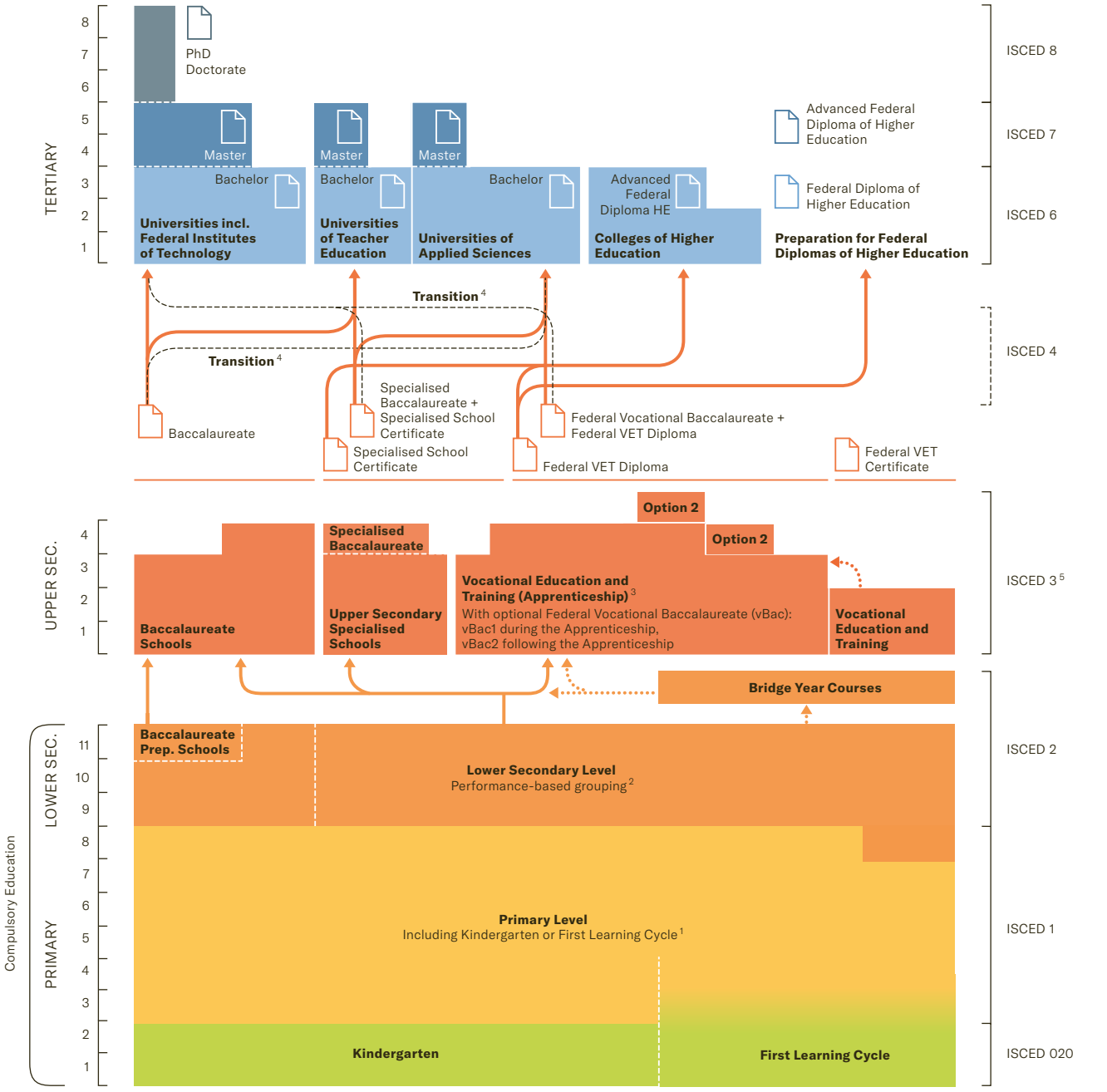
SWISS EDUCATION REPORT

THE SWISS EDUCATION SYSTEM



Children and adolescents with special educational needs

Support through special measures from birth up to age 20

The responsibility for the precise arrangement of special needs education during compulsory education (special schools, special classes, special support integrated in regular classes, etc.) lies with the cantons and is not shown on the chart.

1 Duration of primary level: 8 years. Two years of kindergarten and the first two years of the primary cycle are included in compulsory education in most cantons. In Canton Ticino the primary level lasts 7 years.

2 Lower secondary level: 4-year scuola media in the Canton of Ticino (pursuant to exception clause in Art. 6 HarmoS Agreement)

3 Vocational education and training (apprenticeship): training company + VET school + intercompany courses; full-time school education possible

4 Passerelle 1: traditional baccalaureate → universities of applied sciences (internship)
Passerelle 2: vocational and specialised baccalaureate → traditional university (additional entrance examination)

5 General educational programmes = ISCED 34
Vocational training programmes = ISCED 35

SWISS EDUCATION REPORT 2023

Bildungsmonitoring Schweiz
Monitorage de l'éducation en Suisse
Monitoraggio dell'educazione in Svizzera
Monitoring de la furmaziun en Svizra

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FOREWORD BY THE REPORT COMMISSIONERS

A reference work on education in Switzerland

You are holding the fourth issue of the Swiss Education Report in your hands. This reference work on education in Switzerland provides a compact and up-to-date overview of our education system. It is organised according to educational level and considers the aspects of effectiveness, efficiency and equity. First published in 2010, the Education Report has become well established and is now an important reference work for many players in the world of education. It provides answers to numerous questions and at the same time highlights the areas in which we lack reliable knowledge.

The Covid-19 pandemic

In an unplanned development, this report also investigates the short-term effects of the pandemic in 2020 and 2021 on the education system. The temporary ban on face-to-face teaching in particular created challenges for the players in the education system, for instance with regard to lesson design and structuring. However, the sudden switch to digital, remote teaching also opened up numerous opportunities and provided a possibility to take an in-depth look at new questions such as: were there observable effects on the performance of school pupils, apprentices and students? To what extent have the changed labour market conditions impacted the labour market success of graduates? How are we faring in terms of equal opportunities? The fourth edition of the Education Report is being published a year later than originally planned, not least in order to answer these questions.

Decision-making on the basis of reliable knowledge

People making education policy decisions or involved in quality development need reliable knowledge as a basis for their actions. There is a plethora of studies and research results out there. However, there are also publications that have no serious scientific basis. That is why education policymakers and players in the Swiss Education Area need reliably and expertly presented research results. The Education Report compiles results that prove to be relevant and reliable. It is addressed to anyone with an interest in educational issues, whether in the communes or cantons, or at intercantonal, national or international level.

The key product in education monitoring

The Federal Constitution requires the Confederation and the cantons, within the scope of their powers, to jointly ensure the high quality and accessibility of the Swiss Education Area. In order to fulfil this mandate, they have maintained a system of education monitoring for more than a decade. This instrument enables them to collect data on the sometimes complex issues at play and act in a coherent manner while adopting an overall perspective on the education system. The goal is to develop education, support and advisory offerings, reinforce cooperation among educational players, examine the processes at work at transitional points in education, ensure the permeability of the education system, and maintain the systematic nature of qualifications and the connectivity between them.

Further developing objectives in education policy

The information compiled in the Education Report allows us to make a reliable assessment of the quality and permeability of the education system. The joint education policy objectives of the Confederation and the cantons first agreed in 2011 are developed and laid down in joint declarations on the basis of the Education Report's findings. The last declaration presented in 2019 defines two new objectives: the active shaping of the digital transformation and the promotion of exchange and mobility. Not only does the Education Report help to estimate the progress that has been made in achieving these objectives; it also creates a picture of the quality of the data available in the various fields and at the various levels of the education system. Information gaps make it difficult to make sound assessments or plan measures; this report helps to identify such gaps, and further studies will help to close them.

In-depth reports supplement education reporting

Since the publication of the Education Report in 2018, two thematically significant reports have been issued as part of the education reporting process. *Digitalisierung in der Bildung* (Digitalisation in Education, 2021) is the first report to summarise the available knowledge about digitalisation in education. It also highlights gaps in that knowledge. The second in-depth report, *Sonderpädagogik in der Schweiz* (Special Needs Education in Switzerland, 2021), provides an overview of the legal fundamentals, statistical data and special needs education measures and services in Switzerland. In addition, it presents selected research results on measures that have been taken. These two reports supplement the existing education reporting.

Continuously improving reporting through joint efforts

Since the first Education Report in 2010, we have managed to obtain systematically prepared and reliable information for many areas of the system. This information is continuously used to develop quality, plan measures and draw up strategic objectives for the Swiss Education Area. In order to continuously improve our understanding of the numerous complex causal relationships in the education system, education reporting will remain reliant on the sustained efforts of the researchers and their thorough investigation of the many facets of the Swiss Education Area.

We would like to thank everyone who was involved in compiling this report.

Berne, March 2023, Education Monitoring Switzerland

For the report commissioners

Susanne Hardmeier
Secretary General
Swiss Conference of Cantonal Ministers of Education

Martina Hirayama
State Secretary
State Secretariat for Education, Research and Innovation

GENERAL CONTEXT OF THE SWISS EDUCATION SYSTEM

Introduction

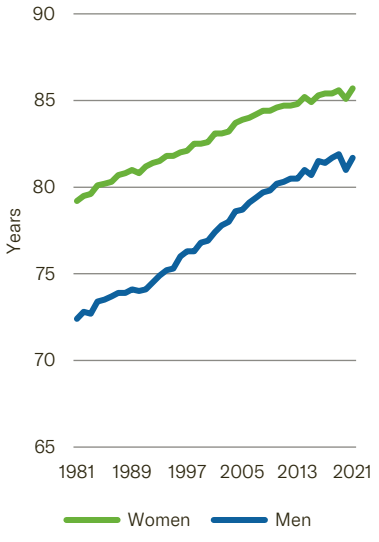
This chapter provides an overview of three groups of factors with a direct or indirect impact on all or part of the Swiss education system. The first of these is demographics, which determines not only the number of school pupils but also the number of people who finance education via tax on their income. The second group comprises factors that affect the behaviour and experiences of children and young people outside school. They outline the wider context of the needs and requirements of the children and young people in Swiss schools, which the education system needs to cater for. The third group includes a series of economic factors. From a fiscal perspective, the analysis of these factors shows the scope for investment in education, while from the perspective of the labour market, it highlights the requirements placed on the education of the working-age population. Particular attention is paid to the impact of digitalisation and automation on the demand for new skills. In a separate new section, selected key figures will be presented on the COVID-19 pandemic, which has dominated society, the economy and thus also the education system since 2020. The potential consequences of the pandemic for education are addressed in the respective chapters on the individual educational levels.

Demographics

Demographic trends belong to the most important factors affecting the education system. Cyclical fluctuations in the number of students have a direct influence on the education system, determining in large part the demand for teachers, classroom space and apprenticeships. Demographic fluctuations can be accommodated to a certain extent by adjusting class sizes. Since demographic changes affect the individual educational levels and types differently, there will be additional analysis of them in the chapters on the educational levels in question.

1 Life expectancy of women and men, 1981–2021

Data: FSO



Population development

Switzerland's population has almost tripled in size since the start of the 20th century, reaching over 8.7 million by the start of 2022. Population development is determined by birth rates and immigration on the one hand, countered by deaths and emigration on the other. If there are more births than deaths in a given year, this is called a birth surplus. Increasing life expectancy has had a positive impact on the birth surplus in recent decades (→ figure 1), although the rate of increase has slowed considerably since the turn of the millennium. The excess mortality caused by the COVID-19 pandemic in 2020 only led to a short drop in life expectancy.

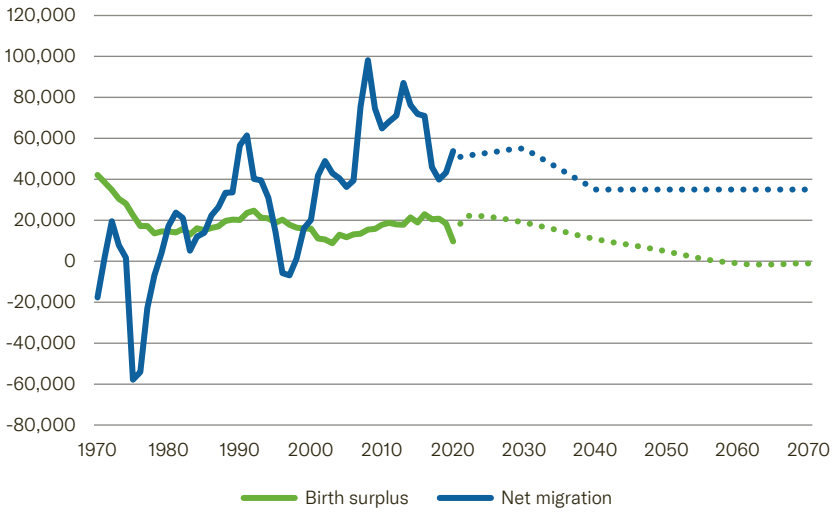
The rise in life expectancy means that fewer births are needed per woman to ensure generation replacement. Population growth and above all the extent of the fluctuations in growth are determined less by the number of births and more by net migration, i.e. the difference between immigration and emigration figures (→ figure 2). However, the number of births per woman is decisive for education as it has a direct impact on pupil numbers.

After a baby boom at the start of the new century, 2021, the second year of the COVID-19 pandemic, saw another rise in birth rates in Switzerland. The 89,400 live births marked an increase of 4.1% over the previous year and the highest figure recorded since 1972 *(FSO, 20220)*.

2 Population development, 1970–2070

Forecast as from 2021, according to the reference scenario

Data: FSO



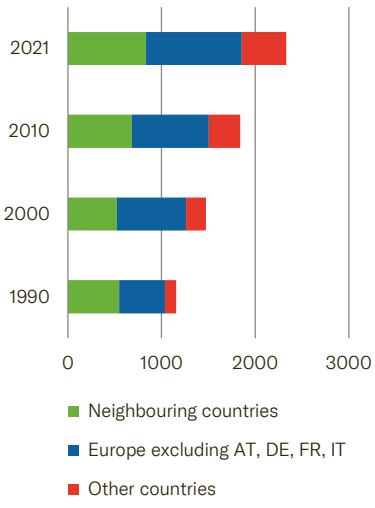
Rising migration figures

Net migration over the last two decades has led to a sharp increase in the proportion of foreign nationals living in Switzerland. At the end of 2021, some 2.2 million people, or 25.7% of the total population, did not have Swiss citizenship (→ figure 3). The introduction of freedom of movement with the EU in 2002 brought with it not only an increase in the number of foreign residents in Switzerland but also a change in the composition of the foreign national population. Whereas most immigrants came from neighbouring countries before the introduction of freedom of movement (1990: 48.5%; 2021: 37.2%), today the proportion of people moving to Switzerland from the rest of Europe is highest, at 45.4%. The number of people migrating to Switzerland from outside of Europe remains the lowest figure, but as a proportion it has doubled since 1990.

