specialised school population lies between those who attend baccalaureate school (60% from families of high socio-economic status) and those who enter an apprenticeship.

143 Percentage distribution of subjects chosen at UAS by holders of specialised baccalaureates, canton of Aargau, 2012

Data: BKS Aargau





Tertiary-level education

Cross-cutting themes

In keeping with the international classification (ISCED 97) still applicable at the time this report went to print, tertiary education in Switzerland is composed of a tertiary sector A (ISCED 5A) and a tertiary sector B (ISCED 5B). Tertiary sector A falls essentially into three types: a) the conventional universities, which essentially means the cantonal universities and the federal institutes of technology (ETH); b) the universities of applied sciences (UAS); and c) the universities of teacher education (UTE). Tertiary level B, providing an advanced level of professional education and training (PET), embraces both formal training at PET colleges and a range of advanced diplomas of vocational and professional education for which candidates are able to prepare within an informal framework of initial and continuous training (→ *Chapter on Continuing education and training (CET)*, page 259). In this section, any teacher training provided at the universities of applied sciences is dealt with together with the universities of teacher education.

Almost two thirds of students pursuing higher education in tertiary sector A are enrolled at conventional universities, almost a third at universities of applied sciences and about 7% at universities of teacher education (→ Figure 144). The latter resemble universities of applied sciences in terms of their typology, except that they are governed in every respect by cantonal law (→ *Chapter on Universities of teacher education*, page 221). Structuring these tertiary A institutes into different types of university is a declared aim of Swiss higher education policy (see Section 3 (b) and (c) of the Federal Act on Funding and Coordination of the Higher Education Sector; *HFKG*, 2011).

This section will, above all, draw comparisons between these different types of university. One reason for this is the available data, as these tertiary A institutes tend to be the only ones providing sufficient data to permit comparison. Moreover, a comparative description has now been facilitated by the Federal Act on Funding and Coordination of the Higher Education Sector (HFKG) of September 2011, which, for the first time, sets out the same rules for each university type. Common decision-making bodies in higher education have accordingly been set up: the Swiss University Conference as a policy body (with a Council, which is a conference of funding cantons and the Federal agencies, and a Plenary, which is a conference of all cantons and the Federal agencies), the Rectors' Conference as an academic body and the Swiss Accreditation Council as a quality assurance body with its own accreditation agency.

In this report, emphasis is placed on three different types of university, which differ in terms of their institutional structure as well as in terms of the content of their degree programmes:

- Conventional universities have the right to issue doctorates. They are run by the cantons or the Confederation, with the admission requirement being a Baccalaureate.
- Universities of applied sciences (UAS) are vocationally-oriented universities run by the Confederation. Admission is frequently based on the Federal Vocational Baccalaureate.
- Universities of teacher education (UTE) are related to the UAS but organised and funded by the cantons. The admission requirement is a Baccalaureate.

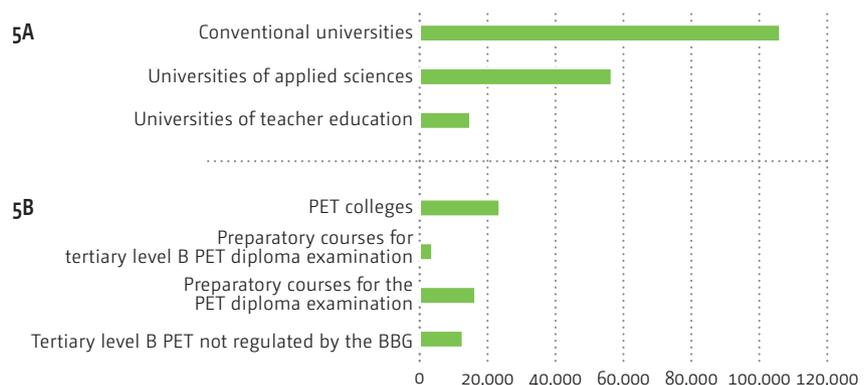
144 Students by type of tertiary education, 2011

Tertiary A only includes Bachelor's, Master's and Lizenziat/Diplom courses.

Teacher education at universities of applied sciences is included under universities of teacher education.

BBG = Federal Vocational and Professional Education and Training Act

Data: FSO



Comparative education status of the population

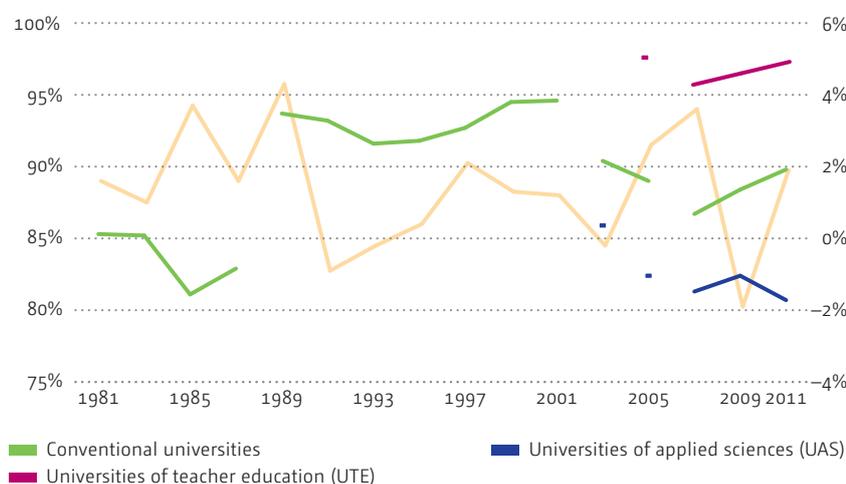
With a higher education (tertiary A) rate of 24% among the employable population, Switzerland ranks midfield on an international scale when it comes to the educational qualifications of adults. The same can be said for the tertiary B rate. If the two are added together, easily one person in three in Switzerland holds a tertiary qualification. The higher education rate in the Anglo-Saxon and Nordic countries, in particular, tends to be higher (→ Figure 145). When making such comparisons, however, it is important to bear in mind the context established by the national education system. In Switzerland, training for certain professions that may have been broadly tertiarised in other countries begins in a dual system at upper-secondary level (health professions and child care are examples). The spread of tertiarisation is reflected in the fact that the higher education (tertiary A) rate among the younger generation (25 to 34 years) is almost one third higher than for the population as a whole (→ Figure 146). However, the expansion of education among the younger generation is not proceeding at the same pace in all over the world: whereas in some countries (Germany, United States, Canada) the tertiary A rate has hardly increased, in others (Finland, Italy, France) it is rising fast.

It should be pointed out when performing such comparisons that the percentage of persons with a tertiary education tells us nothing about the quality, effectiveness or efficiency of an education system in relation to the usefulness of acquired skills in the labour market. The tertiary rate of a country cannot, therefore, be regarded purely and simply as a quality indicator for an education system.

Given the increase in tertiarisation rates in recent years (especially in the tertiary A sector), it would also be useful to ascertain whether this tertiarisation is a response to labour market needs or the result of dynamics inherent within the education system to which the labour market has to adapt.

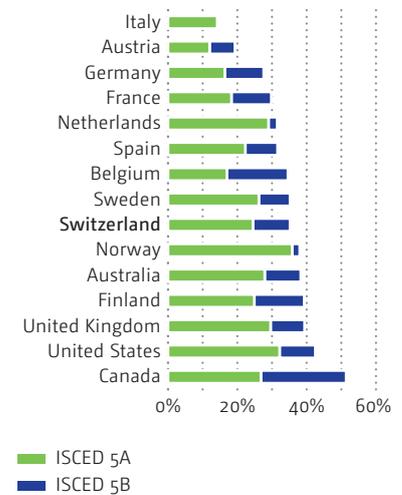
147 Percentage of employed graduates in appropriate jobs one year after graduation, 1981–2011

Conventional universities: only 2nd-cycle graduates (*Lizenziat, Diplom, Master's*).
 UAS/UTE: 1st-cycle graduates (*Bachelor's, Diplom*) who have not begun a Master's course at the time of survey and 2nd-cycle graduates. Gaps in lines indicate changes in survey questions; direct comparisons between these years are therefore impossible.
 Data: FSO (Graduate Survey); computations: SCCRE



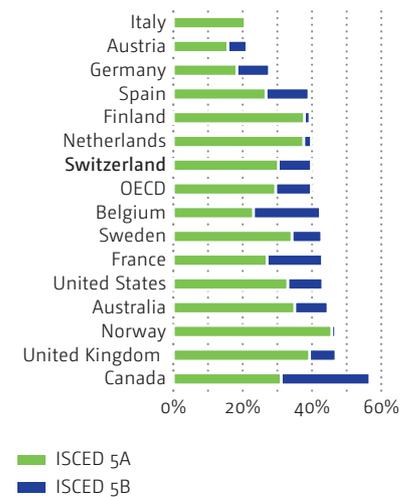
145 Percentage of 25 to 64-year-olds with tertiary education, 2011

Data: OECD



146 Percentage of 25 to 34-year-olds with tertiary education, 2011

Data: OECD



Employment is defined as appropriate to training if it a) requires a tertiary A degree or b) displays a clear match with professional skills acquired during tertiary A education (scores of 4 and 5 on a scale from 1 «not at all appropriate» to 5 «extremely appropriate»).

■ Year-on-year change in real GDP (right axis)

We can observe in the case of Switzerland that the growth in student numbers attending higher education has not led to poorer levels of labour market matching → Figure 147). The percentage of tertiary A graduates who have a job requiring a tertiary A qualification is merely subject to cyclical variations. The somewhat lower rate of graduates from universities of applied sciences who have found jobs to match their training¹ may, in part, result from the fact that access to vacancies in certain fields is also possible via basic vocational training (with CET) or tertiary level B professional education and training (PET), so that a tertiary A degree is not an essential requirement (→ *Chapter on Universities of applied sciences, page 205*).

Skilled labour shortage

Depending on the economic cycle, and on technological and demographic trends, there is great demand on the labour market for highly qualified specialist labour. However, there has been no indication in the last 20 years that this shortage of skilled labour is becoming generally more acute (*FDEA, 2011a*), which may be partly due to the fact that Swiss companies have been able to recruit many skilled workers from EU and EFTA countries.

There is much debate in the media and politics about a shortage of labour in the STEM disciplines (science, technology, engineering, mathematics) (→ *Chapter on Baccalaureate schools, page 139*) and in the health system. This is certainly structural, but it is also subject to major cyclical fluctuations, i.e. much of the skilled labour shortage is a consequence of the upbeat economy over the last decade (*Gehrig, Gardiol, Schaerrer, 2010*) and will only persist for as long as the economy continues to prosper. To make up for the shortage of skilled nurses, computer scientists/software programmers and mechanical engineers, a system of indicators developed by *B,S,S. and Sheldon (2009)* for federal agencies highlights the significance both of skilled workers coming to Switzerland from abroad (in the field of health) and of drawing on skilled workers from related fields (in information technology). There is a down side to drawing on skilled labour from related fields, as illustrated by the mechanical engineers, because there would actually be a sufficient supply of qualified workers in this field had they not found employment in other occupations after taking their degrees. Studies conducted abroad confirm this observation for other fields as well. There is British data, for example, which shows that three years after completing their studies fewer than 50% of university graduates in medicine, the natural sciences and the exact and technical sciences are engaged in scientific employment in the fields they studied, even though in the United Kingdom the pay in these fields is higher on average than in the other types of employment (*Chevalier, 2012*). Furthermore, a study based on data from different OECD countries (*Flabbi & Tejada, 2012*) has observed substantial gender gaps. Whereas 71% of male university graduates who studied a STEM discipline take their first job in the fields of physics, mathematics or engineering, the figure for female graduates is only 43%.

¹ «Business administration and services» exert a particularly strong downward pressure on the average rate, followed to a lesser degree by «design and music» and «theatre and other arts».

In Switzerland, some of the shortage of skilled STEM workers can be attributed to an inadequate supply coming out of the universities. By international comparison, the proportion of STEM graduates among all tertiary A graduates in Switzerland (→ Figure 148) is a little below the average. It is also striking that the ratio of women to men in Switzerland is much less balanced (1:4) than in many other countries, where only two or three times as many men graduate as women.

If there is a shortage of skilled labour, we might expect this to be reflected in rising wages for the occupations concerned. We can see from the trends in starting pay for tertiary A graduates in the last 10 years that wages did, indeed, tend to rise faster than average in occupations in the health sector (→ Figure 149). However, in information science and engineering the increase in pay is not consistently robust. This bears out earlier findings (*B,S,S. & Sheldon, 2009*) suggesting that it is inaccurate to generalise about acute shortages of skilled labour across all these fields. Neither should the shortage of skills in specific STEM occupations tempt us to assume that the supply of STEM workers is consistently too small across all STEM areas, as the demand for subsets of the STEM disciplines is very uneven. Based on the survey of tertiary A graduates in 2011 (sample parameters as described in Figure 149), one year after completing their studies, one in six graduates (male or female) in biology, geography and IT (from the conventional universities) and architecture, construction and planning (from the universities of applied sciences) had a job that did not require a tertiary A degree. For IT graduates coming out of the universities of applied sciences and for environmental engineers, the proportion is even higher at 30% and 40% respectively. The high proportion of IT graduates who do not find jobs to match their education may be due in part to the fact that many of them are engaged in related employment while studying for their degrees and frequently remain in their existing job after graduating (*FSO, 2013c*). The reason for that may be that, in the IT sector, graduates can on average earn the same amount of pay by remaining in a job with lower skill requirements as by switching to a new job to match their qualification.

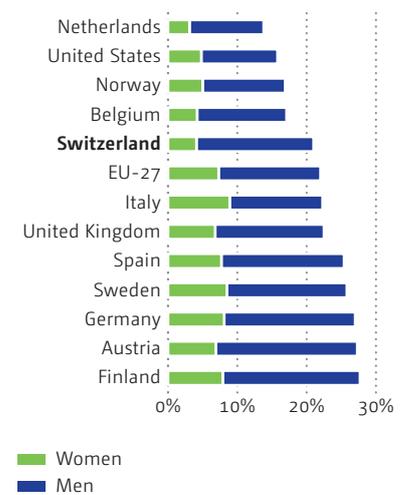
The transition to higher education

The binary structure of the Swiss education system – i.e. its division into a sector pursuing general education and a sector pursuing vocational education and training – is also reflected in pathways of access to higher education (tertiary sector A). About three quarters of those who obtain their baccalaureate from a baccalaureate school wish to study at a conventional university, while the great majority of those who obtain a federal vocational baccalaureate and enter higher education opt to study at a university of applied sciences (→ Figure 150). Hybrid pathways – i.e. a general education format at upper-secondary level followed by a degree at a university of applied sciences or a basic vocational education followed by a degree at university – are not so common, but thanks to the permeability of the education system they are by all means feasible. Studies indicate that hybrid pathways are seen as adding value to qualifications, and so there is a demand for them in the labour market, where they are correspondingly rewarded (*Tuor & Backes-Gellner, 2010*).

A year after completing their baccalaureate at a baccalaureate school, a good 70% of these school leavers have transferred to a conventional univer-

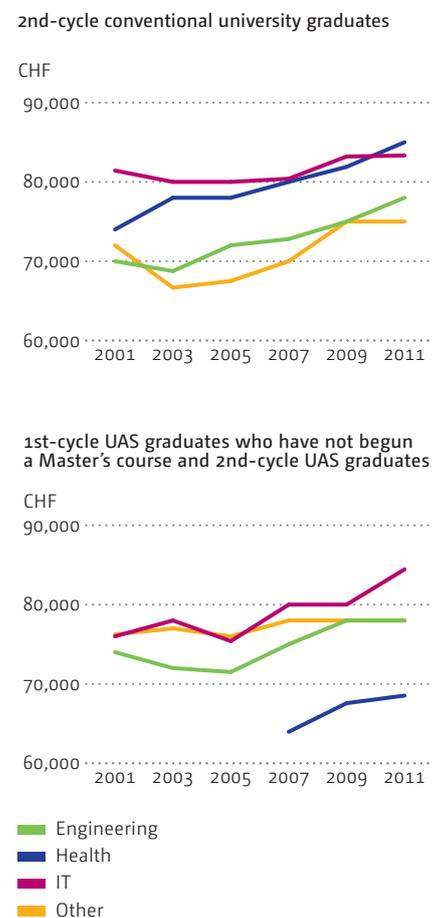
148 STEM qualifications as a percentage of all qualifications (ISCED 5 and 6), 2011

Data: Eurostat



149 Earned income of tertiary A graduates one year after graduation, 2001–2011

Median values for standardised gross earnings. Occupational categories according to Swiss Standard Classification of Occupations 2000
Data: FSO (Graduate Survey); computations: SCCRE



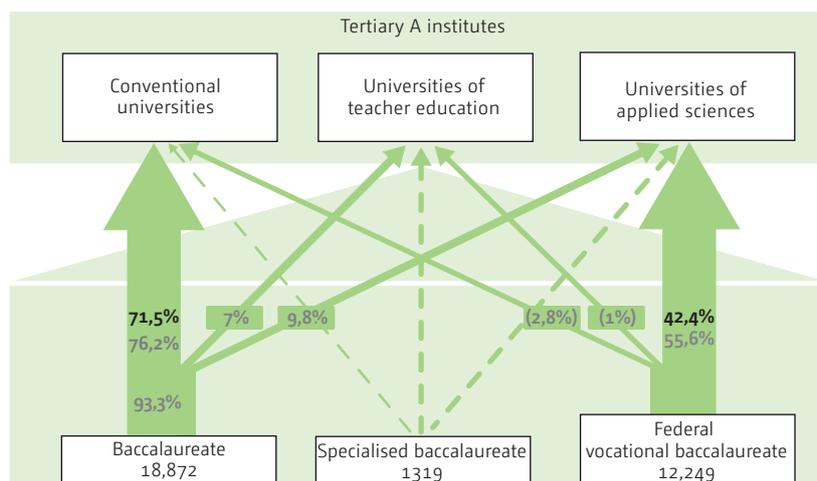
sity (→ *Chapter on Bacculaureate schools, page 139*). If we then add almost 5% who begin their university degree later, we obtain an overall transition rate of around three quarters of all holders of this type of bacculaureate. Combined with the 7% who study at a university of teacher education and the 10% or so who enter a university of applied sciences, we have a transition rate from bacculaureate schools into the tertiary A sector of 93%. This rate has been comparatively stable since 2002; there have merely been some minor shifts between the types of institute chosen. Transitions to universities of teacher education or applied sciences have increased a little at the expense of the conventional universities (*FSO, 2013b*).

Among those who pass their federal vocational bacculaureate, the transition rate is considerably lower, and there is a noticeable time lag before entering a university of applied sciences: more than 13% delay their tertiary studies for two or three years. Altogether the transition rate for federal vocational bacculaureates is about 56% (*FSO, 2013b*).

150 Transitions to tertiary A education, 2010 cohort

Transitions up to 1 year after bacculaureate in 2010

Data: FSO



Numbers in grey: total transitions for 2008 cohort; numbers in parentheses are derived from older cohorts; statistics for specialised bacculaureates are not yet available

Transitions and permeability within the tertiary A system

Now that degree courses have been modularised by the Bologna system (with two cycles leading first to a Bachelor's degree and then to a Master's degree), students today have many different opportunities to change the place and direction of their studies, and they can transfer credits they have already acquired to continue their education elsewhere. This applies in particular to switching from one university location to another, but also to switching from one type to another, such as from a conventional university to a university of applied sciences or vice versa.

The conditions which permit this flow within the higher education system are set out in agreements drawn up by the three Rectors' Conferences (*CRUS, KFH, COHEP, 2007, 2010*). Under this agreement, students complet-

ing their Bachelor's degree are, on principle, entitled to switch to a different type of tertiary A institute to study for their Master's degree as long as they obtain the requisite additional 60 ECTS. Nevertheless, the proportion of Bachelor's degree holders who go on to acquire their Master's degree at a different type of institute is still low, albeit growing (FSO, 2012d) (→ Figure 151).

It is important to bear in mind that for most subjects studied at the universities of teacher education and universities of applied sciences, a Bachelor's degree is the standard qualification and is regarded by the labour market as an indication of ability to work in the profession concerned. Most Master's courses offered by these institutes are therefore opportunities for specialisation. As a result, enrolments for Master's degrees at universities of applied sciences and universities of teacher education reveal far more heterogeneity than at conventional universities in terms of the first cycle from which these students have transferred.

The universities of applied sciences recruit a large percentage of Master's students abroad, especially in the field of music. At the universities of teacher education, almost 30% of Master's students do not have a Bachelor's qualification from an academic institute. This is above all the case for those taking specialised courses in special needs education: diplomas from the institutions which used to train teachers in the past are accepted here as proof of eligibility.

The **Bologna system** divides tertiary A education into three cycles:

- 1st cycle: Bachelor's
- 2nd cycle: Master's
- 3rd cycle: Doctorate (PhD)

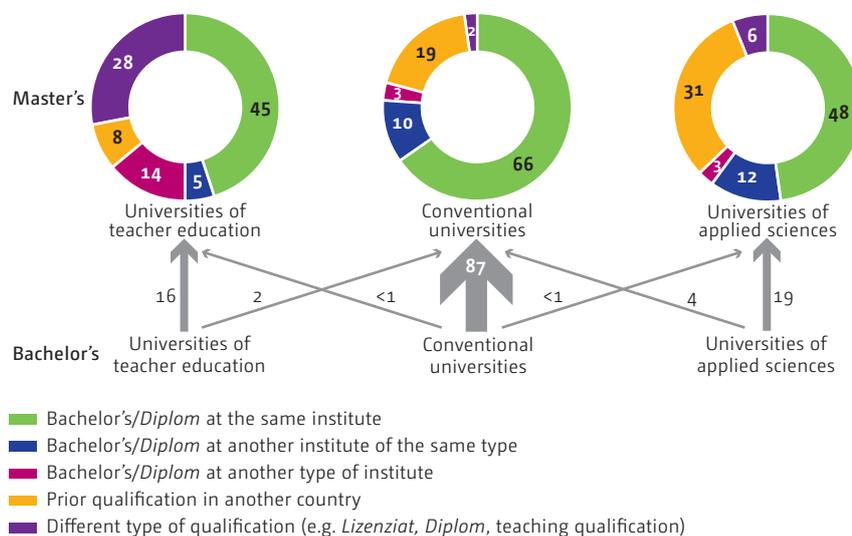
University degrees of the *Lizenziat* and *Diplom* type qualify as 2nd cycle.

Doctorates can only be granted by conventional universities. Partnerships in the form of joint PhD programmes nevertheless exist between universities and universities of applied sciences or teacher education.

151 Master's intake and permeability between tertiary A institutes, 2011

Data: FSO

Percentages



Public responsibility and funding

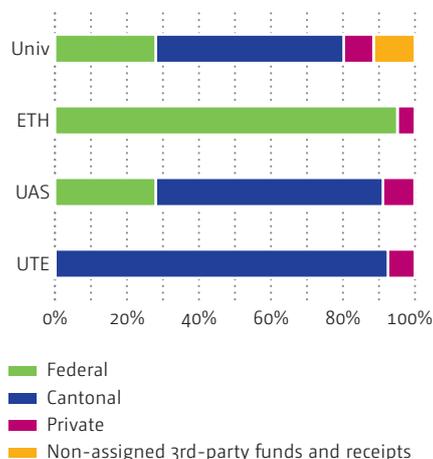
The federal and cantonal authorities bear joint responsibility for the higher education sector. Accordingly, they both play their part in the predominantly public funding for the higher education system. The FSO calculated that the total cost of higher education in 2010 amounted to 9.5 billion Swiss francs. Three-quarters of this was incurred by the conventional universities, about a fifth by the universities of applied sciences, and the rest by the universities

152 Source of funds for regular teaching, 2011

Univ.: cantonal universities, excluding ETH;

UAS: public only

Data: FSO



Types of activity as defined by the Federal Statistical Office (FSO)

Teaching

All activities primarily devoted to teaching students (Bachelor's, Master's, *Diplom* and doctoral) and related tasks. A distinction is drawn between regular teaching (Bachelor's and Master's cycles) and more advanced teaching (doctoral students).

Research and development (R+D)

Systematic, creative work to expand knowledge and draw on it to identify new applications and/or contribute to a restructuring of knowledge.

Continuous education and training

All activities involved in the provision of continuous education and training for students wishing to follow up their initial diplomas.

Services

All academic and non-academic activities of a predominantly routine nature which are related to neither research and development nor teaching and which primarily target an audience outside the tertiary A institutes.

of teacher education. At the conventional universities, more than half of this funding is used for research and development; at the universities of applied sciences and teacher education, the emphasis lies on regular teaching, which accounts for a good two thirds of the resources (FSO, 2012b). The principle is that the public agency responsible for provision assumes the bulk of the costs; for the federal institutes of technology (ETH), the source is therefore the Swiss Confederation, while for the universities (Univ.), the universities of applied sciences (UAS) and the universities of teacher education (UTE) it is the cantons (→ Figure 152).

Under the new legislation governing higher education, the Confederation will provide the cantonal universities with basic contributions, money for investment in construction and for the use of buildings, and project-related funding. For cantonal universities the Confederation will assume 20% of the overall reference costs, and for universities of applied sciences 30% (Para. 50 HFKG). The universities of teacher education, which lie entirely within the responsibility of the cantons, will not receive any basic contributions from the Confederation. Federal funding only flows into these institutes in the form of third-party funding for research projects or (following the entry into force of the HFKG) in the form of project-related federal funding.

The amounts transferred by the cantons are derived from the Intercantonal Agreement between the Universities (IUV) and the Intercantonal Agreement between the Universities of Applied Sciences (FHV), under which the cantons undertake to pay contributions for students from their territory to the cantons responsible for the academic institutes these students attend. In the case of the conventional universities, the amount depends on the chosen faculty, and faculties are grouped into three categories for this purpose: for the humanities and social sciences, for business administration and services and for law, it is about 10,000 Swiss francs, for the exact, the natural and the technical sciences and pharmacy, and for the first two years of medicine, it is about 25,000 Swiss francs, and for medicine from the third year onwards it is approximately 50,000 Swiss francs.

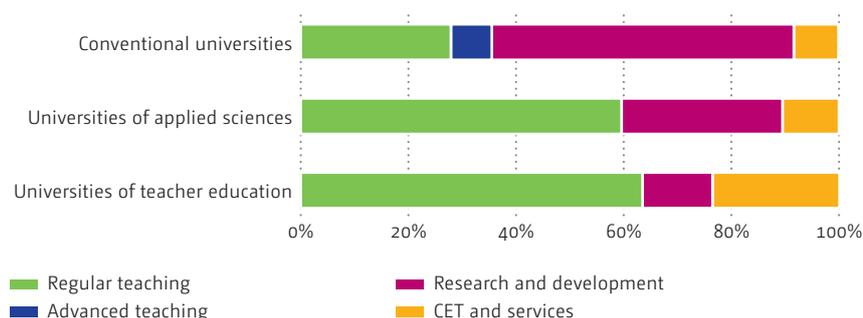
Types of activity

The different profiles of these types of universities, already evident in their cost structures, is similarly reflected in the work performed by staff (→ Figure 153). Whereas most academic staff at the conventional universities are engaged in research and development, that is far less the case at the universities of applied sciences and teacher education. As the differentiated tertiary A system would suggest, the primary activity in the non-conventional universities (UAS and UTE) is emphatically the basic provision of training. Another feature of the universities of teacher education is their relatively substantial involvement in continuous education and training, in particular the provision of regular updates for teachers on behalf of education authorities in the cantons.

153 Breakdown of activities by type of university, 2011

Measured in full-time equivalents (FTE) of academic staff, excluding administration and central services

Data: FSO

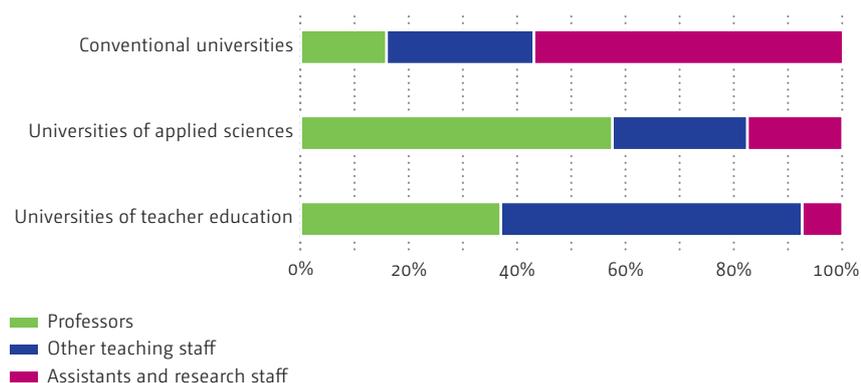


Human resources

The structure of human resources illustrates differences in the operational framework, tasks and institutional characteristics of these three university types. While the ratio of professorships to other academic staff (lecturers and research assistants) is about 1:3.5 at the conventional universities, at the universities of teacher education and applied sciences the pattern is reversed, with five or at least three professors respectively for every other member of the academic staff (→ Figure 154). However, when drawing such comparisons we need to bear in mind that these designations have different meanings at different types of institute. Professors, and also other members of the teaching staff, have different roles and functions, depending whether they work at a conventional university, a university of applied sciences or a university of teacher education.

154 Academic staff (FTEs) in regular teaching, 2011

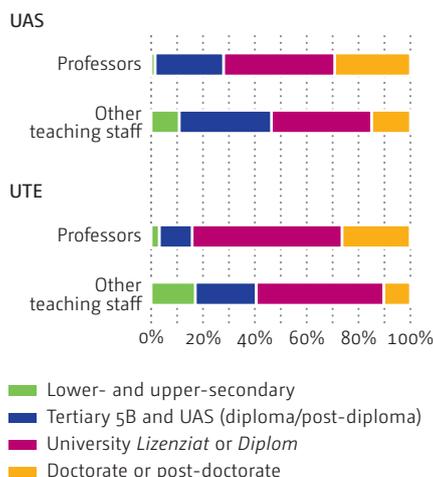
Data: FSO



There are major differences between these types of universities when it comes to the functions, qualifications, working hours, professional origins and research activity of academic staff. Whereas teaching assistants and lecturers at conventional universities make an essential contribution to the education received by students, at the universities of applied sciences and teacher education this work is done primarily by professors and lecturers. Indeed, the term «professor» does not have the same significance at all these types of universities. A professor at a conventional university must have completed a doctor-

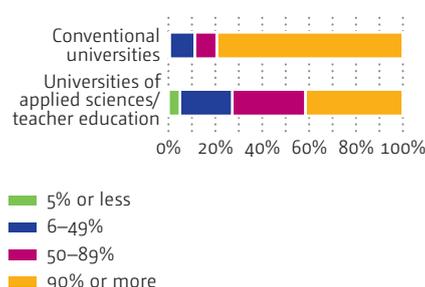
155 **Qualifications of academic staff at universities of applied sciences and teacher education, 2011**

Data: FSO



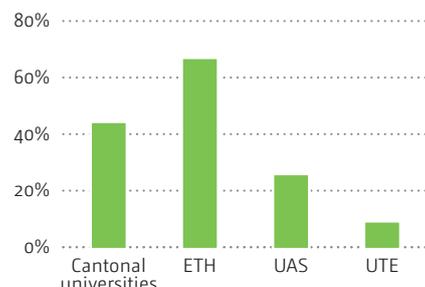
156 **Percentage levels of FTE for professors, 2011**

Data: FSO



157 **Percentage of foreign professors, 2011**

Data: FSO



ate and usually a post-doctoral thesis (*Habilitation*) before he or she can be appointed. Professors at the universities of applied sciences and teacher education, on the other hand, usually do have a higher education degree (and often a doctorate), but this is by no means the rule, as importance is also attached to non-academic qualifications and to practical or professional experience (→ Figure 155).

The particular relationship between academia and industry is also reflected in heterogeneous patterns of employment at the universities of applied sciences and teacher education, where at least half of the professors work part-time (*Weber, Balthasar, Tremel et al., 2010*) (→ Figure 156).

Although the other academic staff at these institutes play an essential role in developing and expanding research, they are often not pursuing the classical junior academic pathway so typical of the universities. Only about half the non-professorial academic staff at universities of applied sciences or teacher education pursue any basic or continuous training alongside their employment. The percentage of them who are working on a dissertation, just over 10%, is very small compared with their conventional university counterparts (*Böckelmann, Erne, Kölliker et al., 2012*).

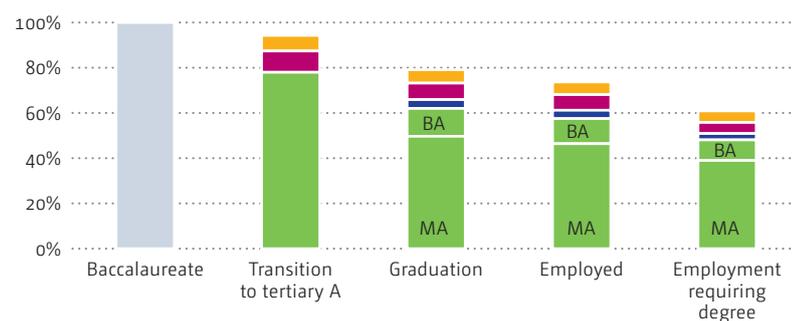
A high percentage of non-Swiss nationals among the teaching and research staff could be regarded as an indication that academic institutes in Switzerland are attractive employers (→ *Chapter on Universities, page 183*). Swiss universities enjoy a good reputation internationally and appeal equally to researchers, teachers and students. Here too, however, the different profiles of different types of universities are a factor. At the conventional universities, almost one in two professors are of foreign origin, whereas the figure for universities of applied sciences and teacher education is much lower (→ Figure 157).

Transition and pass rates

The pathway from a baccalaureate to highly skilled employment brings with it a number of decisions and examinations. Although the percentage of people in Switzerland who hold a baccalaureate is extremely low, even when federal vocational and specialised baccalaureates are included, it is by no means the case that everyone who completes baccalaureate school will end up in an occupation requiring high skills. Drawing on cross-sectional data and the latest figures for transition and pass rates, we can reconstruct the cascading advance from baccalaureate to employment by taking students leaving baccalaureate schools as our example (→ Figure 158). Out of an exit cohort who have just passed their exam at a baccalaureate school, around 94% will begin a higher education degree. Some will drop out of their studies, some will later not enter employment of any kind, and among those in employment not all of them will have a job to match their qualifications. These cumulative exits ultimately lead to a situation whereby, of this original cohort, almost two-thirds will eventually (five years after graduating) find themselves in employment requiring an academic degree. The question that remains unanswered here is to what extent and by what yardstick the remaining third are successful in pursuing an occupation.

158 Transition and pass rate after a baccalaureate from a baccalaureate school

Data: FSO; computations: SCCRE



■ Conventional university
■ University of applied sciences or teacher education via university
■ University of applied sciences
■ University of teacher education
 BA = Bachelor's degree
 MA = Master's degree

Labour market opportunities

The decision to enter academic education is likely to be influenced not only by personal disposition and vocational preference, but also by the benefits that are perceived to accrue when entering the labour market.

Over the last ten years, the employment rate of higher education graduates one year after graduation was between 85% and 95%, depending on the type of university they had attended and the state of the economy (→ Figure 159). Those graduating from a university of teacher education display the highest employment rate one year after graduation and those graduating from a conventional university the lowest. The different prospects for entering the labour market as a function of university type (FSO, 2013d) are also reflected in the unemployment rate as defined by the ILO. If it is lower for graduates from a university of applied sciences than for graduates from a university, that may be due in part to the fact that many university degrees are not tailored to a specific profession and in part to the fact that the average university student has far less vocational experience than the average graduate of a university of applied sciences, which makes it harder to enter the labour market. But if university graduates fare slightly worse in terms of employment or unemployment rate, this is due in most cases to the difficulties they encounter in the early years of starting out on a career. Five years after graduation, no more gaps can be observed in the unemployment rate as defined by the ILO (FSO, 2013a).

The chart draws on the latest available data for each separate transition and pass rate and not on longitudinal data for a selected baccalaureate cohort. The bars therefore describe a fictional cohort. The last two bars are based on data from the Graduate Survey (second-wave survey, 2011) and relate to a point five years after graduation.

ILO/FSO definitions

Employed person

A person who did paid work for at least one hour during the reference week

Unemployed person

A person who was not employed during the reference week and had actively sought work during the four previous weeks

Economically active population

Sum of employed and unemployed persons

Unemployment rate

The unemployed as a percentage of the total economically active population

Employment rate

The percentage of all graduates who are employed

(www.bfs.admin.ch/bfs/portal/en/index/infothek/definitionen.html)

159 Employment rate of tertiary A graduates one year after graduation, 1981–2011

UH: only 2nd-cycle graduates (*Lizenziat, Diplom, Master's*). UAS/UTE: 1st-cycle graduates (*Bachelor's, Diplom*) who have not begun a Master's course at the time of survey and 2nd-cycle graduates.

Data: FSO (Graduate Survey); computations: SCCRE



One year after graduating, holders of an academic degree earn on average about 55,000 to 83,000 Swiss francs per annum (→ Figure 160). The highest earners are graduates in the economic, education and technical sciences. The lowest are graduates in design, the arts and – due to the requirements of vocational practice – law.

Interestingly, salaries do not differ noticeably for the same age group between qualifications obtained from conventional universities and those obtained from universities of applied sciences. This may seem surprising at first sight, as (Master's) graduates from universities will have studied for about two years longer than (Bachelor's) graduates from universities of applied sciences. One major factor in the comparatively high pay earned after studying at a university of applied sciences is likely to be the vocational experience that graduates will have acquired both prior and parallel to their studies. This is especially relevant in technology and business administration and services, which are «traditional» domains of the universities of applied sciences.

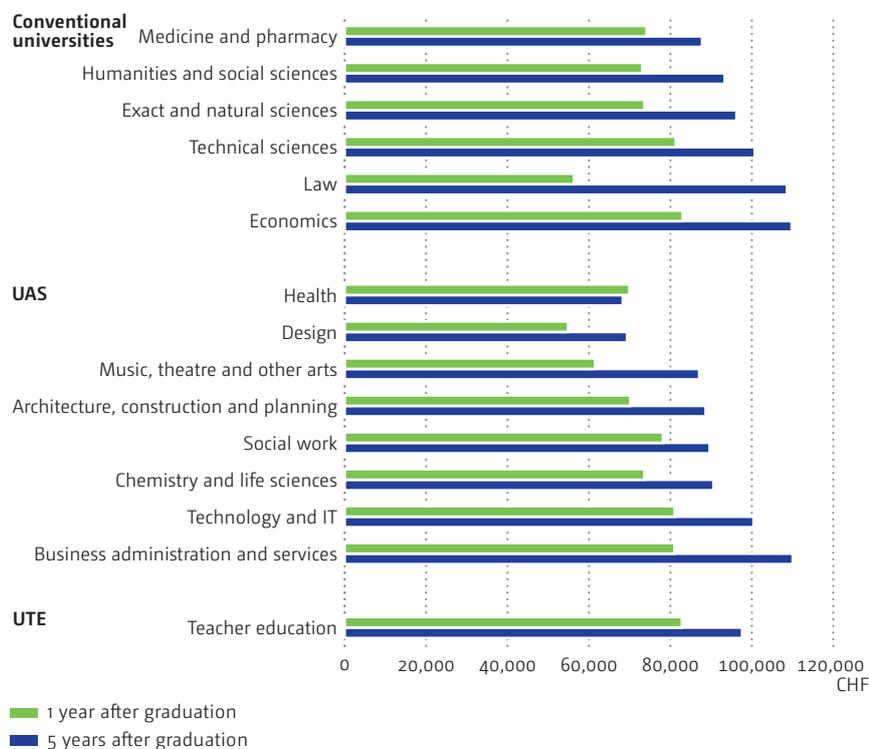
Five years after graduation, income has substantially increased and its distribution remains largely unchanged («law» being the exception). Because of the nature of the data, it is impossible to draw any long-term conclusions about how pay increases for graduates as a function of the type of tertiary A institute they attended, as the available surveys (SLFS, LSE) do not indicate field of study.

SLFS Swiss Labour Force Survey
LSE Lohnstrukturhebung
(Survey of salary structure)

160 Gross earnings after graduation, 2011

Estimated median earnings at age 27 (1 year after graduation) or at age 31 (5 years after graduation) based on quantile regression. UH: only 2nd-cycle graduates (*Lizenziat, Diplom, Master's*). UAS/UTE: 1st-cycle graduates (Bachelor's, *Diplom*) who have not begun a Master's course at the time of survey and 2nd-cycle graduates.

Data: FSO (Graduate Survey); computations: SCCRE



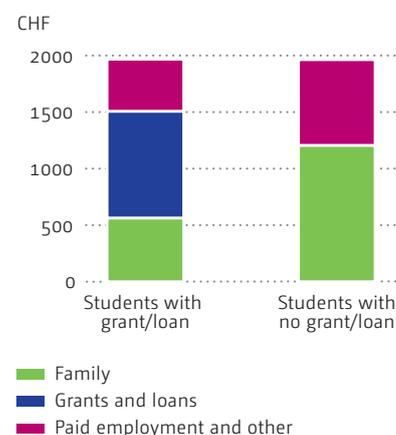
Grants

Studying entails considerable personal outlay. This can discourage those with fewer financial resources from pursuing a degree (*Hurwitz, 2012*) or oblige them to take employment alongside their studies, thereby potentially extending the time it takes to complete the course or increasing the odds that they will drop out (*Kolland, 2002*). Financial aids for students can both increase the probability of study and reduce the risk of dropping out (*Glocker, 2011*).

According to the latest survey on the social and economic status of Swiss students (2009), 20% of university students whose parents completed at most vocational training receive grants and 7% have taken out a loan. Of students from families with average to advanced education qualifications, the percentage of grant recipients is about half as high. The data also suggest that these contributions to training are not only used to top up meagre family resources, but also to reduce the number of hours worked alongside studying (→ Figure 161). The latter can potentially reduce the time taken to complete a degree and also the risk of dropping out. As employment pursued while studying that does not relate to the subject studied also has a detrimental effect on future labour market prospects (*Diem & Wolter, 2013*), grants can, moreover, indirectly exert a positive influence on successful labour market integration.

161 Monthly student income (median values), 2009

Only students not living in their parents' home
Data: FSO (Social and Economic Status of Students); computations: SCCRE



About half the amount paid out in grants by the cantons goes to students in the three types of tertiary A education, 4% goes to students at tertiary level B of professional education and training, and the bulk of the remainder is paid to students in upper-secondary education (FSO, 2012e). The volume paid out in grants has remained nominally constant since the mid-nineties, which means that the value of this support has fallen considerably in real terms. Besides, this decrease has been exacerbated by the big expansion in student numbers during this period. Since 2010, however, the trend has been reversed in some respects. Conventional university students serve as an example to illustrate how the overall reduction in spending on grants has been accompanied by a fall in the percentage of students who receive a grant; the impact on the amount per recipient has been much less pronounced (→ Figure 162).

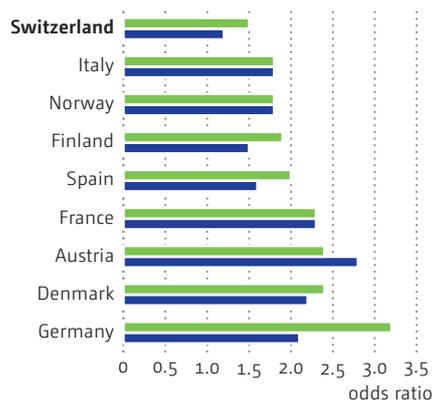
In 2011 about 10% of students at the three types of tertiary A institute received a grant, and the average amount received was just under 8,000 Swiss francs a year. There are, however, substantial differences between cantons with regard to the number of recipients and the amount they receive. The average grants paid to students at universities of applied sciences and teacher education ranged – depending on the canton – from 5,000 to 13,000 Swiss francs; the grant rate ranged from 2% to 24%.

Grant rate

Grant recipients as a percentage of all students

163 Social disparity in tertiary A education, 2009/10

Data: eurostudent

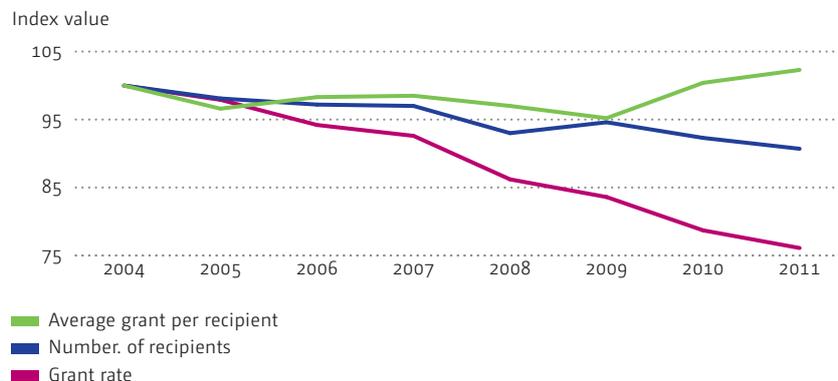


■ ISCED 5A and 6
■ ISCED 5B, 5A and 6

The bars show the ratio between the percentage of students whose fathers have a tertiary qualification and the percentage of the male population aged 40 to 60 who hold a tertiary qualification. The further a bar exceeds the value of 1, the less equity there is in access to tertiary education.

162 Indexed value of grants (inflation-adjusted) and number of recipients at universities, 2004–2011

Data: FSO



The unequal prospects of obtaining a grant have led in recent years to political initiatives designed to establish minimum standards. An Intercantonal Agreement on grants entered into force in March 2013 and about half the cantons had signed it at the time this Report went to print.

Social disparities in access to tertiary A education

The likelihood of studying at tertiary level and obtaining a qualification accordingly is strongly influenced by social origin. For all the political efforts to offer all young people equal educational opportunities, the children of parents with academic degrees are still much more likely to obtain a tertiary A qualification. This correlation can be observed not only in Switzerland, but also in other countries.

If we measure equal opportunity by comparing the education levels obtained by the parents of tertiary students with the education levels of the population in the same age group, it is evident that access to higher education in Switzerland is a little less dependent on parents education than in other countries (→ Figure 163). Nevertheless, compared with a situation of absolute equal opportunity, the children of parents with academic degrees are still about 1.5 times as likely to study in the tertiary A sector; in neighbouring countries, however, this ratio lies between 1.8 and 3.2.

Social selection follows a very different pattern around access to the tertiary level B of professional education and training (PET). The higher levels of PET are more frequently chosen by individuals from families where educational attainment has been lower, and this plays its part in the relatively modest social disparities that mark the tertiary sector as a whole.

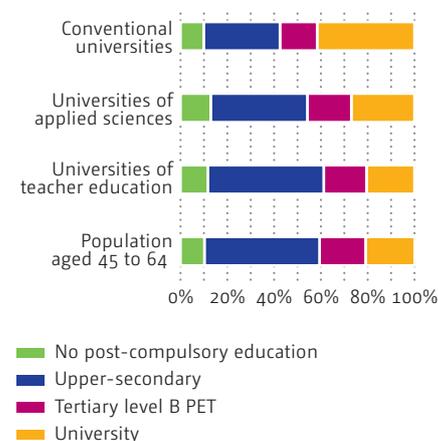
Differences in social selectivity can furthermore be observed between the different types of tertiary A education. The pattern of educational qualifications obtained by the fathers of university students deviates clearly from that of the reference population, but in the case of the other two types of institute the gaps are small (→ Figure 164). It is particularly striking that young people whose fathers hold an academic degree are about twice as likely to attend a conventional university. By contrast, the children of academic fathers at universities of applied sciences are only over-represented by about 30%, and at universities of teacher education not at all.

If the social disparities are greater at conventional universities, this is not just due to differences in the social composition of the schools they come from. In fact, research indicates that even among baccalaureate-school students, parental education has an impact on the choice of the type of university (Denzler, 2011).

Finally, the social composition of the student population varies from one field of study to the next (→ Figure 165). The arts are a case apart, because although this field of study is institutionally associated with the universities of applied sciences, the students themselves very often come from families with the highest socio-economic status.

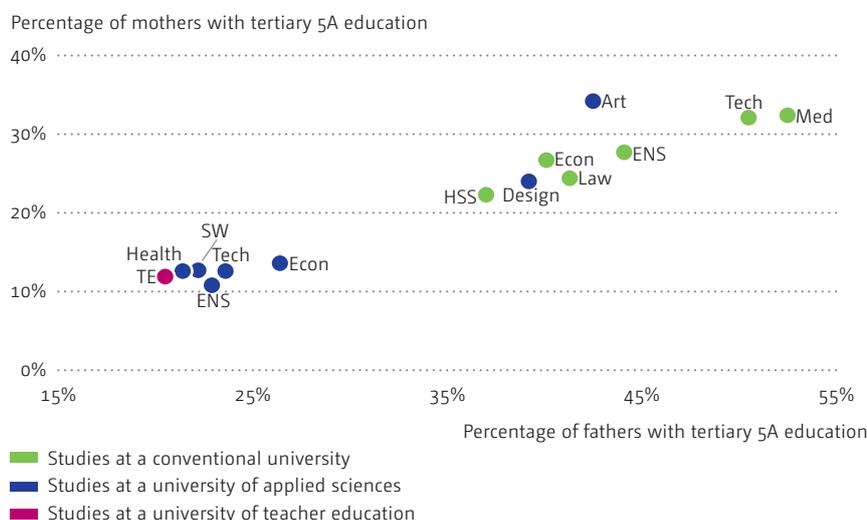
164 Parental education of tertiary A students by type of universities, 2009

Data: FSO (SLFS, Social and Economic Status of Students); computations: SCCRE



165 Parental education of tertiary A students by field of study, 2009

Data: FSO (Social and Economic Status of Students); computations: SCCRE



- HSS Humanities and social sciences
- Art Music, theatre & other arts
- TE Teacher education
- ENS Exact and natural sciences or chemistry and life sciences
- Med Medicine and pharmacy
- SW Social work
- Tech Technical sciences, including IT, architecture, construction and planning, agriculture and forestry
- Econ Economics or Business administration and services

Barrier-free study

Access to higher education for people with disabilities and their right to participate equally in student activities are enshrined in Swiss law.² Research into the current situation at tertiary A institutes (*Kobi & Pärli, 2010*) nevertheless demonstrates that much remains to be done to achieve barrier-free access. Many institutes have no contact point for the disabled or else perform inadequately in matters such as access to buildings or barrier-free websites. Besides, general awareness of equal opportunity issues is not well established, and there is a major need to improve communication about problems and available support and to drive forward standardised procedures for overcoming disadvantages. The above-mentioned study compiled an «Accessibility Index» based on ten items to facilitate comparisons between the various types of academic institution. The average score on this index for all institutes surveyed is 0.6 points on a range from 0 to 1.7. There are considerable differences, however, both between the types of institute and between institutes of the same type. On the scale from 0.1 to 1.7, the median scores for the three types of tertiary A institute are 0.9 (conventional universities), 0.5 (universities of applied sciences) and 0.3 (universities of teacher education). The findings also show that the bigger institutes have made more progress towards barrier-free access than the smaller ones. Guidance is available in various forms to help the stakeholders in higher education work towards designing and implementing equality strategies (cf. www.hindernisfreie-hochschule.ch or the recommendations issued by AGILE, the umbrella organisation for disability self-help groups in Switzerland).³

² Federal Constitution (Article 8) and Disabled Peoples' Equal Opportunities Act (Para. 1 and 2)

³ www.agile.ch/zugang-hochschulen



Universities

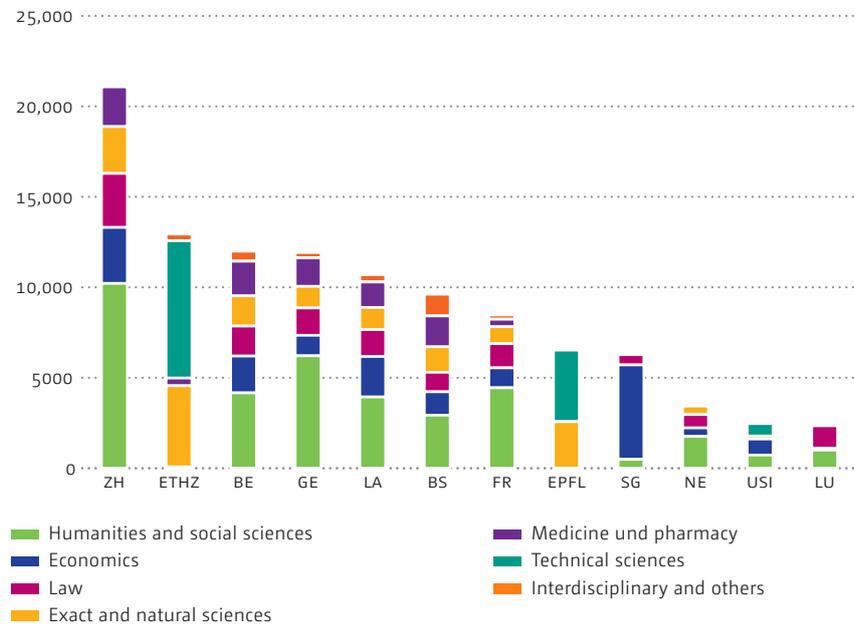
Context

For the purposes of this chapter, the term «students» unless otherwise specified, includes all students working towards a Bachelor's or Master's degree, a *Lizenziat* or *Diplom*, but not doctoral students or students in continuous education and training.

The term universities covers the ten cantonal universities, the two federal institutes of technology and five other university institutions approved under the funding legislation.¹ In 2012 a total of 109,000 persons studied for Bachelor's or Master's degrees or for the older *Lizenziat* or *Diplom* (→ Figure 166). By far the largest university is the University of Zurich with over 21,000 students. Among the smallest universities with fewer than 5,000 students are those in Neuchâtel, Italian-speaking Switzerland and Lucerne. The humanities and social sciences constitute the largest subject cluster, accounting for about a third of students. In all other clusters (with the exception of interdisciplinary studies) the proportion is between 9% and 16%.

166 Student numbers per university, 2012/13

Data: FSO

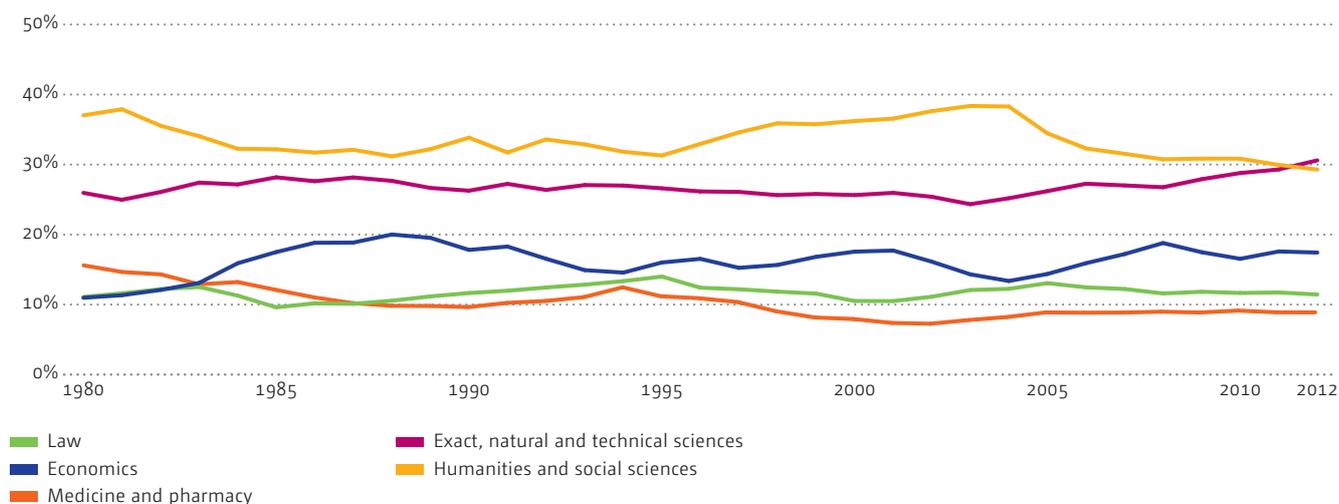


The relative shares of these subject clusters vary over time, although the figures for new intake between 1980 and 2012 do not demonstrate any persistent trend (→ Figure 167). In the last ten years, however, there has been a significant fall in the proportion of new entrants studying the humanities and social sciences (from 38% in 2002 to 29% in 2012), while the opposite is true for the exact, natural and technical sciences. Both these shifts hold true for men and women alike.

¹ The five funding-approved institutions are the Kurt Bösch University Institute, the Universitäre Fernstudien Schweiz (for distance-learning), the Graduate Institute of International and Development Studies (IHEID), the Swiss Graduate School of Public Administration (IDHEAP) and the Schweizerische Zentralstelle für die Weiterbildung der Mittelschullehrpersonen (WBZ), which provides continuous education for secondary-school teachers.

167 Relative share of student intake by field of study, 1980–2012

Data: FSO



Forecasts of student numbers

Between 2000 and 2011 the number of new university entrants rose by 25% (FSO, 2012c). This rapid increase is partly demographic, as a growing number of Swiss pupils are passing the baccalaureate, but it is above all due to a rise in the number of persons who obtained their admission qualifications in another country. The student population is expected to continue expanding in the next few years (→ Figure 168). However, the forecasts of the Swiss Federal Statistical Office (FSO, 2012c) suggest that the growth curve due to domestic demographic trends will gradually level off, while the trend for the number of foreign-qualified students, who currently account for about a fifth of students, is fraught with uncertainties. In 2011 and 2012, for example, their numbers declined, probably due to the high cost of living in Switzerland and the strength of the Swiss franc. Over the student population as a whole, the Federal Statistical Office expects to see an average increase of around 1% per year between 2014 and 2021 (FSO, 2012c). The student population is at least likely to grow until 2017. After that, there are conceivable scenarios for both an ebb in the numbers and a further rise. The reference scenario, however, indicates an ongoing slight growth in student population for both the first and second cycle (2021: 0.6%). At doctorate level the number of students is also likely to increase by around 1% per year.

These diverging forecasts present the universities with a challenge. They need to develop strategies to address the range of course provision, the capacity of their infrastructure and also options for financing (lower revenues when student numbers fall).

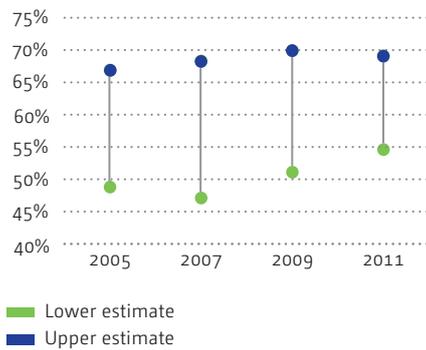
The universities can do little about the number of Swiss students, but they do have some, if rather limited, scope to influence the number of foreign students by applying restrictions. A growing foreign student population entails higher spending for cantons with universities, as the education authorities receive no contributions under the Intercantonal University Agreement (IUV) for students from abroad. A higher percentage of foreign students may nevertheless be in the interest of the universities. Apart from possible economies of scale, there is also an opportunity here to improve on

Foreign-educated foreign nationals are those enrolled at a Swiss university who obtained their school-leaving qualification entitling them to university admission (e.g. the German *Abitur*) outside of Switzerland.

169 Foreign-educated foreign nationals remaining in the Swiss labour market one year after graduation

2nd-cycle graduates only

Data: FSO (Graduate Survey); computations: SCCRE



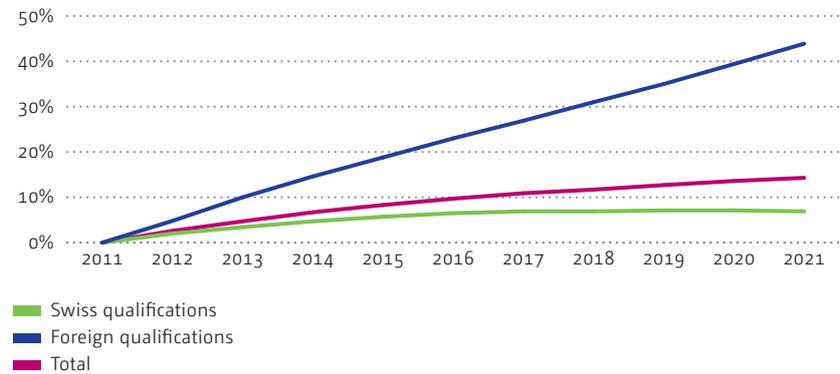
The higher estimate reflects the proportion indicated by graduate data. Calculations of the lower estimate factor in the lower response rate for foreign students who entered university from abroad compared with Swiss students and foreign nationals educated in Switzerland. The assumption is that this deviation indicates a domicile (and hence employment) in another country.

2nd-cycle degrees are equivalent to *Lizenziat* and *Diplom* qualifications. When the text refers to 2nd-cycle graduates, students who pass their *Lizenziat* or *Diplom* are therefore included.

168 Forecasts for student numbers, 2011–2021

Reference scenario; increase on 2011

Data: FSO



the quality of the student population, leading to further benefits (e.g. cultural interchange and networking, or improved rankings). For the Swiss labour market too, foreign students offer a potential of highly skilled future employees. According to the Graduate Survey (FSO), an estimated 50% to 70% of employed foreign students are still working in Switzerland a year after graduation (→ Figure 169). This proportion has remained highly stable over time.

Institutions

Studies at Swiss universities follow the three cycles of the Bologna system, with a Bachelor's degree (1st cycle), Master's degree (2nd cycle, usually following straight on from the Bachelor's) and Doctorate (3rd cycle). All universities have adopted this three-stage structure and apply ECTS credits uniformly. Few students (2012: 3%) now remain enrolled in the old-style *Lizenziat/Diplom* system. In the wake of the Bologna Process the universities have developed a diverse range of study courses and programmes. When it comes to designing competence-based learning, on the other hand, the universities are still at the beginning of the trajectory (CRUS, 2012). According to the report, the concept of learning outcomes has gradually been understood by the universities, but little progress has been made as yet on adapting study programmes to student competencies or testing these skills in students.

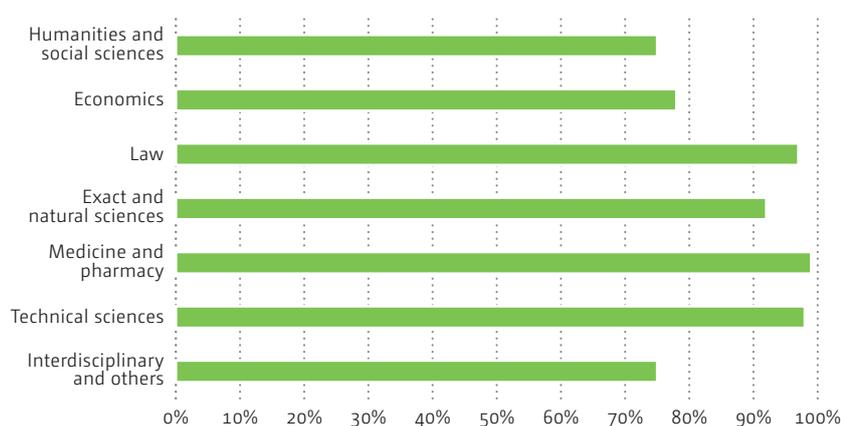
The standardisation of coursework and the overall more rigorous structuring of study courses have meant that course duration has evened up between the various fields of studies and universities. Median course duration in the Bologna system (Bachelor's and Master's degrees) is five and a half to six years, which is similar in length to the old *Lizenziat/Diplom* system. Across the universities as a whole, course durations in the fields of economics, the exact and natural sciences and law seem to have been increasing since «Bologna», while the number of very long or very short courses has decreased.

At Swiss universities the Master's degree has established itself as the standard qualification. Around 85% of students continue immediately or within one or two years of completing their Bachelor's degree (FSO, 2012d).

Reasons for taking a break include acquiring work experience, seeking employment to finance studies, travelling, spending time abroad to learn a language and completing practical traineeships (FSO, 2010d). Transfer rates vary considerably from one field of study to another (→ Figure 170). In law, medicine and pharmacy and the technical sciences, nearly all Bachelor's graduates continue their studies with a Master's degree (97%, 98% and 99% respectively). The situation appears different in the humanities and social sciences, and also in economics, where around a quarter of Bachelor's graduates do not take up a Master's degree in the two years following graduation. According to FSO graduate data, pass marks obtained in Bachelor's exams have no influence on the odds of beginning a Master's degree (without lengthy interruption). Owing to only brief experience with the system, it is too early to say whether such decisions are influenced by structural factors like the state of the economy or conditions in the employment market.

170 Bachelor's-to-Master's transition rate for the 2009 Bachelor's graduation cohort in the two years after graduation

Data: FSO



Admission requirements

Formerly, admission to a university required a baccalaureate from a baccalaureate school, but recently more indirect paths to university have opened up, either via the «passerelle» permitting transition from a federal vocational baccalaureate to university by means of an aptitude test (UAT), or via other Swiss certificates (e.g. a Bachelor's degree from a university of applied sciences, which grants access to a limited number of study options). In addition, some universities and faculties offer the opportunity to those who have no baccalaureate to enter a degree course on the basis of a personal portfolio or by taking an entrance examination, which may require a minimum age or professional experience. The statistics on admission qualifications held by those entering university between 2002 and 2012 show that the proportion of students gaining entrance on the basis of a portfolio or by entrance examination was only 1.3% to 2.6% (excluding foreign qualifications). Indeed, this number has been falling steadily since 2004.

Candidates who obtained their baccalaureate from a baccalaureate school in Switzerland are free to choose their university and subject – unlike in

most other countries, where admission restrictions apply. For capacity and cost reasons, however, there are admission restrictions in German-speaking Switzerland for medicine and to some extent for sport science, where entrance is regulated through aptitude tests. The aptitude test for medicine is a more reliable way of predicting academic success (candidates who score well are more likely to pass intermediate exams and with better grades and at an earlier stage; Hänsgen, 2013; Hänsgen, Egli, & Wechsler, 2007; Hänsgen & Spicher, 2001; Mallinger, Holzbaur, Dierich et al., 2007) compared with the non-standardised grades awarded for baccalaureates (Hänsgen & Spicher, 2008), and hence this restricted admission is fairer than selection based on baccalaureate grades. On the other hand, it is unclear whether dispensing with an entrance exam and limiting the number of students in line with results (ECTS) in the first and possibly second year of study, as practiced in the universities of western Switzerland, is equally valuable or even better as a selection method. Certainly the latter option raises the question of efficiency, since not imposing admission restrictions not only incurs higher costs for the universities but, from an individual perspective, may generate costs due to «lost» years of study or the greater risk of not completing any degree.

Academic staff and junior career pathways

The composition and recruitment of academic staff is another important issue for universities. The age structure of professors shows that the median 50% are between 43 and 58 years old. Male professors are on average around four years older than their female counterparts (FSO, 2011), which is probably due to the fact that in recent years the proportion of women appointed has risen. Overall, professors have become slightly younger, by one to two years, in the course of the last decade. Given the age distribution, an annual retirement rate of around 3% can be expected over the coming years.

In 2011 around half the professors (48%), assistants and other academic staff (54%) were from other (very often neighbouring) countries (→ *Chapter on Tertiary-level education, page 165*). However, these proportions vary substantially from one university to another. The share of foreign professors is particularly high at the two federal institutes of technology (EPFL: 62%; ETHZ: 69%) and at the University of Lugano in Italian-speaking Switzerland (75%), whereas it is particularly low, at less than a third, at the universities of Neuchâtel and Lausanne. A study on the mobility of researchers from sixteen different countries and four disciplines (Franzoni, Scellato & Stephan, 2012) demonstrates that the proportion of foreign researchers in Switzerland is significantly higher than in other countries (→ Figure 171). Further analyses (Stephan, Franzoni & Scellato, 2013) show that, when it comes to choosing a university abroad to pursue a PhD, Switzerland performs well against the average for universities in other countries, including the United States, on aspects such as prestige or research excellence of its institutions. At post-doc level, research conditions and salaries, in particular, make Switzerland attractive. At the same time, it appears that Swiss researchers are also much more likely to go abroad than their counterparts in other countries (Franzoni, Scellato & Stephan, 2012). Around a third of the researchers surveyed were living abroad at the time, and over three-quarters of those questioned already had experience of working abroad.

171 PhD programme intake, 2011

Data: OECD



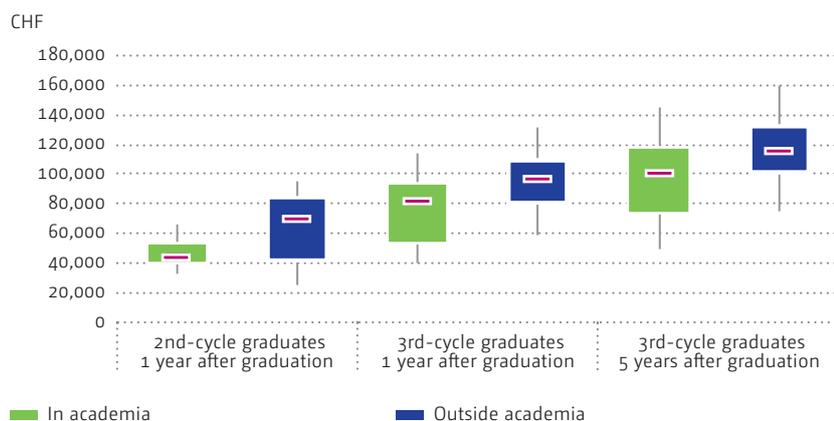
The pronounced internationalisation of academic staff at the universities prompts the question as to whether there is sufficient support for home-grown junior academics or whether the opportunities for an academic career in Switzerland are sufficiently attractive. In view of such concerns, in 2011, the federal bodies (FDHA, EAER) and the cantons published a statement of their shared educational goals for Switzerland as an education landscape, aimed at sustainably enhancing the attractiveness of a career at Swiss universities for young researchers.

Indicators regarding job opportunities for junior academics at the universities can be gleaned from the latest findings of the graduate survey conducted by the Federal Statistical Office (first and second-wave survey, 2011): approximately one in seven 2nd-cycle graduates (not including medical students) find post-graduate employment at a university or similar institute within a year of graduation. In these posts they take an average of four to five years to complete a doctorate (median values, excluding medical doctorates). Two-fifths of these are still in academic employment one year after their doctorate, and one-fifth four years later. Of this fifth about 80% are working on a professorial thesis (*Habilitation*), as post-doctoral fellows, (senior) assistants, contract teachers or (private) lecturers, and a good 20% as professors (including assistant and associate professors). A decision to remain in academic employment entails a lower income, at least in the early years (→ Figure 172). 50% of the lower salaries of PhD students at universities (or similar research institutes) compared to other 2nd-cycle graduates are explained by the fact that they are generally employed part-time only. Among the PhD graduates who hold an academic post five years after graduation, this lower pay is due to typical features of the profession (working abroad, fixed-term contracts, absence of senior/management functions, etc.)

172 Annual pay for graduates in academia and outside, 2011

Gross pay for 2nd-cycle graduates is effective income, gross pay for doctorates has been extrapolated to 100% (latest findings from relevant first or second-wave interviews, 2011); grants are not included, medicine was excluded.

Data: FSO (Graduate Survey); computations: SCCRE



Note

The box describes where the median 50% of incomes lie. The horizontal line gives the median value. The vertical line marks the range of income between the bottom 10% and the top 90%.

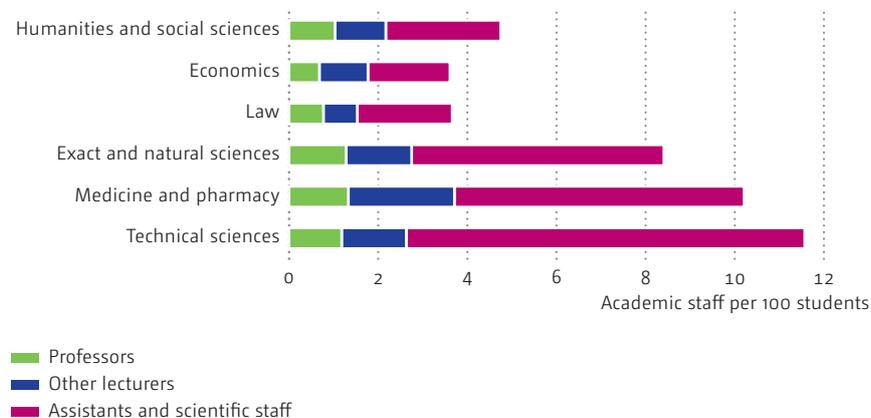
Student-teacher ratios

Student-teacher ratios vary greatly between the various subject clusters (→ Figure 173) and also between subjects within a cluster. Different trends in these ratios have been apparent since 2008. In economics and law, the two fields with the fewest teaching staff (professors and lecturers) in relation to the number of students, the ratio has remained stable. A slight intensification of teaching input can be seen in the humanities and social sciences, while in the technical sciences there has been a tendency in the opposite direction.

173 Teacher ratios in regular education, 2011

Number of academic staff (FTEs) per 100 students. Human medicine was excluded due to lack of data for clinical training.

Data: FSO



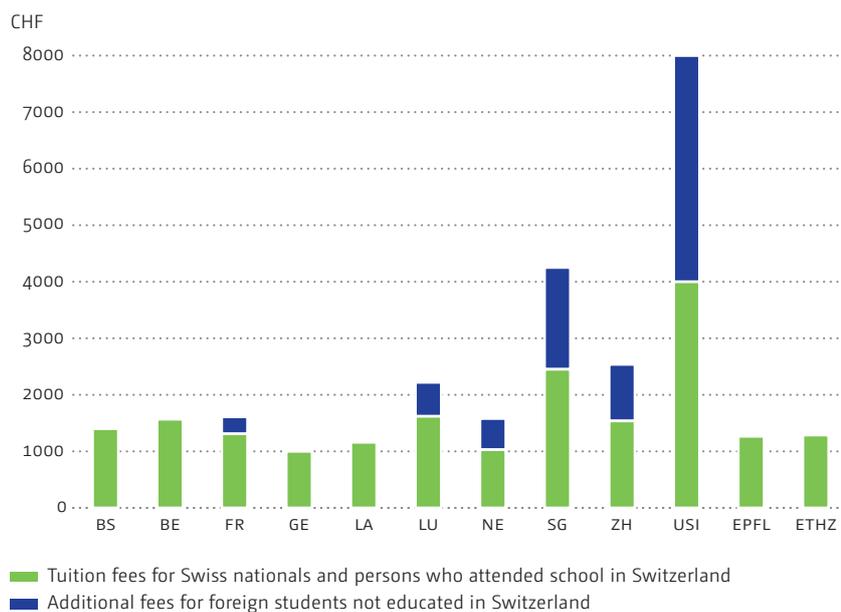
Tuition fees

Tuition fees at most of the universities are somewhere between 1000 and 1600 Swiss francs per annum, with only the University of Lugano (USI) charging significantly more at 4000 Swiss francs (→ Figure 174). Students domiciled abroad when they qualify for university admission sometimes face additional fees of 300 to 4000 Swiss francs (USI). These additional fees are attributed to higher administrative costs (examining the admission «dossier», communication/website in English) and to the funding shortfalls resulting from the university cantons missing out on IUV contributions.

Tuition fees are identical for all fields of study within the university. Since there are substantial cost differences between the various courses, however, the percentage of costs covered by tuition fees varies considerably. At the University of Zurich, for example, a student of social sciences personally assumes 14% of his or her annual teaching costs, while a student of dental medicine only contributes around 5%.

174 Annual tuition fees at universities, 2013

Data: CRUS, university websites



Effectiveness

A primary aim of university education is to impart skills that will be required in later (professional) life. To this end, common transdisciplinary learning outcomes for each qualification framework have been formulated for the tertiary A sector in Switzerland (nqf.ch-HS; CRUS, KFH, COHEP, 2011), and students should have at least a minimum command of these by the end of their study cycle. These essential competencies are grouped in five categories: «knowledge and understanding», «application of knowledge and understanding», «judgement», «communication skills» and «self-directed learning». The development of competence-based teaching has not yet progressed very far at Swiss universities, however (CRUS, 2012), and it is unlikely that these learning outcomes will be tested in the near future. Indeed, in the next few years no great strides are to be expected at international level either towards establishing comparable measures of these skills (→ *Information text on the right*). To derive some idea of the effectiveness of university education, the following section will consider possible indirect evidence of learning outcomes, such as graduation rates and various indicators of employment prospects.

AHELO: On an international level, the OECD's feasibility study AHELO (Assessment of Higher Education Learning Outcomes) explores internationally comparable measures of learning outcomes of tertiary level students. Following its completion (OECD, 2012a, 2013a), it is unclear whether and how the project will continue.

Graduation rates and dropout rates

Graduation rates can serve as an indicator of the effectiveness of a degree programme or a university. However, they rely heavily on both the quality standards applied by the university and the composition of the student population. A low graduation rate may well indicate that a course is subject to stringent requirements, but it could also mean that the course is attracting

University rankings are an important quality benchmark in a global arena of competition. In 2012, according to the ones most often quoted (Shanghai Jiao Tong, Times World University Rankings, QS World University Ranking, Leiden Ranking), 68–78% of university students (or 40–46% of all tertiary A students) in Switzerland attended an institute in the top 200; this is probably the highest quota in the world (SCCRE, 2010). In the national context, these rankings say little about the quality of teaching in different universities, as the criteria are weighted towards research and bibliometric indicators – heavily determined by the disciplines taught – are of prime significance. Besides, good research does not necessarily mean good teaching (Shin, 2011). 2014 will see the first publication of scores from U-Multirank, a new multidimensional ranking for universities founded on five categories: research reputation, quality of teaching and teaching environment, international orientation, knowledge transfer and regional engagement.

Graduation rate: percentage of students who complete their degree within 10 years of starting the course.

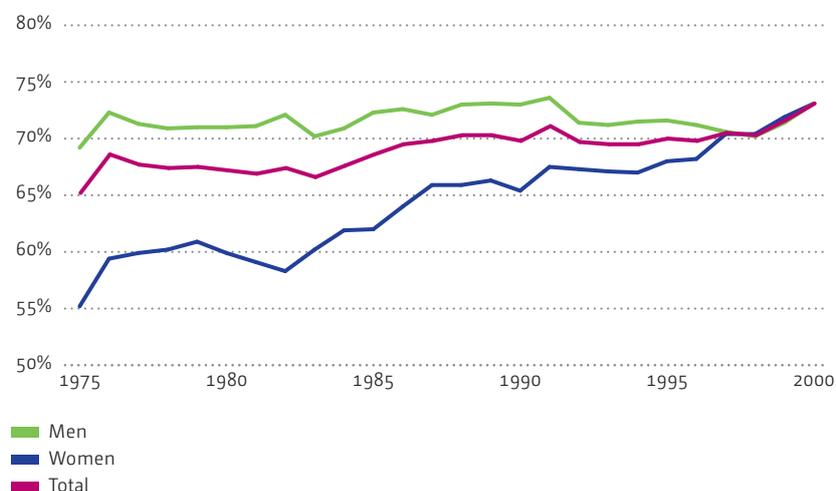
This timed series was not continued because graduation rates for different years were no longer comparable after 2000 due to the switch from the *Lizenziat/Diplom* system to the Bachelor's system taking place at different times.

more students of lower ability or that the quality of education is less good. These questions also arise in Switzerland, where universities cannot choose their students.

For the last 20 years, about 70% of both *Lizenziat* and *Diplom* students have been completing their studies successfully within ten years. This means that the graduation rate has remained more or less constant despite the big increase in student numbers (→ Figure 175). In particular, the greater risk of women failing to complete their studies successfully has fallen over time, in parallel to the growing participation of women. With the «Bologna reform», which also brought forward 1st-cycle graduation (Bachelor's degree), the proportion of students successfully completing their studies has hardly increased overall. At present, it is too early to make precise statements about success rates, because 2006 was the first year when all courses (with the exception of the medicine and pharmacy cluster) began under the Bachelor's system, and it is not unusual for a Bachelor's degree to take more than five years, especially when a student switches course. Under the Bologna system, however, it is already apparent that fewer students complete a 2nd-cycle degree than under the pre-Bologna system, since not all Bachelor's degree holders go on to do a Master's degree (→ *Institutions*, page 186) and, in addition, drop-outs occur even at Master's level (approx. 8%; FSO, 2012d) and the higher graduation rate for Bachelor's degrees (compared to the *Lizenziat*) is not sufficient to compensate.

175 Graduation rates in *Lizenziat/Diplom* system, entry cohorts 1975–2000

Only students who obtained their admission qualifications in Switzerland
Data: FSO (SHIS); computations: SCCRE

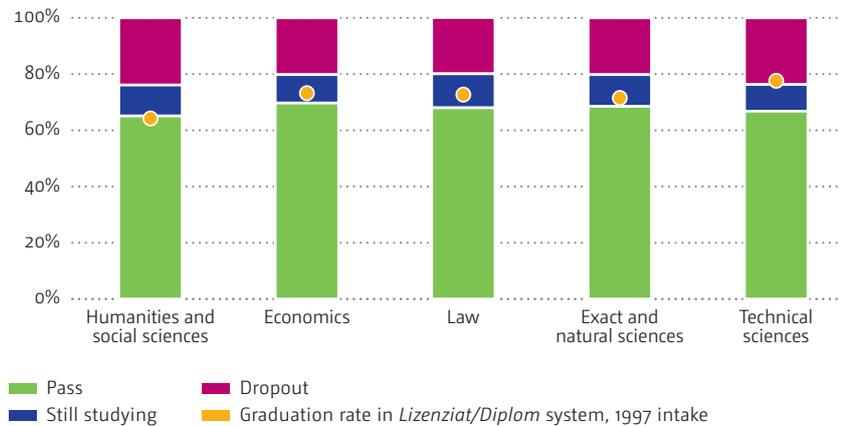


In the pre-Bologna period, there was a marked difference in graduation rates between the various subject clusters (→ Figure 176), with the highest dropout rates in the humanities and social sciences. With the Bachelor's degree it appears that differences between subjects are a little smaller than in the old system. It is also apparent that the risk of incompleteness is significantly higher amongst students switching subject, and that there are positive correlations between the dropout risk and, on the one hand, the age of the students and, on the other, the baccalaureate rate in the canton.

176 Bachelor graduation rates by field of study, entry cohort 2006

Only students who obtained their admission qualifications in Switzerland; includes graduations up to 2011

Data: FSO (SHIS); computations: SCCRE



Evidence on Dropout Phenomena at Universities: Findings from a Systematic Review

(Larsen, Sommersel & Larsen, 2013)

This systematic review maps international evidence on students who drop out of or change subject within European universities and the determining factors. It draws on publications which (based on over 6000 references) were considered robust and reliable in the review process ($n=44$). The review demonstrates that dropouts at university are multifactorial, complex phenomena, and that dropout risk is influenced as much by factors during the pre-enrolment phase (such as social background, prior schooling etc.) as by factors deriving from the current situation (such as motives for study). In formal terminations, i.e. withdrawal from tertiary education, pre-enrolment factors prove to be pivotal. Students whose parents have attained lower levels of education or professional status present an indisputably greater dropout risk. The odds of dropping out are also higher among male and older students. With regard to prior schooling, the review confirms that performance at upper-secondary school, like the nature or focus of previous education, has a significant influence on dropout phenomena, but that this becomes less pronounced over the course of study. Findings about the current study situation are less clear-cut. In general, however, the review confirms that investments in institutional resources and measures to improve academic provision can reduce the risk of dropout.

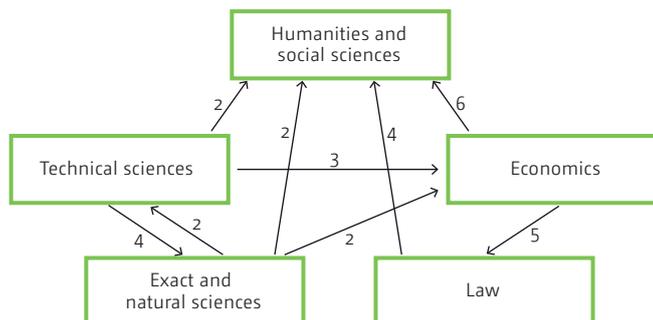
Not all students complete their studies in the field where they began (→ Figure 177). In economics and the technical sciences, the proportion of students who have (successfully) switched is more than 10%. In contrast, there are no great flows into other fields of study from the humanities and social sciences, which may be due in part to the fact that these students more often switch within the cluster, given the wide range of courses on offer. New research is needed to ascertain how far earlier findings about course switching (FSO, 1996) still apply in the Bologna system.

Finally, it should be said that some students transfer to a different type of university during their studies. Around 5% of those who originally begin a conventional university course complete their studies at a university of applied sciences or at a university of teacher education (FSO, 2012d).

177 Percentage who graduated in a different field of study after switching

Bachelor's degree entry cohort 2004
 Data: FSO (SHIS); computations: SCCRE

The figure shows flows of at least 2% (rounded up) based on percentages of students who complete their degrees within 7,5 years. In fact, the effective student flows between clusters are much bigger, as course switchers study longer and drop out more frequently than average.

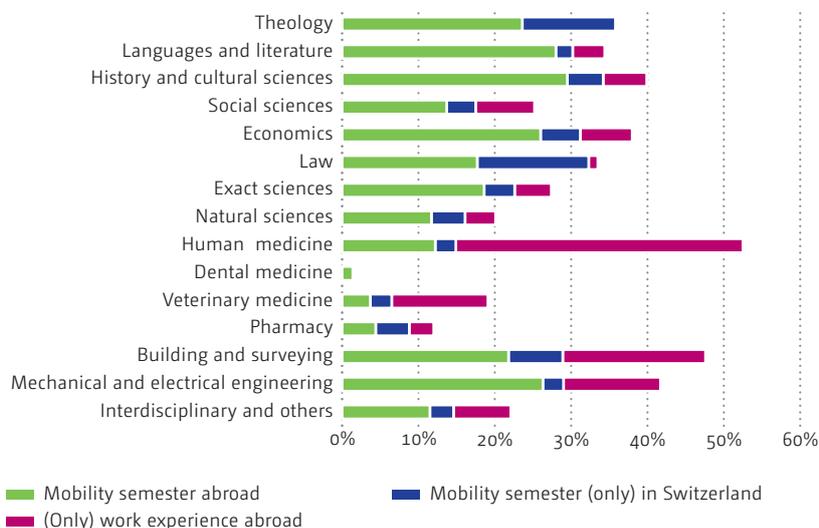


Student mobility

National and international mobility of students is a declared aim of the Bologna reforms. Exchange between universities is intended to promote the quality of teaching and research and also to deliver graduate skills which will enhance success in professional or academic careers (acquisition of linguistic, intercultural and personal skills) (cf. also *Crossman & Clarke, 2010*). Vertical mobility – changing university after completing a Bachelor's degree – is fairly infrequent (10% of students) (*CRUS, 2012*). More common is horizontal mobility, i.e. changing university during a degree course (exchange semester, work experience). The Bologna target, formulated in Leuven, that by 2020 at least 20% of students should be spending some time studying or gaining work experience abroad, has already been met by 2nd-cycle students (28%). Among Bachelor's students the mobility rate is lower, however (16%), suggesting that the rigid structuring of the study regime might hinder mobility. Reasons for not moving include, especially, additional costs, longer periods of study, organisational effort and incompatibility with the circumstances in which people live or study (*FSO, 2011b*).