3 Foreign residents in Switzerland by nationality, 1990–2021

In thousands

Data: FSO



Ageing population

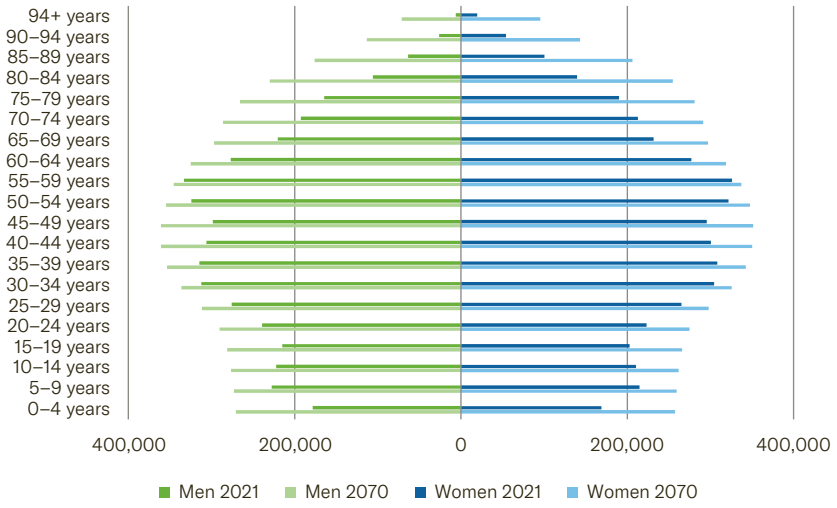
Fluctuations in the birth rate and changes in life expectancy and net migration also lead to changes in the age structure of the population. The proportion of older people in the population is currently increasing rapidly because the baby boomer generation born between 1950 and 1970 are in the second half of their lives. The proportion of the total population over the

age of 65 stood at 19% in 2021 and, according to the forecasts of the Federal Statistical Office (FSO), will increase to around 27% by 2070 (→ figure 4).

4 Age distribution

Age distribution 2021 and 2070, reference scenario

Data: FSO; calculations: SCCRE

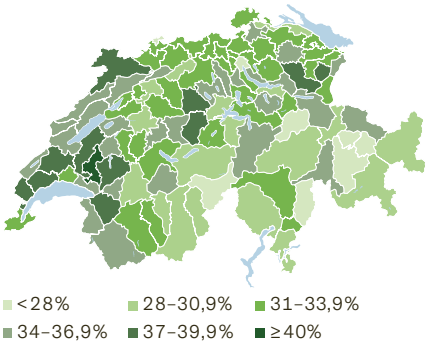


Regional differences in the proportion of the young population

The proportion of young people in the total population differs by canton and region. (→ figure 5). The youth quotient measures the proportion of people aged under 20 relative to the working-age population (aged 20–64). It provides an indication of the financial burden to be borne by the working population in relation to the school-age population (up to and including upper-secondary education). On average across Switzerland, the youth quotient was 32.7% in 2021, which means that there are approximately three people of working age for every young person. Youth quotients are often below average in urban and tourist regions; they are above average in Central, Eastern and French-speaking Switzerland.

5 Youth quotient by district, 2021

Data: FSO



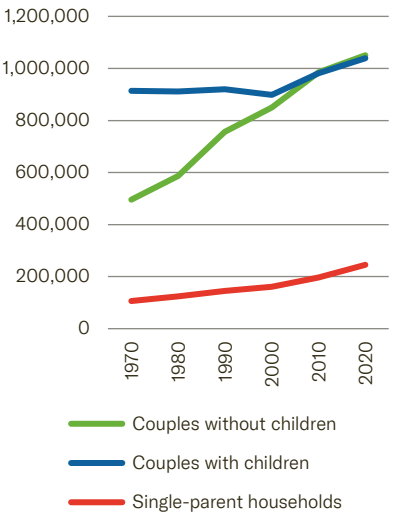
Family structures and ways of living

Family structures and thus social forms of life have changed considerably over the last forty years: More private households without children and single-person households have emerged (→ figure 6). In 2020, households with children under the age of 25 only accounted for a third of all private households. Couples without children make up a similar proportion of households, although a large proportion of these will either go on to have children or have children aged over 25. The latter is also a reflection of the ageing society. The number of single-parent households has risen continuously over the last 50 years; by 2020, it accounted for 6.4% of private households, or around 16% of all households with children and young people under the age of 25.

The size and composition of households have a direct impact on the risk of poverty and thus on the children and young people's life situation. In Switzerland, about 15% of the total population was at risk of poverty in 2020 (→ figure 7). Families with many children and single-parent households are particularly affected, with over a quarter being at risk of poverty. By way of comparison, only 6% of working-age couples without children are at risk of poverty. Families with under-age children are more likely to be at risk of poverty than families with grown-up children. For single-parent households with children aged between 0 and 17, the risk of poverty is 33.4%; this figure falls to 16.1% when the children are aged 18 to 24. This is an indication firstly that parents' income increases as they grow older and secondly that, after completing their compulsory education, young people often begin an apprenticeship, thereby taking the pressure off the family finances with the income that they earn. However, the fact that households only manage to avert the risk of poverty when the children get older also means that children and young people are particularly likely to be affected by poverty during the period of compulsory education.

6 Number of family households by household type, 1970–2020

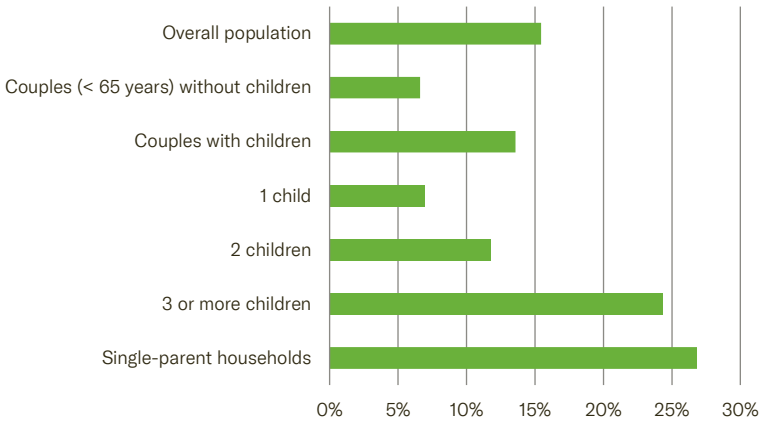
Data: FSO



7 Risk of poverty by household type, 2020

The at-risk-of-poverty figure at under 60% of the median equivalised income

Data: FSO



The **risk of poverty** is a relative parameter that is defined in relation to the available median equivalised income. Whether a person is deemed to be at risk of poverty therefore depends on both their own economic situation and that of the other people in the country in question. People with an income (excluding assets) of less than 60% of the median equivalised income are deemed to be at risk of poverty (European Union method). However, if the threshold for being at risk of poverty were to be set at 50% of the median equivalised income (OECD method), the rate would only be half as high *(FSO, 2021b)*.

The COVID-19 pandemic in Switzerland

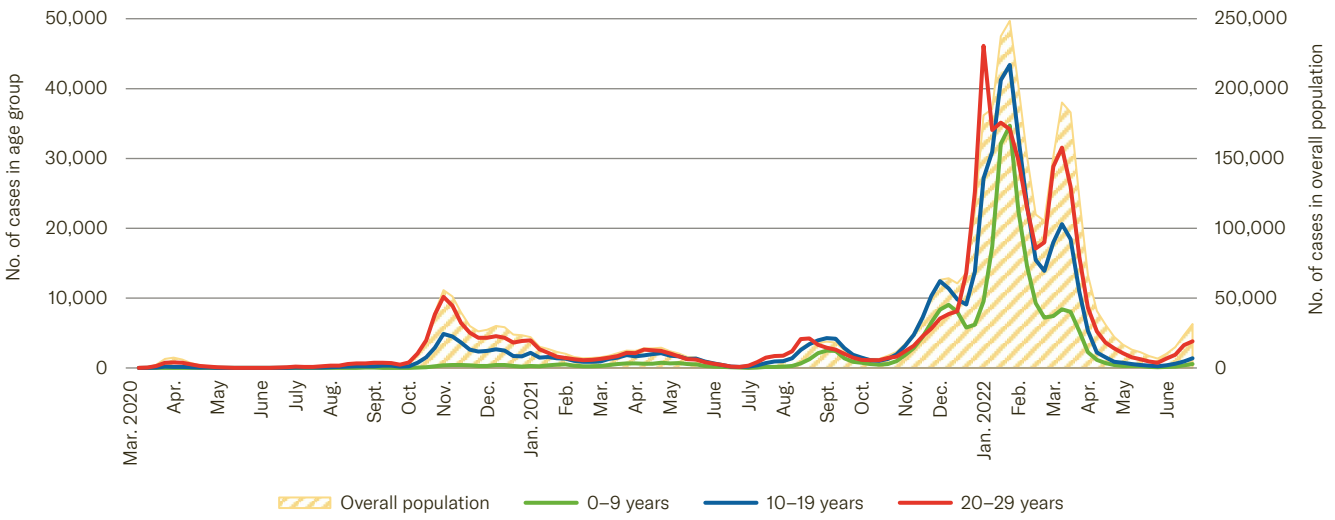
The new **coronavirus** (SARS-CoV-2) is a respiratory disease that is transmitted primarily via droplets in the air and via surfaces and hands *(FOPH, 2022)*.

The new coronavirus (SARS-CoV-2) caused a pandemic at the start of 2020. By June 2022, over 3.7 million people had tested positive in Switzerland and some 13,800 had died as a result of infection with the virus. The first wave of the pandemic mainly affected people over the age of 80. However, when the lockdown ordered by the federal government ended in May 2020, the average age of the infected people fell.

For a long time, children under the age of nine had the lowest infection rates, although the fact that the disease is often asymptomatic in children also meant that they were tested less frequently. In the winter of 2021, infection figures in 0 to 9-year-olds increased because more tests were conducted in this group and because a vaccine was available for the adult population. Infection rates in children up to the age of nine were actually higher than those in 20 to 29-year-olds for a brief period at the end of 2021 (→ figure 8).

8 Infections with the new coronavirus, March 2020–June 2022

Data: FOPH; calculations: SCCRE



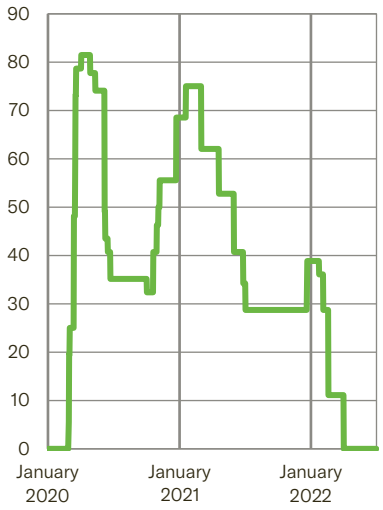
Infection rates were primarily determined by three factors: firstly, by the measures taken to stem the spread of the virus; secondly, by the type and frequency of virus mutations that occurred; and thirdly, especially in the middle phase of the pandemic, by developments in vaccination rates.

The severity of the measures taken to curb the virus's spread changed over the course of the pandemic and also differed from region to region. It is depicted in a measure called the "stringency index". This reached an initial highpoint during the first lockdown in March 2020 and peaked again in the winter of 2021/2022 (→ figure 9).

9 Severity of COVID-19 measures (stringency index)

January 2020–June 2022

Data: KOF ETH



The **stringency index** documents the stringency of the COVID-19 measures over time, with the scale ranging from 0 = no measures to 100 = total lockdown. It is made up of the following metrics: school closures, workplace closures, cancellation of public events, restrictions on public gatherings, closures of public transport, stay-at-home requirements, restrictions on internal movements, international travel controls and public information campaigns *(KOF ETH, 2022)*.

Children and young people of school age

The factors that can influence school learning and development of children and young people include physical and mental health and delinquent behaviour. They relate to the physical and psychological health or the behaviour of the young people themselves and can have an impact on their educational path and that of their fellow pupils – for instance if the young people encounter physical or psychological violence in their environment, be it by adults or other young people. A particularly significant factor is bullying, especially cyber-bullying, which is becoming more widespread as our social lives become increasingly digitalised. This report addresses the special situation during the COVID-19 pandemic in connection with psychological health and experiences of violence.

The health of children and young people in Switzerland

Having fallen between 2008 and 2014, the proportion of young people who take regular exercise has been increasing again since then. In 2020, children and young people exercised for one hour longer per week on average than in 2014. Around half of the children and young people also exercised outside of school sports, and almost a third of them for longer than the recommended hour per day *(Lamprecht et al., 2021)*.

One aspect of children and young people's health that receives a lot of attention is their weight. The proportion of children and young people who are overweight increases with age. Between 2010 and 2021, the proportion of overweight children fell at the lower and middle levels and no significant change was visible at the upper level *(Stamm et al., 2021)* (→ figure 10). A total of 17.2% of all pupils were overweight in 2021, and around a quarter of those were classed as obese. From the middle level onwards, there are slightly more overweight children and young people in urban than in rural areas. A migration background and low socioeconomic status are also risk factors. Although there is a negative correlation between being overweight and school performance, the link is not causal.

Psychological health

According to latest FSO figures, 85% of the total population over the age of 15 describe themselves as happy, but 11% have symptoms of moderate and 4% symptoms of severe psychological stress *(FSO, 2022f)*. However, data on the psychological health of children and young people is not collected systematically in Switzerland. In the HBSC (Health Behaviour in School-aged Children) study, 87% of children and young people indicated that their level of life satisfaction is high to very high, which approximately corresponds to the levels seen in surveys of the adult population *(Ambord et al., 2020)*. Between 2002 and 2018, however, the proportion of 11 to 15-year-olds who regularly suffered from at least two psycho-affective disorders[1] rose from 27.4 to 34.3% (→ figure 11). Girls were consistently more strongly affected than boys, and the level to which the participants were affected increased as they got older.