178 Student mobility rate at universities

Graduation cohort 2010; *Lizenziat, Diplom* or Master's only
 Data: FSO (Graduate Survey); computations: SCCRE



Mobility is heavily influenced by the chosen field of study (→ Figure 178). In certain disciplines, such as pharmacy, the proportion of mobile students is very small, while in the technical sciences more than 40% of students complete an exchange semester. But there is also much variance between the various universities (FSO, 2011b). An important factor in the choice of location by exchange students is the quality of the university (Beine, Noel, & Ragot, 2012; Kahaneč & Králiková, 2011). Other persuasive factors include the offer of English-language courses and a network in the destination country, whereas maintenance costs (but not tuition fees) are an inhibiting factor (*ibid*). The quality of a country's universities is not only relevant to horizontal mobility, but also to the flow of international students (Bouwel & Veugelers, 2010). In this context, the fact that about a fifth of the students in Switzerland come from abroad can be considered an indicator of the high quality of Swiss universities.

Along with vertical and horizontal mobility, the Bologna structure also permits thematic mobility, i.e. a change of subject when progressing from Bachelor's to Master's level. That said, such switches often require the acquisition of additional ECTS credits. In 2011, therefore, the proportion of students enrolling in Master's degree courses with a university Bachelor's degree from another field of study was just 5% (FSO 2012d).

Labour market success

Successful integration into the labour market is a key criterion in assessing the value of university education, as it provides evidence of the extent to which that education has imparted skills relevant to the job market. However, it must be taken into account that universities can only impart some of the skills required by the job market. (cf., for example, the role of «soft skills», Salvisberg, 2010) and they do not merely teach skills that are in short-term demand (and make entry into the job market easier). Successful entry into the labour market may also depend on regional conditions, particularly where students are not completely mobile upon completion of their studies. According to the Graduate Survey of 2011, one year after graduation 88% of university graduates are gainfully employed. The proportion of persons without paid employment is highest among Bachelor's graduates (26%; not including those who have begun a Master's degree) and lowest among those with doctorates (8%), while 2nd-cycle graduates (Master's, *Lizenziat*, *Diplom*) occupy the middle ground (11%). But not all those without jobs are unemployed in the sense of the ILO definition: the unemployment rate one year after graduation is «just» 6.2% (1st cycle), 3.6% (2nd cycle) and 2.3% (3rd cycle). Not being economically active is to some extent an entry phenomenon. Five years after graduation the proportion of 2nd and 3rd-cycle graduates without employment is 7% and 4% respectively, and the unemployment rate (according to the ILO's definition) is well below the Swiss average (at 1.9% and 1.3%). The situation for Bachelor's degree holders is somewhat different, as they have an unemployment rate similar to the average for the working population as a whole.

Most university graduates in employment have jobs that require a university degree or are at least appropriate to the professional skills gained in the course of their studies. The proportion of graduates in jobs that match their qualifications rises with each cycle, standing at 62% for Bachelor's graduates,

ILO/FSO definitions

Employed person

A person who did paid work for at least 1 hour during the reference week

Unemployed person

A person who was not employed during the reference week and had actively sought work during the four previous weeks

Economically active population

Sum of employed and unemployed persons

Unemployment rate

The unemployed as a percentage of the total economically active population

Employment rate

The percentage of all graduates who are employed

(www.bfs.admin.ch/FSO/portal/de/index/infothek/definitionen.html)

A person is defined as **appropriately employed** if the job a) requires a tertiary A degree or b) displays a clear match with professional skills acquired during tertiary A education (scores of 4 and 5 on a scale from 1 «not at all appropriate» to 5 «appropriate to a great extent»).

A person is **inappropriately employed** if the job neither requires a university degree nor is clearly matched with the vocational skills acquired during study (scores 1 to 3).

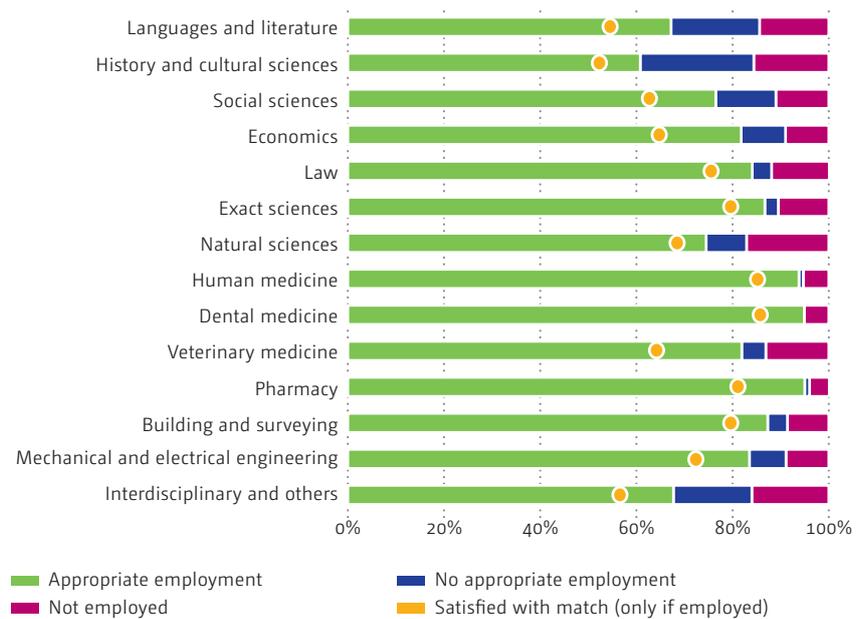
Match satisfaction describes (high) satisfaction about the match between employment and vocation qualifications (scores 4 and 5 on a scale from 1 «not at all satisfied» to 5 «very satisfied»).

90% for the 2nd cycle and 95% for Doctors one year after the qualification is achieved. Although there is a possibility that a Bachelor's graduate will be evaluated differently by an employer regardless of not having a Master's degree, it seems that the labour market draws a clear distinction between degrees from the 1st and 2nd cycles.

There are significant differences between fields of study when it comes to career entry, both in terms of participation in the employment market and in terms of the quality of employment (→ Figure 179). Where degree programmes are less specific to a particular profession, notably in the humanities and social sciences but also interdisciplinary studies, beginning a career is somewhat more problematical. This is reflected in a higher proportion of persons either not in employment or else in jobs that are not appropriate to their training. Four years later, however, the non-employment rate is at a level comparable to other fields of study; the rate of inappropriate employment likewise falls, but remains higher than for other fields of study. In the natural sciences too, the difficulties of entering the employment market are greater than average, and even five years after graduation employment rates are a little lower.

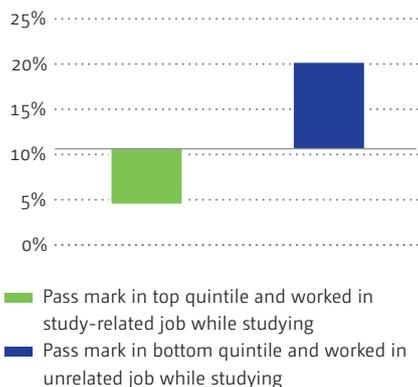
179 Labour market situation 1 year after graduation, 2011

Only 2nd-cycle graduates
Data: FSO (Graduate Survey); computations: SCCRE



180 Percentage in inappropriate employment, 1 year after graduation

Deviation from average (10.5%), 2nd-cycle graduation cohorts, 2002–2008
Data: FSO (Graduate Survey); computations: SCCRE



The likelihood of not finding appropriate employment is significantly affected by performance factors such as pass marks, duration of study and employment during the degree course (Diem & Wolter, 2013) (→ Figure 180). Graduates who do not have appropriate employment one year after completing their studies are also much more likely, for the medium term, to stay in jobs which do not require a university degree or do not match well with their professional skills. Around a quarter of them are still without appropriate employment five years after graduation. Moreover, there is evidently great disparity in earnings between those who are in appropriate employment and those who are not, and these gaps cannot be accounted for by observable skills or other observable socio-demographic or structural characteristics.

The extent to which universities can influence the successful integration of their graduates into the labour market, e.g. through course design or teaching, is an open question. Graduate data reveals pronounced variations between employment rates for different universities one year after graduation (→ Figure 181), regardless of the field of study and after adjusting for the regional unemployment rate (Diem & Wolter, 2012). However, universities do move up and down this ladder to some degree. Given the wide gap between the highest and lowest employment rates (10%, adjusted for the field of study and current unemployment levels), it would be useful to have explanations for it. Analyses of the factors underlying these differences have indicated a negative correlation between the regional baccalaureate rate and the university's graduate employment rate. Nevertheless, five years after graduation the gaps between universities have partially closed (Diem & Wolter, 2012).

181 Employment rate index: deviation from average, 2011

2nd-cycle graduate employment rate, one year after graduation

Data: FSO (Graduate Survey); computations: SCCRE

Employment rate deviation compared with average



The employment rate index shows how much the graduate employment rate of each university deviates from the average after accounting for the composition of subjects taught. To this end the deviations from the average employment rate in that field of study for Switzerland as a whole were calculated separately for each field of study and each university and then aggregated in the light of the relative size of each field of study at the institute in question. These values were then adjusted by the deviation between the cantonal unemployment rate and the average (cf. also Diem & Wolter, 2012).

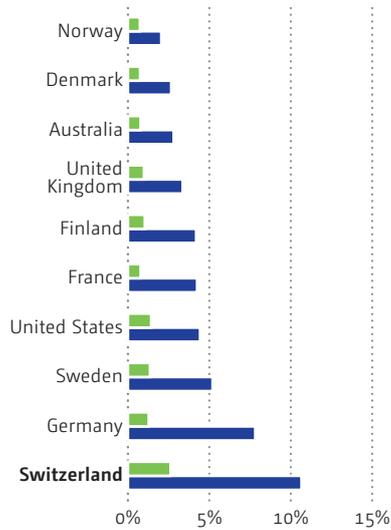
Due to restraints on comparing universities in the technical sciences, law and interdisciplinary studies, these fields of study were excluded from the analyses, which meant that the residual sample sizes for the University of Lucerne and the federal institutes of technology EPFL and ETHZ were too small for inclusion.

Efficiency/costs

In order to adequately assess the efficiency of the use of resources in university education, comparative data on inputs is required, along with a suitable measure of output (i.e. effectiveness). As yet, neither condition is satisfactorily fulfilled. Regarding costs, the accounting models used by universities have been broadly harmonised, but the problem remains that student numbers are currently not expressed in full-time equivalents (FTE). Data collection techniques are currently being modified to address this. Comparable data will probably not be collected until 2014. On the output side, for want of better options the only available measure of effectiveness was the employment rate (→ *Effectiveness*, page 191). Owing to these difficulties in measuring efficiency, the following sections will focus on comparing the costs incurred by universities and on possible explanations for the differences.

182 International comparison of ISCED 6 qualifications, 2011

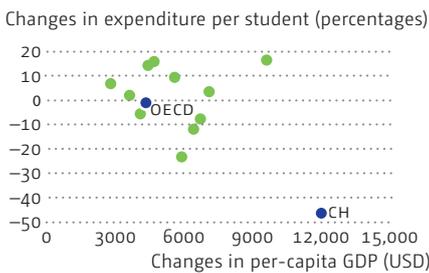
Data: OECD



■ Proportion of 25 to 64-year-olds in the population with an ISCED 6 qualification
 ■ Proportion of ISCED 6 qualifications among tertiary qualifications excl. ISCED 5B

184 International comparison of changes in tertiary education expenditure and economic growth, 2005–2010

Data: OECD



Apart from Switzerland the following countries are included in this graph:

- Australia
- Austria
- Finland
- France
- Italy
- Netherlands
- Norway
- Spain
- Sweden
- United Kingdom
- United States

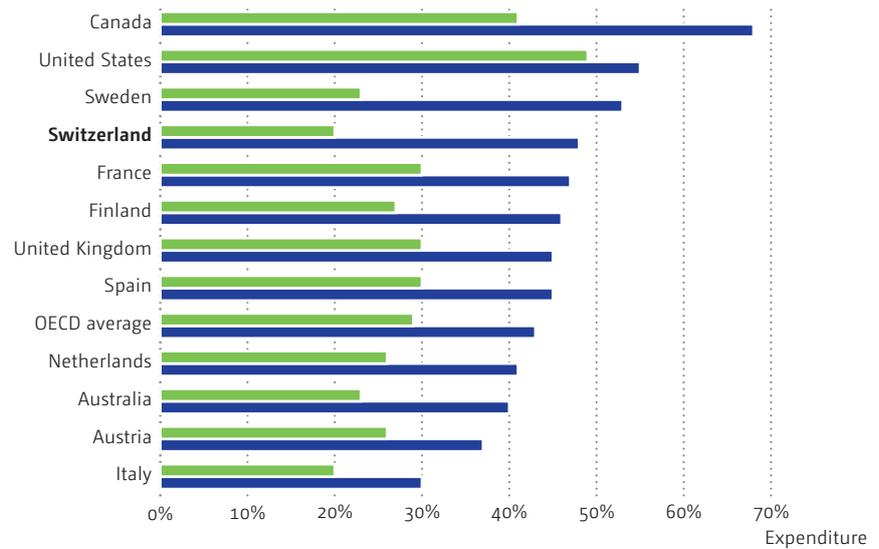
International comparison

Educational expenditure for teaching and research at tertiary level A is high in Switzerland by international comparison (→ Figure 183). A significant reason for this lies in the heavy emphasis on research activities at Swiss universities, which is also reflected in the high proportion of doctorates (→ Figure 182). If teaching costs (in terms of GDP per capita) are taken on their own, then Switzerland is one of the countries where expenditure is at present relatively low. In part, however, this finding could stem from the fact that, while spending on university education has stagnated, Switzerland has witnessed above-average economic per-capita growth in recent years, whereas reference countries have been experiencing stagnating or receding economies. This conjecture is borne out by the observation that, in an international table, Switzerland displays by far the steepest declines in education expenditure when standardised in terms of per-capita GDP, even though in real terms spending has been fairly constant (→ Figure 184).

183 Expenditure per student in tertiary education relative to per-capita GDP, 2010

Canada: only public institutions

Data: OECD



■ Expenditure on tertiary 5A and 5B education excluding R&D
 ■ Expenditure on tertiary 5A and 6 education including R&D

Studies assessing the comparative efficiency of tertiary education systems in different countries (Agasisti, 2011; Bolli, 2011) find a very high level of efficiency in Swiss universities.

Student-teacher ratios and costs by field of study

Annual per-student teaching costs vary greatly, from around 9,000 Swiss francs (economics, law) to nearly 38,000 Swiss francs (agriculture and forestry, dental medicine) (→ Figure 185). At the same time, costs also differ between universities in the same fields of study. These different annual costs can be explained by differences in material costs, infrastructure costs, inten-

sity of study and staffing costs. The latter depend in turn on the composition and salary levels of the academic staff, as well as on student-teacher ratios.

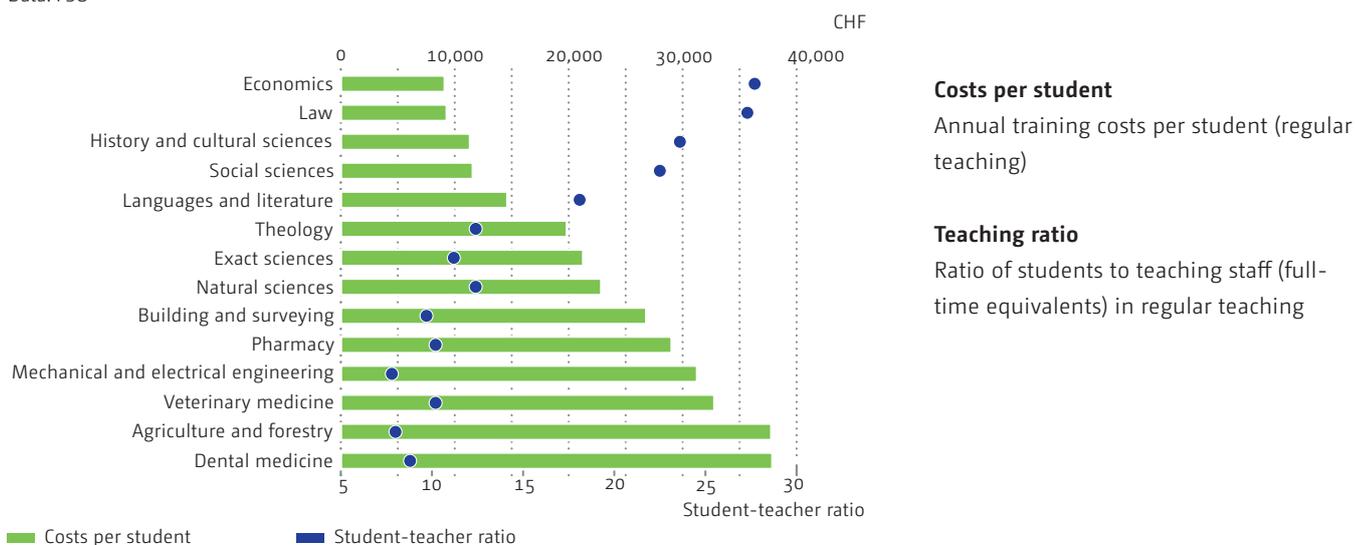
Student-teacher ratios exert a substantial influence on per-student costs (→ Figure 185). The more teaching input devoted to a student, the higher the relative costs. It should also be noted that the optimal student-teacher ratio can vary between fields of study (*Schenker-Wicki & Inauen, 2011*). Little is known however, about the optimum for each field and how much a particular course or university deviates from that. It remains an open question, therefore, whether the same results could also be achieved with less intensive teaching or whether, in certain departments, tighter ratios might actually facilitate effective education.

In Switzerland the student-teacher ratios in law, economics and the humanities and social sciences are generally considered to be too tight. Efforts have accordingly been made to improve student-teacher ratios in the interest of students' ability to study. By contrast, the situation is likely to be different on small study programmes, where teaching input is probably more intensive than it needs to be from the efficiency viewpoint.

185 Teacher ratios and costs per student, 2011

Human medicine and interdisciplinary studies were excluded due to inadequate data

Data: FSO



Costs per student

Annual training costs per student (regular teaching)

Teaching ratio

Ratio of students to teaching staff (full-time equivalents) in regular teaching

Education expenditure and employment rates

If we compare inputs with outputs to judge the efficiency of resource management, the picture will vary considerably from one university to another, as can be shown by taking economics as an example (→ Figure 186). From this perspective, the universities of Basel and Lausanne come close to optimum efficiency.

186 Expenditure and employment rates in the field of economics, 2006–2010

Average values for the years 2006–2010, 2nd-cycle graduation cohorts; employment rate one year after graduation adjusted for cantonal unemployment. Only universities which teach economics with a data sample of at least 50 persons

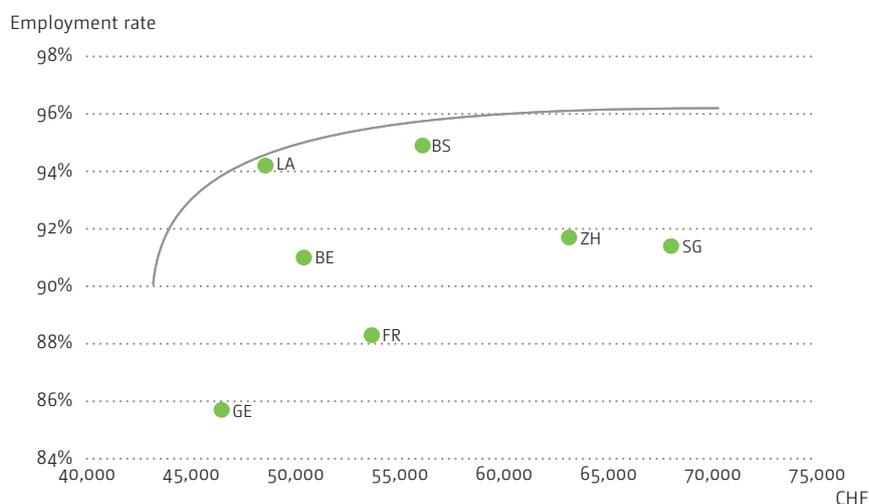
Data: FSO (Graduate Survey); computations: SCCRE

Expenditure

Annual expenditure per student (= costs of teaching basic education divided by the number of students in basic education) multiplied by the average duration of study

Efficient frontier

The curve on the graph represents the hypothetical efficient frontier, i.e. the maximum employment rate to be achieved with the expenditure concerned.



Equity

Access and participation serve below as the criteria for describing equity in university education. Consideration is given to gender gaps and various aspects of the social and economic status of students. Further aspects are discussed in the *Chapter on Tertiary-level education, page 165*. Differences between persons with a foreign nationality and Swiss nationality cannot be analysed at the transition from baccalaureate school to university due to a lack of data at the baccalaureate school level.

Gender distribution at universities

In terms of the total number of students at university, gender distribution is very even. The proportion of female students stood at 51% in 2012. The choice of subjects, however, remains highly gender-specific. In the humanities and social sciences, nearly three quarters (72%) of new entrants were female, while in medicine and pharmacy and in law women accounted for nearly two-thirds (62% and 61% respectively). By contrast, the female proportion is still low in the technical sciences (29%), economics (36%) and the exact and natural sciences (40%). Big variations in the proportion of women can also be observed within individual fields of study. In the exact sciences, for example, the gender ratio is 1:5, whereas in the natural sciences it is 1:1. Gender-specific study preferences are proving very stable over time. Nevertheless, gender segregation has declined somewhat in the technical sciences and in the exact and natural sciences during the last twenty years.

There is no gender gap in the transition from Bachelor's to Master's degrees (FSO, 2012d). On the other hand, women remain less likely to pursue a doctorate after completing the 2nd cycle. However, the disparity between

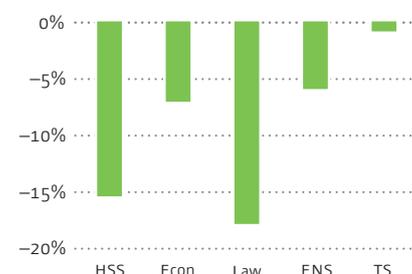
the proportion of women among those who obtain a Master’s degree and those who obtain a doctorate varies greatly across the fields of study (→ Figure 187). The difference in the proportion of female graduates between the 2nd and 3rd cycle is particularly pronounced in those fields where women predominate heavily (humanities and social sciences, law). In the technical sciences, conversely, the share remains more or less constant. Across all fields of studies the proportion of women among those completing their doctorate has risen steadily in recent years by around 1% a year and, in 2011, the figure reached 43% (FSO, 2012a).

Women’s participation declines as the academic pathway advances: in 2011 women accounted for 52% of 2nd-cycle graduates, 42% of assistants and scientific staff, 26% of other lecturers and 18% of professors. At all universities apart from Neuchâtel, the proportion of female professors thus lies below the target figure of 25% proposed in the Federal Programme for Equal Gender Opportunities (Dubach, Graf, Stutz et al., 2012). This leaky pipeline can only in part be attributed to cohort effects, i.e. even independently of the lower rates of female graduation in older cohorts, the proportion of women falls at every step in the hierarchy. The findings of a survey among young academics (Goastellec, Leresche, Ramuz et al., 2010) show that female academics are less likely than their male colleagues to be awarded (research) grants, that they are granted tenure less frequently and that they are more seldom appointed professors. Problematic mechanisms identified as contributing to the leaky pipeline include career support, reconciling academic life with a family, mobility requirements, international networking and recognition of publication output (Leemann & Stutz, 2010).

The proportion of chairs held by women varies between universities by more than 10 percentage points, even when the comparison is confined to an individual field of study (→ Figure 188). This suggests that the low percentages are not merely due to a small supply of well-qualified female academics, but are also influenced by the human resource policies of individual institutions. The Universities of St. Gallen and Lugano have by far the lowest proportions of women after adjusting for the fields of study on offer.

187 Difference between proportion of women among 2nd-cycle graduates (2006) and completed doctorates (2010 and 2011)

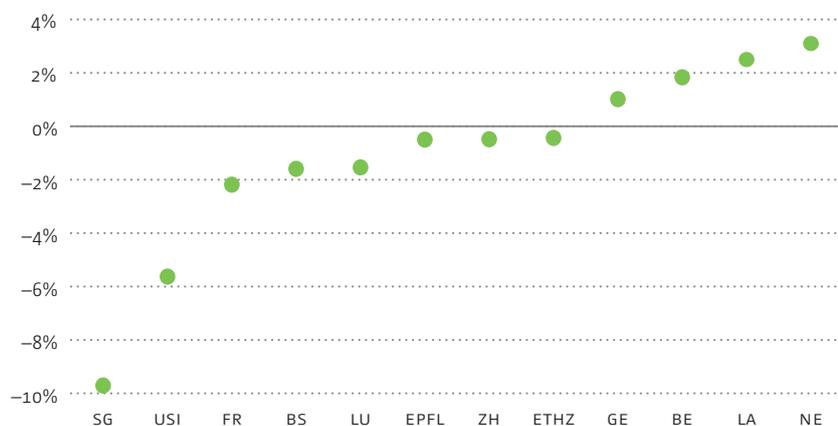
Only Swiss nationals and persons who attended school in Switzerland
Data: FSO (SHIS); computations: SCCRE



HSS humanities and social sciences
Econ economics
ENS exact and natural sciences
TS technical sciences

188 Gender index: deviation from average of the proportion of female professors, 2011

Excluding interdisciplinary studies
Data: FSO; computations: SCCRE



The **female share of professorships** index shows how much the female share of professorships at each university deviates from the average after adjusting for the fields of study serviced. To this end the deviations from the average proportion of women in that field of study in Switzerland as a whole are calculated separately for each field of study and each university and then aggregated in the light of the relative size of each field of study in the institute in question.

The large discrepancies between the universities cannot be explained by the age of the university (newer universities have had better opportunities to recruit female staff thanks to a rising number of qualified female academics in recent years). A look at the different language regions, however, shows that Swiss-French universities boast a higher proportion of female professors than German speaking ones. As research findings in other countries have shown, the percentage of women among teaching staff tends to rise when women exercise executive and managerial positions and when a larger share of women serve on management bodies (Ehrenberg, Jakobson, Martin *et al.*, 2012). To what extent this might also explain the varying percentages of women teaching at universities in Switzerland has yet to be explored.

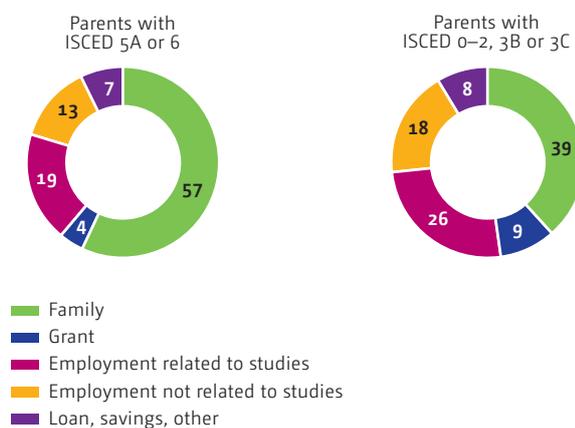
Social and economic status of students

Study paths are not only influenced by institutional contexts, but also by the individual circumstances of students. A central criterion here is disposable income and with it the need to seek employment while studying. Students at Swiss universities who do not live with their parents have on average almost 2,000 Swiss francs a month to pay for their maintenance. Depending on their social origins, support from the family and income from grants will cover something between just under a half and just under two thirds of these costs (→ Figure 189). Students subsidise the rest through paid work or else rely on loans or other sources. 75% of students take paid employment and, of these, 83% also work during the semester (FSO, 2010d).

189 Student income by parents' educational background, 2009

Only full-time students not living with their parents

Data: FSO (social and economic status of students); computations: SCCRE



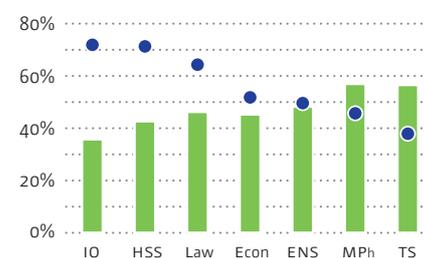
The leeway students have to work during term-time does, however, depend on the course they attend. This can result in baccalaureate school leavers from lower income backgrounds deciding (or being forced to decide) against subjects which place higher demands on their time (→ Figure 190). Moreover, students who work more spend less time on study (FSO, 2010d). Grants can therefore play an important part in allowing students from economically disadvantaged families to choose their studies freely and to proceed faster (→ Chapter on Tertiary-level education, page 165).

The average expenditure of students living outside the parental home ranges from 1,700 to 2,000 Swiss francs depending on the university. Of this, the average spending on lodgings is between 500 and over 600 Swiss francs. Given the substantial differences in rent levels, this relatively small variation in spending on lodgings suggests that students in cities with higher rents can more often only afford small spaces or else rely on cheaper options such as student accommodation.

190 Term-time employment and parents' educational background, 2009

Only Bachelor's degree students

Data: FSO (Social and Economic Status of Students); computations: SCCRE



■ Students with parents with ISCED 5A-6 qualification

■ Students employed during the semester

IO interdisciplinary and others
 HSS humanities and social sciences
 Econ economics
 ENS exact and natural sciences
 MPh medicine and pharmacy
 TS technical sciences

Accueil

Accueil



Universities of applied sciences (UAS)

Context

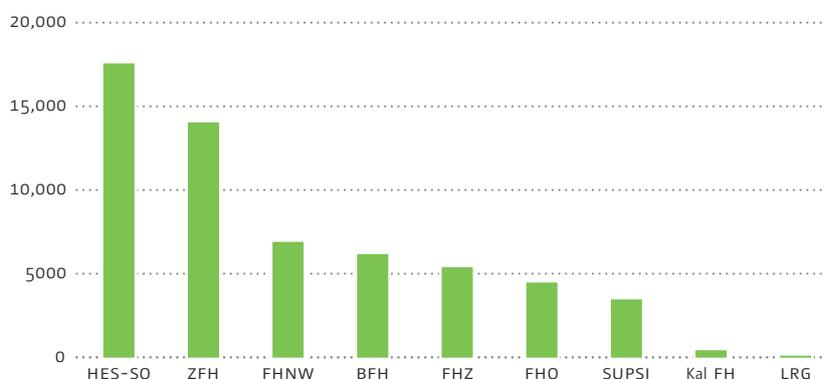
All facts and figures in this chapter relate to the universities of applied sciences but not to the institutes for teacher education contained within these universities. These are covered in the *Chapter on Universities of teacher education*, page 221.

Switzerland has seven public universities of applied sciences (UAS) and two private ones (Kalaidos and Les Roches-Gruyère¹). These institutes consist in turn of several sub-units located in different geographical areas and usually run by their own administration. The universities of applied sciences vary considerably in size (→ Figure 191). The two private universities are the smallest of these institutes by a considerable margin; together they account for less than 2% of the market (excluding CET students). In 2012/13 there were almost 60,000 persons enrolled as Bachelor's, Master's and old-style *Diplom* students (excluding teacher training) at all the universities of applied sciences combined.

191 Number of students on Bachelor's, Master's and *Diplom* courses, 2012

Data: FSO

| | |
|--------|--|
| HES-SO | Haute école spécialisée de Suisse occidentale |
| ZFH | Zürcher Fachhochschule |
| FHNW | Fachhochschule Nordwestschweiz |
| BFH | Berner Fachhochschule |
| FHZ | Fachhochschule Zentralschweiz |
| FHO | Fachhochschule Ostschweiz |
| SUPSI | Scuola universitaria professionale della Svizzera italiana |
| Kal FH | Fachhochschule Kalaidos |
| LRG | Haute école spécialisée Les Roches-Gruyère |



Forecasts of student numbers

The universities of applied sciences have grown fast since they were first established in 1998. This is due not only to the integration of new fields of study (up until 2002) but also to the rising number of people obtaining a federal vocational baccalaureate, combined with higher transition rates to university following a federal vocational baccalaureate (*FSO, 2012c*). The introduction of a Master's degree (from 2008) likewise triggered an increase in student numbers.

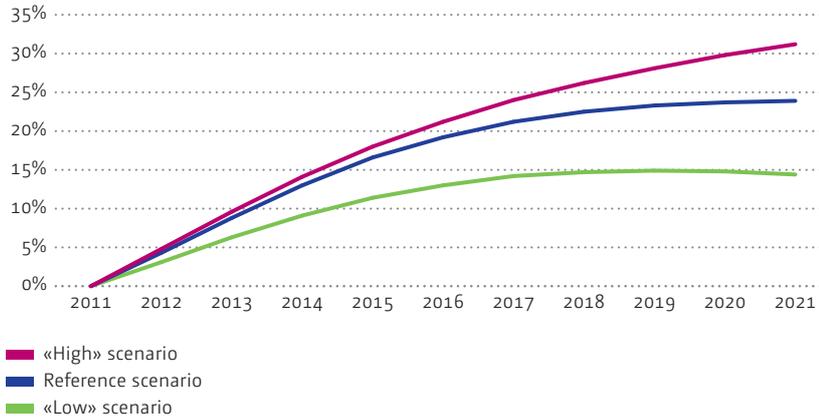
Over the next few years, the growth of the universities of applied sciences is expected to continue, given the upward trend in the number of federal vocational baccalaureates (up until 2015) and the rising rate of transfer from a federal vocational baccalaureate to a university of applied sciences (→ Figure 192). In addition to this, student populations have been boosted by the enrolment of persons who obtained their school-leaving qualification entitling them to university admission from another country and of persons holding «another Swiss qualification». Nevertheless, the forecasts for student numbers are fraught with uncertainties, and as a consequence the Federal Statistical Office has based its calculations not only on a reference scenario,

¹ Les Roches-Gruyère University will, however, stop enrolling students from the autumn semester of 2014 and will cease operations in summer 2016.

but also on two additional scenarios. A key factor in the diverging forecasts for student populations is the transfer rate from the federal vocational baccalaureate to the universities of applied sciences.

192 Forecast changes in student numbers from 2011 to 2021 with 2011 as the baseline

Bachelor's, Master's and *Diplom* students only
Data: FSO

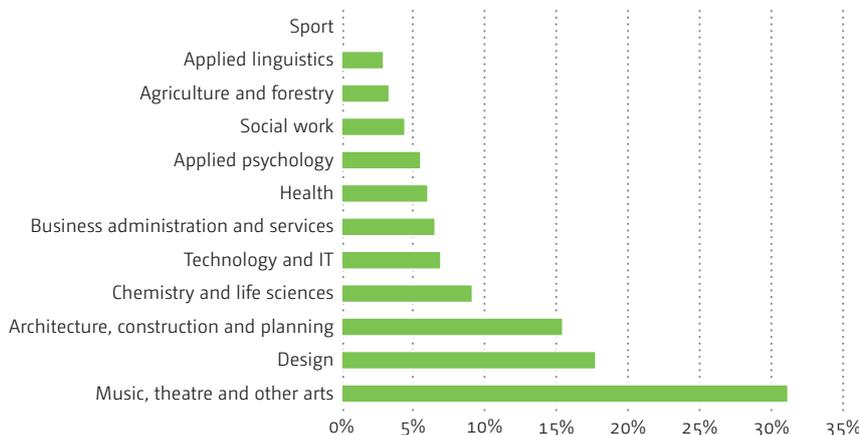


As a result of demographic changes, the growth in student populations will begin to slow down slightly year by year. In the reference scenario, the annual growth rate falls from an initial 4% in 2014 to practically 0% in 2021. At that point the universities of applied sciences will have between 65,000 and 75,000 students enrolled in *Diplom*, Bachelor's and Master's courses.

There has been a moderate growth since 2000 in the number of students who obtained their school-leaving qualifications entitling them to university admission from another country (foreign-educated foreign nationals). The percentage of foreign students does, however, display significant but evidently stable differences between fields of study (→ Figure 193). Music, theatre and other arts have the most international appeal by a clear margin (33% foreign-educated foreign nationals), with music and theatre, in particular, attracting a high percentage of students who obtained their entitlement to university admission abroad.

193 Percentage of foreign-educated foreign nationals on Bachelor's courses, 2012

Data: FSO (SHIS); computations: SCCRE



Institutions

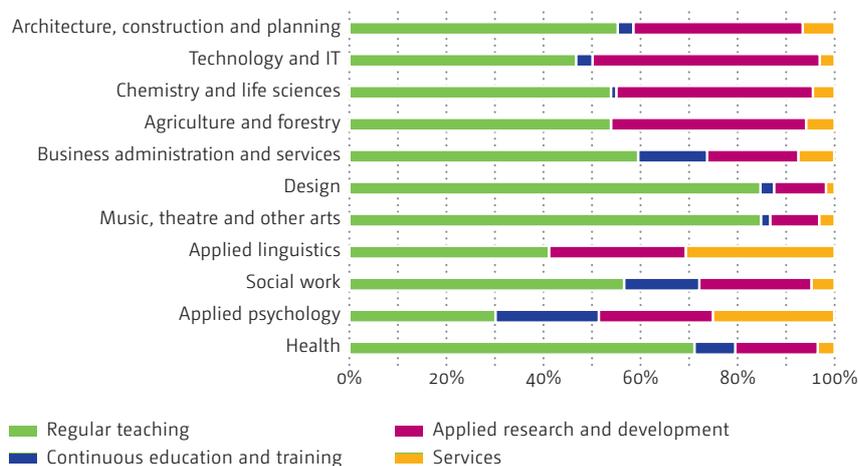
The universities of applied sciences display heterogeneity, both within and between fields of study, with regard to students, teaching staff and the nature of their activities (→ *Chapter on Tertiary-level education, page 165*). Weber, Balthasar, Tremel et al. (2010) distinguish between three segments based on the typical origin of their students and their role within the tertiary sector as a whole. The «traditional» segment, offering a combination of «technology and IT» and «business administration and services», evolved directly out of the system of basic vocational education (with the associated profiles of federal vocational baccalaureates). There were also institutional forerunners in the shape of the Level B engineering colleges (HTL) and Level B business administration colleges (HWV). The «newcomer» segment consists of the youngest group of colleges devoted to social work, health, applied psychology and applied linguistics which were regulated by the cantons until 2005 and whose input structure from basic vocational training is only recent. The «monopoly» segment – music, theatre and other arts, and also design – includes schools who face no competition from university courses and whose roots in basic vocational education are weak, so that they primarily recruit students who have obtained their baccalaureate from a baccalaureate school and those with foreign school certificates (→ Figure 195).

If we consider the focus of activities (→ Figure 194), a substantial amount of research and development (accounting for about 40% of the workload) is clearly carried out in the technical and scientific disciplines, alongside the focus on teaching at basic education and training level, indicating that these fields have a strong industrial anchor. By contrast, activities in the creative disciplines are confined almost exclusively to basic education and training (85% of the workload). The pattern is relatively diverse for disciplines in the «newcomer» segment and in business administration and services, where continuous education and training accounts for a greater component of activity than in the other disciplines.

194 Human resources in full-time equivalents (FTE) by type of activity, 2011

Excluding «administration» and «central services»

Data: FSO

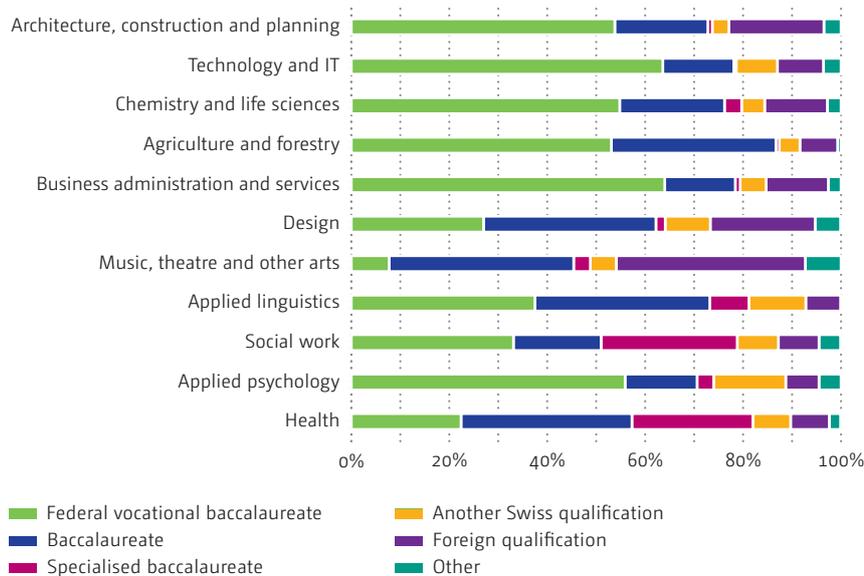


Admission qualifications held by students

The main path to UAS is the vocational baccalaureate. Nevertheless, these universities recruit their students from a very disparate field (→ Figure 195). The federal vocational baccalaureate accounts for 50% of admissions. About one fifth of the students enrolling acquired their baccalaureate from a baccalaureate school. The specialised upper secondary schools also supply a major contingent, as do foreign schools. The composition of the student population varies greatly from one field of study to the next. In the «traditional» segment, the federal vocational baccalaureate is the dominant qualification. By contrast, relatively few students of health (22%) and social work (33%) are admitted in this manner, even though a specific pathway has existed since the introduction of a federal vocational baccalaureate with a health and social work emphasis. School-based education dominates in the creative disciplines and in applied linguistics.

195 Enrolments for a Bachelor's degree broken down by admission qualification, 2012

Data: FSO (SHIS); computations: SCCRE

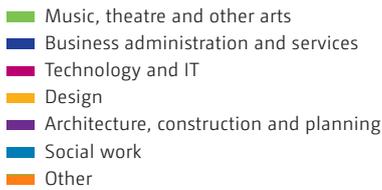
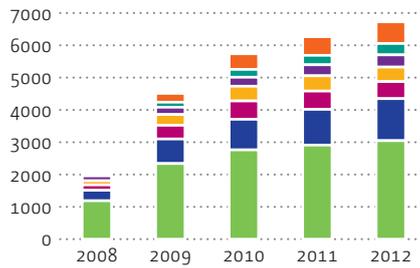


Master's degrees

Since 2008, the universities of applied sciences have also been entitled to offer courses leading to a Master's degree. However, the available options are limited because both the federal and cantonal authorities chose to restrict the number of high-calibre Master's courses geared to the needs of professional practice (UAS Agreement on Master's degrees). As a result, the Bachelor's degree is quite clearly still the standard qualification. Only in the field of music, where courses under the old rules usually lasted four or five years or more and the Master's degree is still customary in other countries, is a Master's degree seen as the standard qualification (*OPET, 2012b*). A total of 74 Master's courses had been authorised by 2013. The fields of study are not equally represented (→ Figure 196); most students enrolled in a Master's course are in the arts disciplines. The average rate of transition from a Bachelor's degree to a Master's course is

196 Master's students broken down by field of study, 2008–2012

Data: FSO



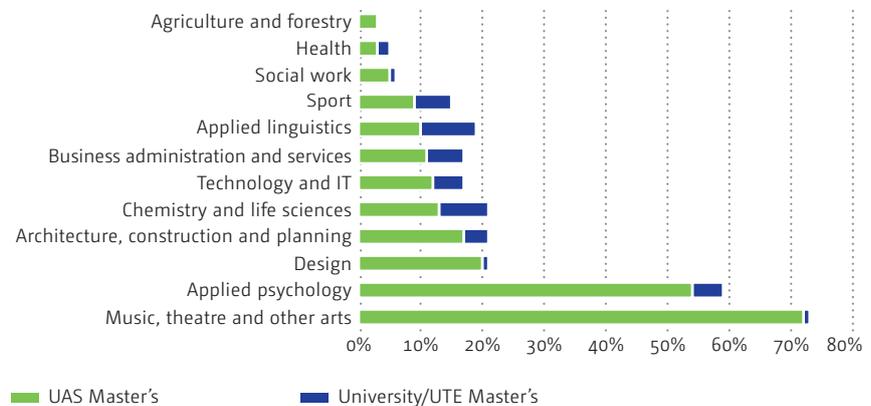
about 19% for the years graduating in 2008 and 2009 (FSO, 2012d). Among those who transferred, approximately 10 percentage points did so immediately, 9 percentage points did so one or two years later and 1 percentage point waited three years after obtaining a Bachelor's degree. The transition rates are expected to fall somewhat in coming years (to about 16%) (FSO, 2012c). The highest transition rates by a clear margin are found in the fields of music, theatre and other arts (72%) and applied psychology (54%); in all other fields, the transition rate is 20% or lower (→ Figure 197). In the arts, this is primarily due to the field of music, where a Master's degree is seen as the standard qualification. In applied psychology the explanation is probably that a Master's degree is required in order to exercise the new regulated profession of «psychologist».