Whereas the suicide rate in adults is on the decline, it remains stable among adolescents. At 3.7 per 100,000, it is above the European average *(Berger et al., 2021)*. Data on suicidal ideation and suicide attempts is not collected systematically in Switzerland, but a significant increase in the use of emergency services has been recorded. In a study by the University of Lausanne, 9% of all children and young people surveyed reported that they had already attempted suicide at least once *(Barrense-Dias et al., 2021)*.

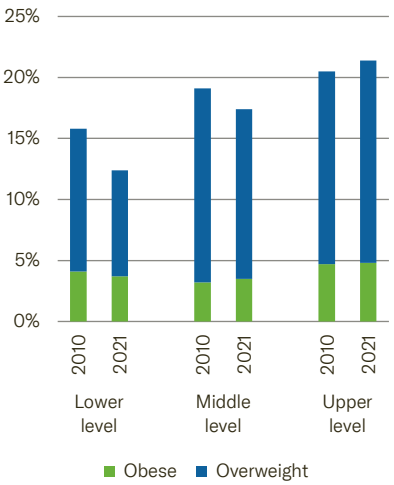
Psychological problems in children and young people can be causally attributed to increased internet usage *(Donati et al., 2022)*. For example, internet access among children and young people around the turn of the millennium led to an increase in diagnoses of depression, anxiety, drug abuse, personality disorders and self-injury in both genders as well as eating and sleeping disorders in girls. This was in comparison with children and young people who did not yet have internet access in the same period.

The COVID-19 pandemic and the associated lockdown placed a specific burden on people's psychological health *(Schuler et al., 2022; Stocker et al., 2021)*. Children, adolescents and young adults reported that their stress levels had increased due to the impact on their social lives and leisure activities and the uncertainty as to how long the state of emergency would last *(Mohler-Kuo et al., 2021)*. Most vaccinated young people perceived the certificate requirement introduced in 2021 to be a relief, while the unvaccinated ones more frequently experienced it as a burden *(de Quervain et al., 2021)*. There are practically no representative studies comparing the psychological health of children and young people in Switzerland before and during the lockdown as almost all studies were started only at the outbreak of the pandemic or are based on small, non-representative random samples. It is too early to evaluate the potential long-term effects. Now it is a question of waiting to see how it settles down as the general health situation continues to normalise and the measures are lifted.

10 Proportion of overweight and obese children

Comparison between 2010 and 2021

Data: *Stamm et al. (2021)*

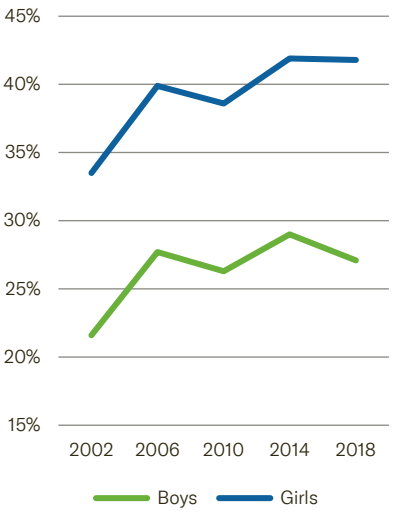


Classes 1–3 were categorised as lower level, classes 5–7 as middle level and classes 10–11 as upper level (class numbering according to HarmoS classification). The study used data from the cantons AG, BS, GE, GR, JU, LU, OW, SG and UR and the cities of Berne, Fribourg, Winterthur and Zurich.

11 Children with psycho-affective problems, 2002–2018

Proportion of 11 to 15-year-olds who stated that they had experienced at least two chronic psycho-affective disorders in the last six months

Data: *Ambord et al. (2020)*



1 These include: sadness/despondency, irritability/bad mood, nervousness, difficulties getting to sleep, tiredness, anxiety/worries, anger/rage *(Ambord et al., 2020)*.

Domestic violence

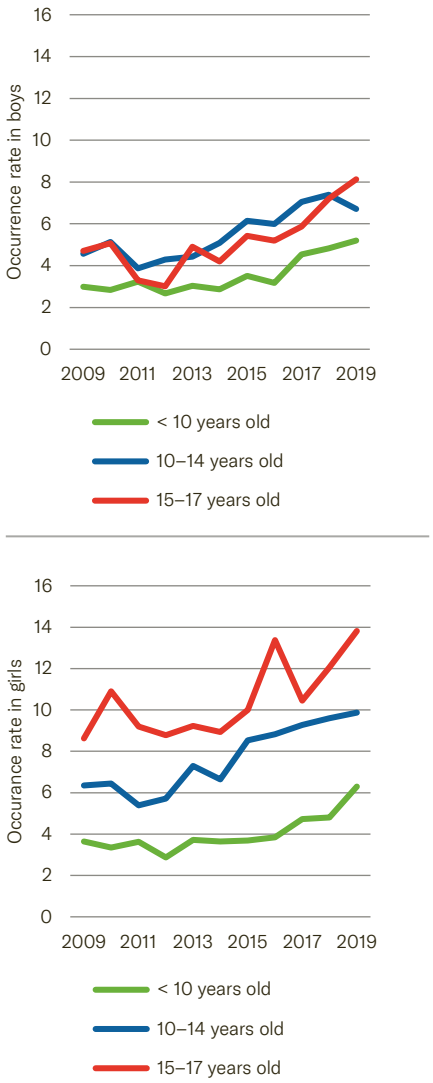
An increase has been observed in the proportion of children affected by domestic violence in Switzerland since 2009 (→ figure 12). Girls are more frequently affected as they grow older; the correlation with age is less clear in boys. It is difficult to estimate the extent to which children are affected as the number of unreported cases is likely to be high. *(Baier et al., 2022; FOGE, 2020)*. Children who live in a violent environment are subject to increased psychological stress even if they themselves are not direct victims of the violence. This may express itself in the form of sleep or attention deficit disorders or learning difficulties or in the impaired development of their self-image or social skills *(FOGE, 2020)*. According to non-representative studies, a third of children have already experienced violence against themselves at home *(Brüschweiler et al., 2021)* and a fifth have witnessed violence between their parents *(Baier et al., 2018)*.

It is difficult to gauge how the coronavirus pandemic has impacted the frequency of domestic violence. Studies investigating the effect of the pandemic on the incidence of domestic violence in Switzerland have not produced clear results *(Baier, 2020; Baier et al., 2022; Baier & Kamenowski, 2021)*. Official statistics do not show a noticeable increase in the number of reported cases, even though victim support centres, helplines and women's shelters reported more frequent use of their services during the pandemic *(FOGE, 2021; Pro Juventute, 2021)*. That said, a longitudinal study based on survey data from Switzerland showed a significant increase in the rates of domestic violence committed by young men aged around 22 years old *(Steinhoff et al., 2021)*. The rise in the number of people seeking support due to domestic violence could be attributable to the fact that stress factors such as financial worries, problems with addiction or the double burden of working from home and looking after children increased during the pandemic and especially during the lockdown *(Baier, 2020; FOGE, 2021)*. It is unclear, however, whether the increased use of support services was related to a genuine surge in rates of domestic violence or merely to a rise in the demand for support services.

12 Domestic violence by parents, 2009–2019

Occurrence rate (number of victims per 100,000 children of the same age), by gender and age

Data: FSO



Media use and cyber-bullying

The use of digital media is playing an ever-increasing role both at school and in pupils' free time. During the week, young people use the internet for an average of two hours per day, and this figure rises to three hours a day at weekends *(Süss et al., 2020)*. However, the variance in the figures is high. Most time is spent on social networks or using the internet for entertainment purposes. Only as young people grow older does their use of the internet for information procurement increase. During the COVID-19 pandemic, the amount of time spent on the internet rose to almost six hours per day on average, with just over three hours of this time being used for school and the rest for private purposes.

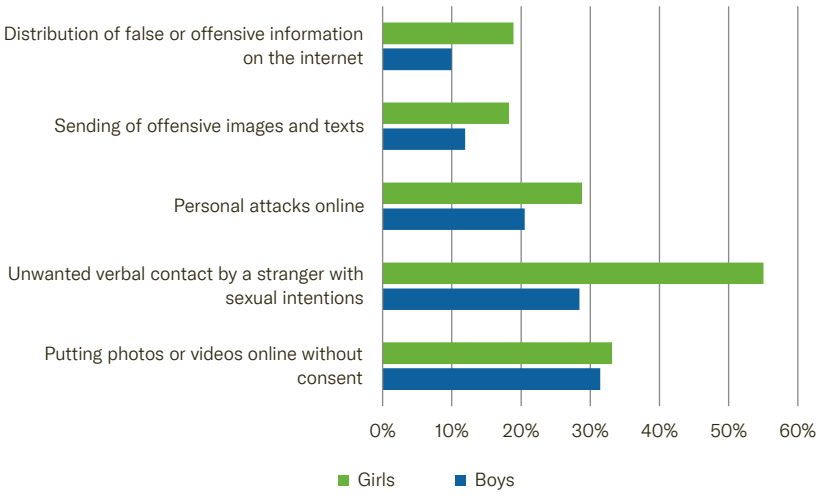
More frequent media use does not only affect the way young people interact socially; it also means that bullying increasingly takes place in the virtual sphere. In comparison with other countries, the overall proportion of children and young people who experience bullying more than once a month is high in Switzerland *(Erzinger et al., 2019)*. Both forms of bullying,

i.e. in the physical and virtual spheres, are now more or less equally frequent *(Hermida, 2019)*. The proportion of children and young people who have experienced particularly severe cases of (cyber-)bullying (at least once a week) stands at roughly 1 to 5% across all ages and school levels *(Erzinger et al., 2019; Hermida, 2019)*. According to the JAMES study (*Jugend, Aktivitäten, Medien – Erhebung Schweiz* [youth, activities, media – survey Switzerland]), a quarter of young people have already been personally attacked on the internet and around a sixth have experienced offensive images or texts being sent about them *(Süss et al., 2020)* (→ figure 13). A comprehensive meta-study with international data, including data from Switzerland, shows that boys are more often perpetrators than girls *(Smith et al., 2019)*. Gender ratios are less clear with regard to the victims. In Switzerland, the tendency seems to be that girls more frequently fall victim to both classic and cyber-bullying *(Ambord et al., 2020; Hermida, 2019; Süss et al., 2020)*. Girls are affected by sexual harassment and the distribution of offensive and incorrect statements on the internet almost twice as often as boys. Bullying and cyber-bullying can have severe effects on the victims' mental health. As a result, those affected report depression, anxiety, low self-esteem and suicidal thoughts more frequently than those who are not affected *(Baier et al., 2018; Takizawa et al., 2014)*.

13 Experience of cyber-bullying, by gender

Proportion of 12 to 19-year-olds who have been a victim of cyber-bullying at least once

Data: *Süss et al. (2020)*



The influence of lockdown and distance learning on cyber-bullying has not yet been fully clarified. Studies from the US noted that cyber-bullying and classic forms of bullying decreased during this period. The reason for this is suspected to be the lack of personal interaction during the phase of restrictions. An argument in favour of this is that cyber-bullying very rarely occurs independently of real-world bullying *(Bacher-Hicks et al., 2021)*. A survey-based study conducted in Switzerland found that, although fewer young people were affected by cyber-bullying during the lockdown,

rates were higher after the schools reopened than they had been before the lockdown *(Baier & Kamenowski, 2021)*.

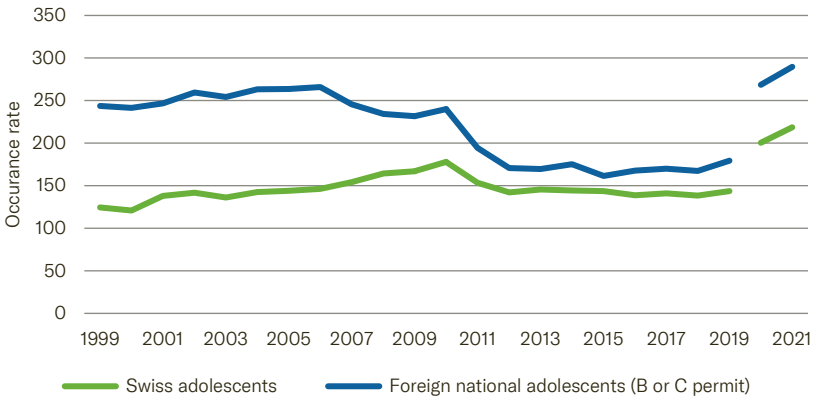
Juvenile delinquency

Statistically recorded severe delinquency in young people, i.e. cases which led to a conviction, has stabilised since the year 2010 (→ figure 14), particularly as a result of the decline in criminal offences committed by young people with migration backgrounds *(FSO, 2022l)*. If one looks at the proportion of delinquents per 100,000 of the same age group (occurrence rates), the following picture emerges: the occurrence rate increases as the young people grow older and reaches a highpoint in late adolescence (15–17 years of age), before falling again in adulthood. Male adolescents are four times more likely to be delinquent their female counterparts *(Baier, 2019b; FSO, 2022l)*. Proportionately speaking, in the year 2000, twice as many foreign national adolescents were delinquent as Swiss adolescents; from 2010, the proportion was only 1.2 times higher. The convergence was much more evident in boys; in girls, the difference between foreign national and Swiss adolescents was small to begin with. The reasons for the convergence in the occurrence rates of delinquency in Swiss and foreign national adolescents have not yet been empirically investigated.

14 Convicted adolescents, 1999–2021

Convicted Swiss and foreign national adolescents (B or C permit) living in Switzerland; occurrence rate (number of convicted people per 100,000 adolescents of the same age)

Data: FSO



The data up to 2019 only includes convictions under the Swiss Criminal Code (StGB), the Swiss Narcotics Act (BetmG), the Federal Act on Foreign Nationals (AIG) and crimes or misdemeanours under the Road Traffic Act (SVG); from 2020 onwards, all convictions under the Youth Crime Act (JStG) are taken into account.