In some fields, such as business administration and services, chemistry and life sciences and also applied linguistics, a comparatively large number of UAS graduates with a Bachelor's degree transfer to a university to take their Master's course, as Figure 197 illustrates.

The probability that a student will begin a Master's course does not merely vary from one field of study to another. All other things being equal, Bachelor's students who acquired their university admission qualification in another country, male students and full-time students are more likely to make the transition than students who obtained their admission qualification in Switzerland, female students or part-time students (FSO, 2012d). Lower transition rates for women are more common in fields of study dominated by men (→ *Equity*, page 216).

197 Transition to a Master's course within two years of completing a Bachelor's degree (cohorts 2008 and 2009)

Data: FSO



Tuition fees

Like other university students, students at the universities of applied sciences must assume part of their study costs by paying tuition fees. Tuition fees at the public universities of applied sciences range from 1200 to 2000 Swiss francs a year (→ Figure 198). The university authorities are at liberty to charge additional fees to foreign students, and all seven of the public universities do so. Compared to their public counterparts, the private universities of applied sciences charge considerably higher fees, with annual amounts ranging from about 10,000 to 20,000 Swiss francs.

Tuition fees do not differ much between fields of study. However, as the costs of training vary greatly from one field to another, the percentage borne by the students themselves diverges substantially. At the UAS in Bern (BFH), for example, students of business administration and services will assume about 7% of their study costs themselves, whereas students of chemistry and life sciences will only contribute about 3%.

198 Tuition fees per semester, 2012

Lowest and highest semester fees for Swiss students at public universities

Data: SERI



Effectiveness

This section considers student pass ratios and several measures of labour market opportunity in order to draw some conclusions about the effectiveness of teaching at the universities of applied sciences.

Student pass rate

Under certain conditions, the student pass rate can be used to determine how effective a course or university has been. This depends crucially on the university's strategy and on the composition of the student population with which the university operates, which is largely beyond its influence. In other words, a low student pass rate may well suggest that a course places the bar high, but it may equally reflect the fact that a particular course only attracts students of lower ability, and this in turn (alongside geographical factors) may be attributed to the university's reputation. Moreover, in some fields (health, social work, applied psychology, arts, design) the universities of applied sciences, unlike other universities, hold aptitude tests. It can be assumed that these tests are relatively good at assessing the suitability of potential students and that prior selection reduces the number of future drop-outs. However, for the student pass rate to function well as an indicator for the effectiveness of

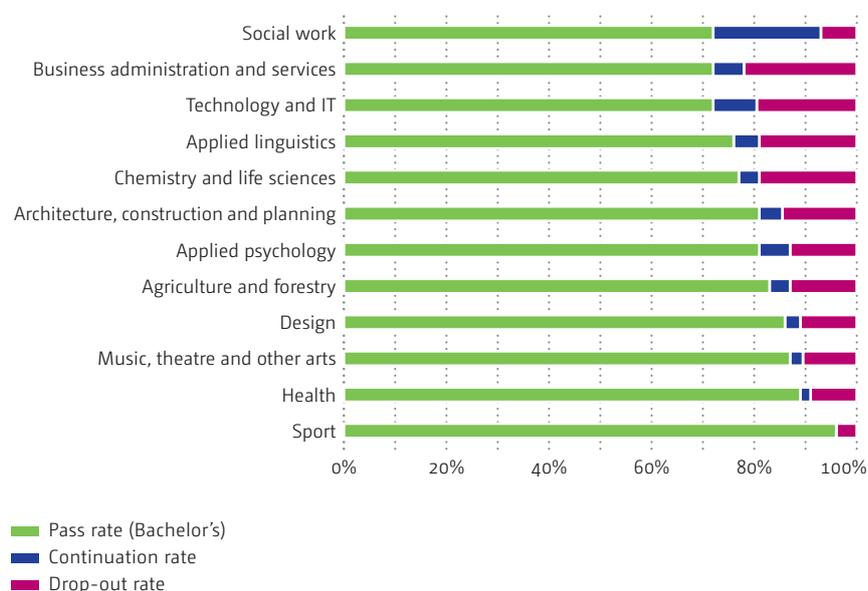
training it is essential that universities do not maintain an «artificially» high pass rate by falling short of labour market expectations when defining the requirements for achieving the qualification. Although the employment rate of UAS graduates, which is currently at a high average, would tend to refute such a hypothesis, the high proportion of employment that does not reflect university qualifications should be borne in mind as a potential problem (→ Figure 201).

Of those students who acquired their admission qualification in Switzerland and began a Bachelor's course at a university of applied sciences in 2006, 76% had completed their Bachelor's degree five years later. 16% had dropped out of the course, and the remaining 8% had not yet finished (FSO, 2012d). The continuation rate is particularly high for courses where studies are pursued in parallel to practical experience, as for example in social work, and this makes it impossible to provide definitive data about the student pass rate. The pass rates and drop-out rates differ from one field of study to the next (→ Figure 199). One explanation for the differences, apart from different admission procedures and varying proportions of part-time students, may be the varying percentage of female students. On about half the courses, women display higher pass rates than men (FSO, 2012d). The Bologna reforms have not significantly affected the drop-out rate; the student pass rate for Bachelor's courses is similar to the rate for the former diploma (*Diplom*) courses. The reason for this is probably that the Bologna reforms have had far less impact on the way studies are organised here than at conventional universities, given that even before the reforms most students usually obtained their degree in three years.

199 Student pass rate 5 years after beginning a Bachelor's course, 2011

Students with Swiss education qualifications who enrolled in 2006

Data: FSO



Labour market success

Successful integration into the labour market is a key criterion for assessing the training received at a university of applied sciences. Apart from the employment rate as such, key factors are the extent to which the training

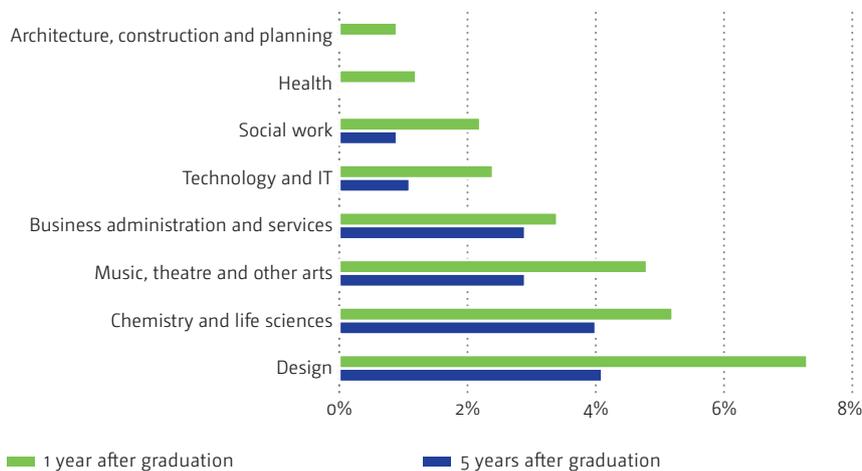
provides the right skills for qualified employment and the extent to which graduates are able to find a job they find satisfying because it matches their vocational qualifications.

Compared with graduates from other universities, graduates from the universities of applied sciences join the labour market somewhat faster. If we take the ILO's definition of unemployment as our yardstick, only 3% of Bachelor's degree holders are affected by unemployment a year after graduation (2011) (Master's degree holders from conventional universities: 4%). Five years after graduation the proportion is still 2%, set against a very high employment rate of 95% (universities: 2% resp. 93%).

However, there are noticeable differences between fields of study with regard to unemployment rates as defined by the ILO (→ Figure 200). Students of design find it especially difficult to launch a career. Graduates in health, on the other hand, are very easily absorbed into the labour market.

200 Unemployment rate (ILO) for graduates with a Bachelor's degree or Diplom, 2011

Data: FSO



This does not yet tell us whether these graduates are working in jobs that match their qualifications. An analysis of the Graduate Survey of 2011 shows that, both one year and five years after graduation, about 30% of employed UAS graduates were in a job that did not require a university degree. The increase in appropriate employment between these two points in time is extremely small (2–3 percentage points), which means that the problem is not just about getting started. One partial explanation for the substantial share of employment in jobs that do not require a university degree may be that some positions can equally be filled by persons who have completed tertiary level B PET or persons with CET certificates. This hypothesis is backed by the situation in the field of health: one year after graduation in the French-speaking area of Switzerland, where tertiary-level health training is only available at the universities of applied sciences, more than three quarters of UAS graduates have found an appropriate job. By contrast, in German-speaking Switzerland, where nurses are also trained at tertiary level 5B, the rate is only one third.

Further analysis of the graduate data shows that of those who, one year after graduating, are in jobs that do not require a university degree, at least a third report that there is a good match between their vocational qualifications and the work they are doing. This reduces the average rate of inappro-

ILO/FSO definitions

Employed person

A person who did paid work for at least 1 hour during the reference week

Unemployed person

A person who was not employed during the reference week and had actively sought work during the four previous weeks

Economically active population

Sum of employed and unemployed persons

Unemployment rate

The unemployed as a percentage of the total economically active population

Employment rate

The percentage of all graduates who are employed

(www.bfs.admin.ch/FSO/portal/de/index/infothek/definitionen.html)

Good match between vocational qualification and work performed

Employment position is clearly appropriate to the professional skills acquired during tertiary A education (scores 4 and 5 on a scale from 1 «not at all appropriate» to 5 «appropriate to a great extent»).

High satisfaction about the match with vocational qualifications

High satisfaction with employment with regard to the match with vocational skills acquired during study (scores 4 and 5 on a scale from 1 «not at all satisfied» to 5 «very satisfied»).

Inappropriate employment

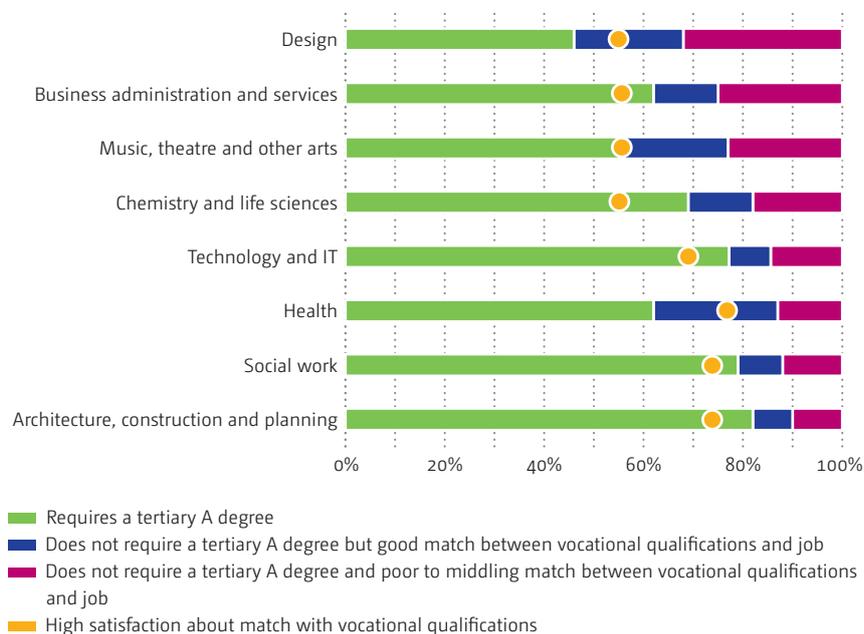
Jobs which neither require a university degree nor are clearly matched with the vocational skills acquired during study (scores 1 to 3 on a scale from 1 «not at all appropriate» to 5 «appropriate to a great extent»).

appropriate jobs among those in employment to just under 20%. There are, however, big differences between fields of study when it comes to the match between training and employment (→ Figure 201). When surveying satisfaction with the match between vocational qualifications and employment performed, it is striking that the scores in the field of chemistry and life sciences are relatively low, which raises questions about either the quality of training or the reported shortage of skilled labour (→ Chapter on Tertiary-level education, page 165). The poor matching and satisfaction scores in the fields of business administration and services are also surprising.

201 Match between job requirements and training one year after graduation, 2011

1st-cycle graduates (Bachelor's degree, old-style *Diplom*) who had not enrolled for a Master's course at the time of the survey and 2nd-cycle graduates (Master's). At least 50 observations are required for the field of study to be included.

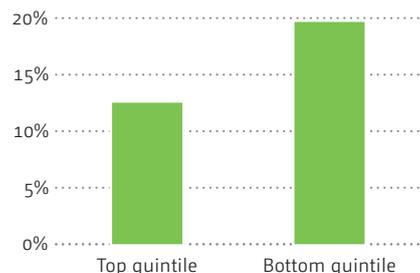
Data: FSO (Graduate Survey); computations: SCCRE



202 Share of graduates in inappropriate jobs as a function of pass marks

1st-cycle graduates who qualified in 2004–2010; excluding those who had enrolled in a Master's course one year after graduation; excluding sport and applied linguistics

Data: FSO (Graduate Survey); computations: SCCRE



As a study carried out for the Swiss universities suggests (Diem & Wolter, 2013), the probability of having an inappropriate job is influenced not only by the chosen field of study, but also by personal performance factors such as the final pass mark, the time taken to complete the course and employment during the degree course. Analyses carried out for the universities of applied sciences (Diem, 2014) confirm the positive correlation between pass mark and employment match (→ Figure 202). It is also evident that one in three persons who do not have an appropriate job one year after graduation will, four years later, still be doing work that does not require skills obtained when studying. The finding that persons who are not in employment appropriate to their qualification earn less than persons who are (Diem & Wolter, 2013; Leuven & Oosterbeek, 2012), can also be observed among UAS graduates (Diem, 2014). The wage differential one year after graduation averages about 6%. However, the monetary value of this disadvantage varies considerably between fields of study.

Efficiency/costs

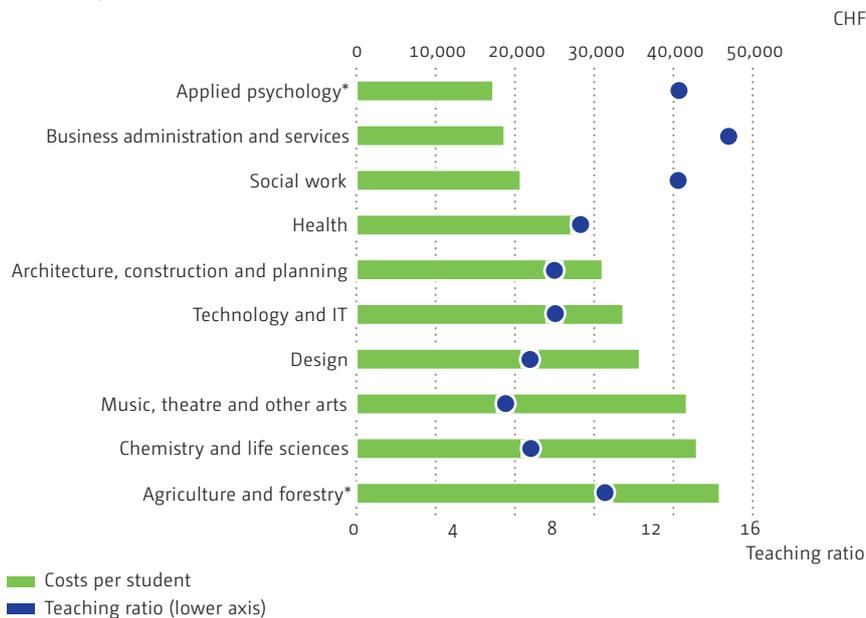
In order to assess the efficiency of teaching resources at the universities of applied sciences, comparative cost data is required along with a suitable measure of outcomes (i.e. the effectiveness of the teaching). As yet, however, we do not have a measure that adequately captures outcomes. The comments in this section will therefore focus primarily on cost comparisons.

Costs of training

The annual costs of basic training (without infrastructure costs) per student differ substantially from one field of study to the next, with expenditure ranging from about 20,000 Swiss francs (applied psychology, business administration and services, social work) to over 40,000 Swiss francs (agriculture and forestry, chemistry and life sciences, music, theatre and other arts; → Figure 203). At the same time, there are significant differences between the various universities of applied sciences, regardless of the composition of subjects on offer. Variations in annual costs can result from differences in the costs of materials and human resources. The latter will depend in turn both on the make-up and pay grades of the academic staff and on teaching intensity. Teaching ratios clearly account for much of the difference in costs between fields of study (→ Figure 203). As we might expect, the lower the teaching ratio, the

203 Teaching ratios and costs per student (FTE), 2011

Data: OPET, FSO



Costs per student

Annual operating costs per student (full-time equivalent) for teaching (basic training, without infrastructure costs)

Teaching ratio

Ratio of students (full-time equivalents) to teaching staff (full-time equivalents) in basic training

higher the associated costs. While it is plausible for fields of study such as the laboratory-intensive life sciences and subjects requiring one-to-one contact such as music and theatre to encourage smaller classes and greater teaching intensity, questions would have to be raised on grounds of efficiency if expensive teaching ratios were shown to increase as a result of too few students attending a particular course.

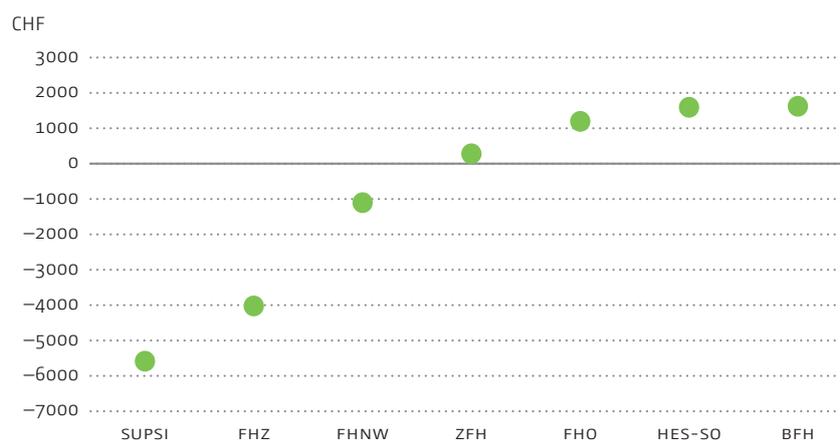
The different levels of costs incurred by the seven public universities of applied sciences (→ Figure 204) seem to be due in part to differences in teaching ratios. Part of the variation could also be due to different input prices (lower prices in Ticino and Central Switzerland). Other possible explanations may be differences in the structure of staff qualifications, differences in the size of the institution as a whole or of its sub-units and departments (economies of scale), and differences in specialisation between the same departments at different universities.

The **expenditure per student index** shows how much the teaching expenditure of each university of applied sciences deviates from the average after adjusting for the fields of study they service. To this end the deviations from the average annual expenditure per student (FTE) for that field of study in Switzerland as a whole are calculated separately for each field of study and each university of applied sciences and then aggregated in the light of the relative size of each field of study at the institute in question.

204 Index of annual expenditure per student (FTE), 2011, adjusted for field of study

Excluding sport and applied linguistics

Data: OPET; computations: SCCRE



Equity

Using access and participation as criteria, this section rates equal opportunities at the universities of applied sciences. It considers disparities between foreign and Swiss nationals and between men and women. It also casts light, from several perspectives, on the social origins of students. Other aspects are addressed in the *Chapter on Tertiary-level education*, page 165.

Students with a migration background

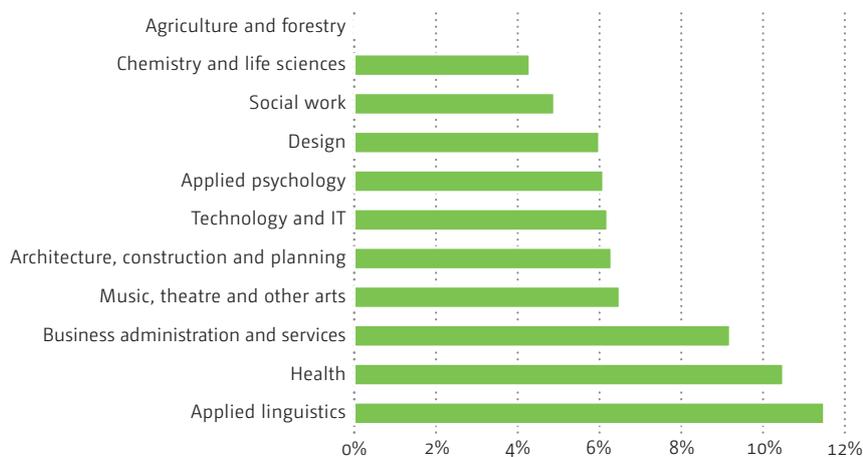
In the light of findings that school students with a migration background are less likely to attend a school offering the federal vocational baccalaureate or a baccalaureate school (→ *Chapter on Upper-secondary education*, page 105) and yet in some cases cherish higher aspirations about education (*Watermann & Kristen, 2013*), there is some interest in their participation levels in courses provided by the universities of applied sciences. About 9% of students at schools offering the federal vocational baccalaureate (2010) and about 13% of students at schools offering the baccalaureate (2010) have foreigner status, whereas on average just under 8% of students enrolling in the universities of applied sciences (2012) are foreigners (as a percentage of students enrolling for a Bachelor's degree who achieved their university admission qualification in Switzerland). This slightly lower percentage of foreigners at the universities

of applied sciences than at upper-secondary schools may not be entirely due, however, to a lower transition probability for foreign nationals, but in part to the fact that Swiss citizenship tends to be taken at this age. As the data on students achieving their baccalaureate is incomplete, no definitive conclusions can be drawn about variations in transition probability. There is clear evidence, on the other hand, that the percentage of students with a migration background differs greatly from one field of study to another (→ Figure 205). On the whole, the percentage of persons with a migration background enrolling for a Bachelor course at a university of applied sciences is similar to the figure for conventional universities (UAS: 7.6%, conventional universities: 8.1%).

205 Proportion of foreign students enrolling for a Bachelor's degree, 2012

Only those who acquired their admission qualifications in Switzerland

Data: FSO (SHIS); computations: SCCRE



Gender distribution

Equal gender opportunities at the universities of applied sciences are a key issue, as is demonstrated by the loans that have been approved for the fourth round of the Federal Programme for Equal Opportunities at the Universities of Applied Sciences (2013–2016). A prime objective of this fourth round was to reduce horizontal and vertical segregation. In terms of horizontal segregation, male students are still slightly in the majority. However, the proportion of female students has risen by about 20 percentage points since 2000, accounting for 47% in 2012 (excluding students in continuing education and training). The big increase in the percentage of women is essentially due to the additional integration or growth of departments with a female predominance. At the same time, however, the proportion of women within certain fields of study has also grown by more than 10 percentage points, especially in male-dominated subjects (architecture, construction and planning, chemistry and life sciences, agriculture and forestry and business administration and services), yet also in the field of social work, which was already dominated by women. Nevertheless, we have only to consider the gender gaps within individual fields of study to see that there are still substantial differences between men and women when it comes to choosing a subject (→ Figure 206). The gaps are particularly wide in the fields of technology/IT and health (→ *Skilled labour shortage*, page 168, *Chapter on Tertiary education*).

Horizontal segregation

Unequal gender distribution across choice of degree/occupation

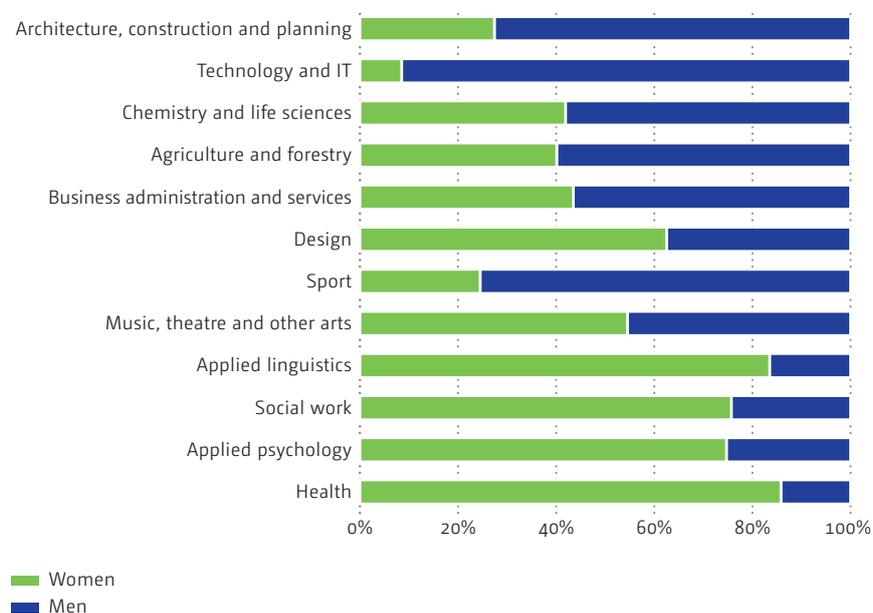
Vertical segregation

Unequal gender distribution across different tiers of the hierarchy

206 Gender distribution of students, 2012

Excluding CET students

Data: FSO



Among the academic staff, there are considerable gender gaps. Thirty-one percent of professors are women, as are 37% of assistants, scientific staff and other lecturers (2011). Here, however, the differences between the various functional categories are not very pronounced. The widest gaps are those between the different subjects. Women are least well represented among professors of technology & IT (8%), whereas they account for a great majority in the field of health (75%).² It should be added that there is a close correlation between the gender distribution among academic staff and the gender distribution among students. Nevertheless, the proportion of female professors is always smaller – with the sole exception of technology and IT, where the gender distribution remains practically identical throughout. The greatest gender discrepancy by a considerable margin is found in design.

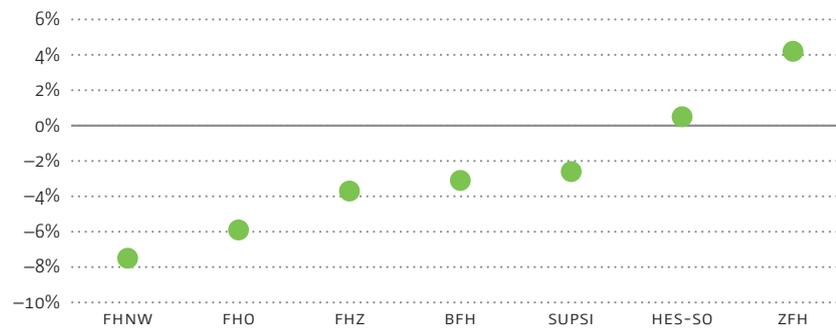
The share of professorships held by women also varies noticeably between different universities of applied sciences, even when we confine our comparison to differences within the same field of study (→ Figure 207). This suggests that the low percentages are not merely due to a poor supply of potential candidates but are also significantly associated with recruitment policies at individual institutions. The proportion of women teaching at the university of applied sciences in Zurich (ZFH) is higher than average. As international studies have shown, the percentage of women among teaching staff tends to rise when women exercise executive and managerial positions and when a larger share of women serve on management bodies (*Ehrenberg, Jakubson, Martin et al., 2012*). However, we do not have a clear picture of the factors accounting for differences between the universities of applied sciences in Switzerland.

² There are 11 professors of sport; not one is a woman.

207 Index of female share of professorships, 2011, adjusted for field of study

Excluding sport and fields of study where women account for 50% or more (applied linguistics, social work, applied psychology, health)

Data: FSO; computations: SCCRE



The **female share of professorships** index shows how much the (per capita) female share of professorships at each university of applied sciences deviates from the average after adjusting for the fields of study serviced. To this end the deviations from the average proportion of women in that field of study in Switzerland as a whole are calculated separately for each field of study and each university of applied sciences and then aggregated in the light of the relative size of each field of study in the institute in question.

Social and economic status of students

A student's origins will not only inform his or her choice of university type and field of study (→ *Chapter on Tertiary-level education, page 165*), but also how likely he or she is to work while studying. Students whose parents do not have a university degree are more likely to opt for part-time study than students whose parents do (29% v. 19%). Of the students who are enrolled in full-time courses, three-quarters also take paid employment, and of those three-quarters will work during the semester.

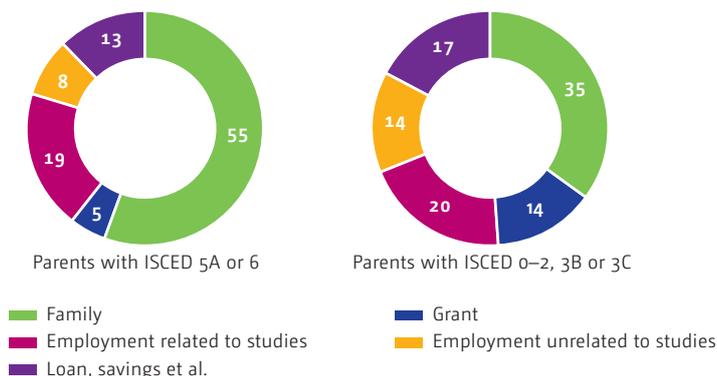
Students who do not live in their parents' home spend on average about 2,000 Swiss francs a month on maintenance. The source of their income varies depending on their social origins (→ Figure 208). Full-time students

208 Student income by parents' educational background, 2009

Only full-time students not living with their parents

Data: FSO (Social and economic status of students); computations: SCCRE

Per cent



whose parents hold a university degree receive more than half their income from the family; for full-time students whose parents do not hold a higher education degree, family contributions only account for a third. These lower levels of financial support are only partially offset by grants. Students from less privileged families are therefore under greater pressure to earn their maintenance from employment, take out loans or draw on savings (→ *Grants, page 177, Chapter on Tertiary education*).



Universities of teacher education (UTE)

Context

With some cantons finding it difficult to fill teaching vacancies, the universities of teacher education (UTE) have devoted increasing attention in recent years to recruitment and training rates. In addition to this, a number of cantons have begun working with their universities of teacher education to provide fast-track teacher training programmes which will enable people from other occupational fields to switch to teaching.

The demand for teachers

The decisive factors behind the demand for teachers are the number of pupils in education and teaching ratios or class size. The former fluctuates in line with demographic trends, while the latter is additionally influenced by political decisions. These questions are discussed in greater detail in the chapters describing the various stages of education. Other contributing factors which cannot be ignored are the turnover rate among active teaching staff (i.e. how many are leaving the profession) and changes in the average level of activity. Age-related retirement plays an important part in the turnover rate, and because of the age distribution among teachers it is subject to cyclical fluctuations. In the models used for forecasting by the Federal Statistical Office (FSO), turnover rates are calculated in the light of activity levels and the rise or fall in the number of hours worked. There are pronounced differences between the activity levels of male and female teachers, which decrease considerably for women after about 30 years of age; but there is little difference in turnover rates for the genders. For the period between 2004 and 2009 the FSO calculated an average exit rate of 7.0% in primary education and 7.9% in lower-secondary education¹ (→ Table 209). The figures show that turnover rates for teachers are not subject to much variation and are hardly influenced by the economic cycle (FSO, 2011a).

The demand for teachers does not adjust in proportion to changing numbers of pupils. An analysis of more extensive longitudinal data reveals a degree of inelasticity in the way demand responds to the size of pupil populations (Grob & Wolter, 2007). This means that annual shifts in the number of pupils can be absorbed fairly easily by flexible teaching ratios, which are adapted step by step and after a time lag. Other factors affecting demand are institutional (curricula, the number of lessons allocated to subjects, retirement rules) and also structural (gender and age parameters) (Santiago, 2002; OECD, 2005).

Age-related exits

The increase in the number of teachers in the oldest age group, which will continue until 2015, has a relatively strong influence on the fluctuating requirement for new appointments. According to FSO forecasts, the increase

209 Turnover rates (exits only), average values, 2004–2009

Exit rates as a percentage of hours worked*

Data: FSO

| Primary schools | |
|-------------------------|------|
| All teachers | 7,0 |
| Men | 6,6 |
| Women | 7,2 |
| Permanent contract | 5,9 |
| Temporary contract | 9,4 |
| Lower-secondary schools | |
| All teachers | 7,9 |
| Men | 7,3 |
| Women | 8,8 |
| Permanent contract | 6,3 |
| Temporary contract | 11,1 |

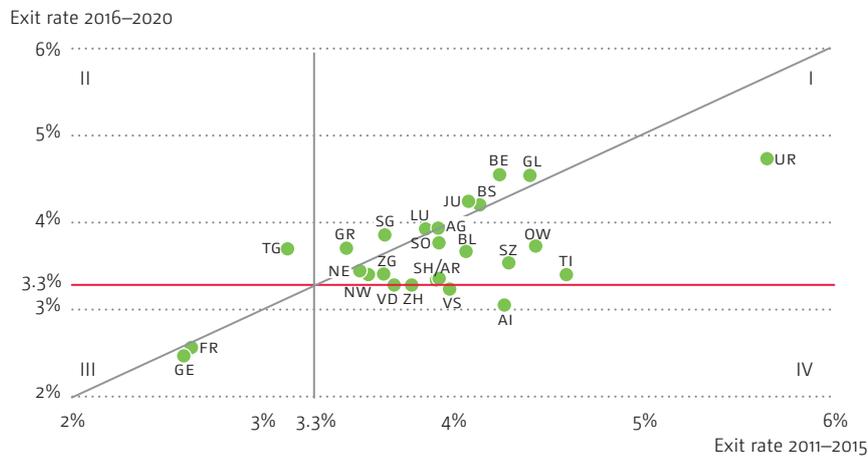
* permanent and temporary exits and transfers between canton or cycle weighted for hours worked (incl. adjustment for changes in hours worked over a professional career)

¹ The FSO points out that the teacher statistics are of limited value insofar as no distinctions can be made between permanent and temporary exits or between transfers between cantons and transfers between education cycles (FSO, 2011a).

in the turnover rate from 8.3% to 8.7% is entirely due to age-related exits. Age-related retirements account for a third of the annual turnover overall (FSO, 2011a).

210 Forecast age-related exits in the cantons (pre-school and primary), 2011–2020

Data: FSO



The forecasts suggest that, as of 2016, the pressure to recruit new staff will diminish slightly in many cantons, since the number of age-related exits will begin to fall again. Nevertheless, in most cantons exit rates will still be higher than the 3.3% renewal rate that can be secured as a result of training (red line → Figure 210). Moreover pupil populations will begin to rise again – from 2013 in primary schools (→ *Chapter on Pre-school and primary school education, page 55*) and from 2017 in lower-secondary schools (→ *Chapter on Lower-secondary education, page 83*), which will presumably boost demand.

Full and part-time teaching

Finally, variations in the number of teachers working full and part-time affects the need to recruit new staff. If the percentage of part-timers increases or if the hours they work are cut further, this will affect the renewal rate. It is a typical feature of the teaching profession that part-time working is widespread. Among newly recruited primary teachers, only about half as many graduates work full-time as in other occupations. The same applies when just the number of hours worked by women is compared. In fact, rates of part-time employment seem, in general, to be less gender-specific than occupation-specific. There is a highly dissimilar percentage of women graduates in economics and law, which are two fields with a comparable incidence of people working very short hours (→ Figure 211).

New recruits to teaching are particularly likely to work part time. Apart from education, this phenomenon can be observed in social work and in the humanities and social sciences. Here, too, part-time work is relatively widespread (→ Figure 211).

Key to Figure

The Figure visualises the forecast for age-related exits* (retirements) in the pre-school and primary cycles. The x-axis shows the annual exit rate for 2011–15, the y-axis shows the rate for the period 2016–20.

The axes intersect at a value of 3.3, which is the current UTE training rate. This rate expresses the average number of new teachers trained each year as a percentage of actively working teachers.

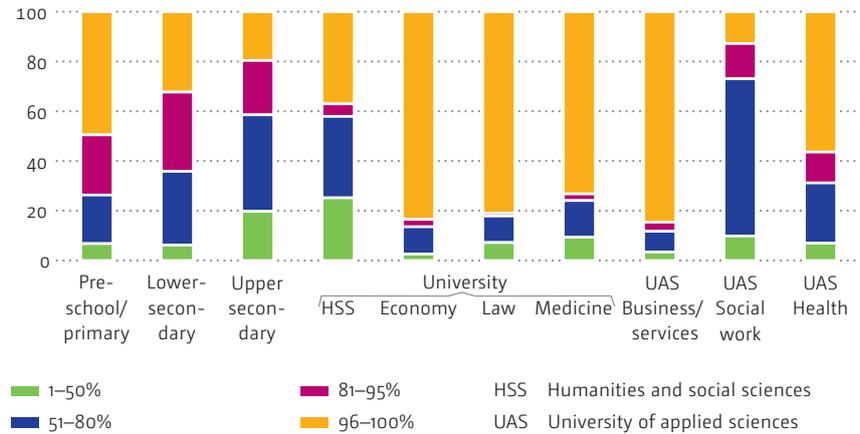
Most cantons are in Quadrant I, i.e. the pressure to recruit will remain, as the rate of age-related exits alone is higher than the renewal rate achieved by the universities of teacher education (red line) and will remain high until 2020.

The diagonal line represents fluctuation due to retirement. In cantons below the diagonal line, the situation will ease to some extent as the age structure evens out and age-related exits start to decrease compared with 2011–15. In cantons above the diagonal line, on the other hand, the situation will be exacerbated, and age-related exits will actually increase after 2016.

* Major changes in the average age of teachers need not have a negative impact on pupils' performances; contrarily to expectations according to which the departure of a major number of experienced teachers would lead to losses in quality, the effect may even be positive, particularly in the case of underprivileged schools.

211 Activity levels of 2010 graduates, women only, one year after graduation

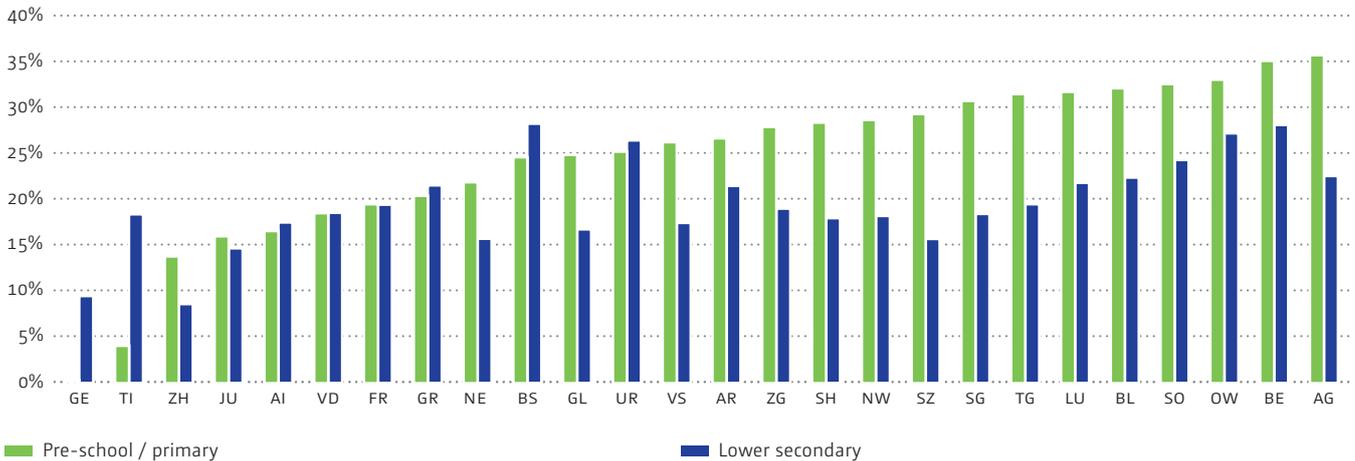
Data: FSO (Graduate Survey 2011)



Within the teaching body as a whole, the high proportion of women results in a greater proportion of part-time contracts over the course of a professional career, given that female teachers cut their hours considerably from the age of about 30 for family reasons (FSO, 2011a). Anything between a quarter and a third of all teachers have part-time (< 50%) contracts (→ Figure 212). Studies have shown that for many budding students the prospect of being able to work very short hours when starting a family is a factor in their choice of teaching as a career (Denzler & Wolter, 2009).

212 Short working hours: percentage of teachers working less than 50% FTE, 2011

Data: FSO



In Canton Geneva primary school classes are taught either by one full-time teacher or by two teachers at 50% each. Official guidelines disallow teachers working less than 50% of full-time hours.

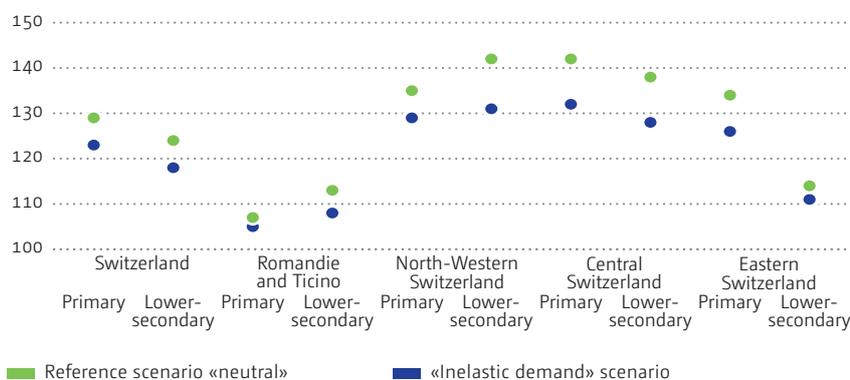
As a comparison with other occupations and disciplines demonstrates, the widespread phenomenon of less than full-time employment among teachers implies a loss of potential that should not be underestimated. Moreover, the larger the number of teachers employed by a school, the more effort that will be required for coordination and the greater the need will be to discuss matters with colleagues, which many teachers perceive as additional stress. This

has prompted debates – for example, in Canton Zurich – about possible ways to alleviate the situation (→ *Information text on the right*).

There is no certainty, however, that political interventions designed to increase the overall number of hours worked by imposing a minimum number of hours, for example, will actually achieve their objectives, since it is not clear just how far prohibiting very short working hours could trigger a recruitment problem. If women choose teaching precisely because it offers such excellent opportunities to work part time, there is a risk that attaching minimum requirements to the number of hours worked will discourage potential teachers from studying and exercising the profession.

213 Forecast demand for teachers, 2012–2020, indexed (2012 = 100), pre-school/primary and lower-secondary

Data: FSO



Taking into account trends in pupil numbers, the age structure of teachers and the turnover rate (adjusted for hours worked), the FSO has forecast that, depending on the particular scenario, Switzerland will see an increase in the annual requirement for new primary school teachers ranging from 6% to 40% over the period 2012 to 2020 (FSO, 2011a). As both the age structure of teachers and the numbers of pupils vary widely from one region to another, the regional requirements also vary widely (→ Figure 213).

When pupil numbers begin to rise again as of 2013, and as of 2017 in lower-secondary schools, all the regions apart from Western Switzerland will additionally be confronted with a pronounced increase in the requirement for new staff. This is especially the case for cantons in north-western Switzerland, including Bern, and in Central Switzerland, where the two factors – a higher age-related turnover and a faster rise in pupil numbers – will coincide.

Trend in potential student numbers

On the supply side, we need to ask what potential there is for students who might one day satisfy this requirement for new teachers. The potential depends on the numbers of pupils in upper-secondary education, i.e. how many young people are taking their baccalaureate. According to the forecast for 2020, most of the demand for new primary school teachers in that year will have to be met by newly qualified candidates. They will need to have fulfilled the usual conditions for admission to teacher education by 2017 at the latest in order to begin their training. In other words, by that time they

A pilot study in Canton Zurich is assessing whether making two teachers (working longer hours) entirely responsible for one class, rather than having one form teacher along with several specialist teachers, reduces the school's internal coordination effort. The two teachers would cover all subjects for their particular class. The aim is to reduce the number of persons to whom pupils relate and thereby intensify the learning relationship (Zurich, Regierungsrat, 2012).

Reference scenario «neutral»

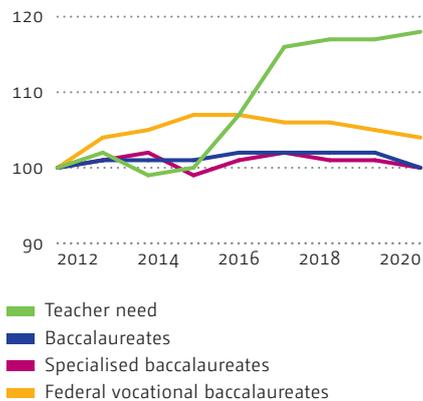
Assuming constant teacher-student ratios in coming years

«Inelastic demand» scenario

Assuming a slight inelasticity in teacher demand in response to changing pupil numbers (i.e. the number of teachers is only partially adjusted to pupil population (FSO, 2011a).

214 Trend in baccalaureates and teacher need (2012–2020), indexed (2012 = 100)

Data: FSO



will need to have obtained a baccalaureate or a specialised baccalaureate in education science. A federal vocational baccalaureate may also suffice as long as the additional requirements are met.

If we assume that the annual replacement rate for primary teachers is going to increase by the order of 20% to 30%, and if the pattern that governs the choice of onward study remains the same, the population of upper-secondary pupils would need to grow at a similar rate. This is not the case. The number of upper-secondary pupils completing an academic baccalaureate or specialised baccalaureate by 2017 is only expected to grow slightly (→ Figure 214). This means that the recruitment gap in the teaching profession can only be closed by newly trained teachers if it proves possible to increase the number of baccalaureate holders opting to go to a university of teacher education by a very considerable margin, i.e. by a good 20%, to the detriment of other courses of study. In view of the difficulties with recruitment being encountered in related occupations, this would scarcely seem to be realistic. Hence additional measures will need to be considered, such as broadening the potential reservoir of new staff by offering training for people from other professions, recruiting teachers from abroad and taking steps to increase the number of hours worked by existing teachers.

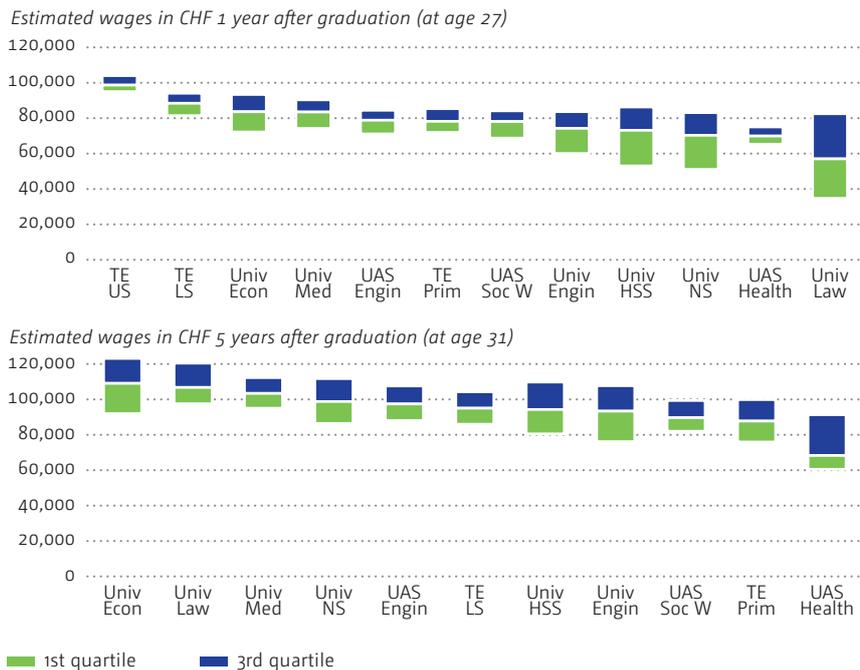
Potential earnings for teachers

The supply of teachers depends on the appeal exerted by the profession, and the factors here include working conditions and pay. Compared with other graduates with academic degrees, the prospective earnings for new entrants to the teaching profession are relatively good at present. Graduates from universities of teacher education who have specialised in the lower-secondary cycle are very well placed in terms of income when compared with graduates of conventional universities and universities of applied sciences. They are outdone only by upper-secondary teachers, although it should be recalled that apart from a regular Master's degree the latter must acquire a qualification as upper-secondary teachers (→ Figure 215), which requires them to study longer than other Master's graduates.

Primary teachers entering the profession (with a Bachelor's degree from a university of teacher education) earn comparable pay to other graduates who leave a university of applied sciences with a Bachelor's degree in the social sciences or a technical field. Five years after graduating, the pattern has changed. While average pay for lower-secondary school teachers is still midfield, the earnings of primary school teachers and graduates in social or medical disciplines from the universities of applied sciences have slipped back. One factor to bear in mind here, however, is that other graduates are partly able to earn more because they will have followed their degree with additional qualifications, such as a doctorate, bar exams, an MBA or similar. To some extent higher pay also compensates for the willingness to do without remuneration for lengthier periods of education.

215 Graduate incomes, standardised annual gross pay, age factored, 2009

Data: FSO (Graduate Surveys); computations: SCCRE



Estimated pay based on quantile regression

Universities: only 2nd-cycle (Master's) students
 UAS/UTE: 1st-cycle students who had not begun a Master's course at time of survey and 2nd-cycle students
 UTE LS: only graduates of a Master's course or other final exam (excl. Bachelor's) who are teaching in compulsory secondary education
 UTE US: all teachers working in post-compulsory secondary education

- TE = Teacher education
- UTE = University of teacher education
- LS = Lower-secondary
- US = Upper-secondary
- Univ = University
- Econ = Economics
- Med = Medicine
- UAS = University of applied sciences
- Engin = Engineering sciences
- Prim = Primary
- Soc W = Social work
- HSS = Humanities and social sciences
- NS = Natural sciences

Among teachers, the variation in pay is partly due to differences in the salaries paid by the cantons. The variation among graduates of other disciplines reflects not only regional differences, but also sectorial peculiarities and individual factors. This means that the income to be obtained by studying such subjects comes with a greater individual risk attached. This tends to result in higher expectations of pay for those occupations (Schweri, Hartog & Wolter, 2011).

Institutions

In 2013 a good 18,000 students were enrolled in courses at institutes of teacher education. Almost two thirds of all teachers are now trained at universities of teacher education run by one or more cantons. Another 30% complete their training at a university of applied sciences. In order to cater for special needs education (special teaching in schools and speech therapy, etc.), 13 German-speaking cantons joined together to set up the Intercantonal University for Special Needs Education (HfH). Certain subjects, such as sport and special needs education, are also offered by universities of applied sciences. In some cantons teachers are trained exclusively (Geneva) or partly (for the lower-secondary cycle in Fribourg and for baccalaureate schools in Zurich) at universities. Finally, at Confederation level, the Federal Institute for Vocational Education and Training (SFIVET) trains teachers for vocational schools (→ Figure 216).

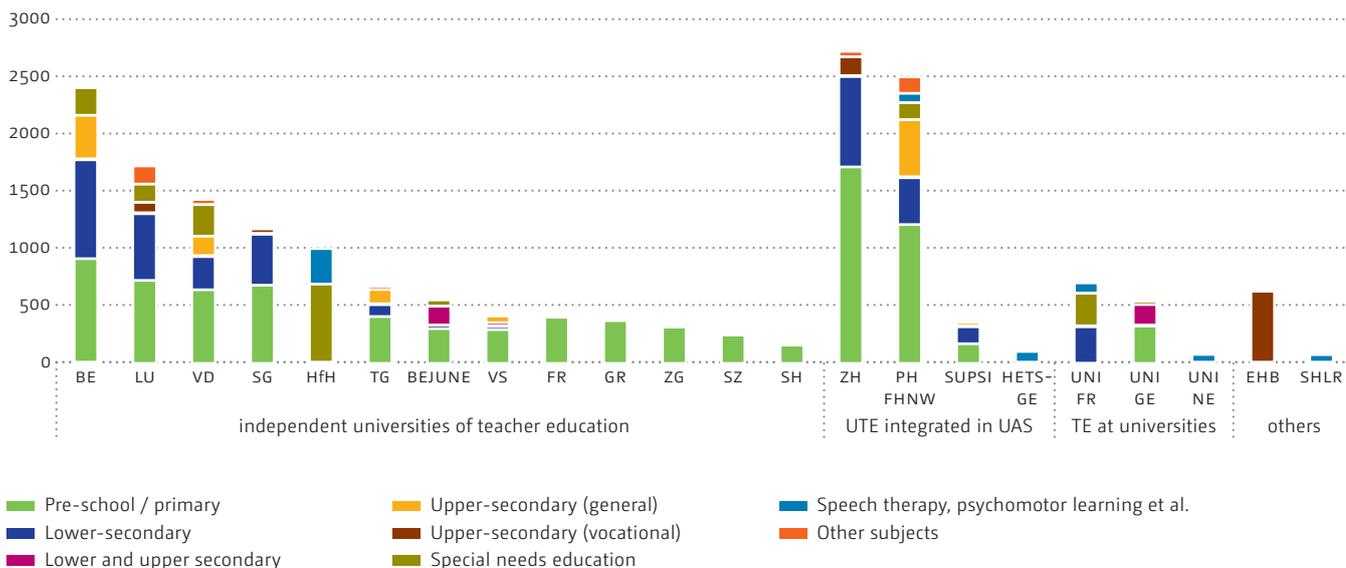
The Intercantonal Agreements do not provide for the institutional standardisation of teacher education (EDK, 1995). This reflects the diverse traditions behind systems for teacher training in the cantons. The institu-

tional form for which most cantons have now opted is the university of teacher education, akin in typology to the universities of applied sciences, but usually run separately from these because governance is entirely at the level of cantons. They therefore constitute a third type of tertiary A institute alongside the universities of applied sciences and the universities (HFKG, 2011). The FSO also treats the universities of teacher education as a tertiary category in their own right, although it does combine their data with those of departments within the universities of applied sciences which offer courses in teacher training. Courses offered by the universities are not included in these statistics (FSO, 2011d). In other words, the category «universities of teacher education» is essentially composed of tertiary A institutes other than universities which train teachers and are exclusively overseen by the cantons. This chapter adopts the same logic. The observations and analyses here focus on the twelve universities of teacher education and the three colleges or departments of teacher education attached to universities of applied sciences where training is at least provided for pre-school and primary teachers. This accounts altogether for over 80% of all students who are being trained for the teaching profession (and over 90% of all students being trained to teach in compulsory education). It is harder to describe the various forms of training for specialised teachers and for certain special categories of teachers because there is frequently no data available and because in some cases (such as courses in sport, art or music) it is not clear from the outset whether students intend to acquire a teaching qualification or whether they will subsequently pursue their professional training at a different institution. As a result, these subjects are not confined to aspiring teachers.

216 Students on teacher education courses, 2012

The canton abbreviations symbolise the universities of teacher education in that territory.

Data: FSO



HfH = Interkantonale Hochschule für Heilpädagogik, Zürich
 SUPSI = Scuola universitaria professionale della Svizzera italiana
 HETS = Haute école de travail social Genève

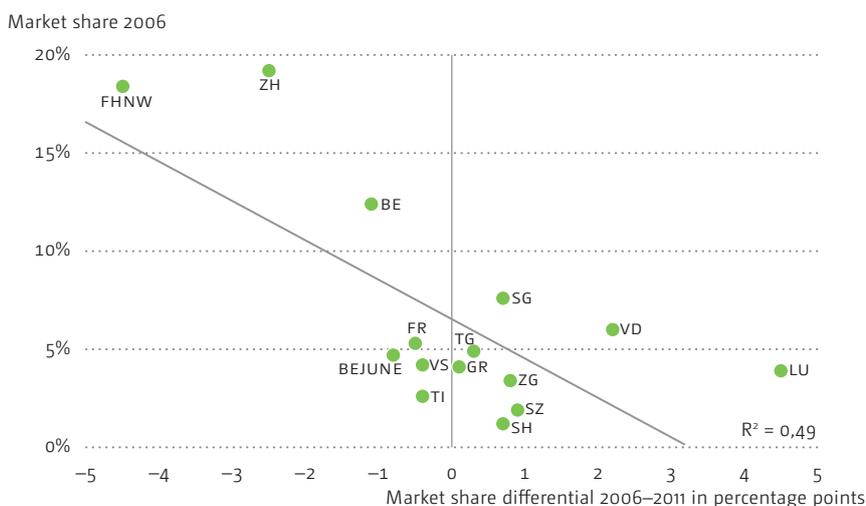
EHB = Eidgenössisches Hochschulinstitut für Berufsbildung
 SHLR = Schweizer Hochschule für Logopädie Rorschach
 FHNW = Fachhochschule Nordwestschweiz

This survey of institutions engaged in educating teachers reflects not only a typological diversity, but also a wide range in size. Half of the universities of teacher education are small and the number of their students enrolled only just (if at all) reaches the minimum threshold of 300 originally envisaged (EDK, 1995).

If we consider the teacher education sector as a whole, there is no perceptible trend towards concentration, as the market analysis below illustrates (Figure 217). Following the custom in market research, it shows the number of students at each institute as a percentage of all students at Swiss universities of teacher education.

217 Market share at pre-school / primary level, 2006–2011

Data: FSO



We cannot test possible explanations for these shifts in the market share of each institute empirically. There are conceivable institutional factors: small entities face greater pressure to grow in order to ensure their survival. Political considerations might also be taken into account: some cantons have a particular interest in maintaining their own institute and therefore do their best to promote the growth of their university of teacher education. Where institutions are already big, the political will of their funding authorities to invest in further growth is limited, especially if the costs would be disproportionate and the primary beneficiaries would be neither their own students nor their own future teaching staff. It is also conceivable that larger universities of teacher education would face greater infrastructure costs if they grew, because unlike smaller institutes they are less likely to be in a position to make better use of existing infrastructure.

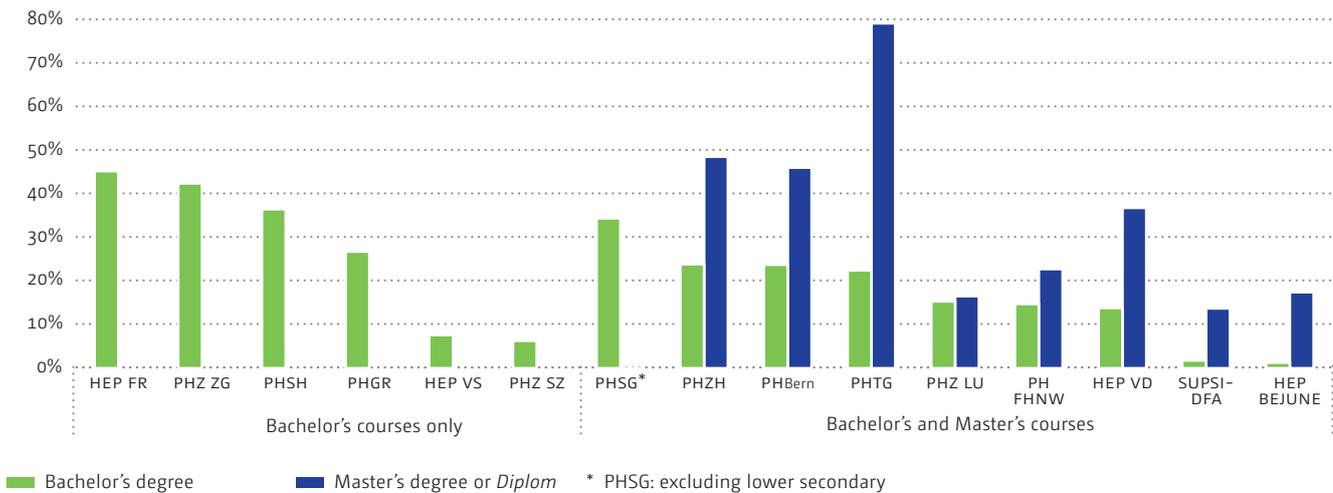
In the light of the empirical data, we can currently neither account for the self-selection of students entering the different universities of teacher education nor ascertain whether attending a particular institute is more or less likely to promise successful study and eventually professional success. The figures merely show that the universities of teacher education are not at present displaying any trend towards concentration.

Mobility

On average, 25% of all students of teacher education are now enrolled at a university of teacher education outside the canton where they obtained their baccalaureate or other qualification entitling them to admission. Although the effective numbers are small, it should nevertheless be noted that it is the smaller institutes which attract relatively high percentages of students from elsewhere (→ Figure 218).

218 Proportion of UTE graduates who lived in a different region prior to studying, 2011

Data: FSO



Universities of teacher education in peripheral locations, such as the Jura, Ticino or Valais, attract relatively few students from elsewhere, and accordingly they primarily ensure training for students from their own (linguistic) region. By contrast, the small universities of teacher education that are easy to reach from other cantons enrol a high proportion of students from outside. At the same time, the cantons which have small universities of teacher education also have a high percentage of their own students studying at universities of teacher education in other cantons (e.g. TG, SZ, SH with over 30%).

Types of diploma

Courses for the teaching profession vary from one institute to the next, as do the diplomas awarded in terms of the subjects the recipients are licensed to teach and the education cycles where they are entitled to work. This diverse picture has hardly changed since 2006 (*Lehmann, Criblez, Guldemann et al., 2007*). It relates in part to the fact that the universities of teacher education adapt the courses on offer to the education structures in the canton concerned.

By way of example, the universities of teacher education in Western Switzerland and in Canton Bern provide courses leading to an integrated qualification enabling teachers to work anywhere from kindergarten through to the 6th year of school. At some point, students will usually specialise in

a particular cycle (e.g. the earlier or later years of primary school). In German-speaking Switzerland and Ticino, it is common to offer different courses for different cycles or stages of education (→ Table 219). Some cantons provide separate training for kindergarten and primary school. The admission criteria for a kindergarten course are usually less stringent (e.g. a certificate from an upper-secondary specialised school rather than an academic baccalaureate). Other cantons distinguish between courses for teachers specialising in the early phase, which includes pre-school and the first years of primary school, and courses for primary school teachers. Another difference concerns the number of subjects which students will later be authorised to teach. At a time when teachers are in short supply this is a constant cause of debate, given that it is harder to employ teachers when the age groups and subjects they can teach are limited.

Practical training

One criticism frequently voiced when teacher training moved to the tertiary sector concerned the risk that studying at an academic institute would remove students from the professional environment and devalue practical training. If anything, however, practical training has become even more important. Firstly, the regulatory requirements are now more explicit in this regard; the EDK rules for licensing pre-school and primary teachers require 20–30% of the entire training period to be devoted to in-classroom experience. Secondly, much more is invested today in organising, developing and researching the practical side of training (*Fraefel, 2012a; 2012b*). A survey of the universities of teacher education shows that the practical part of the course lies within the required range of 20 to 30%. It is also striking that there is no correlation between the training model (integral versus differentiated by cycle) and the proportion of time devoted to practical experience (→ Figure 220).

By international standards, teacher education in Switzerland enjoys a very high teacher to student ratio. Whereas in German-speaking Switzerland 65% of aspiring primary school teachers are supervised by one mentor for more than three quarters of their practical training, the figure for Germany is only 5% (*Oser, Biedermann, Brühwiler et al., 2010*).

219 Pre-school / Primary specialisation, 2013

Data: SCCRE

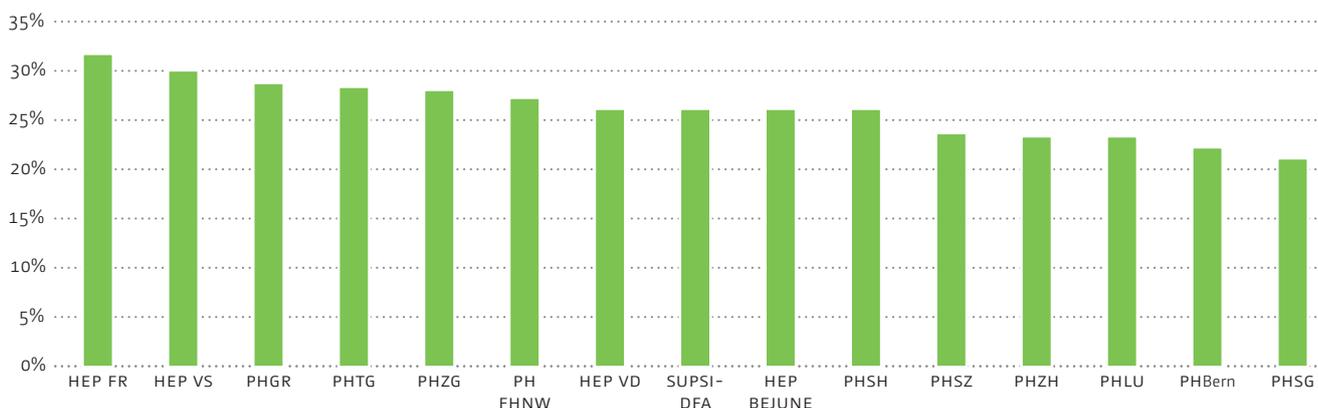
| Pre-school and primary | Kindergarten | Entry level | Primary |
|------------------------|--------------|-------------|---------|
| -2/+6 | -2/-1 | -2/+2 | +1/+6* |
| [1-8] | [1-2] | [1-4] | [3-8]** |
| BEJUNE | GR | FHNW | FHNW |
| FR | SH | SZ | SZ |
| VD | TG | ZG | ZG |
| VS | TI | LU | LU |
| BE | ZH | ZH | ZH |
| | | SG | SG |

* counting from 1st year of primary school

** HarmoS numbering system in square brackets

220 Practical training as a proportion of entire course, primary school level, 2013

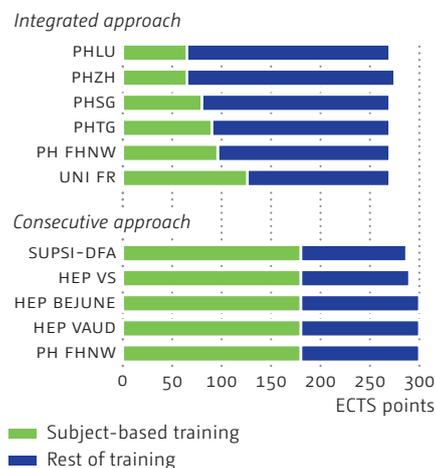
Data: SCCRE



221 Subject-based education as a proportion of lower-secondary teacher training, 2013

The part of subject-based education that is typically framed within method training is not included in the chart.

Data: SCCRE



Lower-secondary level

When training teachers to work in lower-secondary schools, a consecutive approach is adopted by Western Switzerland and also by the School for Teacher Education attached to the University of Applied Sciences and Arts in Northwestern Switzerland (FHNW). This means that those entering teacher training have already obtained a Bachelor's degree at a conventional university (or possibly – for certain disciplines – at a university of applied sciences). In other words, the 180 ECTS credits attached to a Bachelor's qualification constitute an admission requirement. This model thus attaches greater weight to an academic grounding in the subjects to be taught than does the integrated model, where students only obtain 65 to 125 ECTS credits for subject-based education during their course (→ Figure 221). This subject-based education within the integrated model is sometimes organised in partnership with a nearby university and sometimes by the teacher-training institute itself. On the other hand, the integrated model devotes more time to subject-related teaching methods and to the science of education.

Apart from describing the situation at the various institutes, little can be said about how training for lower-secondary teachers is structured. No in-depth comparative studies have been conducted for Switzerland. It is therefore impossible to compare the effectiveness of different models of teacher education.

Admission criteria

The student intakes of different teacher-training institutes vary quite considerably in terms of admission qualifications (→ Figure 222). While almost 90% of trainee pre-school and primary teachers studying at HEP BEJUNE (Bern, Jura & Neuchâtel) and SUPSI (Southern Switzerland) hold an academic baccalaureate, fewer than 40% at PSHH (Schaffhausen) and PHGR (Graubünden) do so. The differences are due in part to local and regional traditions: in some cantons in north-western Switzerland, for example, obtaining a specialised baccalaureate from an upper-secondary specialised school has long been established as a pathway into training as a primary school teacher.

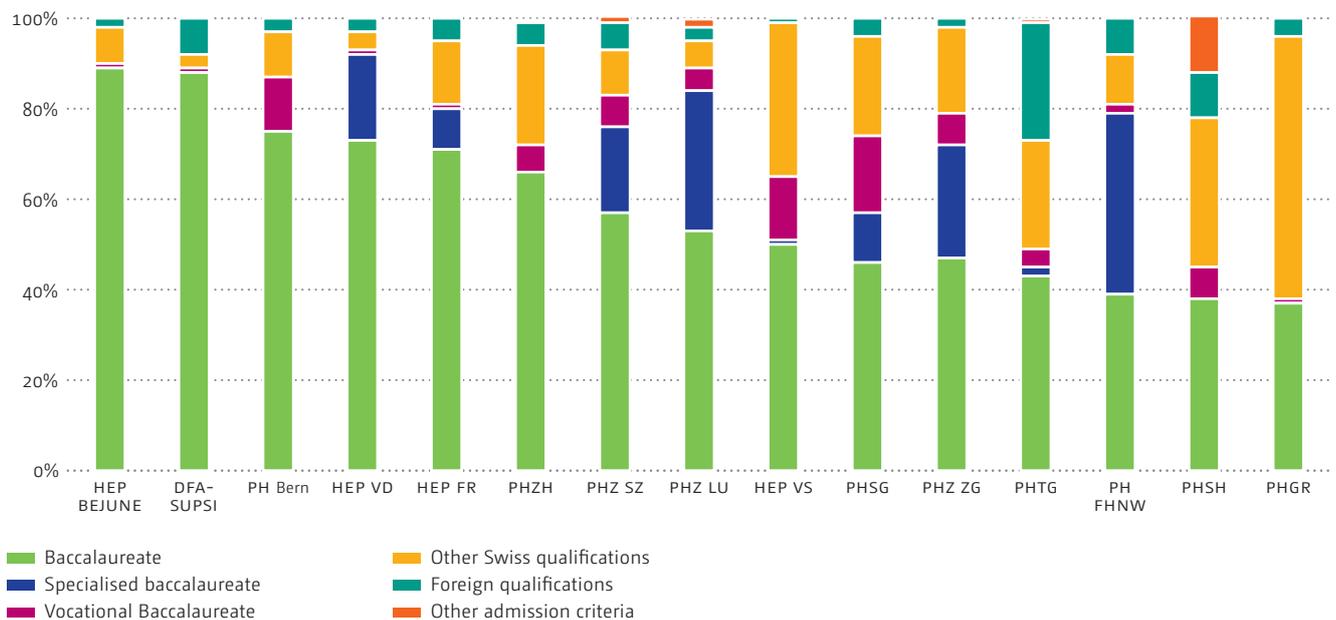
However, the percentage of young people who obtain a baccalaureate is only of limited significance when explaining these differences. In Canton Bern, for example, which has an average baccalaureate rate of 18.7%, a high percentage of trainee pre-school/primary teachers (76%) hold an academic baccalaureate, whereas in Canton Zug, with a baccalaureate rate of 22%, the corresponding figure is under 50%.

The high proportion of «other Swiss qualifications» is partly due to the fact that, wherever separate courses are provided for the kindergarten cycle, these apply their own admission criteria, and a certificate from an upper-secondary specialised school is a standard way to fulfil them (Art. 5.3 of the EDK's Regulations for the Recognition of Diplomas). However, trainee kindergarten teachers only account for 10–20% of the student population at these institutes. This means that, even on courses for primary school teachers, the proportion of students with an academic baccalaureate is on the low side.

To the extent that differences in prior qualifications relate to differences in achievement ability at school (cf. *Oser, Biedermann, Brühwiler et al., 2010*), the variations described above give rise to a potentially significant heterogeneity among trainee teachers which may have a bearing on pass rates and teaching outcomes, and this merits further investigation. However, any research of this nature should also take account of the heterogeneity within each type of admission qualification, as there are also pronounced variations between baccalaureates depending on the weighted composition of the subjects chosen (*Eberle, Gehrer, Jaggi et al., 2008*).

222 Trainee pre-school / primary school teachers by admission qualification, 2011/12

Data: FSO



Joining the teaching profession from other fields

As people begin entering regular teacher training from other occupations, the pattern of admission criteria among students at the universities of teacher education will become even more heterogeneous. In response to the shortage of teachers, a few universities of teacher education have made it easier for people contemplating a career change to qualify for admission. Credit is given for experience in other professions and previous academic achievements, and this shortens the period of study. Moreover, after completing their first year of training they may already be permitted to work in classrooms under supervision. The EDK revised the Regulations for the Recognition of Diplomas in 2012 to create a binding framework for these special formats, enabling career changers to acquire a qualification recognised by the EDK. These rules make it much easier for career changers than for ordinary students to fulfil admission criteria and to meet course requirements. From the perspective of those who provide the training, however, questions arise as to what kind of relevant experience career changers may have that distinguishes them from ordinary students and justifies a substantial reduction

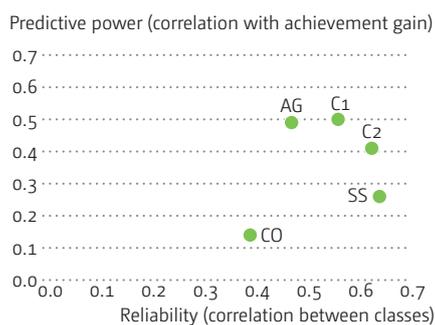
in the duration of their course. A study conducted among trainee lower-secondary teachers at the School for Teacher Education attached to the University of Applied Sciences and Arts in Northwestern Switzerland demonstrates that there was practically no difference between career changers and ordinary students with regard to their relevant educational experience (such as working in youth organisations or providing private coaching) (Engelage & Diesbergen, 2013).

The strong response to career change programmes illustrates the great appeal of teaching for this target group. This is partly due to the better pay that career changers often stand to gain – depending on their previous occupation – and partly to non-monetary factors, such as a greater ability to influence working hours and hence to reconcile family life with paid employment. These factors are all rated as very important by persons with vocational experience in other sectors who have chosen to switch to teaching (Hof, Strupler & Wolter, 2011).

Effectiveness

223 Measures of teaching outcomes: a comparison

Figure: after Kane, 2012



The research project on «Measures of Effective Teaching» (MET) at Harvard University is analysing various methods used to measure teaching outcomes and testing their reliability and predictive power with data on over 1300 teachers and at least 44,000 pupils (Kane, 2012).

- CO = classroom observations
- AG = achievement gains on tests
- SS = student surveys
- C1 = combined measure
- C2 = combined measure, weighted

Sample: The link between diagnostic feedback from classroom observations and gains in student achievement is very poor, with a correlation of just over 10%; besides, the measure is not very reliable, i.e. the correlation between different classes taught by the same teacher is rather low at 40%. Student surveys are much more reliable, while achievement tests demonstrate high predictive power.

The effectiveness of teacher education is measured against how well future teachers are prepared for their profession and ultimately how successfully they master the various aspects of professional practice (in particular in the classroom). The impact their teaching has on their pupils is an essential gauge of effectiveness (Faust, 2010). In other words, the effectiveness of teacher education will eventually reflect in the outcomes of teaching, i.e. the gains in pupil achievement that can be causally attributed to the work of the teacher.

To evaluate the effectiveness of teacher education, we must therefore start with the performance of their pupils and then take two steps backwards: we must first analyse how much of the gain in pupil achievement is due to teaching, and then we must consider what contribution teacher education makes to the professional activity of an individual teacher.

Measures of teaching outcomes

There are various methods for measuring the quality and effectiveness of teaching. One classical approach is to observe what happens in the classroom. This method is frequently used in training and later regularly applied in the form of inspections. Another method is to interview pupils about their lessons, the climate in the classroom and other such factors. Finally, the pupils can be tested, although for this purpose it is only the gain in achievement that is of interest (value added tests), as otherwise we would be measuring differences between specific pupils rather than the impact of teaching.

All these instruments have their advantages and disadvantages (→ Figure 223). Value added tests are very helpful in predicting pupils' future skills with considerable accuracy. Their main disadvantage, however, is that they are only available for a narrow selection of subjects, which means that the performance of the majority of teachers at most stages of education cannot be assessed in this way. Besides, testing pupils does not provide vital dia-

gnostic feedback about the kind of continuous education a teacher might need. With classroom observation, on the other hand, the focus lies on this diagnostic function and identifying the teacher's strengths and weaknesses. Classroom observation does (at least implicitly) also pursue the aim of improving classroom conditions and hence the ability of pupils to learn. However, there has been little research into this causal relationship, and there is meagre scientific evidence for the power of classroom observation and expert feedback to predict student outcomes (*Kane, 2012*). Another problem with using classroom observation to evaluate teaching is posed by major differences between both observers and lessons. Scientific measures of the reliability of classroom observation therefore tend to produce low scores. Well-designed student surveys, on the other hand, can generate good results, even with younger pupils; they identify differences between teachers, and there is surprising consistency to the findings with different classes. Student surveys are, besides, a more reliable way of assessing gains in achievement than classroom observation (*Kane, 2012*).

Combining these measures generates better results than using them separately (C1); if they are then spread across several classes and years, they are less prone to volatility and their predictive power is greatly reinforced. If the measures are combined and also weighted according to the criterion of achievement gains (C2), reliability and predictive power can be enhanced even further (*Kane, 2012*).

Hitherto, however, teacher training has drawn more or less exclusively on classroom observation. This is problematic in that this measure is demonstrably less reliable and less capable of predicting student achievement (*Kane & Staiger, 2008*). Classroom observation is no doubt indispensable in teacher training for the role it plays in diagnosing teaching behaviour (*Oser, Salzmann & Heinzer, 2009*), but the value of this instrument could be improved by focussing more clearly on the link between teaching practices and the way students learn. Only then can effective teaching practices be correctly identified and imparted.

Whatever method is used to measure the causal impact of teaching practices on improving pupil achievement, there is a need to collect both repetitive data on individual pupil performance and observation data on the teacher's work in the classroom. As there is an almost complete lack of such data in Switzerland, we will have to be satisfied with some partial insights into effectiveness. These frequently take the form of research based on self-assessments by aspiring teachers of their own acquisition of skills or on classroom observations by experts² (cf., for example, *Abel & Faust, 2010*; *Blömeke, Suhl & Döhrmann, 2012*; *Oser, Biedermann, Brühwiler et al., 2010*).

² These expert assessments are usually not considered alongside the results of pupil testing. Besides, reasonably reliable results would call for several expert assessments of several lessons. In the MET project (→ *Information text left*) an average was calculated after at least four lessons by the same teacher had been assessed by different experts, and the reliability was then checked against the results of tests on students (*Kane, 2012*).

Teacher skills on graduation

It has been customary in Switzerland to assess the effectiveness of teacher education primarily by conducting surveys of the skills and standards achieved upon completion of the course (cf. *Baer, Dörr, Fraefel et al., 2007; Baer, Guldemann, Kocher et al., 2009*). For example, *Larcher, Müller, Baer et al. (2010)* used student self-assessments, classroom observation and interviews with pupils to demonstrate significant skill improvements over the course of training. In a number of cantons, students at universities of teacher education are also interviewed when they take up professional employment (cf. on Zurich, for example, *Nido, Trachsler & Swoboda, 2012*).

Research into skill acquisition has recently also been conducted at the career start, drawing on classroom observation by experts, achievement tests and opinions expressed by pupils (cf. *Smit, Helfenstein & Guldemann, 2013*).

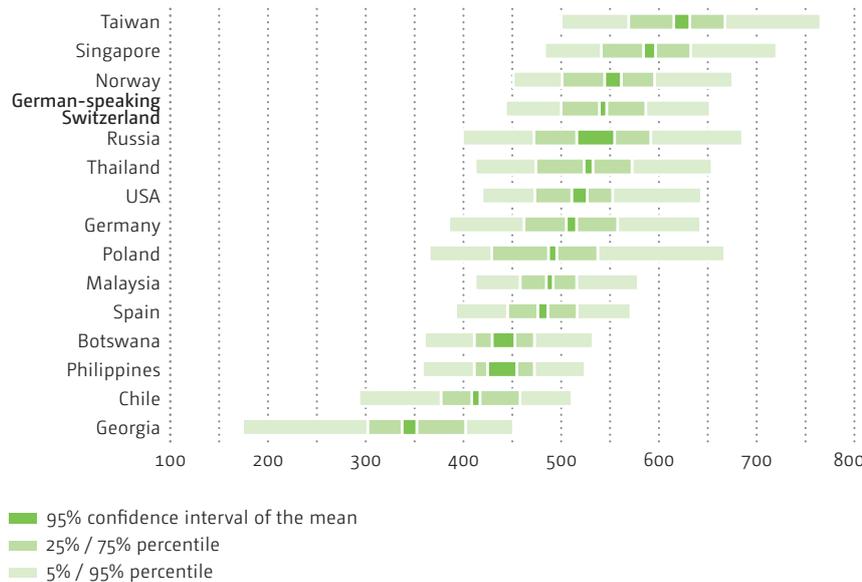
Little research has hitherto been devoted to the relationship between subject skills and methodical skills. However, recent studies have clearly demonstrated the importance of teachers' classroom skills in terms of both command of subject and command of related methods. Foundations have been laid in Germany by the findings of the COACTIV Study, which draws on PISA data about pupils and their maths teachers. The authors show that teaching which activates cognitive functions in order to ensure effective learning among pupils calls for a high level of knowledge about the subject combined with good subject-related didactic skills and pedagogical content knowledge (*Baumert, Kunter, Blum et al., 2010; Kunter, Klusmann, Dubberke et al., 2011; Kunter, Baumert, Blum et al., 2007*).

TEDS-M, the international comparative study of training for teachers of mathematics, has drawn the first empirical conclusions about the effectiveness of teacher education in Switzerland (cf. *Oser, Biedermann, Brühwiler et al., 2010*). The findings concern training for teachers of mathematics at primary and lower-secondary level in German-speaking Switzerland, and the focus lay on determining their knowledge of the subject, knowledge of subject-related teaching methods and knowledge of pedagogical and psychological aspects.

Given the low degree of specialisation during the training of primary school teachers in Switzerland, the TEDS-M findings might be regarded as very positive (→ Figure 224). The average quality of maths teaching in German-speaking Switzerland is higher than the international average, with only Taiwan and Singapore performing better. Teachers in this field in Germany, the United States and Spain, for example, perform significantly worse. Moreover, the quality of Swiss teachers turns out to be astoundingly consistent. Two thirds of them are in the highest skill category, almost a third in the middle category, and a mere 4% are allocated to the poorest category qualified as unsatisfactory. In most countries, including Germany and Spain, more than 10% were placed in the poorest category (*Oser, Biedermann, Brühwiler et al., 2010*).

224 Mathematical abilities of trainee primary teachers (TEDS-M)

Source: Oser, Biedermann, Brühwiler et al, 2010



| | M | SE | SD |
|-----------------------------|-----|-------|----|
| Taiwan | 623 | (4.2) | 84 |
| Singapore | 590 | (3.1) | 74 |
| Norway | 553 | (4.3) | 74 |
| German-speaking Switzerland | 543 | (1.9) | 66 |
| Russia | 535 | (9.9) | 91 |
| Thailand | 528 | (2.3) | 75 |
| USA | 518 | (4.1) | 69 |
| Germany | 510 | (2.7) | 83 |
| Poland | 490 | (2.2) | 98 |
| Malaysia | 488 | (1.8) | 54 |
| Spain | 481 | (2.6) | 57 |
| Botswana | 441 | (5.9) | 48 |
| Philippines | 440 | (7.6) | 52 |
| Chile | 413 | (2.1) | 65 |
| Georgia | 345 | (3.9) | 85 |

■ Mean significantly higher than in German-speaking Switzerland
 ■ Mean significantly lower than in German-speaking Switzerland

M = mean
 SE = standard error
 SD = standard deviation

However, the studies also flagged up differences in the mathematical abilities of teachers in different cycles of education (early years vs. lower-secondary or primary cycle) (Oser, Biedermann, Brühwiler et al., 2010). Further research will be needed to establish how far these differences can be attributed to selection effects associated with choice of study or to differences in training. With courses in teacher education opening up to broader circles, it would be useful to observe what factors influence the subject-related and method-related skills of aspiring teachers.

Primary teachers in German-speaking Switzerland also achieve very high scores by international comparison in the field of subject-related teaching methods. As a whole, the findings on teaching skills reflect the results of international tests to measure pupil achievement. There is a correlation between the mathematical skills of school students and the subject-related and method-related skills of maths teachers (Blömeke, Kaiser, & Lehmann, 2010).

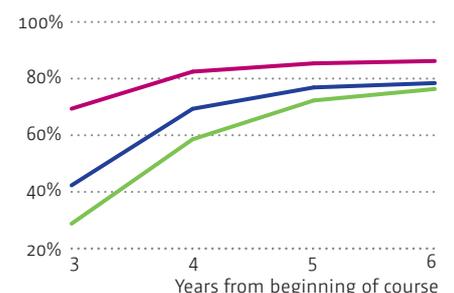
Graduation rate

Five years after enrolment, the universities of teacher education display a high graduation rate (85%) for students pursuing a Bachelor’s degree (→ Figure 225). For the universities of applied sciences the figure is just under 77%, and for the universities it is just under 72%.

Essentially, a high graduation rate should indicate that an institute has performed well in achieving its targets, and ultimately this would be an expression of effectiveness. There are, however, two assumptions underlying this conclusion: one is that all tertiary A institutes select similar students, and the other is that drop-out rates are not be influenced by different standards of requirement. We are unable to say whether these two conditions are met by the comparison between universities of teacher education and other tertiary A institutes or other fields of study (→ Figure 226).

225 Time to graduation for student intake with Swiss admission qualifications

Data: FSO



■ UTE Bachelor (2005 cohort)
 ■ UAS Bachelor (2005 cohort)
 ■ University Bachelor (2003 cohort)

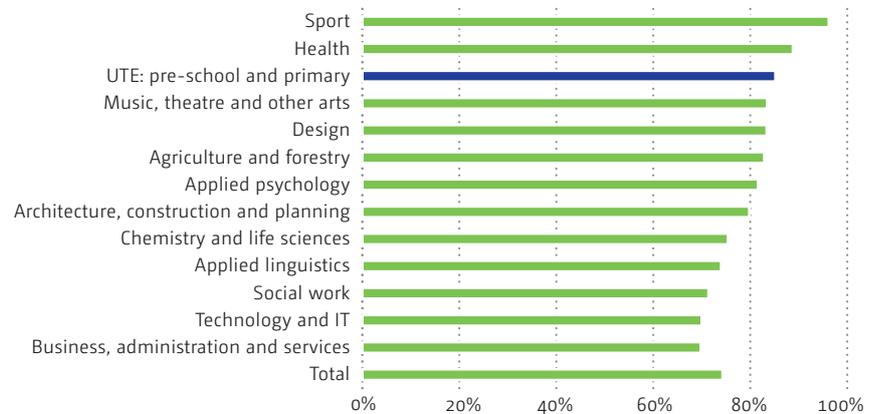
Comments

a) The graduation rates shown only include first degrees completed at an institute of the same type as the initial institute of study, i.e. transfers from e.g. university to university of teacher education are not included.
 b) University (UH) figures do not include the cluster «medicine and pharmacy» as it is not representative.