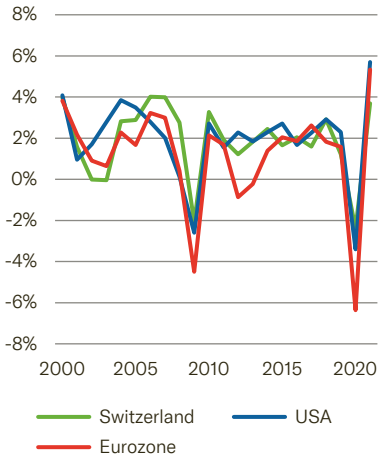
Potential explanations for delinquent behaviour among adolescents include socioeconomic and cultural background, criminality in the adolescents' environment (e.g. contact with delinquent friends or experience of violence at home) and individual personality traits and behaviours, such as low self-control and alcohol or drug consumption *(Baier, 2019b; Ribeaud, 2015)*. These factors can have a mutual effect on one another. Delinquency and school success also have a reciprocal relationship: studies have shown, for example, that delinquency correlates with a negative school climate, poor school performance, difficulties with social behaviour (especially bullying) and regular truancy *(Rabold & Baier, 2007; Reinecke & Stemmler, 2016; Ribeaud, 2015)*.

The economy and the labour market

Growth rates stable despite crises

15 Growth rate of GDP per capita, 2000–2021

Data: OECD



Economic development over the last two decades has been marked by three large cycles, which Switzerland has by and large followed (→ figure 15). The first cycle began with the recession after the dot-com crash on the financial markets and the terror attacks of 11 September 2001. A short phase of growth was followed by the financial crisis in 2008 and 2009 and then a fiscal crisis that led to a further slump in the eurozone. This slump, however, did not have an impact on Switzerland *(FSO, 2015b)*. Following the recovery in the global economy, the upturn ended with the declines that were triggered by the COVID-19 pandemic in the year 2020. Even though the recession was restricted to the first year of the pandemic in most countries, the slump was so sharp almost everywhere that the subsequent recovery was not sufficient for production to return to pre-pandemic levels by 2022. The recovery was jeopardised again in 2022, on the one hand by further COVID-19-related interventions in economic life in China and the resulting supply chain bottlenecks, and on the other by the upheavals on the commodity markets brought about by Russia's attack on Ukraine.

Government borrowing at a consistently low level

The economic cycles of the last two decades, particularly the financial and subsequent fiscal crisis as well as the economic downturn caused by the COVID-19 pandemic, have had a negative effect on government debt. A pattern of hysteresis has been observed in almost all countries. This means that in every crisis, government debt exceeds the level of the previous crisis and during the phases of economic recovery it never returns to the level of the previous recovery phase. Before the COVID-19 pandemic, Switzerland was an exception to this pattern as it had found a way of preventing continuous growth in government borrowing with the "debt brake". Switzerland's government debt is consistently low in an international comparison (→ figure 16). Measured in terms of GDP, it stood at just under 45% in 2020. In the environment of historically low interest rates since the

financial and euro crises, government debt has not had a tangible effect on the ability of countries to act as servicing the debt was very cheap. However, rising inflation and, consequently, interest rates will significantly restrict many countries' capacity to act because a rapidly growing portion of government revenues have to be used to service the debt, which is also likely to have a detrimental effect on educational expenditure.

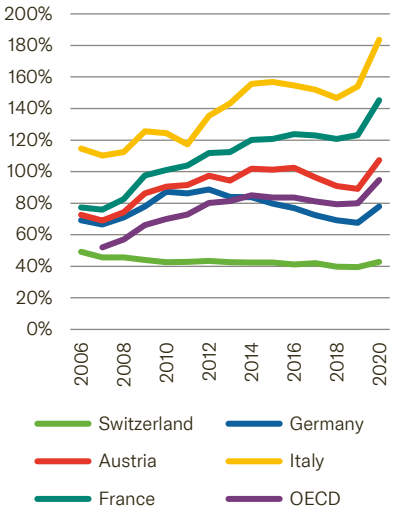
Cantonal fluctuations in educational expenditure

The significance of government revenue for education in Switzerland is apparent from the fact that some 17.4% of total public spending went on education in 2019. Not all cantons are equally affected, however, (→ figure 17), which can be explained by both their different economic output and their educational offering. For example, the Canton Fribourg spends most on education when measured both in terms of cantonal GDP and total government spending, not least because it operates its own university (which also generates revenues, however). At the other end of the spectrum is the Canton Zug, whose educational expenditure is in upper mid-table in relation to government spending but makes up relatively little of its economic output thanks to the canton's high GDP.

16 Government debt, 2006–2020

As a proportion of GDP

Data: OECD



17 Educational expenditure by canton, 2019

Expenditure as a proportion of government spending and GDP, with the average for all cantons (green line)

Data: FSO

Stable labour market situation despite pandemic

According to the ILO, **the unemployed** are defined as permanent residents between the ages of 15 to 74 who were without a job, have been actively seeking work and are available to start work *(FSO, 2022p)*.

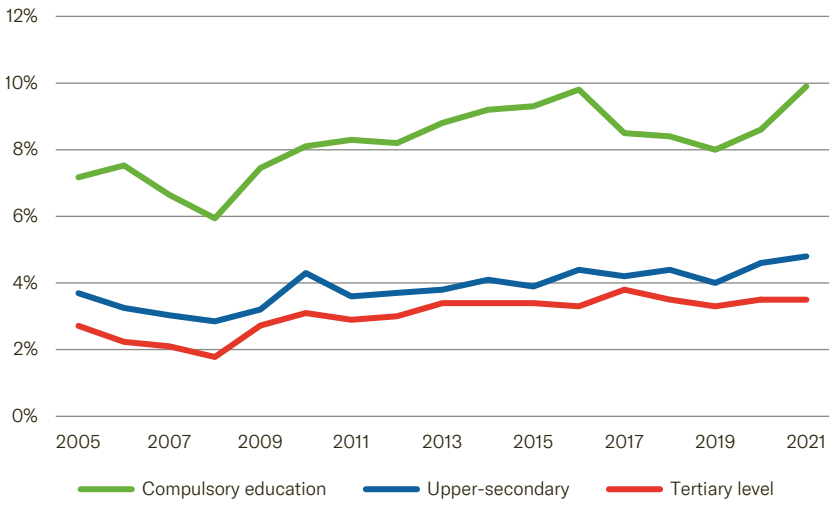
Switzerland managed to cushion the effects of the COVID-19 pandemic quickly and effectively, not least thanks to generous government support measures (e.g. short-time working compensations or bans on debt collection). According to the ILO (International Labour Organisation) definition, unemployment was 4.6% in Switzerland in the first quarter of 2022, having fallen below the four-percent mark before the pandemic. It reached a high of 5.8% during the pandemic in the first quarter of 2021 *(FSO, 2022p)*. A similar picture emerges at a slightly higher level for the entire EU, where the unemployment rate shrank from 7.8% in the first quarter of 2021 to 6.5% in the first quarter of 2022. The difference in the unemployment rate is more marked among young people; in Switzerland, it fell from 8.8 to 7.2% within a year up to the first quarter of 2022, whereas in the EU, despite a sharp decline, it stood at 14% at the same point in time.

The fact that education continues to provide effective protection against unemployment is demonstrated by the differences in unemployment rates by education level. Unemployment is highest among people who only completed compulsory education (→ figure 18). The rate has risen continuously since 2008, reaching a high of 9.8% in 2016. The unemployment rate among people with an upper-secondary level qualification is significantly lower, if slightly higher than among those with tertiary-level education. An upper-secondary level qualification therefore provides good protection against unemployment, albeit not as good as a tertiary qualification.

18 Unemployment rate by education level, 2005–2021

Unemployment rate according to ILO (25 to 64-year-olds)

Data: FSO



Only those aged 25 to 64 are displayed, as younger people have often not yet completed their education and those over 64 are usually no longer in employment. Due to a change in the survey method, there is a break in the time series in the years 2010 and 2021.

High employment rate but low degrees of employment

A country with a low unemployment rate does not automatically have to have a high employment rate as people can withdraw from the labour market either temporarily or permanently. Besides low unemployment, Switzerland also has one of the highest employment rates in Europe; the 2021 figure of 83.7% was around 10 percentage points above the European average. However, this high employment rate partially conceals a very high rate of partial employment – the second highest in Europe. As a result, despite the regular working hours for a full-time position being high, average weekly working hours per person in Switzerland are among the lowest in the OECD countries (→ figure 19).

19 Partial employment rate and average weekly working hours

Data: OECD

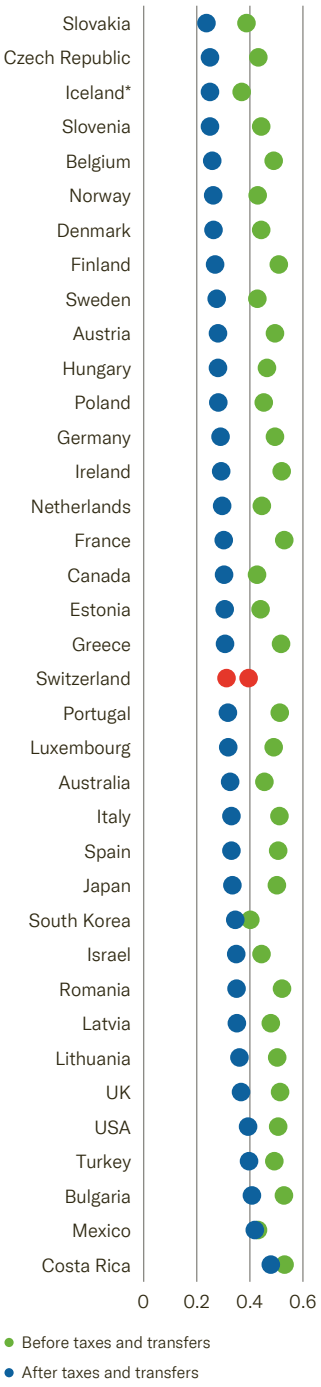
Part-time work
According to the OECD, anyone who works less than 30 hours a week at their main place of work is deemed to be in part-time employment *(OECD, 2016a)*. This means that in Switzerland, a person's degree of employment would have to be less than around 75% for them to be classed as part-time.

Relatively equal income distribution

A further result of good educational levels that are equally distributed throughout the population is an equal income distribution. In contrast to many other countries, the equality of income distribution has remained relatively stable in Switzerland over recent decades. Before taxes and transfers, Switzerland is in third position among the OECD countries in terms of equality of income distribution, after Iceland and Slovakia (→ figure 20). Even though Switzerland is only in mid-table after taxes and transfers, the very equal income distribution before taxes and transfers means that the amount of redistribution required to achieve high income equality is much lower than in other countries *(Avenir Suisse, 2013)*.

20 Gini coefficients of income distribution, 2018

Data: OECD



* Data from 2017

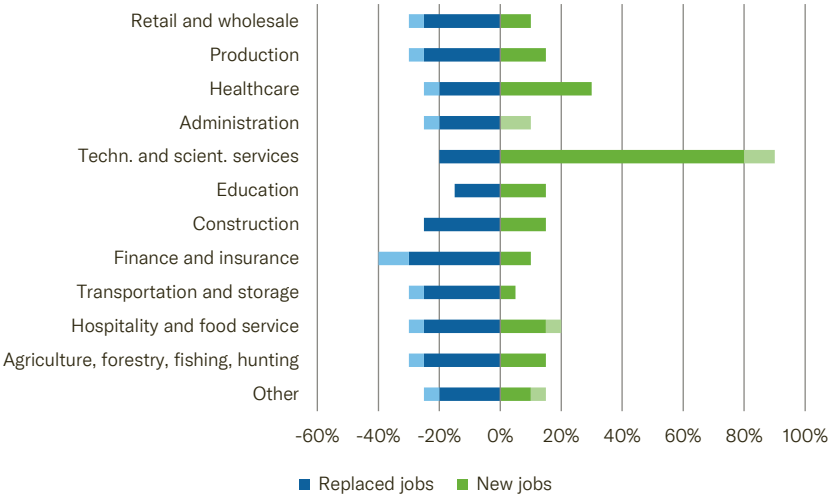
The **Gini coefficient** shows the extent of income inequality on a scale of 0 to 1. A coefficient of 0 expresses perfect equality – everyone has the same income. 1 expresses maximum inequality – one person has all the income *(FSO, 2020g)*.

Digitalisation leading to changes on the labour market

Digitalisation, which is often referred to as the fourth industrial revolution, is having a major impact on the process of structural change and is also changing the labour market both quantitatively and qualitatively. Unlike earlier waves of technological progress, the additional potential for automation that digitalisation provides is mainly affecting services rather than manual activities. OECD calculations assume that an estimated 9 to 14% of all jobs have high potential for automation, i.e. there is a high risk that work that was previously performed by humans will be done by machines *(Georgieff & Milanez, 2021)*. However, digitalisation also creates new employment opportunities, so that on a net basis, structural change does not automatically have to lead to fewer jobs being available *(Bughin et al., 2018; OECD, 2021b)*. There are forecasts for Switzerland which state that, in retail and wholesale, manufacturing, finance, insurance and transportation and storage, more jobs will be lost than new ones created due to digitalisation (→ figure 21). The biggest increase in jobs is expected in the areas of technical and scientific services and healthcare *(Bughin et al., 2018)*.

21 Jobs replaced and created by automation by 2030, by industry

Data: *Bughin et al. (2018)*



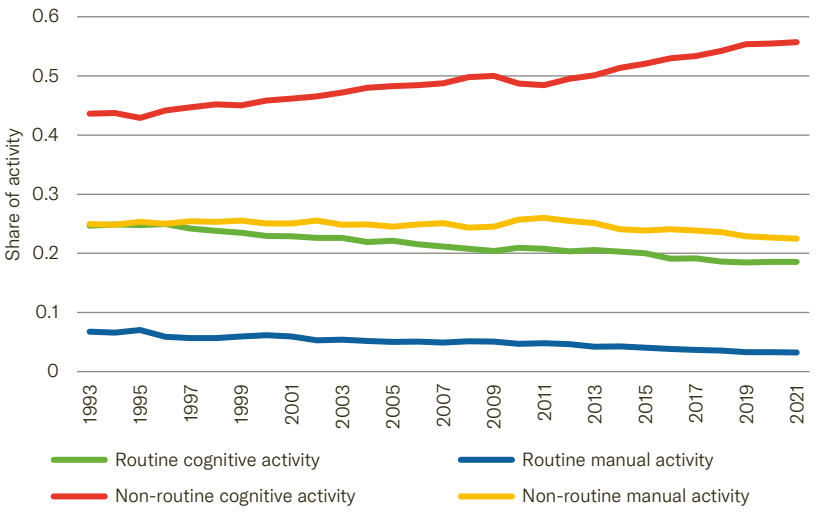
The diagram shows the proportion of jobs that will be added or replaced in the various sectors due to automation by 2030 (reference year: 2014). The researchers studied how the activities performed can be automated with currently available technologies. In addition, the distribution of new technologies was modelled using the adoption speeds of earlier technologies. Matte colours depict the scenario with a high degree of automation.