226 Graduation rate of UTE / UAS Bachelor's degree students 2011 (2006 cohort)

Graduation rate 2011, five years after beginning course in 2006 with Swiss admission qualifications (graduation at same institute and in same field of study)

Data: FSO

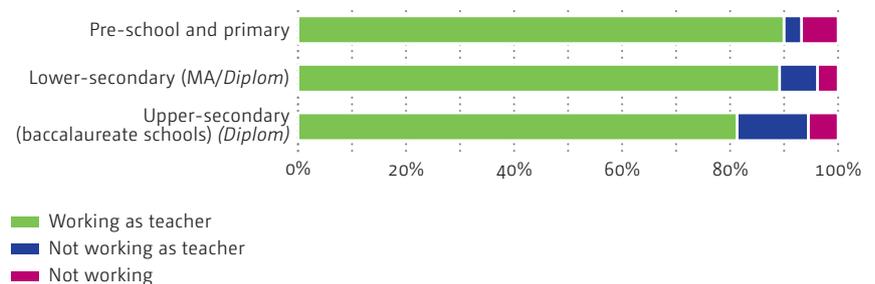


Entering employment

It is a hallmark of teacher training that a relatively high number of graduates enter the profession. All tertiary A courses in teacher education result in an entry rate of over 80%. Not many graduates (from 5% [primary level] to 15% [upper-secondary level]) take their first job outside of teaching. And very few graduates (2–9%) do not take any employment at all after graduating (→ Figure 227). The exit rate in the first five years of employment is also low. Of all those who graduated in 2004, 83% were still working as teachers five years after graduation. This at least suggests that graduates in teacher education are relatively well prepared for their professional life and that most of them master the transition well. If that were not the case, we could expect to see a far higher exit rate during those early professional years.

227 Employment of UTE graduates one year after graduation, 2008

Data: FSO (Graduate Survey); computations: SCCRE



Efficiency/costs

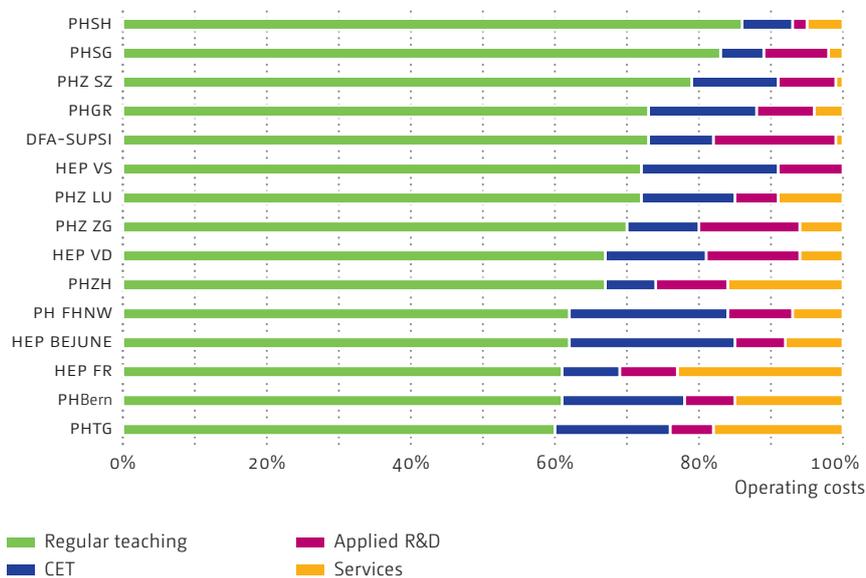
To draw conclusions about the efficiency of the universities of teacher education, we would need not only comparable cost data for the various institutes but also identifiable and verifiable targets. As these conditions cannot be met, this chapter will confine itself to analysing cost structures at the universities of teacher education.

Cost structure

Different institutes spend different amounts on the four types of activity in which they engage (teaching, research, continuous education and training, services) (→ Figure 228). Generally speaking, at the smaller universities of teacher education the operating costs incurred during regular teaching account for a far greater proportion of overall costs. These ratios could, of course, be interpreted as evidence that small institutes are too small to spend much money on the other three types of activity. It should be borne in mind, however, that they are obliged to sustain their own CET and service activities in full and that research also generates revenues. In other words, relatively low values for these three types of activity are also an indication that some institutes may be operating on a sub-critical scale.

228 UTE operating costs by type of activity, 2011

Data: FSO



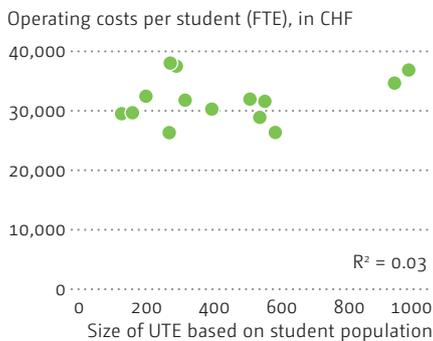
Per-capita costs

To improve comparability, the Swiss Conference of Rectors of Universities of Teacher Education (COHEP) has standardised operating costs for particular types of course based on student full-time equivalents (as a function of ECTS credits). For those studying to become pre-school/primary teachers, the operating costs per full-time equivalent (FTE) average out across all uni-

229 Correlation of per capita costs and size of UTE, 2011

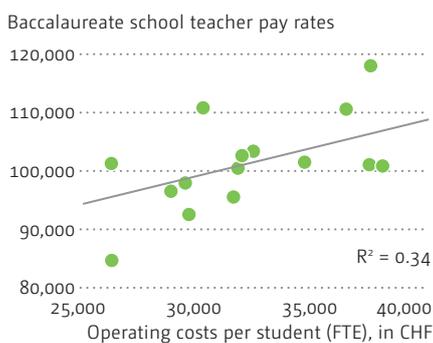
Costs per student (FTE) training for pre-school / primary school

Data: FSO, COHEP



230 Correlation between per capita costs and teachers' pay, 2011

Data: FSO, COHEP



universities of teacher education at 32,200 Swiss francs. The variation is considerable, with a range from 26,300 to 38,000 Swiss francs.

Total costs per student do not, however, correlate with the size of the institute (→ Figure 229), i.e. there does not appear to be a tendency for larger institutes to generate economies of scale. One explanation may be that big institutes usually display a different activity structure. In addition to this, economies of scale are, as a rule, difficult to implement in fields of training where teacher-student ratios are high.

It is also likely that institutes show little elasticity in responding to short-term fluctuations in student numbers. The teacher-student ratio therefore varies both from one institute to another and over time, and this has an impact on annually reported per-capita costs.

The factor which probably accounts most for the cost variation between institutes is the pay for the teaching staff in different cantons. This is at least substantiated by a link (correlation: 0.6) between the per-capita costs of universities of teacher education and the income of teachers in baccalaureate schools (as an approximate value for staffing costs at the universities of teacher education). This would account for 34% of the variation (→ Figure 230).

Equity

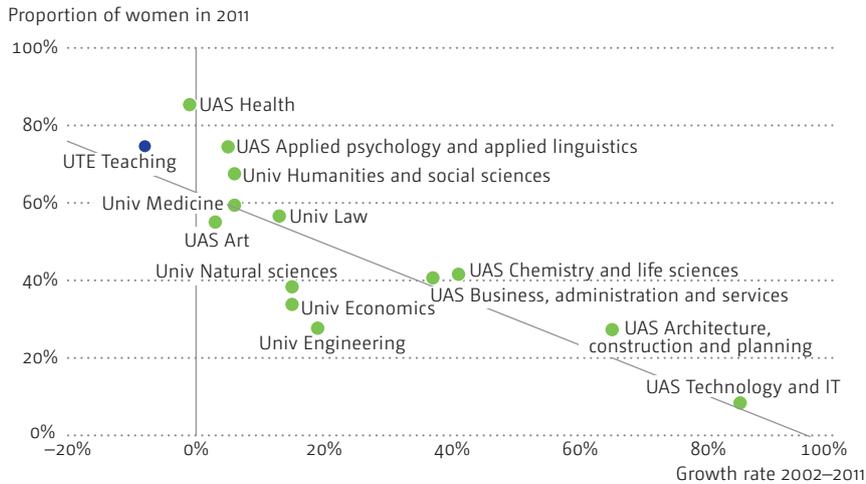
The following sections describe the students of teacher education in terms of gender and migration status. The purpose is to establish, from an equity perspective, whether the groups distinguished by these hallmarks enjoy equal opportunities when choosing a degree, pursuing their studies and entering the profession.

Gender distribution

Courses at the universities of teacher education, like tertiary A courses in subjects such as social work and health (at the universities of applied sciences) or languages and literature (at the universities), are fields of study with a high proportion of female students (75% and more). This percentage has barely changed at the universities of teacher education over the last ten years. By contrast, in male-dominated fields such as technology/IT and architecture (at the universities of applied sciences) but also mechanical and electrical engineering (at the universities), women have been closing the gap. Over this period the proportion of female students in these fields has risen by 40% and more (→ Figure 231).

231 Proportion of women by subject cluster, 2002–11

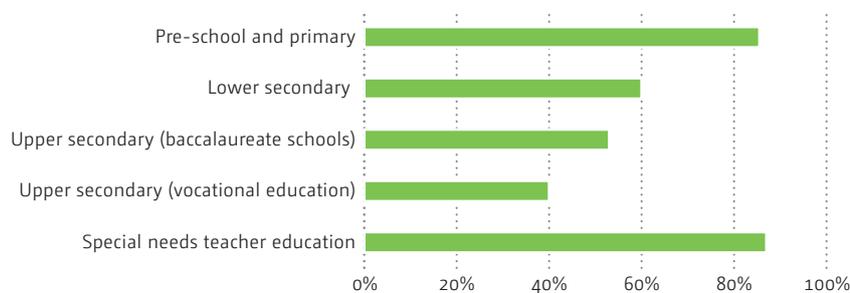
Data: FSO; calculations: SCCRE



The gender ratio at the universities of teacher education follows a familiar pattern, with the percentage of women falling as we advance through the education system (→ Figure 232). Courses in special needs education are attended almost exclusively by women.

232 Women as a proportion of UTE students 2005–2011 by specialisation

Data: FSO



The feminisation of the teaching profession, i.e. the growing percentage of female teachers, is the result of a long-term cohort-related trend. In other words, the percentage of women has risen steadily over time from one cohort to the next (Eckert, 2006). This also means that the gender gap can only be closed if the percentage of male students increases continuously over a long period.

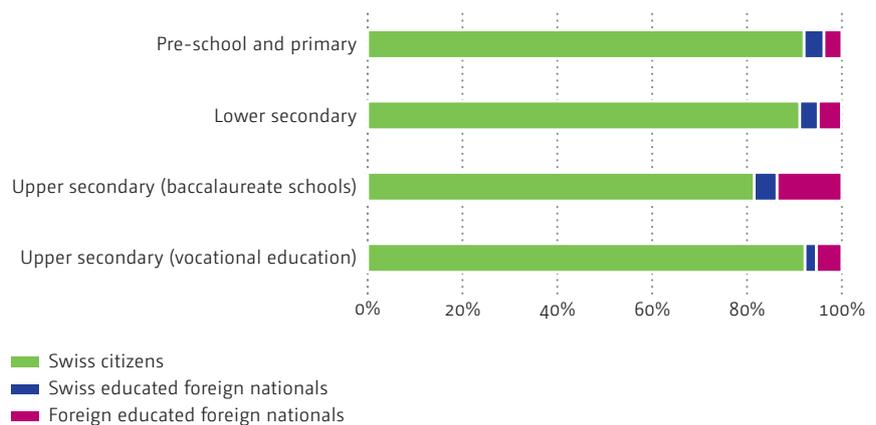
Migration status

There are noticeably few foreign students at the universities of teacher education. They account for only slightly more than 8% of those planning to teach in compulsory education. The percentage is greater on courses aimed at teaching in those upper-secondary schools which provide general education (→ Figure 233). The prime contributing factors here are the approximately 10%

of foreign students who come to Switzerland to study after obtaining the school certificates they need to qualify for university entrance from another country. This can probably be explained by the various partnerships linking some universities of teacher education located close to the Swiss border to their neighbours on the other side. In Thurgau, for instance, the PHTG offers a number of courses in cooperation with the University of Konstanz. These are especially popular with students from nearby areas across the frontier, as the qualifications are also recognised in Germany.

233 UTE students by migration status and specialisation, 2011

Data: FSO



The reasons for the very low numbers of foreign students compared with other types of tertiary A education require clarification. In view of the lack of empirical research, we can only surmise and formulate hypotheses. Given that there tends to be less selectivity at the point of entry to these degree courses and also during the course of study (→ Figure 225), the low percentage of foreign students at universities of teacher education (→ Figure 234) is presumably not caused by greater obstacles to access for foreign students, but rather by the greater appeal of other tertiary options. International mobility is a priority for foreign students. Hence this group is unlikely to be attracted by teacher training geared to the realities of the Swiss education system. The fact that different study preferences result in different patterns of choice does not imply a failure to respect the principle of equal opportunity.

Nevertheless, with a view to the integration of foreign pupils in schools, a higher percentage of student teachers from migrant families would certainly seem to be desirable (*Bader & Fibbi, 2012; Edelmann, 2013*). From this perspective, the lack of linguistic and cultural diversity among the teaching profession is perceived as somewhat problematic (cf., for example, *Herzog-Punzenberger & Wroblewski, 2010; Herzog-Punzenberger, 2009; Villegas & Irvine, 2010*). Specific measures such as those being implemented in Germany by the MigraMENTOR project (cf. *Bader & Fibbi, 2012*) have not yet been developed in Switzerland. The focus for now is on studies designed to examine the phenomenon more closely and to formulate it in scientific terms (*Edelmann, 2013*).³

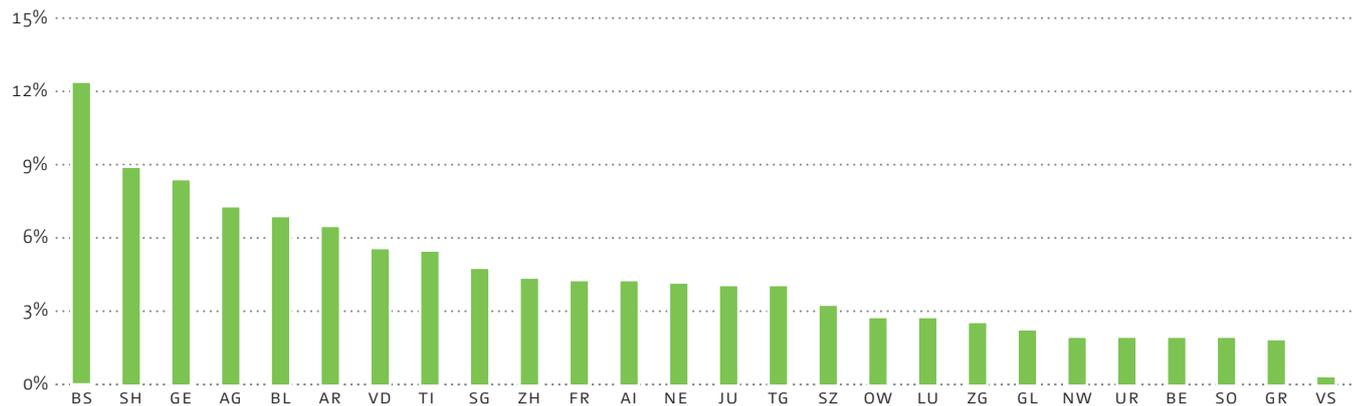
³ Cf. also the study currently being designed by the University of Teacher Education in St. Gallen (PHSG) on «Diversity among Trainee Teachers» (DIVAL).

Foreign teachers

In 2011 foreign teachers still only accounted for 5% of teachers in Swiss schools. In absolute terms, this means just over 5,000 people. The percentage ranges from under 1% to about 12%. Cantons in border areas, such as Basel City, Geneva and Schaffhausen, display much higher percentages than others (→ Figure 234).

234 Proportion of foreign teachers, by canton, all schools, 2011

Data: FSO

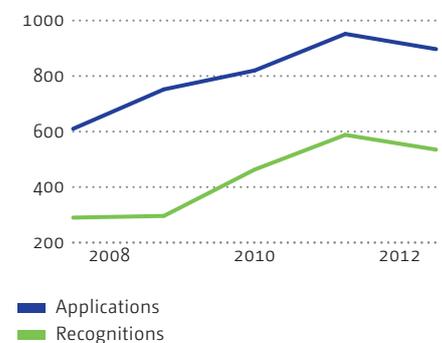


The available data does not reveal, however, whether these teachers commute across the border and whether they obtained their qualification to teach in Switzerland or elsewhere; nor is it clear how long they have been in Switzerland.

The annual statistics on the recognition of foreign teaching qualifications by the Swiss Conference of Cantonal Ministers of Education (EDK) offer some clues as to how many people have applied to teach in Switzerland in recent years (→ Figure 235). Up to 2011, the number of applications received had been rising steadily since the entry into force of the agreement with the EU on the free movement of persons. However, the numbers for the education sector are small compared with migration in other occupational fields. Besides, the data does not indicate whether the individuals whose qualifications were recognised remained in Switzerland and are actually employed as teachers.

235 Recognition of foreign teaching qualifications by EDK, 2008–12

Data: EDK





Tertiary-level B
professional
education and
training (PET)

Context and institutions

ISCED Reform 2011

The classification of the education systems was revised at the 36th UNESCO General Conference in 2011. The new classification replaces the 1997 classification, which, at tertiary level, divided education and training at Level 5 into university qualifications 5A and tertiary non-university qualifications 5B. The highest level in the classification was Level 6, which was reserved for doctorates or other academic qualifications following on from a Master's degree. The ISCED classification now takes in eight levels, with the topmost one being reserved for doctorates once more. Level 4 again includes post-secondary non-tertiary education. Tertiary courses can now be classified at Level 5 and above, with the individual levels being described as follows: 5: Short-cycle tertiary education, 6: Bachelor's or equivalent level; 7: Master's or equivalent level. The individual countries are given a certain latitude when allocating their national qualifications to the ISCED levels.

Tertiary-level B professional education and training is aimed at the transfer and acquisition of the «skills needed to carry out a demanding occupational activity or an activity that involves responsibility» (Vocational and Professional Education and Training Act, VPETA Art. 26, Para. 1). The federal PET and advanced federal PET diploma exams test the ability of candidates to perform activities (either technical or management-related) which are subject to more stringent requirements than for vocational education and training (VET) at the level of the federal VET diploma. The advanced federal PET diploma exam establishes whether candidates have the ability to run a small or medium-sized enterprise independently or to act as experts in their field.

To enter tertiary-level B professional education and training it is necessary to have a federal VET diploma, to have completed an upper-secondary general education or hold an equivalent qualification (VPETA, Art. 26, Para. 2). In other words the PET sector is the only part of the tertiary-level education sector that does not require an academic or vocational baccalaureate for regular admission. This does not, however, mean that there are no students with these qualifications in PET programmes.

The Federal Vocational and Professional Education and Training Act has legally anchored PET programmes at the tertiary level, alongside the cantonal universities, the Federal Institutes of Technology, the universities of applied sciences and the universities of teacher education. By contrast to the other tertiary-level types, however, PET programmes are not defined as university-based tertiary-level A education (ISCED 5A) but as tertiary-level B education (ISCED 5B). When the revised international standard classification of education, ISCED, is introduced, the qualifications obtained for tertiary level B PET will be re-classified as of 2014 (→ *Information text on the left*). Given the heterogeneous nature of the qualifications obtained in PET programmes, it would make sense not to allocate them all to the same level again as in the old classification.

236 Overview of Switzerland's PET sector

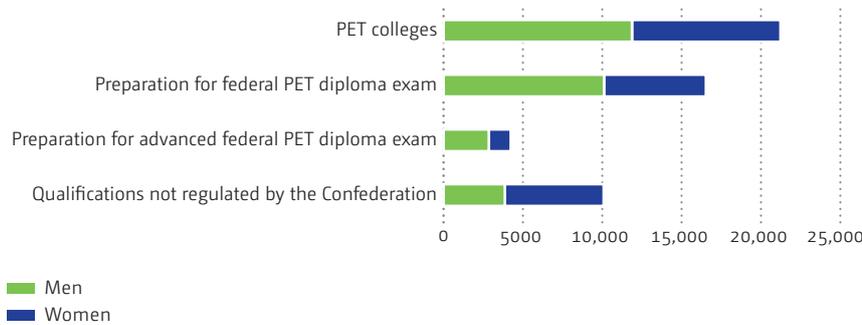
Data: SCCRE

| | Admission requirements | Duration | Providers | Full-time/ part-time | Qualification |
|--|--|--|--|-------------------------|---|
| Professional colleges | Upper-secondary qualification and work experience in some cases | 2–3 years | Private and public schools | Full-time or part-time | Professional college degree. Example: Professional College Degree in Nursing |
| Federal PET Diploma Examination | Upper-secondary qualification and a certain number of years' work experience in relevant field | Unspecified since attendance of preparatory courses is voluntary | Trade associations: voluntary attendance of preparatory courses offered by education institutions and professional organisations as well as public and private schools | Part-time | Federal PET Diploma. Example: Federal PET Diploma in Construction Site Management |
| Advanced Federal PET Diploma | Federal PET Diploma and a certain number of years' work experience in relevant field | Unspecified since attendance of preparatory courses is voluntary | Trade associations: voluntary attendance of preparatory courses offered by education institutions and professional organisations as well as public and private schools | Part-time | Advanced Federal PET Diploma. Example: Advanced Federal PET Diploma in Cabinetmaking, Advanced Federal PET Diploma in Finance |

Tertiary level B PET takes in the federal PET diploma exams, the advanced federal PET diploma exams and the PET colleges (→ Figure 237) as well as qualifications that are not regulated by the Federal Vocational and Professional Education and Training Act.

237 Students in tertiary level B education and training by education type and gender, 2011

Data: FSO

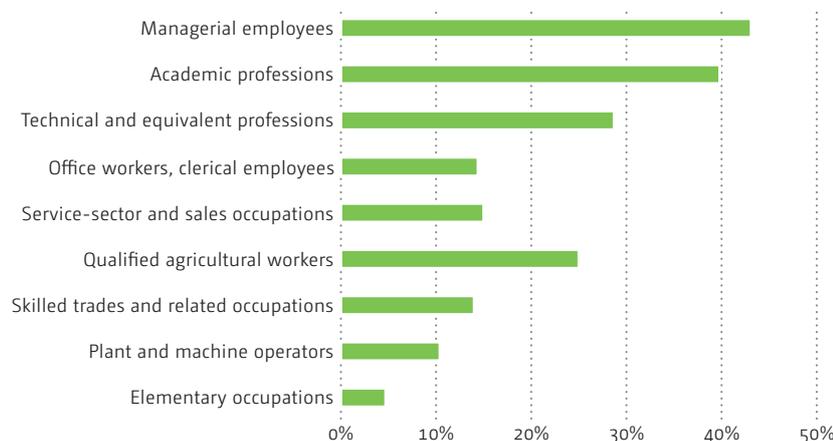


Alongside the PET qualifications that are regulated by the Confederation, there are also a number (albeit declining) of diplomas and post-diplomas that **are not regulated by the Confederation**. Of the 2343 diplomas awarded in 2012, most related to the hotel and catering sector (e.g. hotelier). Alongside these, however, there are also a fairly large number of business qualifications (e.g. HR clerk) and health qualifications (e.g. naturopath). Almost half the post-diplomas were accounted for by the hotel, restaurant and catering sector.

The majority of those studying at PET colleges take up their studies after acquiring an upper-secondary level qualification (generally a federal VET diploma). For the federal PET and advanced federal PET diploma exams, by contrast, which require students to have had a longer period of practical experience beforehand, a large proportion of those completing the diploma programmes have not only held a management function already (→ Figure 238) but, in some cases, have also acquired a different qualification at the tertiary level (→ *Chapter on Continuing education and training*, Figure 258). The high proportion of tertiary level B PET qualifications in the «academic professions» category in relation to persons with vocational education and training working in this occupational group, is due to the small numbers in this comparative group and, at the same time, also indicates that many of those with tertiary level B PET qualifications are working in jobs that count as academic professions in other countries.

238 Proportion of gainfully employed persons with tertiary level B PET amongst the total of gainfully employed persons with VET, by occupation (ISCO classification), 2011*

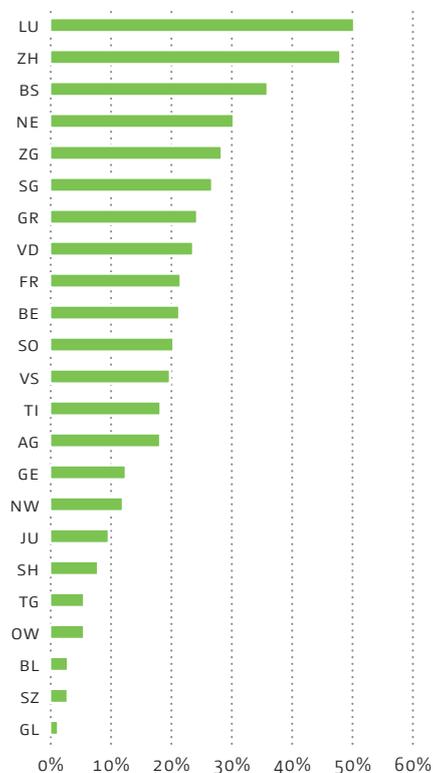
Data: FSO



* The average is 24.6%. In other words, over all the occupation categories taken together, roughly one quarter of those with a VET qualification have a tertiary level B PET qualification too.

239 Number of students in tertiary level B PET for each student in VET, by canton (the school's location applies in the case of tertiary level B PET students), 2012

Data: FSO



Appenzell Innerrhoden and Ausserrhoden and Uri have no tertiary level B PET programmes in their canton.

240 Students by provider type, 2011

Data: FSO



Public providers
Private subsidised providers
Other private providers

It is estimated that approximately one third of those with tertiary level B PET qualifications hold multiple qualifications: people who have already obtained a tertiary-level qualification (conventional university or university of applied sciences), have completed a degree programme at a PET college or have already passed a PET exam, acquire further qualifications at the tertiary B PET level (→ *Chapter on Continuing education and training (CET)*, page 259). The large number of diplomas issued for tertiary level B PET each year thus have to be put into perspective on two counts. One group of those awarded diplomas are people who, even after they have acquired their tertiary level B PET diploma, will continue to appear in the statistics on the basis of their studies at a conventional university or university of applied sciences as their highest educational qualification. The other group takes in those who have obtained a second or even third qualification at tertiary B PET level. Since a large proportion of the tertiary level B PET diplomas issued each year are not the first educational qualification that the holder has obtained at tertiary level, simply adding these diplomas to the other qualifications obtained at tertiary level would overestimate the number of people living in Switzerland who have completed tertiary level education. Overall, the Swiss Labour Force Survey (SLFS) shows that some 14% (2011) have a tertiary level B PET qualification as their highest educational qualification, by comparison to almost 30% who have a qualification from a conventional university, a university of applied sciences or a university of teacher education. With tertiary-level qualifications, however, the significance of university qualifications is overestimated in relation to tertiary level B PET qualifications, since foreign employees who have moved to Switzerland are more likely to have a university qualification than a tertiary level B PET qualification.

Drawing international comparisons is difficult, since tertiary level B PET following the Swiss pattern does not exist outside the German-speaking countries. While in the OECD countries, some 11% of the population have a qualification at level ISCED 5B as their highest educational qualification, the qualifications in question are not generally directly comparable with Switzerland's. In most countries, short courses of study at tertiary level which cannot be allocated to level ISCED 5A on account of the duration of the education (less than the three years required for a Bachelor's degree) are included under ISCED 5B education and training. Since these short training courses are more frequently completed by women, Switzerland is also an exception in this respect, since the majority of tertiary level B PET qualifications are obtained by men. With regard to the socio-demographic characteristics of those with tertiary level B PET qualifications, it must also be stated that, for the PET and advanced PET exams, where some 90% of candidates are Swiss (*Neukomm, Rageth & Bösch, 2011*), the percentage of foreigners is even lower than in vocational education and training. It is not known what proportion of this difference could be accounted for by naturalisation. By contrast to the case for the other types of formal education, two-thirds of tertiary level B PET is dominated by private providers (subsidised and non-subsidised) (→ Figure 240).

The provision of tertiary level B PET is distributed very unevenly over Switzerland, which is only partly a result of the fact that vocational education and training, which is the feeder, is also available to differing extents in the individual regions. The main reason for this regional distribution is the large concentration of providers (schools and associations) in individual cantons (→ Figure 239).

PET colleges

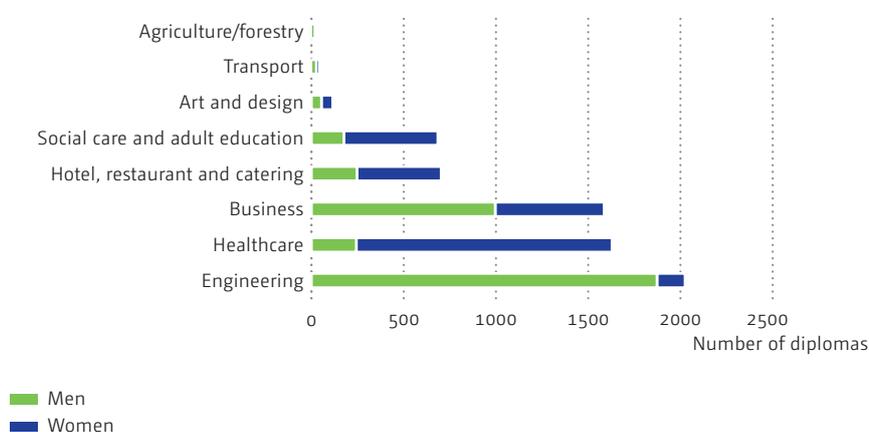
The Federal Department of Economic Affairs, Education and Research's Ordinance on the Minimum Requirements for Recognition of PET College Degree Programmes and Continuing Education and Training Courses states the following: «PET college degree programmes and CET (continuing education and training) courses provide students with the skills needed to independently assume technical and managerial responsibilities in their field. They are practical in focus and specifically develop the ability to think in a methodical and abstract manner, to analyse professional tasks and to apply the knowledge gained in a practical way.» Apart from upper-secondary level qualifications (a federal VET diploma obtained upon completion of a three-year or four-year VET programme; a specialised school certificate; an academic baccalaureate) candidates wishing to enrol in a degree programme or CET course at a PET college may be required to demonstrate a certain amount of professional experience and undergo an aptitude test, the precise contents of which are set by the PET providers. The admission requirements vary for the different degree programmes. The Ordinance covers the following fields: engineering; hotel, restaurant and catering; business; agriculture and forestry; healthcare, social care and adult education; art and design; transport.

The PET college degree programmes are based on national core curricula developed and issued by the PET colleges themselves in cooperation with professional organisations; the State Secretariat for Education, Research and Innovation (SERI) approves these core curricula at the request of the Federal Commission for PET colleges.

There are still certain unresolved issues where PET and university of applied sciences or vocational CET programmes overlap. On a number of training courses, such as in the field of healthcare, identical qualifications can be obtained at both PET colleges and universities of applied sciences. In other fields, qualifications can be obtained in post-graduate courses (MAS, DAS, CAS) at universities of applied sciences that are identical to those obtained at PET colleges or with federal examinations.

241 Diplomas awarded by PET colleges by subject area and gender, 2012

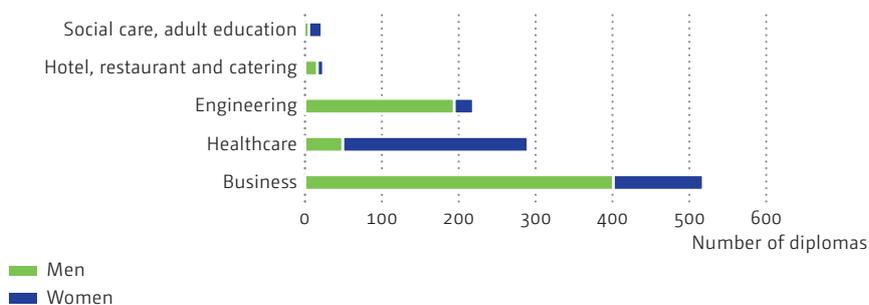
Data: FSO



PET colleges also award post-diploma qualifications, which are similarly recognised by the Confederation and give those holding them access to specialised occupations in their field, such as anaesthetics or intensive care in the health sector. Those who have obtained these qualifications hold the same title as those with the PET college degree but have the letters «NDS» added at the end of their title meaning that it is a post-diploma qualification.

242 CET diplomas awarded by PET colleges by subject area and gender, 2012

Data: FSO



The PET colleges are highly concentrated in geographic terms, with the colleges in the cantons of Bern and Zürich alone awarding 41% of all PET college diplomas (2012). In addition, there are more PET colleges in the German-speaking part of Switzerland than in western Switzerland and Ticino (which together award 20% of all diplomas). This is due, on the one hand, to the fact that similar courses are more frequently offered at universities of applied sciences in the French and Italian-speaking parts of Switzerland and, on the other hand, to the lower share of holders of VET qualifications who provide the candidates for degree programmes at a PET college.

Federal PET Diploma and Advanced Federal PET Diploma examinations

The advanced federal PET diploma examination (also referred to as the *Meisterprüfung* in commercial and industrial contexts) was governed by the first Federal Vocational and Professional Education and Training Act in 1933 already. The federal PET diploma examination was then included in this same Act when it was revised in 1963.

Contrary to the case for the PET colleges, where the whole course is recognised by the Confederation, the recognition of the federal PET and advanced federal PET diploma examinations relates solely to the holding and contents of the examination. The initiative to create a new federal PET or advanced federal PET diploma examination always comes from a professional association. This association determines the contents while the Confederation assumes responsibility for supervising the examinations and for approving the examination regulations. The SERI only authorises one federal PET diploma examination and one advanced federal PET diploma examination for a particular specialisation within a given sector. The advanced federal

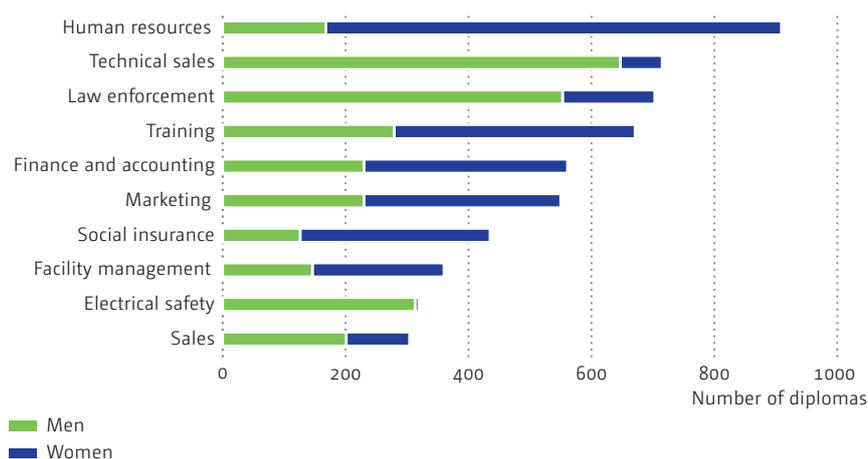
PET diploma examination generally differs from the federal PET diploma examination through its more demanding requirements. This is the reason why the majority of people who take a federal PET diploma examination have a VET qualification as their highest educational qualification (approx. 70%), while those taking advanced federal PET diploma examinations generally already have a tertiary level B professional education and training qualification (such as a federal PET diploma) or a different tertiary qualification (approx. 70%) (Neukomm, Rageth & Bösch, 2011).

The individual professional associations organise the examinations that are held every year or every six months. Some associations, however, only hold examinations every two or three years, because there are not enough candidates for annual examinations. There are no regulations governing the preparations for the examinations; those sitting the examinations are free to choose their mode of preparation themselves. They can study by themselves or attend one of the courses offered by the associations in privately-run or public colleges. Between 80 and 90% of candidates for the federal PET diploma examination attend a preparatory course (Neukomm, Rageth & Bösch, 2011). Candidates generally prepare for the examination while still working and just reduce their hours somewhat. Around 90% of candidates for the federal PET and advanced federal PET diploma are in 90% or more FTE posts prior to the exam, and even during the examination period itself, some 80% still maintain this level of employment (Neukomm, Rageth & Bösch, 2011).

Despite the large number of possible qualifications that can be obtained through the federal PET diploma examinations (224 in February 2013), most diplomas are obtained in just a small number of fields. Hence, of the 13,582 diplomas obtained in 2012, 40% were awarded in the top ten fields (→ Figure 243).

243 Top ten fields for the federal PET diploma exams, number of diplomas, 2012

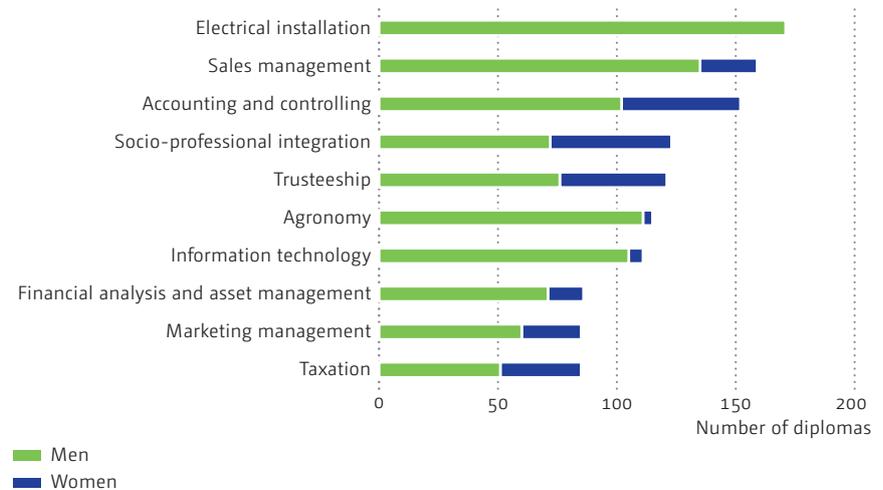
Data: FSO



The concentration of diplomas in just a few fields is even more marked for the advanced federal PET diploma examinations. In 2012, 43% of the 2815 diplomas were for the ten most-frequently chosen areas of training (out of a total of 169; figure for February 2013). In fourth place (and in 2011, even in first place) is the profession of «socio-professional integration worker» (social worker providing assistance with people's integration into the world of work) – a profession that did not even exist prior to 2010 (→ Figure 244).

244 Top ten fields for the advanced federal PET diploma exams, number of diplomas, 2012

Data: FSO



Costs, funding and benefit

Costs

The cost of PET colleges to be met by the public purse was 344.8 million Swiss francs in 2011, according to the SERI. Since a cost calculation performed by the supplier side (*SCCRE, 2010*) for 2006 revealed that some 80% of the cost of PET colleges is covered by public grants, the overall cost of PET colleges is thus probably just above 430 million Swiss francs per year.

Calculating the overall cost of tertiary level B PET is relatively difficult, since most of the costs associated with the federal examinations are borne by those sitting them, and therefore have to be estimated. The private costs estimated by *Neukomm, Rageth and Bösch (2011)* for federal PET and advanced federal PET diploma examinations amount to 243 million Swiss francs. Since these are calculated from the viewpoint of the individual, however, and represent the overall costs for those sitting the examinations in 2010, the actual costs incurred each year are probably slightly lower, since, for many of these people, they are spread over more than one year. Public contributions towards vocationally-oriented further training and preparation for examinations amounted to 143.8 million Swiss francs in 2011 according to the SERI.

All in all, tertiary level B PET receives some 500 million Swiss francs from the public purse every year, not including the indirect funding of part of the costs through tax deductions.

Funding

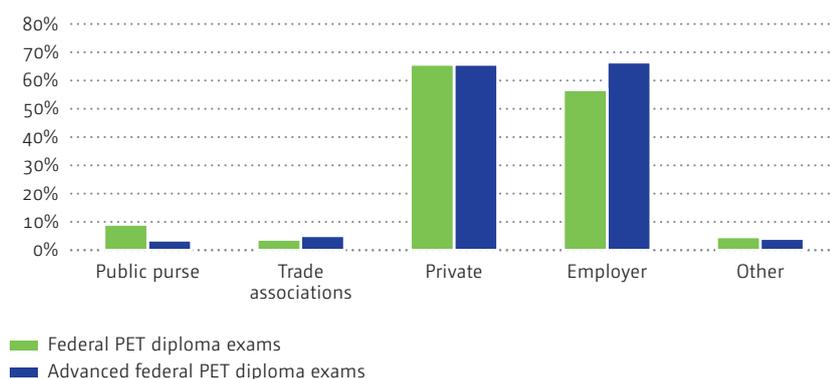
As already mentioned, 80% the costs of the PET colleges are covered by the public purse. The remainder comes from tuition fees for the most part. The very uneven geographical distribution of the 200 or so PET colleges in Switzerland means that a large number of students do not study in the canton in

which they live. The Agreement on Technical Colleges (FSV, 1998), which was signed by all the cantons, had permitted the cantons to engage in «à la carte» funding for students from their canton, which meant that they only had to pay contributions to those PET colleges outside their own canton that they themselves had selected. As a result, students studying outside the canton could find themselves faced with higher tuition fees in such a situation. The new agreement, the «Intercantonal Agreement on Contributions to Educational Courses at PET colleges» (HFSV), now makes provision for all the cantons that have signed the agreement to pay contributions to all the colleges covered by the agreement (lump-sum contributions that cover 50–60% of the costs of the course) thus ensuring greater freedom of movement for the students. This agreement was adopted by the plenary meeting of the EDK on 22 March 2012 and will come into force when at least 10 cantons have signed it. Implementation will be possible in the 2015/2016 academic year at the earliest; until then, the provisions of the FSV will apply. This new agreement does not cover public subsidies for the federal PET and advanced federal PET diploma examinations.

For the preparatory courses and examination fees, the survey conducted by *Neukomm, Rageth & Bösch (2011)* for 2010 showed that approximately a fifth of the students covered all the costs themselves, while the remaining 80% received full or partial support from their employer (→ Figure 245); the employer paid the full costs for a quarter of the students. Public subsidies primarily take the form of grants for students. The extent to which the examinations are subsidised by the public purse, by contrast, can only be determined from the public expenditure on tertiary level B PET, since the contribution is not visible to those sitting the examination. The federal contributions to the cost of examinations cover 60% of the actual costs and, in exceptional cases, 80% of these costs.

245 Sources of funding for federal PET and advanced federal PET diploma exams, 2010

Source: *Neukomm, Rageth & Bösch, 2011*

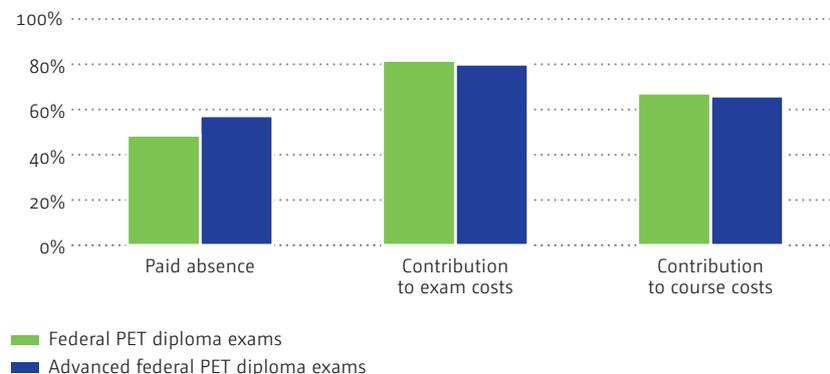


What is not stated in monetary terms at the moment is the remuneration that employers give students in the form of time off (→ Figure 246). This sum serves to reduce the opportunity costs of the training for students, which, in turn, increases its profitability for them. Most employers insure their contributions with a repayment clause, i.e. students have to undertake to repay all or part of the support if they leave the employer before a certain period of time has elapsed. Only just under a quarter of students receiving support from their employer were not subject to any repayment obligations (*Neukomm, Rageth & Bösch, 2011*).

246 Forms of employer contribution for federal PET and advanced federal PET diploma exams

Multiple answers possible

Source: *Neukomm, Rageth & Bösch, 2011*



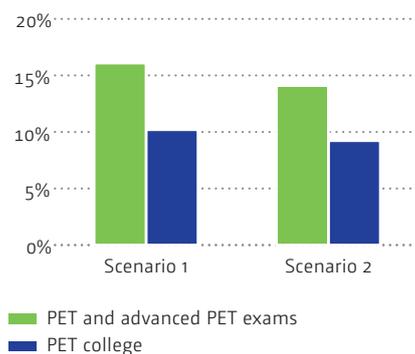
Finally, part of the funding for tertiary level B PET is obtained afterwards through the possibility of deducting the costs of training from taxable income. More than two-thirds of those surveyed by *Neukomm, Rageth and Bösch (2011)* said that they could tax deduct all or part of their costs. In the case of candidates for advanced federal PET diploma examinations in the regulated professions, the proportion was more than 95%. Depending on the applicable marginal tax rate, between one fifth and one third of the privately borne costs ought to be refundable in this way afterwards.

Benefits

The costs of the training must also be set against the different benefits derived from the training in the form of increased job security, career opportunities and higher wages. The effectiveness of the training can thus be estimated on the basis of whether people are able to generate better job market results by virtue of tertiary level B PET. Calculating the return on investment for tertiary level B PET (*Cattaneo, 2011*), assuming average cost scenarios for the corresponding types of education and training (PET colleges, plus federal PET diploma and advanced federal PET diploma examinations), the return on each year spent training is seen to be considerably higher than for other formal educational qualifications in Switzerland. These latter returns amount to approximately 7% per year spent training (→ *Chapter on Cumulative effects, page 275*); for PET colleges, by contrast, a return of some 10% is obtained for each year spent in education and training, and for federal PET and advanced federal PET diploma examinations the return is up to 16% (taking a realistic average scenario for the share of the costs borne by the student and the student's percentage of full-time gainful employment) (→ *Figure 247*). The returns on federal PET and advanced federal PET diploma examinations are thus especially high. The potential explanations for these above-average returns on investment in education provide a certain insight into the way in which PET works. First of all, precisely in the case of tertiary level B PET, the returns can be drastically overestimated, since it is talented professionals, in particular, who select PET, and their wages would already have been very high without a PET qualification. In other words, the causal higher return obtained by investing in PET is overestimated, because the wages of

247 Return on advanced PET as a function of costs and wage scenarios for a standardised year of education

Source: *Cattaneo, 2011*

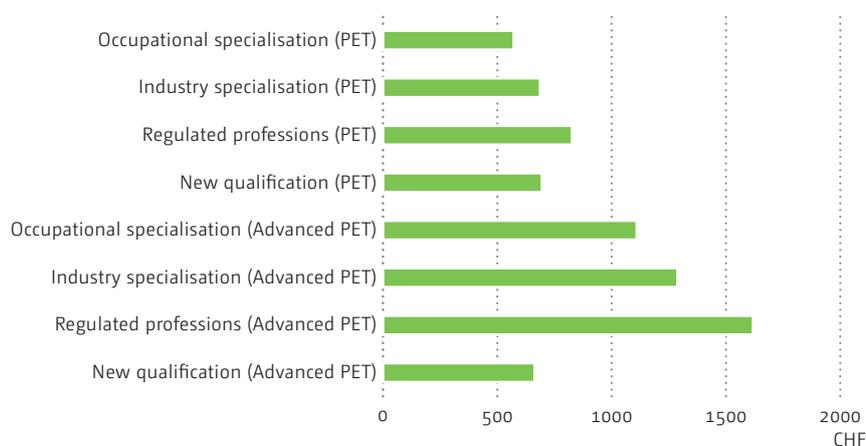


Scenario 1 for PET colleges is based on part-time study, with only 50% of the costs of the education being assumed by the student. Scenario 2 is based on full-time study with all the costs being assumed by the student. For the exams, scenario 1 is based on 80% FTE employment and assumption of 50% of the costs, while scenario 2 is based on 50% FTE employment and assumption of 50% of the costs.

those who have not undergone any further training after the VET level do not constitute a true benchmark. In the majority of cases, this distortion can be corrected by only considering the wage differential (before/after) for those persons who have obtained a PET qualification. While a comparison of this type considerably reduces the returns, despite an appreciable increase in wages (→ Figure 248), they nonetheless remain positive. It is also important to bear in mind, however, that calculating things this way tends to lead to the returns being underestimated. This is because wage growth is low for many people in the short term after gaining their PET qualification, since they are tied to their employer through repayment clauses.

248 Change in monthly income before and after the exam, by exam category, 2010

Source: Neukomm, Rageth & Bösch, 2011



A further explanation for above-average returns could be that students pursuing PET (and especially those taking the federal PET and advanced federal PET diploma examinations), have to pay more costs themselves than for a comparable education at a university or university of applied sciences, and hence the wage growth thus compensates the high education costs. Even with allowance for the average costs of education borne by the students themselves, the returns still remain very high, however, which means that this state of affairs cannot explain the high returns as a whole. It can, however, be shown that, with a particularly unfavourable financing situation (where the student bears the full costs and greatly reduces his number of hours in gainful employment over a long period of time), the returns can become very small. For a large number of students, therefore, the support provided by their employer thus constitutes a key condition for a high return.

Apart from the return on PET being distorted by the fact that talented students would have earned more even without PET, there is also another way in which the return could be overestimated. This overestimation comes into play if the only people who opt to pursue PET are those who can genuinely increase their productivity and hence their wage by a large margin, while those who would not stand to gain much from further training do without PET. While, with this form of distortion, the returns are correctly estimated for those persons who have completed the training, they are overestimated for those who have not completed a PET programme. Taking this form of distortion as an explanation for the high returns would certainly seem only logical, given that almost 80% of the students benefit from support from their employer, and it can be assumed that the employers select

those employees that they regard as having a higher potential to receive the support.

Finally, it would be possible for the return to be overestimated because the educational input is much greater than simply attending the preparatory courses. This is a plausible assumption, since a federal PET or advanced federal PET diploma examination certifies much more than simply the knowledge that is acquired in preparatory courses – the examination actually serves to validate all the skills that have been acquired informally and non-formally over several years of gainful employment.

If, however, the examination is also intended, or is primarily intended, to test and certify skills that have been acquired over a prolonged period of employment, the question must then be asked as to why the wages of these persons had not risen more sharply prior to the examination already – which would have reduced the return on the examination once again. There are two obvious explanations for this. Firstly, there is an information asymmetry between the current employer and possible competitors in relation to the employee's true productivity, which the current employer is exploiting to his/her benefit (but is also contributing towards the costs of the education for this). One indication of this information asymmetry is the fact that a large number of students change employer shortly after passing the examination, since they are now able to provide credible evidence of their increased productivity to a new employer. Another indication is that a large number of employers seek to prevent the loss of employees in this way by means of repayment clauses. Finally, it must be borne in mind that it is precisely the examinations that provide access to regulated professions that make wage growth possible in the first place, since without access to the regulated profession, the skills acquired could not be exploited in wage terms. It is in these fields that the wage hikes after passing the examination are greatest (→ Figure 248). Precisely for the regulated professions, however, it has to be assumed that a big increase in student numbers would not automatically lead to more people qualifying, since the examinations are to some extent used to govern market access to individual professions.

To sum up, it can be said that the above-average returns that students derive from tertiary level B PET probably stem from the fact that a highly selective number of students are involved, and that this selection is supported not least by the selective form of financing (on the part of the employer) and the fact that the examinations (especially for the regulated professions) are the preserve of the trade and professional associations. This ultimately also means, however, that a pronounced increase in PET student numbers or interventions in the mode of financing would run the risk of eroding precisely these returns.



Continuing education and training (CET)

Context

Continuing education and training (CET) is a response of advanced knowledge-based societies to the challenges of a globalised economy where technological change is rapid and labour markets are increasingly international. Knowledge must be constantly developed and renewed. Nor is it enough to acquire new skills; existing ones must equally be fostered. In the light of demographic change, there is a pressing need for a rigorous strategy to continue educating and training all economically active adults. The challenges associated with acquiring, retaining and developing skills must be tackled by individuals, employers and societies as a whole. However, as the CET landscape in Switzerland is predominantly operated by private players in a structure defined by a market economy, the state plays less of a governance role than in the other spheres of education.

Depending on formal education structures and on the economic sector concerned, CET activities may focus primarily on renewing existing skills, expanding and adapting knowledge and abilities in order to meet new tasks, or enabling people to acquire missing qualifications at a later stage in their career.

Available data

The scope for maintaining up-to-date reporting in the field of continuing education and training is limited, as the various national and international surveys, such as the international Adult Education Survey (AES) conducted by the European Union, do not take place very frequently. The SLFS¹ CET module was last performed in 2009 and in 2011 it was replaced by a Microcensus on Education and Training (MET). Then there are surveys like the one on corporate CET programmes (SBW)² carried out by the Federal Statistical Office (FSO), although these have not yet been evaluated as they were only recently initiated. Given the data available, there are constraints not only on longitudinal observations of individual CET pathways, but also on international comparability, as the reference periods are often different. Finally, the data supplied by providers of CET in Switzerland is still totally inadequate. As a result, this chapter is obliged to concentrate primarily on individual CET pathways among the population in general (based on data from the Microcensus of 2011). Consequently, it is not possible at present to set out data relating to the cost structure of continuing education and training, which would specifically need to factor in corporate investment and the cost calculations of training providers.

Continuing education and training as a concept

Continuing education and training, like adult education, reflects a particular aspect of the broadly defined, multidimensional concept of «life-long learn-

¹ SLFS = Swiss Labour Force Survey

² Cf. www.bfs.admin.ch/bfs/portal/de/index/infothek/erhebungen__quellen/blank/blank/sbw/oo.html

ing» (OECD, 1996; OECD, 2003). Originally, the concept of life-long learning was above all understood to mean adult education; later concepts placed far greater emphasis on the comprehensive approach which postulates learning or education as a life-long process, hence embracing rather more than education acquired in adulthood. In recent decades the concept has been established as an underlying principle of education policy (cf. Kraus, 2001; Óhidy, 2008; European Commission, 2010). However, it does not lend itself easily as a conceptual tool for the empirical documentation and description of individual CET-related behaviour. For these purposes it is preferable to draw on more narrowly defined concepts that distinguish continuing education and training from formal learning activities.

CET activities are identified and described with the aid of various criteria, such as degree of institutionalisation, objective or content. The most commonly used classification is the one applied by UNESCO, OECD and EU, which is founded on the degree of institutionalisation (cf. OECD, 2003; European Commission, 2006). The primary distinction here is not between basic and continuing education or training, but between formal, non-formal and informal learning, and this can take place at any point during a lifetime.

Formal learning consists of institutionalised, government-regulated education within a hierarchically structured education system. This breaks down into a primary, secondary and tertiary stage (see the diagram on the inside front cover). Formal learning is institutionalised insofar as it is a requirement for obtaining the corresponding formal qualification within the education system.

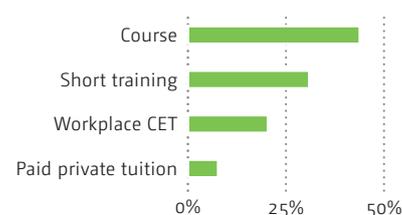
Non-formal learning includes organised learning activities outside the formal education system and hence outside the classical education hierarchy. Non-formal learning activities take place within an organised, structured framework in or outside the workplace (e.g. courses, seminars, private tuition) (→ Figure 249). These learning activities complement formal education programmes, but do not result in a formal qualification such as an apprentice's diploma, a baccalaureate, a Master's degree or a doctorate. Courses to prepare candidates for advanced professional examinations likewise count as non-formal learning. Although they lead to an officially recognised qualification, the preparation itself is not government-regulated and is not a compulsory component of the examination; courses of this kind rank as non-formal learning, even if the learning objective itself is a formal qualification.

Advanced professional studies pursued at universities, universities of teacher education or universities of applied sciences are not equivalent to regular tertiary A studies. Although they lead to qualifications (e.g. Master of Advanced Studies, MAS), they cannot be compared with the academic degrees that constitute the «Bologna» system (Bachelor's, Master's); the same applies to the post-diploma programmes pursued at professional colleges (FDEA, 2011b) (→ Figure 250). These learning activities fall outside the hierarchically structured formal education system. That the MAS is not equivalent to a formal tertiary A Master's degree is also evident from the fact that this CET format is usually equivalent to 60 ECTS, whereas the academic Master's degree granted by a university or university of applied sciences requires 90 or 120 ECTS. Besides, admission to a Master's course assumes a Bachelor's degree worth 180 ECTS. Although the CET programmes offered by tertiary A institutes were designed for higher education graduates, in practice we find that between 40% and 60% of the participants in these courses do not actually hold a tertiary A degree.

249 Participation in non-formal learning, age 25 to 64, residents of Switzerland, 2011

Reference period: last 12 months

Data: FSO (MET 2011); computations: SCCRE



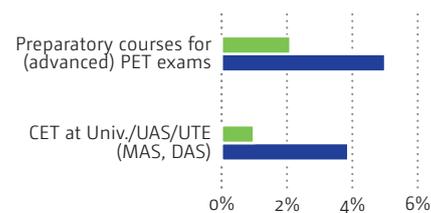
A «course» is a CET format that usually takes serial form, is devoted to a particular theme and is taught by one teacher.

«Workplace CET» is geared to occupational activity, organised by the employer, subject to a schedule and usually taught by one teacher.

«Short training» covers targeted, irregular CET activities such as seminars, lectures, congresses and workshops (FSO, 2013e),

250 Participation in non-formal learning, tertiary A and B, residents of Switzerland aged 25–49, 2011

Data: FSO (MET 2011); computations: SCCRE



■ Percentage of total population aged 25–49
 ■ Percentage of corresponding education category (tertiary A for tertiary A institutes, basic VET for advanced PET)

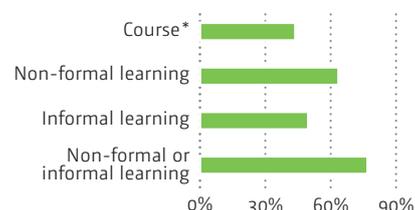
The concept of *informal learning* is intended to highlight the fact that learning does not always take place in formal, institutionalised or at least organised settings, but can take wide-ranging, individual forms. Informal learning includes all activities which pursue a learning objective but take place outside an organised learning setting or an organised learning relationship. Informal learning may draw on teaching aids and media, but it might equally be founded on observation or experiment.

That is why this concept is ill-suited to statistical endeavours, as informal learning is difficult to operationalise. Even when this problem is resolved, it is only of secondary value in analysing a system, precisely because it is by definition informal, i.e. neither institutionalised nor organised and hence less relevant to public policy than formal or non-formal learning. This also explains why informal learning is not subject to government regulation. When reference is made below to continuing education and training, it usually means non-formal learning activities undertaken by the economically active adult population, such as CET courses, post-diploma professional programmes, seminars and private tuition.

Participation in CET activities

251 CET participation, residents of Switzerland aged 25 to 64, 2011, various concepts

Reference framework: 12 months
Data: FSO (MET 2011); computations: SCCRE



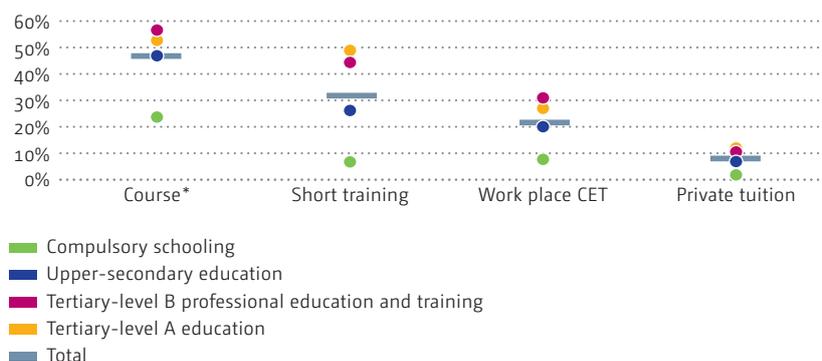
* The «course» category also includes preparatory courses for (advanced) PET exams and CET at tertiary A institutes (e.g. MAS).

The CET-related behaviour of a population is usually described in terms of participation rates. There are a number of indicators that can be used, which also permit international comparison. However, participation rates will turn out quite differently, depending on how broadly the concept is defined, which learning formats (formal, non-formal, informal; career-oriented or of general interest) are taken into account, how the sample is focussed (age, labour market status) and what period of observation is applied (→ Figure 251).

Shifts in conceptual design furthermore inhibit longitudinal and international comparison. Even if these indicators permit a relatively accurate coverage of this type of learning activity, they remain a crude yardstick, as often no information is gleaned about the intensity, periodicity or quality of CET activities. Moreover, this conceptual demarcation implies variations in other factors which influence CET participation rates, such as how much formal education has already been acquired (→ Figure 252).

252 Participation in non-formal learning by highest education qualification, residents of Switzerland aged 25 to 64, 2011

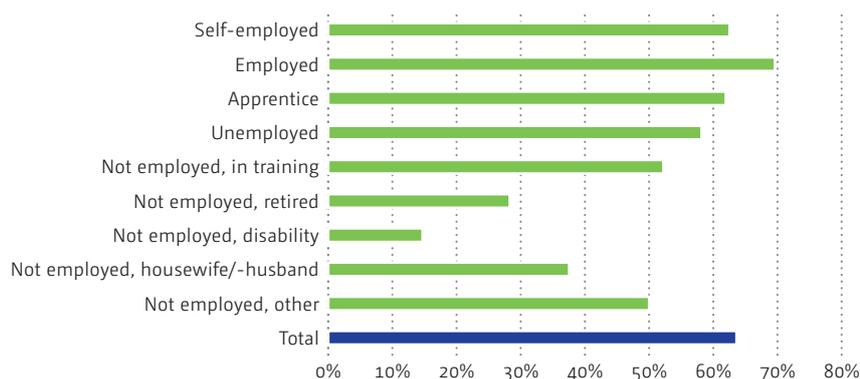
Data: FSO (2011 MET); computations: SCCRE



The great significance of CET for the world of work is demonstrated, for example, when participation rates are broken down according to employment status. About two-thirds of those who are involved in gainful employment participate in continuous education and training, whereas the rate is much lower for unemployed persons who are not currently seeking a job (→ Figure 253).

253 CET participation (non-formal learning) by employment status, residents of Switzerland aged 25 to 64, 2011

Data: FSO (MET 2011); computations: SCCRE

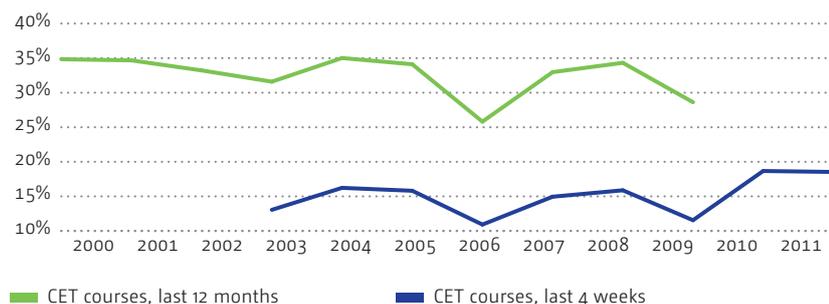


A number of surveys are conducted to ascertain patterns of CET-related activity among the Swiss population. The SLFS records participation in continuing education and training by asking a general question about CET events attended during the previous four weeks. Until 2009, an additional CET-themed module was carried out every three years in order to obtain in-depth survey data on CET activities. Since 2011 this SLFS module has been replaced by an independent Microcensus on Education and Training (MET), which is to be carried out every five years. However, following these various changes to the survey tools and reference framework, longitudinal observation is now more difficult (→ Figure 254). The rate of participation in CET programmes determined by the Microcensus is so different from the SLFS rate that the two results cannot be compared. Problems with the reliability and validity of CET surveys exacerbate the identification of external factors. It is consequently not really feasible to examine the extent to which the economic climate influences CET patterns among the population.

254 Participation in CET courses, residents of Switzerland aged 25 to 64, 2000–2011

Themed interview module in SAKE 2003, 2006 and 2009

Data: FSO (SLFS); computations: SCCRE



The different reference framework – four weeks as opposed to twelve months – results in **different participation rates**, although not in a structurally different pattern; the numbers merely shift downwards. Nevertheless, the rate for the four-week reference period is very high compared with the twelve-month reference period, even when an adjustment is made for longer lasting courses (→ Figure 254). The three striking dips in the curve are not easy to explain. Probably, as the FSO suspects (FSO, 2010f), they relate to the fact that in those years CET activity was recorded more precisely by means of the themed module, which evidently resulted in lower rates. If the different slants in the interviews have such a big impact on the responses, however, the validity of an isolated general question about CET activity needs to be seriously questioned.

CET participation by international standards

The economic importance of CET is reflected in high rates of CET participation – even by international standards – among the economically active Swiss population. Most of the highly productive countries whose economic structures have evolved towards a service economy demonstrate high rates of CET participation. This is particularly the case for Switzerland, with its highly advanced technology and economy (→ Figure 255).

Swiss CET participation rates are above average for all education categories. Nevertheless, the 4.5:1 ratio of tertiary A graduates to those with no more than compulsory schooling is relatively high by international comparison (→ *Equity*, page 270).

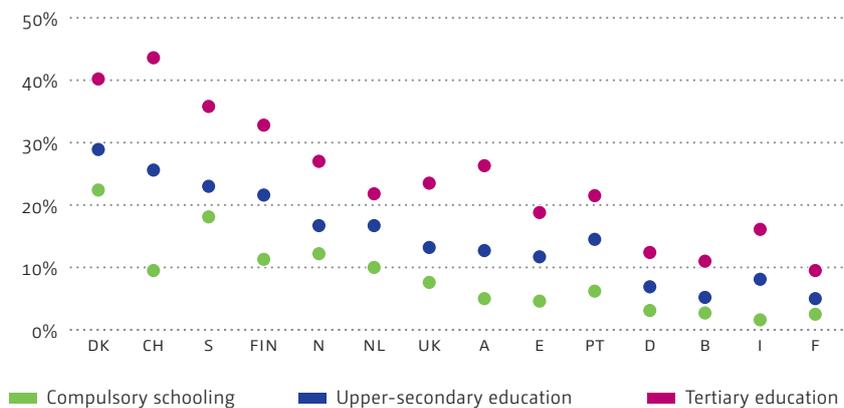
255 International comparison of participation in life-long learning after highest education qualification, 2012

Participation of adult population (aged 25–64) in general and vocational education

Reference period: last 4 weeks

Data: Eurostat (Labour Force Survey 2012)

- DK = Denmark
- CH = Switzerland
- S = Sweden
- FIN = Finland
- N = Norway
- NL = Netherlands
- UK = United Kingdom
- A = Austria
- E = Spain
- PT = Portugal
- D = Germany
- B = Belgium
- I = Italy
- F = France



Institutions

256 Providers of vocational and professional CET

Data: FSO (MET 2011)



The great majority of CET institutions are privately operated and accordingly financed out of demand for their services. The coexistence of public and private, profit-making and non-profit-making institutions is a hallmark of the Swiss CET system (*Schläfli & Sgier, 2007; Weber & Tremel, 2009*).

Employers and companies play a major role in provision: they organise nearly half of job-related CET (→ Figure 256) themselves. Whereas private providers only account for 17% of job-related learning, their share of non-vocational programmes is almost 40%. The growing importance of CET in recent decades in preparing participants for qualifications and upgrading their job-related skills has induced a shift in the relative weight of institutions: smaller private organisations have increasingly been forced out of the market by big private or public providers (*Schläfli & Sgier, 2007*).

Scale and intensity: the duration of CET activities

There is little spread in the number of CET activities attended. The median 50% of the population take part in 1–3 activities a year. Among tertiary A graduates the figure is 1–4. Only 5% of those with a tertiary education attend more than 7 CET activities per annum, and these are almost exclusively of short duration (→ Figure 257).

CET median: 2 weeks at 7 hours a week

For the median 50% of the population, a CET programme lasts 1–8 weeks (median value = 2) and takes up 3–15 hours a week (median value = 7 hours). Full-time programmes are rare in non-formal CET. Only 5% of the population engage in a CET activity lasting a full year.

If all the factors that might influence CET participation are run through a regression analysis, factors such as gender, nationality, region of residence and employer support are seen to exert a significant influence on the odds of participating in CET programmes and correlate with intensity (measured in terms of the number or duration of programmes).

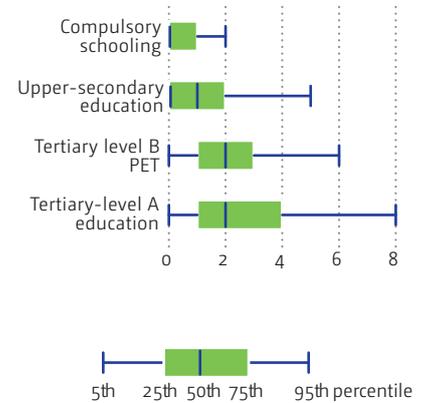
Tertiary CET programmes

Non-formal tertiary learning – which includes, for example, courses to prepare participants for advanced vocational or professional examinations and CET activities provided by universities or universities of applied sciences (e.g. CAS, DAS, MAS programmes) – lasts longer on average. In the median range, these courses take up 100 hours a year. That corresponds to about one day a week over the course of a semester.

Usually a tertiary A degree is required in order to take part in a CET programme at a conventional university, or indeed at a university of applied sciences or teacher education. These institutions often make exceptions, however. The universities of applied sciences and teacher education in particular also accept qualifications from establishments providing basic vocational education and training (VET) (in the case of the UAS) or from upper-secondary schools which engage in teacher training (in the case of the UTE), and also from colleges of professional education and training (PET). These preparatory courses for PET or advanced PET exams are predominantly attended by people who have completed basic VET or PET programmes, and frequently also by people who already hold a Federal PET or Advanced PET Diploma. Barely a fifth hold a tertiary A degree (→ Figure 258).

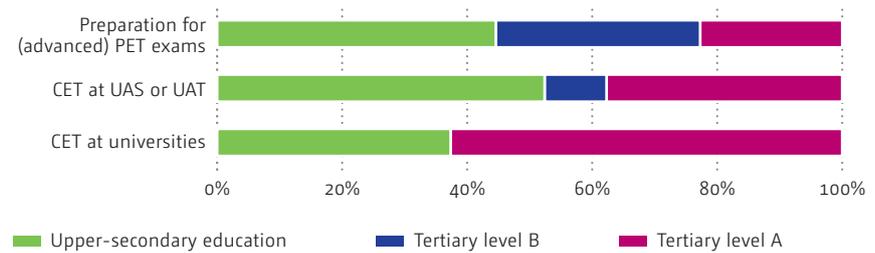
257 Number of non-formal learning activities, by education status, residents of Switzerland aged 25 to 64, 2011

Data: FSO (MET 2011); computations: SCCRE



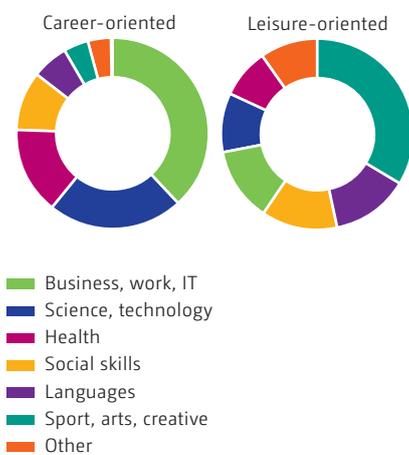
258 CET at tertiary A and B institutes, by highest education qualification, 2011

Data: FSO (MET 2011); computations: SCCRE



259 CET themes, 2011

Data: FSO (MET 2011)



Subject-matter

In non-formal learning that is vocationally or professionally motivated, over half the CET activity is devoted to topics of specific relevance to the business or job concerned, such as IT, finance or science & technology. Health and social skills programmes plus management courses account for a further quarter (→ Figure 259).

In non-vocational, non-formal learning, classical leisure options devoted to sports or artistic pursuits account for about a third. Languages, social skills and courses related to business, employment and IT make up another third (→ Figure 259).

All in all, however, career-related CET predominates. According to the 2011 Microcensus, career-related CET accounts for two-thirds of non-formal learning, and leisure-related CET for one third.

Effectiveness

Switzerland has no programme targets for continuing education and training in the way the EU does through its Lisbon strategy. CET is not a priority objective for Swiss education policy and only receives limited public funding. Besides, given that the participation rates are already high, there is little to be gained from boosting general demand for CET. It might, on the other hand, be worth addressing the issue of social disparity and considering specific measures to support appropriate target groups, based on the empirical evidence available.

The bill that has been drafted for new Swiss legislation on continuing education and training does not envisage revisiting the predominantly private structure of the CET landscape. The primary objectives are to improve framework conditions, to recognise knowledge and skills already acquired, to design specific support for certain target groups such as the low skilled, and to clarify a number of concepts.

The benefits

Theoretically, continuing education and training generates personal benefits from which both the individual and the employer gain in monetary and non-monetary ways. These include increased productivity, higher pay, more competitive performance, enhanced labour market opportunities, greater job security, but also increased knowledge, personal development and emancipation. At the same time, society derives benefit from continuing education and training, and this may be expressed in growth and innovation, increased tax revenues, lower unemployment, enhanced macroeconomic competitiveness, but also greater political participation, prevention of social risks and other factors (Balzer 2001; Beicht, Krekel, & Walden, 2006). An empirical utility analysis, along with an allocation of specific benefits to specific stakeholders, is above all valuable in relation to public funding and support for continuing education and training (supply- or demand-driven funding, vouchers, tax breaks, etc.) (cf. Wolter, Denzler, Evéquoz et al., 2003).

The empirical evidence for the impact of CET activities on (for example) pay is not robust, and if any impact at all can be demonstrated, it tends to be minor (Becker & Hecken, 2005; Jürges & Schneider, 2006; Pischke, 2001; Wolter & Schiener, 2009). The methodical challenge for analyses of this kind is posed in particular by the risk of endogeneity. This means that observed correlations may not be causally induced by CET activities, as they could be accounted for by other factors (such as motivation or cognitive abilities) and because participation in CET is subject to selection biases of several kinds: individuals who take part in CET differ from individuals who do not take part in ways which, whether or not they are observed, also influence productivity and pay. This occurs because participation in CET activities depends on self-selecting decisions taken by the individual concerned or on selection by a line manager, and this selection is founded on the potential individual benefits. If, for example, participants in employer-funded CET programmes subsequently receive pay increases, this will relate to the fact that the employer selected the more productive workers for the CET programme or at least funded their participation (Pfeifer, 2008). It also means that these wage impacts cannot be transferred to the non-participant sample by assuming that they would have enjoyed wage increases of a similar magnitude if they had only participated in the CET programme (Vignoles, Galindo-Rueda & Feinstein, 2004). That this analysis applies in the case of Switzerland is demonstrated by the only study to be carried out in the country in which allocation to CET programmes was experimental, and thus random and which, at least in the short term, identified no wage impacts or other positive employment gains as a result of participation (Schwerdt, Messer, Wössmann et al., 2012). Only the probability of engaging in future CET programmes can be shown to correlate with past participation in CET programmes.

The only indications of CET utility on which we can currently draw for Switzerland are descriptive accounts by participants of the benefits derived from their CET activities (→ Table 260). Almost two thirds report that they were subsequently able to make frequent use of the skills and knowledge they acquired. As we might expect, this practical benefit is especially evident where the CET programme was supported by the employer.

When participants were asked directly what particular aspects were served by their CET programme, it turns out that even in the case of career-related learning the benefits were associated not so much with concrete

260 Benefits of employer-supported CET, 2011

Data: FSO (MET 2011); computations: SCCRE

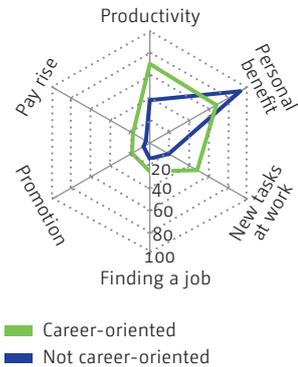
| Applied in job | Employer-supported | |
|----------------|--------------------|------|
| | No | Yes |
| No | 35% | 29% |
| Yes | 65% | 71% |
| Total | 100% | 100% |

Chi² = 7.65, p < 0.01

261 Benefits of CET, 2011

Resident population aged 25 to 64

Data: FSO (MET 2011); computations: SCCRE



objectives such as promotion or better pay, but rather with general aspects such as personal benefit or improved performance at work (→ Figure 261).

Efficiency/costs

The costs of continuing education and training take the form of direct costs (fees, equipment, documents, expenses and similar) and indirect costs, above all opportunity costs (time in the form of lost income). Other reported costs that potential participants weigh up against anticipated benefits are lost leisure and additional mental strain (greater pressure at work or at home, stress, cognitive effort).

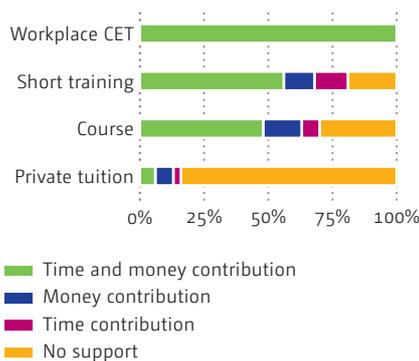
From a rational perspective, nobody will engage in continuing education and training unless they expect to derive net benefit from it. This positive net benefit is not a sufficient criterion, however, for rating a CET measure as efficient, because the benefit could quite possibly be greater if the outputs could be magnified or the costs reduced.

CET behaviour may be rational in terms of individual benefit and yet not desirable for society as a whole. That would be the case if the benefit consisted wholly of externalities but the learning had to be predominantly privately financed. By externalities we mean benefits (including cost avoidance) which are derived not by the person engaged or not engaged in the learning but by others. In the case of CET, these externalities are most likely to be encountered among persons with a very low formal education status. Their skill deficits may result in high social costs (unemployment, welfare, health provision etc.) which could possibly be avoided if the deficits were offset by CET programmes. As the potential benefit of the CET activity (in the form of cost avoidance) is derived by society, the requirement to fund the activity privately may result in a failure of demand (Wolter, 2009).

262 Employer support for non-formal, career-oriented learning, by education status, 2011

A randomly selected career-oriented learning activity in the last 12 months, employed persons aged 25 to 64

Data: FSO (MET 2011)



Employer contributions to costs

Employers assume a large share of CET costs, whether in the form of financial support for direct costs or in the form of permission to make use of paid working hours. Employer support for continuing education and training is widespread. About three-quarters of participants state that they have been partly supported by their employer. This is important, because, drawing on German data, Tuor and Backes-Gellner (2009) were able to show that the option of attending a CET programme during working hours is often decisive in choosing whether to participate. Among those in work who take part in at least one career-related, non-formal learning activity (random Microcensus sample), three-quarters are supported by their employer in one way or another, at least half of them in the form of financial support and because they are able to make use of hours for which they are paid (→ Figure 262).

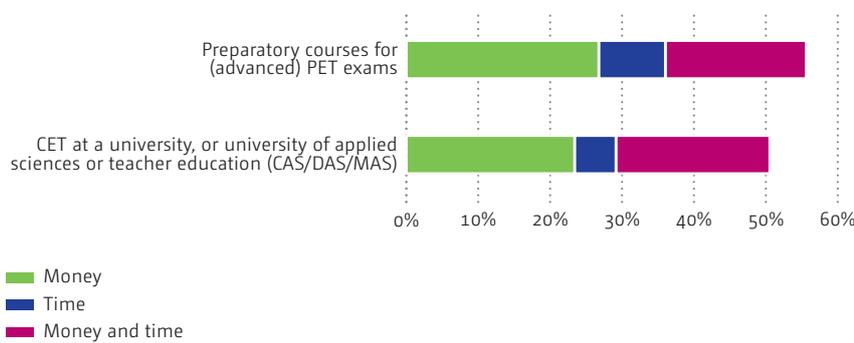
While there are indications that employer-funded learning is more effective, we do not know whether it is also more efficient, i.e. whether the relative cost of the benefit is also greater when measured against the time and money invested.

In non-formal tertiary learning (e.g. MAS programmes or preparatory courses for advanced PET exams), where CET activities last a number of weeks and are correspondingly more expensive, the costs are very often divided between employer and employee. This means either that the employer helps to pay the costs, or that the employee is able to pursue at least part of the course on paid time. Often the two forms of employer support are combined. On preparatory courses for advanced PET examinations, employers contribute in more than half of cases (→ Figure 263), whether by paying a part of the costs or by making paid time available.

263 Employer support for non-formal tertiary learning, by provider, 2011

Support in the form of shared cost and/or time

Data: FSO (MET 2011); computations: SCCRE



CET spending

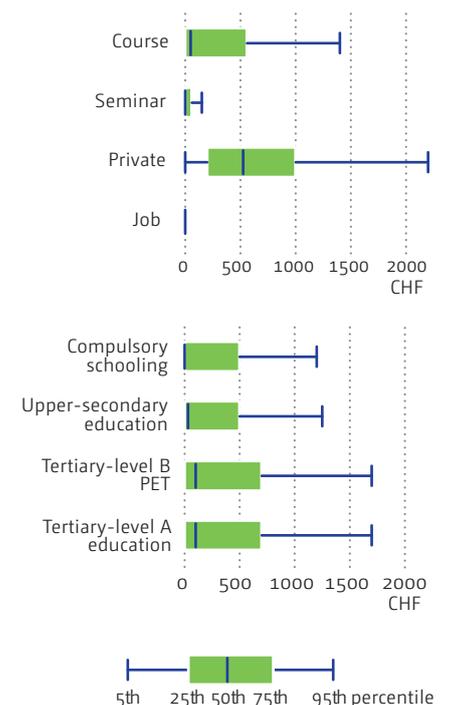
Direct spending on continuing education and training in Switzerland was estimated for the first and last time in 2007. The estimates amounted to a total of 5.3 billion Swiss francs (Messer & Wolter, 2009), or approximately 1% of GDP.

As discussed above, spending on CET is only partially assumed by the participants themselves. About half of participants indicate that their employer bears the costs or at least contributes. The average amount paid by participants for non-formal learning activities is 450 Swiss francs, but it should be noted that about half the participants pay nothing at all for their CET programme (median value = 0). The third quartile includes costs of up to 400 Swiss francs. In other words, 75% of CET participants pay no more than 400 Swiss francs for a learning activity. The median value for CET costs borne by the participants themselves is 50 Swiss francs; only the top quartile of participants pay well over 500 Swiss francs. Individual CET spending on courses is also not particularly dependent on education status; for those participants with tertiary education the upward variation is somewhat greater (→ Figure 264).

264 Costs borne by CET participants, by education status, 2011

Costs assumed personally by participants for one CET activity in the last year

Data: FSO (MET 2011)



Equity

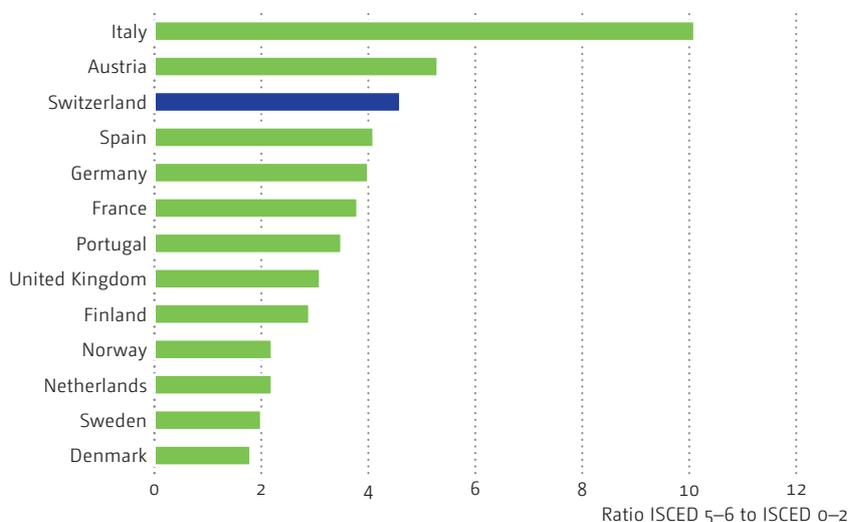
Theoretically, the expected benefit of a CET activity will depend on the human capital acquired prior to the activity (Cunha, Heckman & Lochner, 2006; Wössmann, 2008). Moreover, we can assume that the costs of CET will be higher for those with lower skills, above all in terms of cognitive investment. As a result of these two causal mechanisms, the net benefit of CET activity is especially high for those who already have a high degree of formal education, so that CET does not close the learning gap between those with less formal education and those with more, but tends if anything to widen it. This poses an equity problem in continuing education and training. Rather than ironing out social disparities, it tends to generate further social inequalities between individuals with low and high skills.

By international standards, Switzerland displays a relatively wide opportunity spread for CET activities (→ Figure 265): tertiary A graduates are about four times as likely to benefit from continuing education and training as those who have only completed compulsory schooling. However, this gap only concerns the category with the lowest education attainments.

* The learning gap is expressed by the ratio of the participation rate for those with the higher education attainment to the rate for those with the lower education attainment.

265 Learning gap (in general and vocational education) between tertiary graduates and persons with no post-compulsory education, 2012

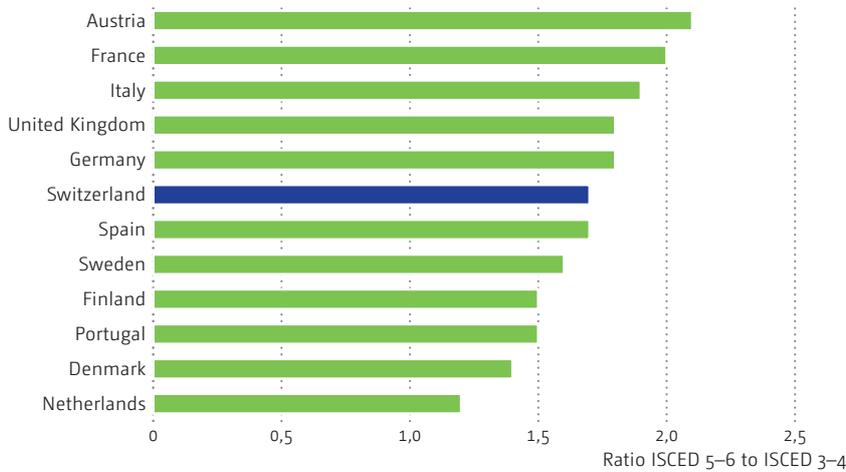
Data: Eurostat (Labour Force Survey 2012)



When we consider the ratio of higher education graduates (ISCED 5 and 6) to those who have completed an upper-secondary education (general or vocational) the pattern changes: the ratio between these two education categories is only 1.7:1. This value places Switzerland in the European mid-field (→ Figure 266).

266 Learning gap (in general and vocational education) between tertiary graduates and persons with upper-secondary certificates, 2012

Data: Eurostat (Labour Force Survey 2012)



Major spending inequalities can be observed depending on education and income status: compared with their percentage of the overall population, higher education graduates spend above-average amounts on non-formal learning, whereas the expenditure by persons with no post-compulsory education is disproportionately low.