Alongside quantitative shifts between the professions and sectors, digitalisation and automation are also leading to a change in the required skills in almost all professions. In addition to technological skills, soft skills such as problem-solving, ability to work in a team and creativity are becoming more and more important *(Bughin et al., 2018; OECD, 2021a)*. Whereas in previous phases of industrialisation it was primarily routine activities in manual fields that were replaced through the mechanisation of work processes, digitalisation is mainly eliminating routine activities of a cognitive nature. This process has already been under way for several decades and has led to a constant expansion of non-routine cognitive activities (→ figure 22). The process is likely to continue in the coming years and will have consequences both for the labour market mobility of workers and for the education system. Whereas in past decades, many manual workers were able to improve their salaries by switching to professions involving routine cognitive activities, this path is only open to a limited extent now. At the same time, a switch from routine or non-routine manual activities to non-routine cognitive activities is generally only possible with additional education, which explains the increasing tertiarisation of the education sector in particular.

22 Change in work activities between 1993 and 2021

Share of activity among employed people

Data: FSO; calculations: Christian Gschwendt, University of Bern



The analysis studied 436 different professions which each encompass 2–14 different activities. In turn, these were divided into four activity categories.

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION AND TRAINING

COMPULSORY EDUCATION

CROSS-CUTTING THEMES

Organisation of compulsory education

Compulsory education comprises the primary level – including kindergarten or the first two years of an entry level – and lower-secondary level. According to the International Standard Classification for Education (ISCED 2011), the first and second years at primary level: pre-school or the first two years of a first learning cycle correspond to ISCED Level 0.20 (pre-primary education), school years 3 to 8 are ISCED Level 1 (primary education) and school years 9 to 11 are at ISCED Level 2 (lower secondary education) *(UNESCO et al., 2016)*. The duration of compulsory education is therefore set at 11 years and divided into three cycles (→ figure 23).

23 Organisation of compulsory education

Comment on German-speaking Switzerland: *Lehrplan 21* is divided into cycles.

Data: EDK-IDES

School years	1	2	3	4	5	6	7	8	9	10	11
As per HarmoS Agreement	Cycle 1				Cycle 2				Cycle 3		
German-speaking Switzerland	Kindergarten		Primarschule						Sekundarstufe I		
French-speaking Switzerland	Cycle primaire 1				Cycle primaire 2				Cycle secondaire		
Ticino	Scuola dell'infanzia		Scuola elementare					Scuola media			

Cantons are responsible for compulsory education. They are responsible for the curricula, set the timetable and determine the teaching resources. The Federal Constitution, however, obliges the cantons to provide a high quality and accessibility of the Swiss Education Area in conjunction with the Confederation and to harmonise important targets and structures nationwide[1]. One of the instruments in achieving this constitutional target is the joint education-policy initiated targets that the Confederation and cantons want to manage in a coordinated manner *(EAER & EDK, 2019)*. The Swiss Conference of Cantonal Ministers of Education (EDK) has also defined how the harmonisation mandate is to be implemented with the Intercantonal Agreement on Harmonisation of Compulsory Education *(EDK, 2007)*. It was determined, for example, that the harmonisation of curricula and coordination of teaching resources will be at the linguistic region level. The conferences in the different linguistic regions are responsible for this. The German-Speaking Swiss Conference of Cantonal Ministers of Education (D-EDK) established in 2011 – a merger of the regional conferences of Eastern, North-western and Central Switzerland as well as the Principality of Liechtenstein – was dissolved again following the successful introduction of *Lehrplan 21* at the end of 2018. The three regional conferences (EDK-Ost, NW EDK, BKZ) and the Principality of Liechtenstein still harmonise certain areas relevant for compulsory education (*Lehrplan 21* competence centre, Databank *Lehrplan.ch*,

1 Art. 61a para. 1 FC and Art. 62 FC

educational television) *(D-EDK, 2018)*. The French-speaking cantons and Canton Ticino, which form the *Conférence intercantonale de l'instruction publique de la Suisse romande et du Tessin* (CIIP), continued the implementation of the *Convention scolaire romande* during the 2020–2023 management period, by proceeding with the creation of the western Switzerland teaching resources (*moyens d'enseignement romands [MER]*) on the basis of *the Plan d'études romand* (PER) *(CIIP, 2021a, 2021b)*. The EDK also regularly sets priorities at national level. From 2021–2024, the focus is on equality in education and digitalisation in the education system. Both subjects are attributed particular significance due to the Covid-19 pandemic *(EDK, 2021c)*.

Compulsory education in figures

Schools operating in the compulsory education segment were attended by approximately 976,000 pupils (2020/21 school year), or 58% of the entire pupil population from the start of the primary through to the tertiary level. A good 94% of children and adolescents attend a public school at no cost, 4.5% attend a private institution without cantonal subsidies *(→ Private school, private tuituion and homeschooling, page 49)*. Of the 976,000 pupils, 1% attend a special needs class and 2% a special school class *(→ Special needs education, page 38)*. Corresponding to the high number of pupils in compulsory education, 62,846 teachers work in state schools full-time equivalent (FTE), which corresponds to 97,339 persons in absolute figures (→ figure 24). Given the large number of pupils, about 43% of all state education expenditure is accounted for at this level (including special schools).

Educational pathways

For the first time it is possible to map the entire individual educational paths for a cohort of pupils during compulsory education using individual data *(FSO, 2021l)*. Available data enables tracking over nine years of the cohort that started the 3rd school year at primary level in 2012/13. Of these about 70,000 pupils, 91% achieved a linear educational trajectory without repetition up to the end of the primary level and 6.5% repeated a year. About 2% attended a special needs class or special school at the end of primary school. Of the children who had already repeated a year at primary level, 3% repeated again at lower-secondary level. Eight years later, 86% of the cohort attended the 11th school year (mainstream class) and 11% in total repeated at least one school year (→ figure 25). The longitudinal data for compulsory education show overall that foreign nationals, pupils from French-speaking Switzerland and children of low socio-economic status repeat more frequently *(FSO, 2021l)*. In future it will be possible for this cohort and others to make observations about post-compulsory education.

24 Compulsory education in figures, 2020/21 school year

Information on the teachers and school management: public schools;
repetitions: regular classes in public schools

Data: FSO (LABB)

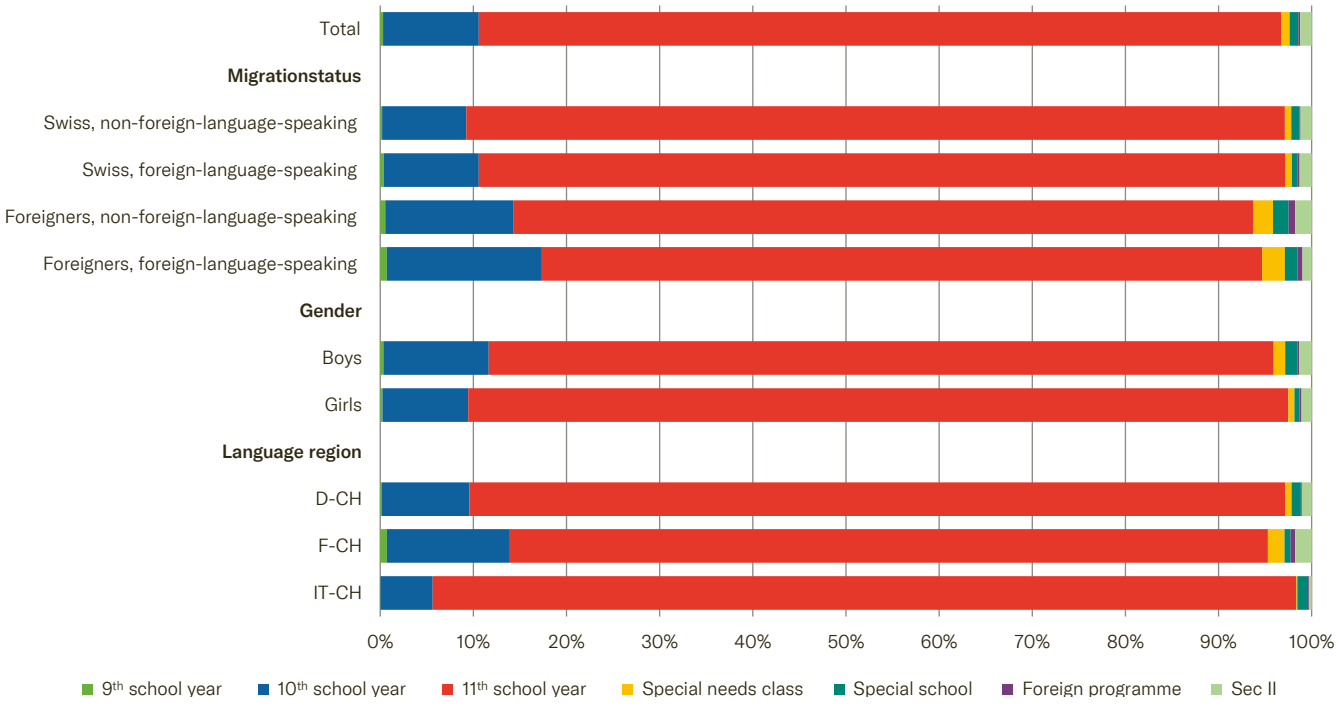
Number of pupils	
1st–11th school year total	976,105
1st–2nd school year	181,082
3rd–8th school year	530,230
9th–11th school year	264,793

Personnel (FTE) 1st–11th school year	
Teaching staff	62,846
Special education staff	8,746
School management	3,394

Repetitions	
1st–2nd school year	2.7%
3rd–8th school year	1.2%
9th–11th school year	2.6%

25 Educational pathway during compulsory education

Cohort that started the 3rd school year in 2012/13; observation after eight years in the 2020/21 school year Data: FSO (LABB); calculations: SCCRE



Development of pupil numbers and pupil forecasts

Pupil numbers in compulsory schooling have risen consistently since 2011. According to the 2021–2031 reference scenario, growth is ongoing across all levels: a 9% increase is expected for the first and second school years (to 192,600 pupils) and a 10% increase in the third to eighth school years (to 558,300 pupils). The relatively strong growth at lower-secondary level (+14% to 279,100) is due to the large number of primary school pupils from earlier strong cohorts only transferring to lower-secondary level in these years (→ figure 26). By cantonal comparison, the forecasts vary greatly in the area of compulsory schooling *(FSO, 2021k)*. While average growth of plus 10% is expected for the Swiss, the forecasts for the individual cantons vary from minus 3% (Ticino) to plus 17% (Thurgau).

There was an above-average increase in the birth rate in Switzerland during the pandemic *(→ chapter General context of the swiss education system, page 9)*. In 2021, births were higher than at any time since the 1970s. This will filter through to the number of school-age children by 2025/26 at the latest. The rising pupil numbers in compulsory education will impact demand for teachers at all levels in the coming years *(→ chapter Universities of teacher education, page 285)*. It is uncertain whether it will be possible to employ more teachers – in spite of their already being in short supply in many places – or whether the rising number of pupils can be absorbed into larger classes. The resulting costs for the education system will depend on whether it is the former or the latter outcome.

Harmonisation

The joint education policy goals of the Confederation and cantons *(EAER & EDK, 2019)* comprise the following areas for harmonisation of compulsory education: starting age, compulsory schooling, duration of education levels and transitions and national education targets. At the cantonal level, the HarmoS Agreement regulates *(EDK, 2007)* their implementation and contains details about the duration of school levels, language teaching and national education targets. By 2010 – one year following the coming into force of the agreement – fifteen cantons have joined (→ figure 27). This number has not changed over the past 12 years.

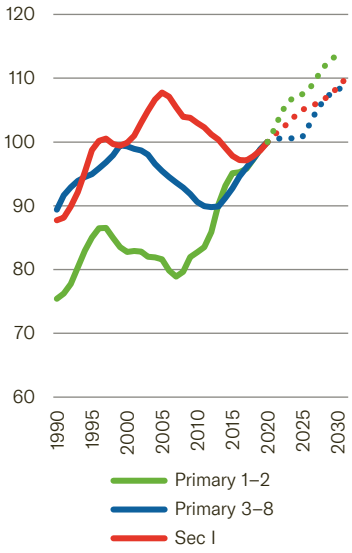
In 2019, the EDK evaluated the progressive harmonisation of the structure and targets for all the cantons for the second time *(EDK, 2019a)*. As reported in the first assessment in 2015, 17 cantons incorporated the two years of kindergarten or the first two years of an entry level cycle into compulsory schooling. The other cantons broadened the mandatory offer in kindergarten or brought forward the cut-off date for starting school to 31 July. While the primary level in Switzerland is six to eight years and secondary school lasts a standard three years[2], the main intercantonal differences still arise in the first two school years at primary level *(→ chapter Primary school level, page 53)*.

To ensure the high quality of the Swiss Education Area, practically all the cantons, regardless of whether they have joined the HarmoS Agreement, have approved legal fundamentals to secure and promote the quality of compulsory schooling. While external evaluation as such is not so established in French-speaking Switzerland, cantonal performance tests (*épreuves communes, épreuves cantonales or épreuves de référence*) are common.[3] The cantons in German-speaking Switzerland ensure quality mainly through a combination of in-school quality management, external school evaluation and school supervision *(EDK-IDES, 2021a)*. In recent years, different cantons have realigned the external evaluation, for example as focus evaluation whereby a selected quality area is evaluated, such as school management, the special needs offering or promotion of interdisciplinary competencies (→ figure 28). Two thirds of German-speaking cantons are members of the *Arbeitsgemeinschaft Externe Evaluation von Schulen* (argev), which supports the cantons in developing external school evaluation and quality assurance *(argev, 2020)*.

26 Forecasts for pupil numbers in compulsory education

Reference scenario; index value 100: year 2020

Data: FSO



27 Accession to the HarmoS Agreement

As of June 2022

Data: EDK-IDES

2 With the exception of Canton Ticino, which has the four-year *Scuola media* (HarmoS Concordat, Art.4)

3 Cantons Geneva and Waadt generate data which can be used for the quality assurance processes. In the French-speaking part of Canton Fribourg, the introduction of external evaluation is planned.

28 External evaluation for quality management

Data: *EDK-IDES (2021)*

External evaluation	
External evaluation or focus evaluation	AG, AR, GL, GR, LU, NW, OW, SO, TG, UR, ZG, ZH
Suspended following pilot phase	BE-d, BL, FR, SG, SH, SZ
None	AI, BE-f, BS, GE, JU, NE, TI, VD, VS-d, VS-f

29 Introduction of the curricula for the different linguistic regions

Data: BKZ (2019); CIIP (2013)

Start of introduction	Cantons
2011/12	BE-f, FR-f, GE, JU, NE, VD, VS-f
2015/16	BL, BS, TI
2017/18	AR, GL, LU, NW, OW, SG, SZ, TG, UR
2018/19	AI, BE-d, GR, SO, VS-d, ZH
2019/20	FR-d, SH, ZG
2020/21	AG

Linguistic-regional curricula

Since 2023, the introduction of linguistic-regional curricula has also been completed in German-speaking Switzerland. While the *Plan d'études romand* (PER) was incrementally introduced in the French-speaking regions as early as 2011, the Ticino curriculum *(Piano di studio della scuola dell'obbligo ticinese)* was implemented in 2018/19. Most German-speaking cantons began introducing *Lehrplan 21* in 2017/18 or 2018/19 (→ figure 29); it will be in all the cantons by 2022/23.[4] The introduction did not follow a standard format in all the cantons: barely a quarter of cantons implemented the curriculum simultaneously following a preparatory phase in all cycles. Whereas in many cantons, the introductory process lasted for three up to a maximum of six years starting with the 1st cycle.

Unlike German-speaking Switzerland, the CIIP approved clear guidelines for the *moyens d'enseignement romands* (MER). There is usually one teaching resource per subject and level. The school language is an exception: there is a choice between two teaching resources for the school language *(CIIP, 2021a)*. In German-speaking Switzerland, the cantons determine the teaching resources themselves to a large degree. Individually, the cantons agreed to the joint use of certain teaching resources. One example is the Passepartout project. That is the agreement to coordinate foreign language teaching and the associated teaching resources *(→ chapter Primary school level, page 53)*. In French-speaking Switzerland, changes are already being made to *Médias, images, technologies de l'information et de la communication* (MITIC) towards a digital education. Moreover, an Item database (EpRoCom) is being generated that enables the cantons and teachers to reliably evaluate the competencies underlying PER. An actual impact analysis of the introduction of the PER curriculum has not hitherto been possible due to the ongoing development. The introduction process and framework conditions can voluntarily be evaluated in German-speaking Switzerland. While some cantons (St. Gallen, Uri, Zug) have already created evaluation reports on the introductory phase, others are at the start of this process (e.g. Basel-Landschaft, Basel-Stadt, Graubünden, Schwyz).

With the introduction of *Lehrplan 21*, there was also a convergence of the cantonal timetables with regard to the teaching time and technical terms. In 2018, the biggest differences became apparent at primary level between the cantonal number of periods in *Natur, Mensch, Gesellschaft (NMS)* and design. At lower-secondary level, the share of cantons where the number of periods does not correspond to the guideline is greatest for mathematics and languages (14 or 15 cantons out of 21). The cantonal technical terms correspond to a large degree to the terms in *Lehrplan 21 (BKZ, 2019)*.

4 In Cantons Aargau, Appenzell Innerrhoden, Berne, Grisons, Lucerne, Schaffhausen, Solothurn, St. Gallen, Thurgau and Zurich there were initiatives against the introduction of *Lehrplan 21;* in Cantons Grisons, Lucerne and St. Gallen, the initiatives did not reach the ballot box and in the other cantons, they were rejected (status 2021).

Verification of the attainment of basic competencies

In 2011, the EDK approved the harmonisation of teaching goals across the country in its national education standards. These education targets define the baseline levels that pupils must achieve in the school's language, two foreign languages, mathematics and natural sciences at the end of the fourth, eighth and eleventh school years. The survey of verification of the attainment of basic competencies (ÜGK) is to determine which share of pupils actually achieve these basic competencies. In the first survey in the 2015/16 school year, the competencies in mathematics at the end of compulsory schooling were examined, in the second in the 2016/17 school year it was competencies in the school language and the first foreign language at the end of the primary school level *(Consortium ÜGK, 2019a, 2019b)*. The work related to the planned ÜGK 2020 and 2022 had to be interrupted and postponed due to the outbreak of Covid-19 (→ figure 30).

30 Surveys for the verification of the attainment of basic competencies

Status September 2022

Data: *EDK (2019a)*; chart: SCCRE

School year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
11th school year	ÜGK Maths		PISA		ÜGK L1 L2 L3		PISA	ÜGK L1 L2 L3		PISA	
8th school year		ÜGK L1 L2									
4th school year									ÜGK L1 Maths		
Publication Education report			Yes					Yes			Yes

Maths: Mathematics L1: teaching language L2: first foreign language L3: second foreign language

In 2016 62% of pupils acquired the basic competencies in mathematics across Switzerland, whereby the corresponding cantonal proportions varied markedly between 44% and 83% Only a small part of the major intercantonal differences can be justified by the composition of the pupils *(Consortium ÜGK, 2019a)*. In 2017, between 80 and 90% of pupils across Switzerland achieved the basic competencies in the school language and first foreign language, whereby the corresponding proportions at cantonal level are a lot less varied than with mathematics *(→ chapter Primary school level, page 53; → chapter Lower-secondary education, page 83)*. This can partially be explained by the average already being a lot higher *(Consortium ÜGK, 2019b)*.

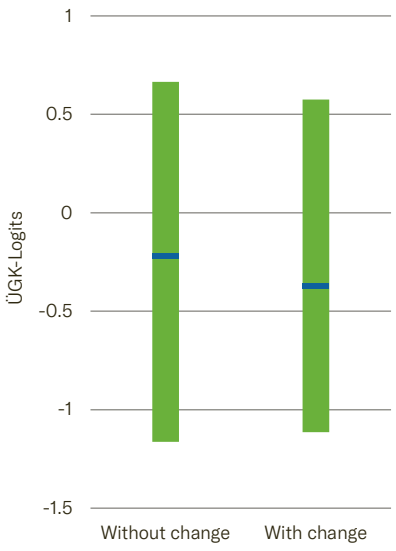
Change of canton and school performance

In connection with the structural and target harmonisation of compulsory school, the Confederation and cantons aim to ensure the accessibility of the Swiss education system. Although the cantons have a high degree of autonomy in compulsory schooling, the approximation will strengthen shared cornerstones and remove major hurdles to mobility among the national population *(EDK, 2007)*. Only about 1% of pupils in Switzerland change school canton in a year during the compulsory stage (excluding transfers to private school or in the context of special needs educational offerings). It is therefore not clear whether the low number is an expression of a generally low tendency to move to another canton or due to the worry that the children could suffer from changing to another school system. Switching within a canton is somewhat more common: about 6% of children change school to a different municipality. Although changing school across a cantonal border remains rare, the data on the educational pathways can be combined with the performance data from the ÜGK, enabling an initial analysis of the effects of a change of school. Unlike switching within a canton, such moves across the cantonal border do not suggest that dissatisfaction with the school was the reason for moving. This justifies the assumption that the causal effects of moving may be measured by school performance when switching cantons. International research on the effect of changing school on performance at school predominantly indicates a negative effect, the evidence is however conflicting *(McMullin et al., 2020; Schwartz et al., 2017; Voight et al., 2012)*[5]. The studies only occasionally factor in whether the change of school was an endogenous or exogenous factor *(Hanushek et al., 2004)*. There is no evidence in Switzerland of a negative effect on performance from changing school when taking all pupils into account (→ figure 31). However, the effect of such a switch differs a lot according to gender. In the case of boys, changing school is associated with performance impairments *(→ chapter Lower-secondary education, page 83)*.

31 Performance in mathematics in the 11th school year with and without changing to a school in a different canton

The performance results are listed as logits with ÜGK. The higher the Logit value, the higher the competencies of the pupil.

Data: *(Angelone et al., forthcoming)*



Legend
The median of persons who have changed to a school in a different canton is –0.2 (blue). The performance of the middle 50% of pupils is between –1.1 and 0.6 (green bar).

5 The majority of the studies are from the USA, where free choice of school and attendance of private schools are widespread and the school change rate is correspondingly high. Why children leave a school and which new school is chosen as the target school is therefore not usually coincidental in this context.

Language teaching

As regards language teaching, the main key principles are in the national language strategy approved by the EDK in 2004. These principles form the basis for the corresponding articles in the HarmoS Agreement *(EDK, 2007)* and in the Federal Act on the National Languages and Understanding between the Linguistic Communities.[6] These key principles cover the promotion of the local national language at all school levels, the promotion of a second national language and another foreign language during compulsory schooling, then the promotion of the first language of pupils with a migration background through instruction in the native language and culture and finally the promotion of language exchange with classes from different linguistic regions. By 2015, 23 of the 26 cantons had implemented the provision in the languages strategy involving teaching a national language and another foreign language to primary level pupils *(EDK, 2015)*. The harmonisation has progressed further in the meantime. 24 cantons are implementing the 5/7 model, i.e. the first foreign language starts in the 5th school year and the second foreign language in the 7th year of compulsory schooling (→ figure 32). The national education targets stipulate that the same level of competency must be achieved in both languages by the end of compulsory schooling *(EDK, 2019a)*. The ÜGK reviewed achievement of the basic competencies in the first foreign language at the end of the primary level *(Consortium ÜGK, 2019b) (→ chapter Primary school level, page 53)*. The review regarding the achievement of the basic competencies at the end of compulsory schooling in 2023 will enable comparison of competencies in both foreign languages.

Foreign language teaching and instruction time

The introduction of a second foreign language at primary level raises the question of whether the compulsory school curriculum has become more language-intensive as a result. The comparison of the number of hours in a school cohort before and a second following the introduction of the second foreign language at primary level reveals the following: In 22 of the 23 cantons evaluated or language-regional cantonal parts[7], there was also an increase in the total number of periods per week following the introduction of the second foreign language, although the increase in foreign languages was partly offset by a reduction in lessons in other subjects (→ figure 33). Nowhere has the introduction of the second foreign language been compensated solely through reducing hours in the first foreign language (e.g. at lower-secondary level) or the school language. However, as there were minor reductions to the school language overall, the share of total language teaching (school language and foreign languages) only increased slightly in the overall school curriculum. The share of language subjects increased by a mere 2 percentage points in total and comprises about one third of teaching time before and after the reform. School has therefore tilted slightly more towards foreign languages through the

The HarmoS cantons are committed to supporting the voluntary **native language and culture (HSK) teaching** outside the compulsory curriculum, provided it conforms to religious and political neutrality *(EDK, 2007)*. The organisation and financing is privately funded (e.g. local entities, associations). The Confederation has made its position clear in the Languages Act, which enables it to provide funding for cantonal measures to promote the first language. The HSK offering is mentioned in the legislation in 19 cantons. The review of quality criteria or the neutrality principle is, however, hardly institutionalised. Individual cantons (such as Basel-Stadt and Zurich) have a recognition procedure for sponsoring bodies *(EDK-IDES, 2022b)*.

32 Implementation of the 5/7 model

In 2022

Data: EDK-IDES

- National language/English
- English/French
- Deviation from 5/7 model

AI English from the 3rd school year, French from the 9th school year

UR English from the 5th school year, French from the 9th school year, Italian as a compulsory optional subject from the 7th school year

TI There is an exception for three foreign languages as compulsory subjects: French from the 5th school year, German from the 9th school year and English from the 10th school year

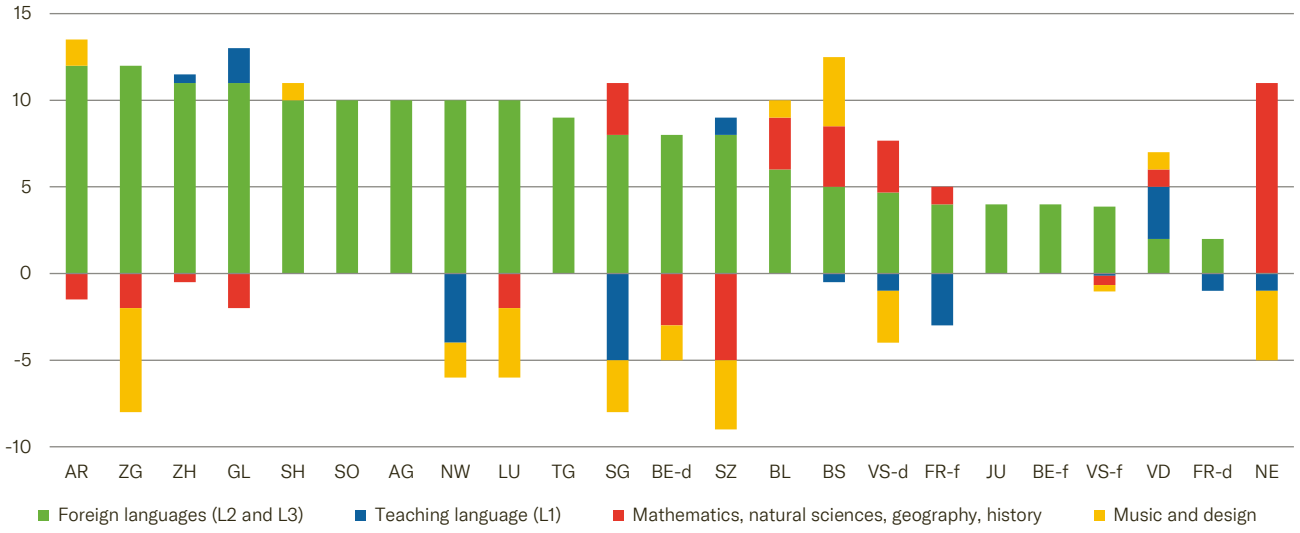
6 Language Act of October 2007

7 Due to incomplete information on the period before the reform or due to special circumstances (Grisons, Ticino, Uri), not all cantons could be considered.