The central problem posed by the lower participation rate of the less educated population lies less with the cost factor, however, than with the lack of incentives to engage in continuing education and training and in the selection processes applied by employers. Once this hurdle has been surmounted, employer contributions do not depend greatly on education category (→ Figure 267).

Employer selection results in support being granted to those persons who would be prepared to pay for their own CET programmes if the employer did not contribute (Tuor & Backes-Gellner, 2009). This means that selective support from employers does not substantially increase the attainment-dependent gap in participation rates, because better-qualified individuals would seek continuing education and training in any case. Employer support can do little to enhance the CET participation rate (it rather results in deadweight effects by the employees). At the same time, the gaps are not closing either, because without employer support low educated employees do not engage much in CET activities under their own initiative.

As long as these inequalities persist, state subsidies for continuing education and training should make a priority of improving equity in CET access by offering selective support to people with little formal education. The tax break discussed by the Federal councils cannot be expected to achieve this selective impact.

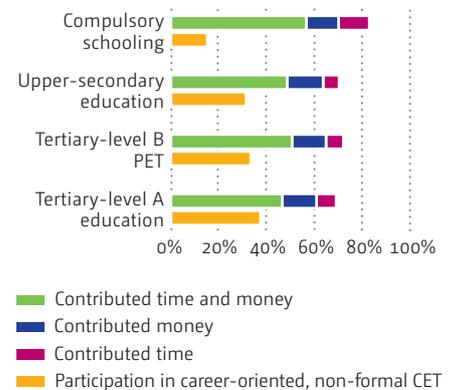
The gender gap in CET support

In general, women display higher participation rates than men. However, working women are more likely to fund their own CET activity, as they receive less support from their employers. Even if the comparison is limited to

267 Employer support for non-formal, career-oriented learning, by highest education attainment, 2011

A randomly selected career-oriented learning activity in the last 12 months, employed persons aged 25 to 64

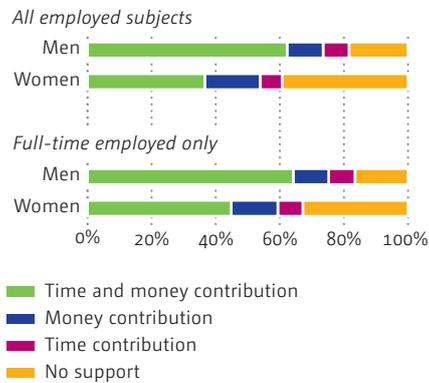
Data: FSO (MET 2011); computations: SCCRE



268 Employer support for non-formal, career-oriented learning, by highest education attainment, 2011

A randomly selected career-oriented learning activity in the last 12 months, employed persons aged 25 to 64, courses only

Data: FSO (MET 2011); computations: SCCRE



individuals in full-time employment, this is a significant gap (see also *Messer & Wolter, 2009*; → Figure 268).

If we consider the latest data from the 2011 Microcensus (random selection of a CET activity), it is evident that the proportion of women who receive no employer support for their programme is about twice as high as for men. This ratio does not change much if only full-time employees are compared. The difference is above all due to the fact that the proportion of participants receiving support in the form of paid hours and shared costs is about 40% higher for men than for women (or 30% when the comparison is confined to full-time workers).

If women only engaged in continuing education and training when their courses were funded by their employers or when they were able to pursue the programme in working hours, their participation rate would be much lower. Women compensate for this unequal treatment by employers by footing the bill for this CET activity themselves.

In the tertiary B sector (advanced vocational and professional exams, CET provided by universities), the gender gap is a little less pronounced with regard to employer support, especially when the comparison is confined to full-time workers.



Cumulative effects

Introduction

The concept of «cumulative» in the title of this chapter is to be understood in several different ways. First of all, the investment made in education and the acquisition of education is viewed in cumulative terms. In this case, «cumulative» is used in the sense of time (i.e. over the full length of an education path) as well as in the sense of not just referring to the acquisition of education during formal (school) education but also to the acquisition of education outside school. In addition to the observations made in the 2010 Education Report, this present report places particular focus on so-called «non-cognitive» abilities and skills (→ *Note in the margin*), whose importance for educational success and success in life is increasingly being stressed by empirical research. Apart from observing the cumulative acquisition of skills, this chapter also looks into the cumulative benefits of education. At the level of the individual, these include both monetary and non-monetary benefits (happiness, satisfaction and health) and, at the level of society, both fiscal benefits and non-monetary effects, such as a functioning democracy. The thought model for this chapter is summarised in the schematic diagram in Figure 269.

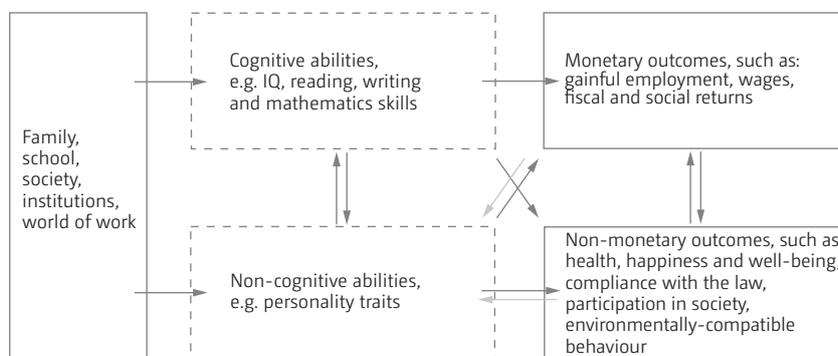
No universally valid definition exists for so-called **non-cognitive abilities**. Neither in theory nor in empirical analysis are there any standardised concepts that can be applied to achieve a precise distinction between cognitive and non-cognitive abilities. The term non-cognitive abilities is generally used to denote things like personality or character traits (such as emotions, self-control or social skills – → *also the text insert*), while the term cognitive abilities is used to denote intelligence and, in particular, educationally defined and imparted skills, such as reading or arithmetical skills. All these distinctions are always arbitrary to a certain extent, since there are only a few abilities that one can envisage as not being determined and governed, at least partially, by cognitive processes as well. It is also impossible to divide cognitive and non-cognitive abilities into skills acquired at school and those not acquired at school, since many of the skills targets pursued at school explicitly include personality traits that are denoted non-cognitive aspects in the research literature. The question as to whether non-cognitive abilities are stable and hence unalterable personality traits or whether they can be changed in the same way as cognitive skills is the subject of ongoing scientific debate (see *Borghans, Duckwort, Heckman et al., 2008*). Also a subject of current research is the issue of interdependencies and interaction between cognitive and non-cognitive abilities.

Cognitive and non-cognitive abilities

The acquisition of both cognitive and non-cognitive abilities and traits is promoted by a number of different factors. These include a person's family, their broader social environment and – what is most important for this report – their school. Cognitive and non-cognitive abilities correlate to a pronounced extent, and it is not always clear just how far this correlation is due to the influence of a single determining factor or to the simultaneous influence of several such factors (a good family setting, for example, can promote both motivation as a non-cognitive trait and reading ability as a cognitive trait). The extent to which cognitive and non-cognitive abilities ultimately influence each other on a causal basis is also not clear.

269 Thought model for cumulative effects

Data: SCCRE



Measuring personality traits

In psychology, there are many different ways of capturing and describing personality traits. This can be illustrated (in chronological order) by Allport's theory of personality with more than 4000 traits (*Allport & Odbert, 1936*), Cattell's factor theory with 16 personality factors (*Cattell, 1965*) and Eysenck's three-type model (*Eysenck, 1992*). The «big five» model is the one that has become most widely established in both empirical and non-psychological research. This describes an individual's personality on the basis of five main dimensions. The development of this theory started more than 50 years ago, important contributions being made by *Goldberg (1981)* and *McCrae & Costa (1987)*.

Although researchers have not always been in agreement on the precise designation of these five factors, the following division has now been adopted: extraversion, agreeableness, conscientiousness, openness to experience and neuroticism. These «big five» are very broadly defined categories of personality traits, and each one takes in a series of specific subgroups. Hence the factor of extraversion includes several traits, such as talkativeness, drive, openness and sociability.

A number of different forms of instrumentalisation exist when it comes to measuring the big five empirically, and these measurements are increasingly being included in large-scale population surveys conducted on a regular basis, such as those of the Swiss Household Panel (SHP), the Socio-Economic Panel (SOEP) in Germany, the Household, Income and Labour Dynamics Survey in Australia (HILDA Survey) and the British Household Panel Survey (BHPS) in Great Britain. This has strongly promoted the use of these concepts in empirical research into education.

Since 2011, the OECD has been running a large-scale project entitled «**Education and Social Progress**», which addresses the question as to how non-cognitive and cognitive skills impact on social and economic outcomes and which role the family, school and society play in these processes. Empirical analyses are also being conducted on this with Swiss data from the longitudinal assessment panel for schoolchildren from the PISA 2000 cohort in the context of the TREE study. Isolated provisional results of these analyses have been channelled into this chapter.

Whereas both cognitive and non-cognitive traits have been empirically proven to influence monetary and non-monetary outcomes on a positive basis, it is not always clear, precisely in the case of non-cognitive traits, just how far the reverse applies, i.e. how far outcomes change the non-cognitive traits that are measured at a later date. This potential inverse causality makes it more difficult to interpret the correlations established in cross-sectional studies and could mean that longitudinal, panel or cohort studies would be more appropriate.

The acquisition of non-cognitive abilities and correlation with cognitive abilities

Contrary to the case for the production and acquisition of cognitive abilities (see, for example, *Todd & Wolpin, 2003*), the measurement and research of both the determining factors and the impact of non-cognitive abilities is still in its infancy. While the Education Report concentrates primarily on the influence of educational institutions on cognitive abilities in the individual chapters, when it comes to the development of non-cognitive abilities, it is not yet at all clear just how important the formal education setting is. Neither is it known whether perhaps the family (genetically and as a point of socialisation), the social environment (i.e. friends) or leisure activities play more of a key role as determining factors for non-cognitive abilities.¹ If it is

¹ *Felfe, Lechner und Steinmayr (2011)* showed, using data from Germany, that membership of a sports club during a child's time at kindergarten and primary school not only improved cognitive abilities (school grades) but also had a positive influence on non-cognitive traits. Emotional and behaviour-related problems such as hyperactivity, anti-social behaviour and prob-

assumed that non-cognitive abilities are not simply innate and that non-cognitive ability scores can be influenced, then the question arises as to whether they are formed early in life or can still undergo change at the adult stage (Heckman & Carneiro, 2003; Cunha, Heckman & Schennach, 2010). While a number of studies assume that non-cognitive abilities are formed by the time children have reached their teens (Cunha, Heckman & Lochner, 2006; Heckman & Masterov, 2007; Almond & Currie, 2011), other studies even postulate that non-cognitive abilities can be manipulated right through into old age. Only limited empirical evidence is available for the latter, however. Even if non-cognitive abilities and skills can be improved and extended at any age, there is always the question (in the same way as for cognitive skills) as to when it is best to do this. At which point in time it is possible to invest most efficiently in the development of these abilities? On the basis of the argument of so-called «own productivity», which states that the acquisition of skills in later life is reinforced through abilities that are acquired at an early stage, it is generally assumed that investing at as early a stage as possible will always be more efficient than a later investment.

Given the major importance of very early investments in non-cognitive abilities, the family setting has received considerably more attention in research than the school setting – including as a point of potential state intervention for influencing non-cognitive abilities. This is why support for non-cognitive abilities is discussed much more frequently in the context of family and social-policy measures than in the framework of education-policy interventions. Cognitive and non-cognitive abilities also already mutually influence each other to a considerable extent as they are developing (Deke & Haimson, 2006). Low cognitive abilities can thus intensify less desirable personality traits, while low non-cognitive abilities (such as impatience or a pronounced aversion to risks, see Dohmen, Falk, Huffman et al., 2010) can impair the development of academic performance (see, for example, Duckworth & Seligman, 2006). In the same way as empirical evidence exists of non-cognitive abilities having a direct influence on a child's academic performance, the influence of non-cognitive skills on the duration of a child's educational path has now also been empirically proven (see, for example, Jacob, 2002, or Segal, 2008). For children with the same level of cognitive and academic performance, those who score highly on non-cognitive abilities have a greater probability of aiming for a higher educational qualification and also of actually getting it.

Despite the strong focus on the family, there are certainly also research papers that have investigated and found evidence of the influence that institutional aspects of the education system have on the acquisition of non-cognitive abilities. Studies have been conducted inter alia into the influence of school entry age (the earlier the better – see, for example, Schlotter, 2011) and the early allocation to different school levels (tracking; see Groenez & De Blander, 2010).

lems with friends, were alleviated in this way. These non-cognitive traits, in turn, positively affect the educational path and the outcomes in both the private and the job-market setting.

The benefit of education

Investments made in the acquisition of skills in the form of time and money, whether inside or outside the formal education process and whether paid for privately or publicly, are all made because both the person pursuing the education and society expect to gain a benefit from the skills acquired. This benefit, in turn, can be gained both by the person pursuing the education and by society – in both monetary and non-monetary form.

The problem inherent in the empirical determination of causal effects and relationships

The biggest problem encountered in measuring the benefit obtained from investments in education is that the benefit is not generally just the difference in outcome (whether this be wages, health, happiness or something else) between people with a certain number of years of education (or skills) and people with fewer years of education (or skills). This would generally be a distorted comparison, since the decision to acquire more or less education is a selective process, and individuals do not opt for more or less education by chance. Hence, healthier people can decide to pursue more education, since they are better able to cope with the requirements of additional years of education. If it is subsequently established that those who have a longer educational path are healthier, then this is possibly not the consequence but rather the cause of more education. Attempts are made to counter this cause-and-effect problem with statistical techniques on the one hand (for an overview of the literature see *Meghir & Rivkin, 2011*) or on the basis of so-called «natural experiments» on the other hand, such as an increase in the number of years of compulsory schooling. For certain types of intervention in the education system, it is also possible to conduct randomised field experiments (for a more recent overview see, for example, *Bouguen & Grugand, 2012*), where the intervention is only conducted for a randomly selected group of persons while the remainder serve as a control group. Finally, reference must be made to the challenge posed by certain educational effects only emerging over the long term, in dynamic form. This calls for either cohort studies or good sets of administrative data which make it possible to track the education and job market profiles of representative groups of the population.

The monetary benefit of education

When it comes to the monetary benefit of education, this relates, at the level of the individual, to how the acquired skills will impact on well-being in the form of a greater likelihood of being employed and, in addition, of obtaining a job with good remuneration. At the level of society, it relates primarily to the influence of the collective acquisition of skills on competitiveness and hence on the growth of a country's economy (see *SCCRE, 2010, pp. 287–288*). There is also the impact in terms of higher tax revenues, which then provide the basis for public investment in education.

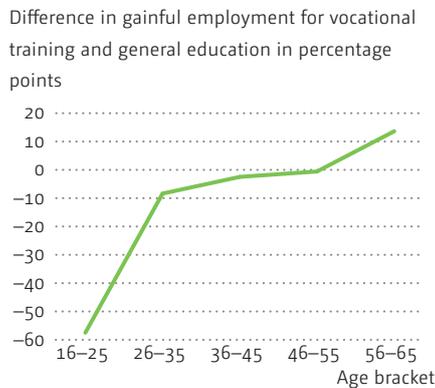
Employment

The influence of education on the likelihood of a person actively participating in the labour market acts via three channels, and these are not mutually exclusive. Firstly, depending on how well-developed the social security

270 Employment over a life cycle for vocational training and general education

Results for Switzerland; negative values show an advantage in the employment rate for vocational training and positive values an advantage for general education.

Source: Hanushek, Wössmann & Zhang, 2011



People with vocational qualifications benefit from an advantage in terms of their employment rate up to the age of 40 and, after that, are at a disadvantage. The lower level of employment amongst persons with VET and PET, especially after age 55, may, however, also be a «desired» result. This is the case in the construction industry, where the trade unions have successfully fought for the right to retire early.

To make allowance for the selection of differently talented people entering vocational training or pursuing a general education, the calculations compare individuals who scored the same results for their skills in the 1995 IALS test in each case. The authors also calculate the lifetime income for the variants of vocational training and general education and come to the conclusion, for Switzerland, that the higher level of employment in younger years leads, on balance, to a slight advantage in terms of lifetime income for those who have chosen a vocational path.

system is and on a person's particular family status, some people may voluntarily forgo taking up employment if their low level of education means they would only receive a very low wage or would only find a particularly strenuous job. Coupled with this is an individual's likelihood of giving up employment earlier (→ Figure 270) if they have to do an arduous job or even a job that impairs their health.² Secondly, a person's level of education and training influences their probability to find a job at all. While this likelihood is conditioned to a key extent by the economic climate, this is by no means the only factor involved. This is borne out by the fact (→ *Chapter on General context, page 21*) that, while there is a cyclic pattern to unemployment for all the different levels of education, unemployment is still considerably higher for those with a lower level of education even when the economy is booming. Thirdly, skills lose their value over time, and hence the risk of being unemployed can depend on how rapidly the originally acquired skills lose their value (Allen & de Grip, 2012). The rate at which skills devalue depends on the nature of the skills originally acquired (whether they are tied to a particular profession), the rate of technological change in the profession in question and, of course, the extent to which individuals offset the loss by engaging in continuing education. Attention should be drawn to more recent research work here, which shows that a readiness to protect oneself against the devaluation of already acquired skills is, in itself, governed by both cognitive and, above all, non-cognitive abilities (see Fouarge, Schils & de Grip, 2013).

When measuring the influence of education on employment, it is not easy to determine which specific skills improve or reduce the chances of finding work, since the statistics frequently only specify a person's level of formal education. More specific measurements of skills, however, show that both cognitive and non-cognitive abilities (see, for example, Fletcher, 2012; Wichert & Pohlmeier, 2010) increase the chance of being in paid employment, or reduce the risk of being unemployed, as does the form of training and education pursued, i.e. vocational training or a general education (→ Figure 270 with the corresponding text).

The latest findings based on the Zurich longitudinal assessment (see Häfeli, Schellenberg, Hättich et al., 2013), which tracked a cohort of persons as of age 15 (in 1978), were that the probability of still being able to boost one's professional status between the ages of 36 and 49 can be explained on the basis of both a person's verbal intelligence at age 15 and their conscientiousness measured at a young age (one of the five dimensions of the «big five»).

One innovation that has been introduced into research over the past decade when estimating the influence of education on earning opportunities is that greater attention has been paid to distinguishing between routine work and non-routine work in jobs. In the past, the focus was solely on distinguishing between manual and cognitive work. In the case of manual work, a steady reduction in the number of jobs was observed due to the possibility of replacing workers by machines or outsourcing work to developing countries. This led to a call for more to be invested in the development of cognitive abilities in education, since there would soon be no more jobs left for those with manual skills. It has now emerged that it is not the distinction between manual and cognitive work that is decisive here. What is important is the fact

² The counterpart to this is that a higher level of education delays entry into working life on account of the longer time spent in education and training.

that routine and non-routine work can be found in both manual and cognitive jobs, and that only the non-routine work (in either a manual or cognitive job) provides a certain protection against rationalisation through technology or outsourcing (see, for example, *Autor, Levy & Murnane, 2003; Goos & Manning, 2007; Goos, Manning & Salomons, 2011; Michaels, Natraj & van Reenen, 2010*). While manual and cognitive skills were generally equated with a small amount of formal education and a great deal of formal education respectively, this new distinction similarly implies a risk for persons who have pursued a high-level, lengthy formal education, since it also highlights dangers in professions requiring prolonged education and training. For particularly well-educated persons, this risk is less one of unemployment, since they can always take on work that requires lower qualifications, and more a risk of a big wage differential for well-educated persons in employment (→ Figure 272).

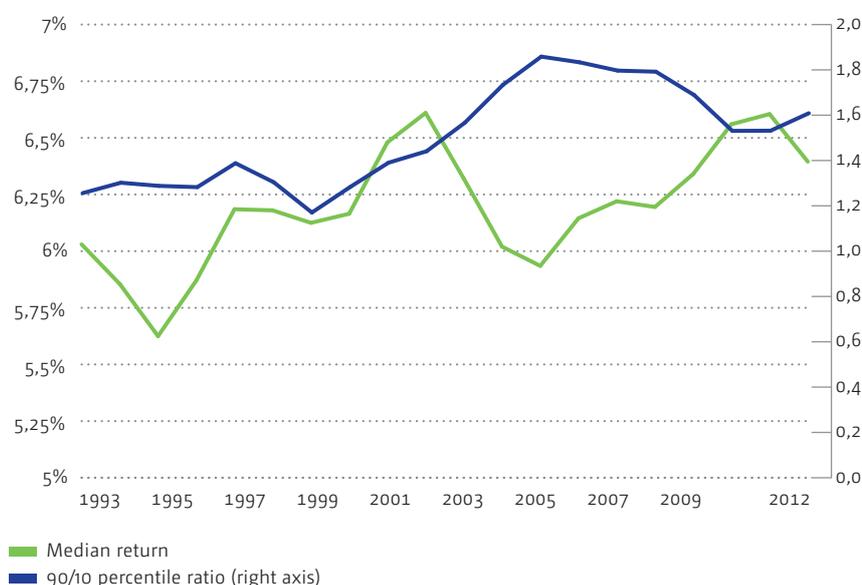
Wages

Differences in education not only affect the likelihood of working at all, but also the wage that can be obtained by working. Education-dependent wage differentials are due in part to the difference in productivity between people with a dissimilar education and hence different levels of competence and, in part, to the fact that more productive jobs (such as those involving the use of technical equipment) tend to be given to highly qualified individuals. The wage differentials resulting from a different number of years of formal education are denoted private returns to education. It can be assumed that the value, in the form of higher wages, of years spent in formal education is frequently overestimated, since there are other skills that correlate positively with formal education – especially non-cognitive abilities – that either cannot be observed at all or can only be observed with difficulty (see, for example, *Heckman, Stixrud & Urzua, 2006*).

271 Returns on an additional year's education, median and ratio of returns on education, 1991–2012

The figures show a moving average over two years.

Data: FSO (SLFS); computations: SCCRE



Heterogeneity in returns on education

There are also differences between the individual returns to education that follow the pronounced pattern of the economic cycle (→ Figure 271). These differences result from the fact that not all people with the same length of education earn the same amount of money, but the gap between the highest and lowest wages is all the greater the longer a person has been in education. The cyclical pattern additionally stems from the fact that this wage differential between persons with a very high level of education is greater when the economy is booming than during a recession. For those with a lower level of education, however, the wage differential between the lowest and highest earners is less pronounced, irrespective of the economic situation.

In Switzerland, the wage benefit associated with an additional year of education (→ Figure 271) over the past twenty years has been between 5.5% and 6.5%. At 6%, this means that, after qualifying, an individual with five years of study up to Master's degree level can expect a 30% higher wage on average than someone who took up work directly after obtaining their baccalaurate without pursuing any further training. This return to education has been subject to cyclic fluctuations over the past two decades and is showing a slight upwards trend. In other words, the general increase in the level of education of the working population has not led to an excessive supply of education which would have served to erode the individual's return on this investment.

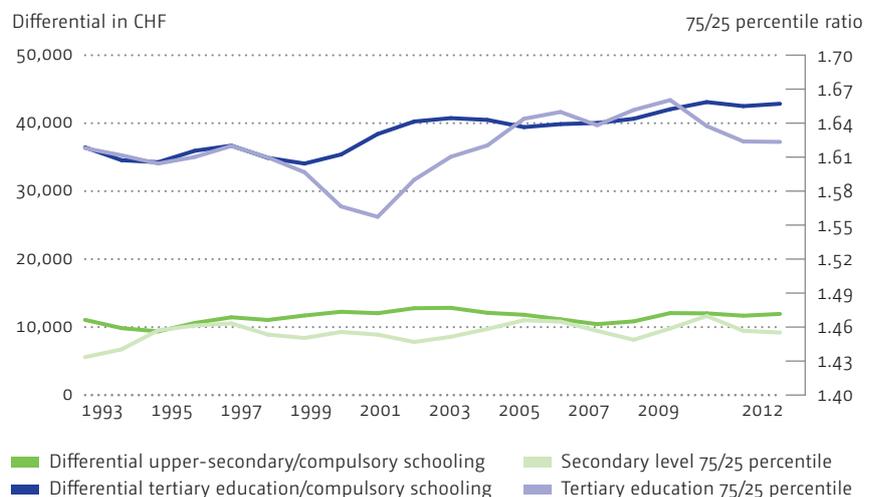
Comparing wage trends for people with a tertiary-level education or an upper-secondary educational qualification with those of workers who have simply completed their compulsory education, it is seen that the favourable economic climate of the past decade has been reflected in a rising wage differential to the advantage of those persons educated to tertiary level, while the wage differential in favour of individuals who have completed upper-secondary education has remained stable at something above CHF 10,000 per year of employment (→ Figure 272). At the same time, the wage disparity between gainfully employed persons with tertiary qualifications has risen steadily each year after a short fall in the wake of the recession at the start of the millennium.

Figure 272 firstly shows the income differential that a person with an upper-secondary or tertiary qualification (university, ETH, UAS, PET) can expect during a year of employment by comparison to a person with a compulsory schooling qualification. Secondly, it shows the change in the wage differential between the 75th percentile and the 25th percentile within the individual education levels, i.e. between a person who is just in the top quarter of the wage distribution and a person who is just still in the bottom quarter of the wage distribution. The higher wage gap for people with a tertiary qualification shows that a tertiary education is not simply coupled to a higher wage but also involves a higher risk of not being able to command the average wage. This means that part of the higher wage can also be regarded as compensation for a greater wage risk (see, for example, *Schweri, Hartog & Wolter, 2011*).

272 Wage differential by educational qualification, 1991-2012

The figures show a moving average over 2 years.

Data: FSO (SLFS); computations: SCCRE



External factors and fiscal returns

In addition to the monetary benefit of education for the person pursuing it, education also has a monetary benefit for society as a whole, which is manifested in the form of higher economic growth and hence higher tax revenues. The fiscal benefit derives from the fact that people with a higher

level of education earn more, while being subject to progressive tax rates.³ A better education normally also produces fiscal benefits due to better educated people receiving fewer social benefits from the state. The fiscal return on investment can thus be viewed as a combination of higher tax revenues, lower government transfers and state expenditure on education. In the same way as for the individual return on education, it is, of course, necessary to make allowance for the causal relationship between education and returns here as well. If people who have remained in education for longer would also have achieved higher incomes without this education, then the fiscal return obtained would be overestimated. There is also another point to be borne in mind from the fiscal angle when assessing the level of this return, which can lead to the potential return being underestimated. If the person wishing to pursue education would have completed this education even if the government had not contributed towards its funding, then the potential fiscal return on education would have been higher, since the same fiscal return could have been obtained with much lower fiscal costs. Pronounced differences in the tax systems and the public funding for education in the different countries mean that the differences in the fiscal returns on education are much greater than the differences in the individual returns on education (see *De la Fuente & Jimeno, 2009*).

The social revenue from education can be more than just the sum of individual benefits, since education can have positive spillover effects. Education can exert a positive influence in cases where it not only impacts positively on the productivity of the person pursuing it, but also boosts the productivity of individuals who have not received the education. These spillover effects can be seen at both company level (see, for example, *De Grip & Sauermann, 2012*) and the level of the economy as a whole (see, for example, *Hanushek & Wössmann, 2012*). This latter effect is reflected in the fact that the growth effects at the level of society as a whole are higher than the individual wage benefits derived from education.

Non-cognitive skills can similarly have positive spillover effects. Certain personality traits, for instance, can positively influence the working climate within a company and thus promote the distribution and transfer of knowledge in that company, which, in turn, will have a positive impact on the innovative capacity and productivity of the company as a whole (see, for example, *Matzler, Renzl, Mooradian et al., 2011*).

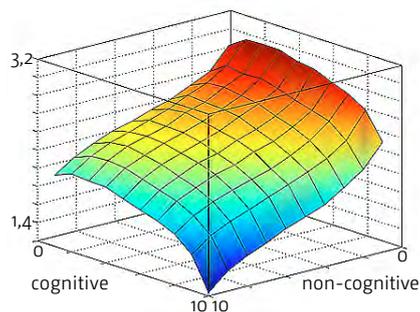
The non-monetary benefit of education

Education and skills also influence many different dimensions and aspects of life outside employment. Better education is expected to have positive effects on health, and thus on life expectancy, on personal satisfaction, on people living together harmoniously, on political participation and also on other outcomes. While these effects are, admittedly, of a non-monetary na-

³ Because of the progressive rate of taxation, a longer period spent in education will even lead to a higher tax burden for the better educated person if the pre-tax income they obtain over their entire working life is the same as for a person with a lower-level or shorter education. This is because the income is spread over fewer years' employment, and hence a higher income is achieved in an individual working year which is then subject to a higher tax rate.

273 Effects of cognitive and non-cognitive abilities on smoking behaviour

Source: OECD, 2014; TREE data 2000
(provisional computations)



Non-cognitive abilities are measured with one indicator for persistence and two indicators for self-assurance. The values for the cognitive abilities correspond to the results in the three PISA tests.

When it comes to the influence of cognitive and non-cognitive skills on smoking behaviour, the two forms of skills have a complementary effect. People with very low cognitive skills and very high non-cognitive skills even display a lower rate of smoking than persons with very high cognitive skills and very low non-cognitive skills. And there are virtually no smokers amongst those who score high values for both cognitive and non-cognitive skills (10, 10).

ture, since they are not measured directly in monetary values, they nonetheless normally generate monetary benefits, or benefits to which a monetary value can be attached at the level of both the individual and society as a whole. The following sections highlight the most important outcomes which education seeks to positively influence.

Health

One of the most important non-monetary benefits that is hoped for from education is health.⁴ This influence can be direct, or indirect, and is exerted via various different channels.⁵ First of all, more education directly promotes specific ways of thinking (such as an awareness of the consequences of behaviour that is detrimental to health) as well as influencing decisions and behaviour that will have a positive impact on health (not smoking or not taking drugs). Secondly, better educated individuals behave more efficiently in maintaining and enhancing health, i.e. they frequently have better knowledge of which preventive measures they can adopt, and when, in the interest of their health. Thirdly, education increases the opportunity costs of illness. This, in turn, discourages people from engaging in behaviour that is detrimental to their health and provides them with an incentive to engage in health-promoting behaviour (such as fitness training). Fourthly, education has an indirect effect on health via income. A higher level of education leads to a higher income, and, with a higher income, it is possible to purchase better health services (see *Cutler, Lleras-Muney & Vogl, 2011*). Education additionally reduces the likelihood of having to take up a job that will be detrimental to health. And, finally, mention should be made of the fact that health-promoting activities are already pursued during the time spent in education. Hence, sports education at school can reduce the risk of schoolchildren being overweight (see, for example, *Cawley, Frisvold & Meyerhoefer, 2012*).

More recent studies (including *Schneeweis, Skirbekk & Winter-Ebmer, 2012*) provide evidence of education having a long-lasting effect on health. In other words, the education acquired during childhood and adolescence is still having a positive impact on health at a very old age. When it comes to the effect of education on health, a large number of studies reveal an important complementarity of cognitive and non-cognitive abilities (→ Figure 273). In other words, while both types of skill boost health on their own, the effect is even greater when they are combined. Individuals with a good level of self-control and self-discipline eat more healthily, are more likely to engage in sport, smoke less and avoid excessive drinking (*Cobb-Clark,*

⁴ For an overview of the literature on the effects of education with a non-monetary benefit, see *Lochner (2011)*.

⁵ The causal relationship between education and the outcome (health) is not always automatic for this topic either, since the reverse effect also holds true, namely that healthier people remain in education for longer, which would be equivalent to an inverse cause and effect relationship (see, for example, *Bharadwaj, Vellesten Løken & Neilson, 2012; Cornaglia, Crivellaro & McNally, 2012; Fletcher & Wolfe, 2008*). To make sure that a causal effect of education on health is indeed involved here, various more recent studies have thus taken the changes in the duration of compulsory schooling in European countries since midway through the 20th century as a means of identifying the cause and effect relationship between education and health (see, for example, *Banks & Mazzonna, 2012; Brunello, Fabbri & Fort, 2013; Jürges, Kruk & Reinhold, 2013*).

Kassenboehmer & Schurer, 2012) – and if they complete an even higher level of formal education, then the values will be higher still.

In considering the effect of education on health, it is important to highlight the additional impact on children's health of having parents with a high level of education (see *Currie & Moretti, 2003; Lindeboom, Lena-Nozal & van der Klaauw, 2009*). These effects similarly act via different channels, starting with a lower level of risk behaviour on the part of mothers during pregnancy (*Almond, Mazumder & Ewijk, 2011*), and proceeding via better access to information on the recognition or prevention of illness in their children right through to the indirect effect of education on income and hence on the ability to purchase more and better health services (*Chou, Liu, Grossman et al., 2010*).

Self-contentment and happiness

As with the effects on health, there are potentially a number of direct and indirect mechanisms through which education can influence self-contentment. The effects of educational attainment on self-contentment have been less clearly proven in empirical terms than the impact of educational attainment on health. This is not least because education can affect the subjective feeling of happiness in both a positive and negative way.

First of all, the knowledge acquired through education can be viewed as a benefit in itself, thus enhancing self-contentment. Secondly, education can improve our ability to reflect on our own situation and that of other people, thus increasing the likelihood that we will be able to cope more effectively with life in general or with twists and turns of fate, which in turn can boost self-contentment again. On the other hand, a higher level of education can also cause people to place higher expectations on themselves, on others, or on life in general, which are then more difficult to fulfil. This increases the likelihood of people being less satisfied with life.

As with health, it is important to always consider the possibility of an inverse cause-and-effect relationship here too. Less satisfied individuals could have a lower stress tolerance, for example, or engage in behaviour detrimental to their health (e.g. high levels of drug and alcohol consumption), which, in turn, reduces the prospects of a successful educational path. If it were then ascertained across-the-board that people who had spent less time in education were less self-content, then, in the present case, this lower self-contentment would not be the consequence but the cause of the shorter educational path.

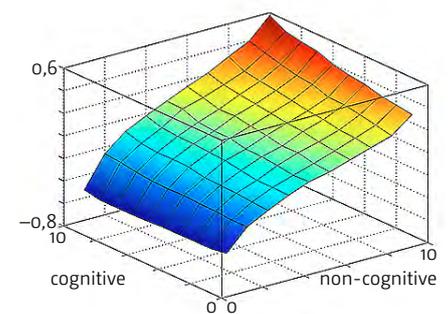
Even if the cause and effect problem is difficult to resolve, empirical studies reveal more of a correlation between non-cognitive abilities or personality traits and subjective self-contentment (*Boyce, Wood & Powdthavee, 2012; Ferrer-i-Carbonell & Frijters, 2004; Wood, Joseph & Maltby, 2009*) than between the formal level of education or cognitive abilities and self-contentment. The results obtained on the basis of the TREE data (→ Figure 274) also point in this direction, showing virtually no correlation between cognitive abilities and contentment, but an almost linear correlation between non-cognitive abilities and contentment.

Apart from the direct influences of skills on contentment, there are, of course, a large number of potential indirect influences that must be borne in mind. Education can generate greater contentment through the income

274 Effects of cognitive and non-cognitive abilities on self-contentment

Source: *OECD, 2014*; TREE data 2000

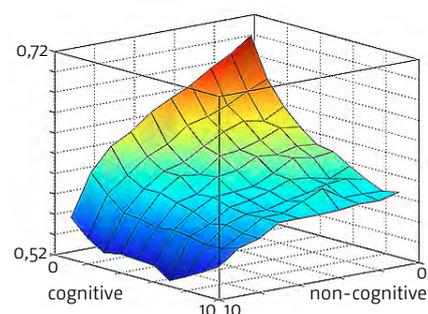
(provisional computations)



Non-cognitive abilities are measured with one indicator for persistence and two indicators for self-assurance. The values for the cognitive abilities correspond to the results in the three PISA tests.

275 Effects of cognitive and non-cognitive abilities on the probability of experiencing problems with the police

Source: OECD, 2014; TREE data 2000
(provisional computations)



Non-cognitive abilities are measured with one indicator for persistence and two indicators for self-assurance. The values for the cognitive abilities correspond to the results in the three PISA tests.

obtained or the profession exercised, as well as through the fact of being in work and through health. The many direct and indirect channels through which education can act make it very difficult to precisely identify these channels on an empirical basis.

Crime

One of the positive effects of education is also that it reduces criminal or other socially harmful behaviour. Here again, education can exert its influence via a whole series of direct and indirect channels, some of which have been empirically proven. Education can directly develop cognitive and non-cognitive traits and skills, such as patience or risk aversion, which reduce the likelihood of anti-social and criminal behaviour. One direct and proven correlation between education and crime stems from the fact that young people who spend more time in school have less opportunity to commit crimes. A study by *Bjerk (2012)* reveals a correlation between educational performance and less crime, showing that school leavers with an average educational performance who leave school early in order to provide financial support for their family are not more likely to engage in crime, while pupils who have left school early on account of an insufficient educational attainment do display a significantly higher crime rate. This result alone, however, does not prove that education has a direct or indirect influence on crime.

One particular way in which education can affect crime indirectly is through the income and career opportunities that it opens up. These markedly increase the opportunity costs of socially undesirable behaviour and, at the same time, reduce the incentive to acquire income and recognition through crime (see, for example, *Entorf, 2009*, or *Machin, Marie & Vujic, 2012*). Since potential income from criminal behaviour is highly uncertain and involves a great deal of risk compared with the relatively certain income from investments in education, it can be assumed that more risk averse people will dispense with behaviour of this type (*Mocan & Unel, 2011*).

The significance of the combination of cognitive and non-cognitive skills also becomes clear in an analysis of the TREE data (→ Figure 275). While young people who score high values for non-cognitive traits (irrespective of their cognitive skills) have only a low likelihood of police contact on account of their behaviour, the same also applies for young people with very high cognitive skills (irrespective of their non-cognitive traits). Deficits in non-cognitive traits, by contrast, have a negative impact especially when coupled with low cognitive skills.

Finally, here again, attention must be drawn to the possibility of an inverse cause and effect relationship. Young people who have been convicted of a criminal offence are less likely to continue or finish their education on account of this offence (cf. *Hjalmarsson, 2008*). Cases of this type show that not only does education influence the probability of a person committing a crime, but that, conversely, a criminal act can also reduce the probability of a person spending a longer period in education.

Environmental knowledge and behaviour

Education can have a potentially positive effect if it raises awareness of the environment and prompts the corresponding environmentally-conscious behaviour. The most direct link can be achieved by having environment and ecology taught as subjects at school. The additional tests for PISA 2006 showed that the environmental knowledge of Swiss pupils was somewhat better than the OECD average, with significantly more people at the best competence level and, mirroring this, significantly fewer at the lowest competence level (OECD, 2009). Pupils' attitudes to environmental topics are influenced to a significant extent (even after controlling for their origin) by their performance in the natural sciences, which were similarly tested in the PISA assessment. A better performance in the natural sciences was seen to go hand in hand with a greater awareness of ecological topics and a sense of responsibility towards the environment. At the same time, however, this is coupled with a lower level of optimism (or a higher degree of realism) in respect of the future for the environment.

Even if formal education raises awareness of the environment, there is still a significant gap between this heightened consciousness and actual behaviour vis-à-vis the environment (see *Kollmuss & Agyeman, 2002*). In other words, the greater awareness of environmental issues imparted by education does not automatically lead to more environmentally compatible behaviour.

In Switzerland, data from the Household Panel (→ Figure 276) shows that environmental protection is rated as important by all those questioned, irrespective of their level of education. A big difference emerges as a function of education when it comes to the question as to who should do something for the environment.

Here too education can have indirect effects on ecological awareness and behaviour, such as in respect of the relationship between education and income. Income can positively influence behaviour (*Franzen & Meyer, 2010*), because environmental quality is viewed as a (positive) asset that people (or societies) with a higher income are better able to afford, and indeed wish to afford. Income can also have a negative impact on behaviour, however, if more income leads to a greater consumption of goods and energy that, in turn, damages the environment.

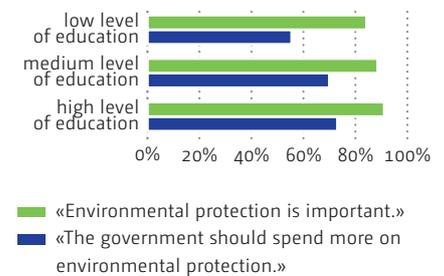
Non-cognitive skills most probably have a greater influence on ecological behaviour than cognitive abilities. A comparative study of different countries and people shows that agreeableness, conscientiousness and openness to experience are traits that correlate most strongly with a positive commitment to the environment (see, for example, *Milfont & Sibley, 2012*).

Political participation

What is also of great importance for peaceful coexistence within a society and for a functioning democracy is the expected influence of education on civic knowledge and behaviour. As with environmental knowledge, an attempt is made to steer this behaviour directly via the education provided at school. Swiss schoolchildren achieved an above-average rating in an international comparative study on political knowledge and understanding (*Biedermann, Oser, Konstantinidou et al., 2010*), coming in the top group of countries tested. It is impossible to say, on the basis of the study, whether

276 Importance attached to environmental protection and attitude to government spending on environmental protection, 2011

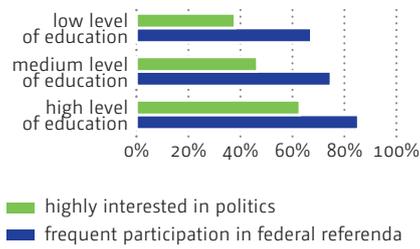
Data: FORS (Swiss Household Panel);
computations: SCCRE



On a scale of 0 (not at all important) to 10 (very important), the probability of people with a tertiary qualification rating the importance of environmental protection at more than 5 is 90%, compared with 84% for persons who have completed compulsory schooling as their highest qualification. 73% of those with a tertiary qualification feel that the government should spend more on environmental protection, while only just above half of those with a compulsory schooling qualification (54%) are of this opinion.

277 Political interest and participation in federal referenda, 2011

Data: FORS (Swiss Household Panel);
computations: SCCRE



People with a higher level of education are more interested in politics than people with a medium or low level of education. This same distribution is found for the probability of people participating in more than half the Swiss referenda within a year. These rates have been adjusted for individual characteristics, such as gender, age, political orientation, canton of residence and civil status. A study of the political participation of young people aged between 18 and 25 shows that politically passive people tend to have a lower education level than other groups (Rothenbühler, Ehrel, Kissau, 2012)

this good result is due to the teaching they received at school. This study too, however, shows that the parents' education level, together with their political interest and political participation, are the most important factors in determining an individual pupil's knowledge. Alongside the unanswered question as to how far knowledge and attitudes to political participation can be influenced through tuition at school, there is also the matter of whether more knowledge is indeed accompanied by greater political participation. Although a large number of studies reveal a positive correlation between a person's level of education and their actual political activity (see, for example, Mayer, 2011, and also Figure 277 for results from Switzerland), there are an increasing number of studies which question the postulated causal effect of education on a person's political participation and attribute all the causal differences to factors associated with family background or personality traits (Persson, 2012; Berinsky & Lenz, 2011; Kam & Palmer, 2011; Acemoglu, Johnson, Robinson et al., 2005; Kam & Palmer, 2008). Given the relationships established between non-cognitive abilities or personality traits and political attitudes and behaviour types (Gerber, Huber, Doherty et al., 2010; Caprara, Schwartz, Capanna et al., 2006; Mondak, Hibbing, Canache et al., 2010), the question thus arises as to whether schools should perhaps attempt to influence people's actual political participation via these personality traits rather than through educational content.⁶

⁶ For an overview of the results in the USA, see Gerber, Huber, Doherty et al. (2010). An influence in the sense of greater participation in political life was found for those who scored highly on conscientiousness (Steinbrecher & Schoen, 2012) and for more extroverted persons (Vecchione & Caprara, 2009).

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Annex

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