33 Change in number of weekly periods by subject

Before and after the introduction of the second foreign language; 3rd–11th school year accumulated; only compulsory and compulsory optional subjects of the extended requirements profile considered

Data: EDK-IDES; calculations: SCCRE



introduction of the second foreign language at primary level, but is only conditionally more language-intensive (→ figure 34). It is not possible to evaluate the effect of introducing the second foreign language at primary level on the competencies of pupils in Switzerland due to a lack of data for the time preceding the new measure. It is, however, possible to analyse the influence on education progression following the reform *(→ chapter Lower-secondary education, page 83)*.

School exchange between linguistic regions

The promotion of a school exchange between classes from different linguistic regions is a specified goal of the languages strategy in Switzerland *(EDK, 2004)* and enshrined in law at the national level.[8] In 2017, the Confederation and cantons also formulated the objective in their strategy that all young people should participate in at least one exchange during their education *(EAER, 2017)*. In the 2019 declaration, the promotion of exchange and mobility was accordingly adopted at all education levels as an educational policy goal *(EAER & EDK, 2019)*. To review this objective, there was an initial and unprecedented nationwide survey of exchanges among school classes in 2018/19 (earlier surveys formed cantonal quotas at educational levels or were based on estimates). On the whole, 4% of all classes asked participated in language-regional exchanges during the year under review. The cantonal exchange quotas were between 0 and 16% (→ figure 35). Participation was restricted almost exclusively to lower-secondary level, where 11% of classes surveyed participated in an activity

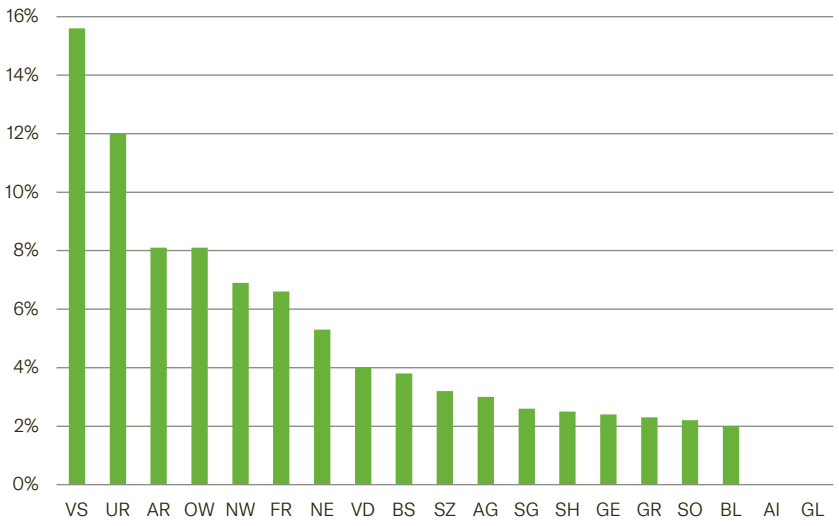
8 Languages Act, Art.14

during the year under review. To achieve the political aim of all pupils taking part in an exchange once during their compulsory schooling, activities would have to be trebled. In-depth survey analyses have enabled statements on the determinants of the language exchange for the first time (→ figure 36). Results show that school classes in municipalities that are further away from the language border have a lower probability of participating in an exchange. Therefore those classes that come into contact with another language and culture on a daily basis tend to have more exchanges. Wherever contact with another language cannot be spontaneously organised, there are fewer instances of institutional exchange. Other results indicate unequal access opportunities (equity issue). Exchanges were more frequent in municipalities with few migrants, classes with more girls and with higher requirements at lower-secondary level *(Albiez & Wolter, 2021)*.

35 Class exchange ratio during compulsory schooling by canton

No data available: Jura, Lucerne and Zug; not considered due to a low response rate (< 60%): Bern, Ticino, Thurgau and Zurich

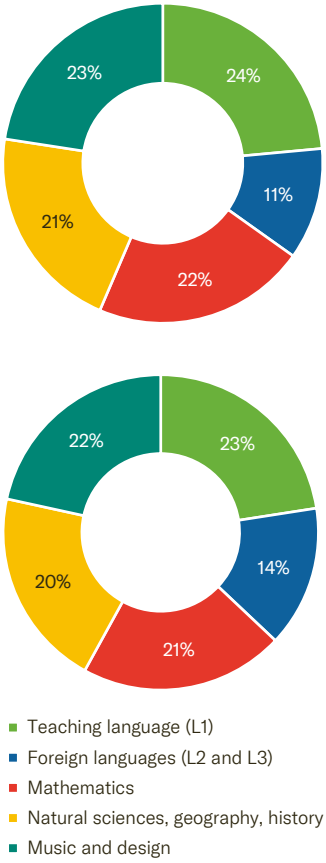
Data: *Albiez & Wolter (2021)*



34 Shares of subjects in the school curriculum

Total teaching time (3rd–11th school year) before and after introduction of the second foreign language

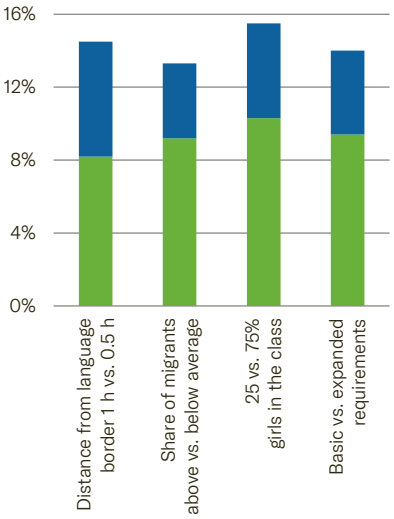
Data: EDK-IDES; calculations: SCCRE



36 Exchange ratio with relevant determinants

Only Sec I considered; controlled for different background variables; the distance to the language border and share of migrants is at the municipal level.

Data: *Albiez & Wolter (2021)*



Legend
The exchange ratios of the municipalities one hour from the language border average out at 8.2%. The ratio is 14.5% in municipalities half-an-hour from the language border. That makes a difference of 6.3 percentage points (marked blue).

Education for sustainable development

Education for sustainable development (ESD) is part of the state's educational provision. It has the objective of promoting the skills needed to participate in environmentally, socially and economically sustainable development *(Education21, 2016)*. The Federal Council approved Agenda 2030 for sustainable development in September 2015 *(Swiss Federal Council, 2021)*. This is based on the resolutions of the UN global sustainability conference and formulates 17 global Sustainable Development Goals *(UNESCO-Kommission, 2017; United Nations, 2020)*. In view of the increased significance of sustainable development in education, the EDK sits on additional committees in the 2021–2024 programme period that deal with sustainability: e.g. the *Beirat Schweizerisches Netzwerk gesundheitsfördernder und nachhaltiger Schulen Schulnetz21* (Advisory board of the Swiss network of health-promoting and sustainable schools). The ESD-relevant competencies are also integrated in the language-regional teaching plans, which are now in force across the country. ESD is not seen as an independent subject, instead it is part of many subjects as a cross-disciplinary education concept. ESD is listed as a guiding principle in individual subjects and in the *Allgemeine Bemerkungen zur Allgemeinbildung* (general observations on general education) (Cycle 1–3); the ESD education concept is included in *Lehrplan 21* in cross-divisional subjects *(BKZ, 2022)*. For example, in recent years work with *Querblicke* (interdisciplinary perspectives) has been established for primary level teaching in some cantons (Appenzell Innerrhoden, Basel-Landschaft, Basel-Stadt, Lucerne, Nidwalden, Obwalden, Solothurn and Valais). Various ESD modules in universities of teacher education instruct the teachers in how to deliver ESD-based teaching.

Special needs education

Since 1 January 2008 – the date when the *Neugestaltung des Finanzausgleichs und der Aufgabenteilung zwischen Bund und Kantonen* (NFA) came into force – the cantons have been responsible for special needs education in all areas. They are technically, legally and financially responsible for the special schooling of children and young persons from the age of 0 to 20 years old and for special needs educational measures.[9] To fulfil this constitutional mandate, the cantons have specified in Art. 1 of the Intercantonal Agreement on Special Needs Education – the baseline offering for the education and care of children and young persons with special educational needs and disabilities. The principle "integration before separation" applies. 16 cantons have joined the agreement since it came into force in January 2011. Independently of their accession, all the cantons had to change the legal bases in the context of the NFA and establish strategic special needs education concepts. This was not least done against the background that the cantons have to finance the offerings themselves. In 2019, for example Canton Bern started a review of the Act on State Schools, which legally regulates the combination of special schooling and mainstream school education; it came into force in January 2022. The theme is

9 Art. 62 FC

also prominent in the 2021–2024 EDK activity programme *(EDK, 2021c)*. And: the Federal Council also wants to commit to inclusive access based on equality of opportunity to high-quality education in the context of Agenda 2030 *(Swiss Federal Council, 2021)*. All these efforts are based on focusing on integrative schooling in mainstream schools and classes for children and young persons with special educational needs, i.e. a departure from separate schooling in special schools and classes *(Kummer Wyss, 2012; Luder et al., 2019; Sahli Lozano et al., 2021)*.

Special needs education statistics: separation and integration

The modernised statistics on special needs education distinguish between the separate teaching types in special school classes from the 2017/18 school year and other special needs classes (introductory classes, classes for speakers of a foreign language and other special needs classes). The latter belong in the mainstream schools with the mainstream classes. The 2004–2019 statistics show that the number and share of separately taught pupils (separation ratio) have consistently declined *(FSO, 2020d; Lanners, 2021)*. In the 2020/21 school year, 3% of the 976,000 pupils in compulsory schooling were in a special needs class (1.2%) or special school class (1.8%). About 97% of children and young people attended a mainstream class (integration ratio) – an increase of 2.1 percentage points over the past 15 years. The modernised special needs education statistics enable the detailed presentation of the separate forms of schooling. They also allow the recording of pupil numbers undergoing enhanced special educational measures and/or an amended curriculum (adjusted learning targets in one, two or more main subjects) *(FSO, 2020d)*. There are 15 schooling variants (→ figure 37) derived from the combination of these measures and schooling types. Access to enhanced special needs educational measures is formally regulated. The individually ordered measures are based on the standardised assessment procedure (SAP) *(EDK, 2014)* or a similar procedure. The enhanced measures include psychomotor therapy and speech therapy[10] or specific support with visual, hearing and physical impairments, cognitive disorders or autism. Individual learning goals can be changed (curriculum adjustment) if a pupil fails or exceeds the learning goals by a large margin and over an extended period. They can be changed in one or more subjects. No diagnosis is required for individual learning goals, however a note is made in the report. Curriculum adjustments do not necessarily involve supporting measures. Relevant literature refers to the risk when curriculum adjustments are made without supporting measures. They do not entail any costs and therefore often go unnoticed. However, they have far-reaching consequences for the affected pupils *(Kronenberg, 2021; Sahli Lozano et al., 2020, 2021; Schellenberg et al., 2017)*.

37 Survey model on the teaching types in compulsory education

Percent values for the 2020/21 school year

Data: FSO; figure: *Kronenberg (2021)*

Class	Type	Measure	Curriculum	%
Mainstream classes	1	NSM	MC	93.72
	2	NSM	CA (1–2)	1.20
	3	NSM	CA (≥ 3)	0.48
	4	SM	MC	0.78
	5	SM	CA (1–2)	0.30
	6	SM	CA (≥ 3)	0.50
Special needs classes in mainstream schools	7	NSM	MC	0.44
	8	NSM	CA (1–2)	0.14
	9	NSM	CA (≥ 3)	0.33
	10	SM	MC	0.02
	11	SM	CA (1–2)	0.01
	12	SM	CA (≥ 3)	0.14
Special school classes	13	SM	MC	0.22
	14	SM	CA (1–2)	0.28
	15	SM	CA (≥ 3)	1.45

NSM No or simple measures
SM Enhanced special needs educational measures
MC Mainstream curriculum
CA (1–2) Curriculum adjustment in 1–2 subjects
CA (≥ 3) Curriculum adjustment in 3 or more subjects

10 These two interventions occur both as simple or non-reinforced measures and also as reinforced measures *(Kronenberg, 2021)*.

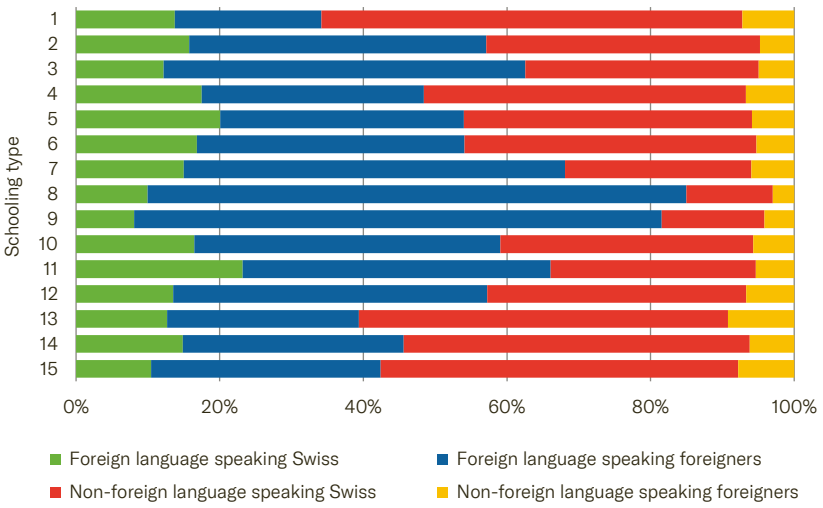
Distribution of measures to certain groups of persons

Besides the schooling in a mainstream class without enhanced measures and without curriculum adjustments, there are 14 more teaching opportunities for children with special needs educational needs, which are used to varying extents *(Kronenberg, 2021)*. For example, variants 2 and 4 are very much to the fore in mainstream school at 60%. There are differences as regards distribution of measures according to specific personality traits (nationality, foreign language or gender). Compared to the gender distribution in the mainstream classes, there are more boys than girls in preparatory classes (+21%), other special needs classes (+24%) or special school classes (+36%) *(FSO, 2021l; Lanners, 2021)*. Foreign and foreign language speaking pupils are overrepresented in special needs classes and also have more than twice as many reduced learning goals than Swiss children (→ figure 38). Taking account of only 3.4% of pupils with special educational needs who are integrated into schools, the share of Swiss is higher at 57% than that of foreign nationals. However, as many more Swiss (74%) than foreign nationals (26%) attend compulsory schooling, the foreign pupils are overrepresented. Looking solely at the distribution of Swiss pupils, it is apparent that they are more often integrated into mainstream schooling, especially the girls *(FSO, 2020d)*.

38 Pupils in compulsory education by schooling type and demographic features, 2020/21

Explanations on schooling types 1–15 see figure 37

Data: FSO



The impact of the enhanced measures for special educational needs and curriculum adjustments on the children's post-compulsory schooling cannot yet be determined based on current data, as the detailed data only covers few years. It thus will not be possible for a few years yet to statistically combine the curriculum status and education path of pupils until achievement of an upper-secondary education certificate. Those pupils who follow the mainstream curriculum in spite of enhanced measure, should be in a position to successfully complete upper-secondary level education. Not least because they also have the opportunity to request compensatory measures *(→ chapter Upper-secondary education, page 111)*. Those who, on the other hand, are taught predominantly using the adjusted curriculum during compulsory schooling, are suspected to only be able to achieve basic vocational level in exceptional instances.

School management and teaching staff

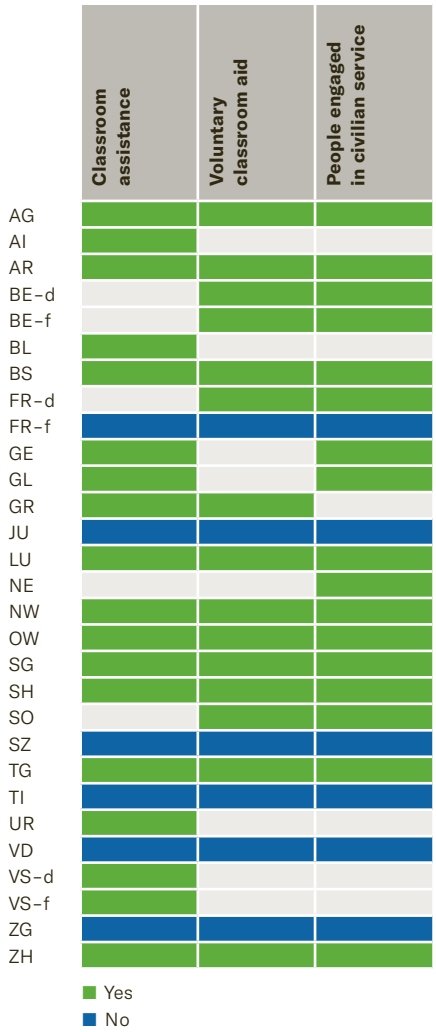
For several decades, most primary level teachers have been women. Most primary school headteachers are also women. There is a certain time lag with the increase in female teachers at lower-secondary level; it has been over 50% for about ten years. Most head teachers at lower-secondary level schools are male. One reason for the high proportion of women among the staff at the compulsory schooling level is the scope for part-time employment *(→ chapter Universities of teacher education, page 285)* with guaranteed equality of salary and promotion opportunities (school management). In other areas, part-time work often impacts remuneration or at least entails restricted career opportunities. Current research literature does not definitively answer the question of whether a teacher's gender is relevant to pupils' performance *(Antecol et al., 2015; Paredes, 2014; Winters et al., 2013)*. It emerged, independently of the gender of the teacher, that gender-specific stereotypes were detrimental to the performance of girls *(Carlana, 2019; Lavy & Megalokonomou, 2019; Terrier, 2020)*. A current extensive study from Finland is investigating the abolition of the male quota in teaching and now demonstrates a positive effect on a balanced gender ratio of teaching staff on pupils' performance at school and educational pathway. The effects may be related to certain unobserved male competencies or complementarities among teaching staff *(Schaede & Mankki, 2022)*.

The further development of compulsory schooling with regard to integration, daily structures and school autonomy leads on the one hand to schools employing staff with varying qualifications, besides the teachers. On the other hand, it becomes apparent that the different functions are differentiated in connection with different professionals. Support staff have been used increasingly for about ten years, for example classroom assistants, classroom volunteers such as senior citizens or, since 2016, also people engaged in civilian service *(Verordnung über den zivilen Ersatzdienst*, as amended on 1 July 2016). There are auxiliary staff in classrooms throughout almost every canton. The applicable cantonal provisions on employment and qualifications differ greatly (→ figure 39). However, there is no exact information on that or statistical data on the extent to which such support is used in schools. In addition, there has been next to no research to date regarding the nature and use of support staff. According to an exploratory Swiss study, classroom assistants often undertake

39 Use of support staff

Compulsory school in total, as at 2021

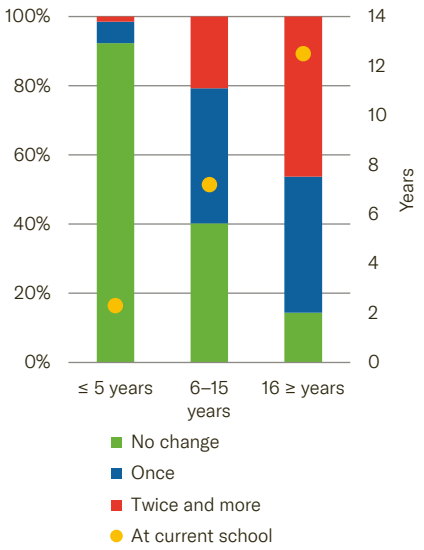
Data: EDK-IDES



40 Change of job and years of service in current position, 2021

Public schools at cycle 1–3; excluding school management boards for special areas such as music schools; monitored for gender and linguistic region

Data: SLMS; calculations: SCCRE



Legend
52% of school managers having been in the position for 16 or more years, have changed job no more than once. The group has been at the current school for an average of 12.5 years.

teaching-related tasks when administrative and organisational support is needed under the regulations *(Vogt et al., 2021)*. The research literature on the effect of classroom assistants does not present a clear picture. On the one hand, there are negative findings showing that strong assistant support leads to less interaction with the qualified teacher and poorer learning outcomes when comparing pupils with similar characteristics *(Webster et al., 2013)*. On the other hand, other studies indicate a positive causal effect of classroom assistants on school performance *(Hemelt et al., 2021)*.

For about two decades, schools in Switzerland have been institutionally managed by school management boards[11] that are responsible for staff as well as school and teaching quality *(EDK, 2019a)*. School managers therefore play a central role in terms of quality assurance. There is a comprehensive body of research literature confirming the importance of the school management to school success. School management boards are not just central to staffing decisions and other factors that can directly and indirectly impact pupil's learning outcomes, but also to the general school climate. Various studies also indicate that fluctuation at school management level is also associated with higher staff fluctuation at the school and a lower level of learning progress among the pupils *(Bartanen et al., 2019; Burkhauser, 2017; Kraft et al., 2016; Miller, 2013)*. According to the *Schulleitungsmonitor Schweiz* (SLMS)[12] the school managers surveyed have been in their role for ten years on average, about seven of which have been with their current school (only cycle 1–3 state schools without particular specialisms, i.e. music schools etc.). These positions are therefore rather stable and 85% of those surveyed said that they had not changed school more than once in their capacity as a management member. The share of school managers who have changed job a number of times increases markedly in line with seniority (→ figure 40). About half of school management board members (55%) work 100%, the others often teach as well at varying employment levels. The size of the management team varies greatly. There is also a marked disparity in terms of employment level among the school management, for example smaller schools with fewer than 20 teachers have managers working from 20% to 100% (→ figure 41). In non-German speaking Switzerland, the employment level among school managers tends to be higher than in the German-speaking part of the country (→ figure 42).

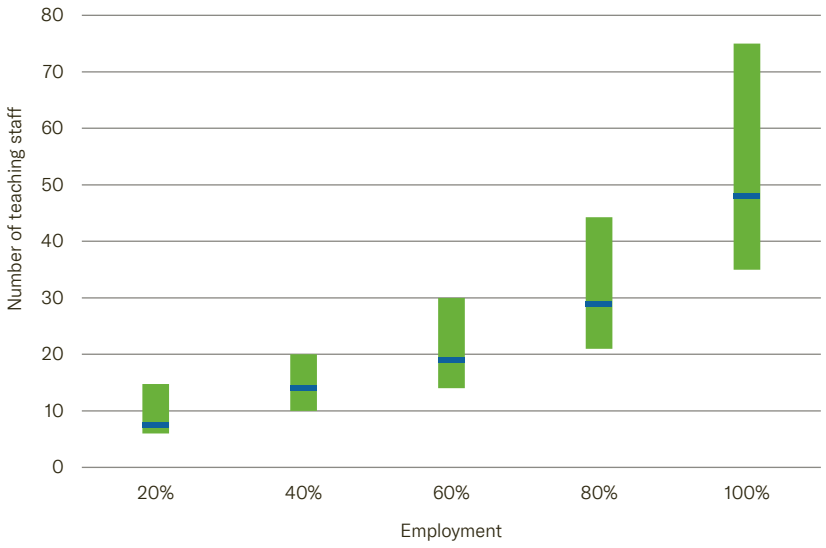
11 Canton Schaffhausen represents an exception. Cantonal legislation does not stipulate that schools must be run by school directors. In 2017, the corresponding ordinance was adjusted, so that the municipalities can voluntarily appoint school directors, which some of the municipalities have done in the meantime.

12 The SLMS (survey of school management boards in Switzerland) is a cooperation project of the School Leadership Association Switzerland (VSLCH), the School Leadership Association of French- and Italian-Speaking Switzerland (CLACESO) and the PH FHNW, which is supported by the Mercator Schweiz Foundation and the Jacobs Foundation *(Tulowitzki et al., 2022)*.

41 School management workload and team size 2021

Public schools at cycle 1–3; without school management boards for special areas such as music schools; number of teachers: in absolute figures without accounting for level of employment; blue: median, green: middle 50%

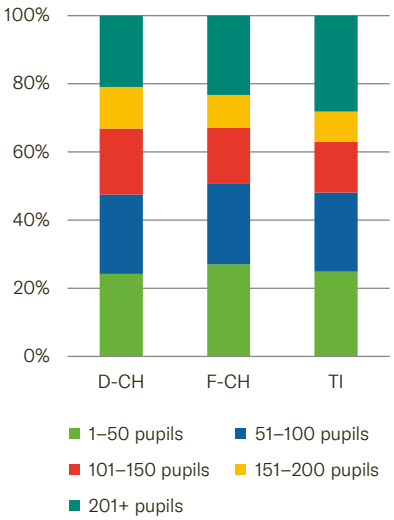
Data: SLMS; calculations: SCCRE



42 School size by linguistic region

Only public schools excl. special schools, 3rd–11th school year; 2019/20, excl. special schools, 3rd–11th school year

Data: FSO; calculations: SCCRE



43 Return to onsite teaching in May 2020

Data: EDK, cantons

Teaching	Cantons
Regular onsite teaching	AG, AI, AR, BL, BS, GL, GR, LU, NW, OW, SH, SO, SZ, TG, UR, ZG
Half-class teaching for a maximum of 2 weeks	BE, JU, NE, FR (prim), GE (prim), VD (prim), VS (prim)
Half-class teaching for 3 to a maximum of 5 weeks	SG, TI, ZH, FR (Sec I), GE (Sec I), VD (Sec I), VS (Sec I)

Compulsory schooling during the Covid-19 pandemic

Compulsory schooling was massively impacted by the Covid-19 pandemic in 2020 and 2021. As instructed by the Federal Council, all lessons were conducted remotely for eight weeks during the pandemic (16 March to 10 May 2020). The teachers had to work remotely, the pupils had to study from home and parents were to help their children – as much as possible. To support the teachers and families, about half of the cantons drew up an official guide on remote learning with information on school material, the number of online lessons, pupil assessments and possible groups of tasks. Depending on school level or canton, there were major differences in terms of the number of online lessons to be held. While the curriculum was adhered to in most cantons in spite of the distance learning – albeit at a slower pace – other cantons preferred to go over past teaching content again *(Brüderlin et al., 2020; Canton de Vaud, 2020; Garrote et al., 2021; Kanton Bern, 2020; Kanton Zug, 2020)*. When onsite lessons resumed, the cantons selected different paths in accordance with the federal system (→ figure 43). In April 2020, the EDK decided the 2019/20 school year counts as a full compulsory schooling year and the school time will therefore not be lengthened. Reports for all classes include a comment (there was no onsite teaching during the Covid-19 pandemic). The provisions determining the type of grading during the distance learning were left up to the cantons; they are therefore not uniform *(EDK, 2020, 2021a)*.

Effects of distance learning

Pandemic-induced distance learning (school closures and quarantine cases) and the associated increased use of digital learning led to the initiation of over 30 studies on the influence of distance learning. A fifth of these are international studies that include Switzerland, in 6% of cases the specific influence of distance learning on children with special needs or the influence on equality of opportunity are evaluated *(Cecchini & Dutrévis, 2020; Garrote et al., 2021; Helm et al., 2021; Neuenschwander, 2020)*. There are many redundancies in terms of questions and groups of persons surveyed. Moreover, the evaluations are mainly based on random samples, i.e. samples involving persons who randomly and voluntarily made themselves available for the study or survey. As most of these studies were to deliver immediate results under considerable time pressure, they were generally not designed to examine the long-term consequences of distance learning, providing a short-term snapshot of the situation instead. As a result, most of the studies provide no, or only very limited, evaluations regarding the influence of distance learning on medium or long-term learning success, equality of opportunity or even sustainability of digital teaching following the switch back to onsite lessons *(→ Digitalisation, page 47)*.

The different evaluations show that the compatibility of working from home and distance learning was a very big challenge to the parents or guardians. One of the biggest problems cited was that parents often felt they were expected to assume the role of teachers for their children. There was also the limited space from so many persons having to work and take their lessons in the same household, as well as the timing issues involved in undertaking multiple tasks in parallel *(Helm et al., 2021; Sieber et al., 2020; Siebert Egger & Unterweger, 2022)*. The children complained about a lack of contact with people of the same age, teaching staff often reported being overstretched by obscure digital learning offerings or having too little support for their new tasks.

Different studies examined pupils' daily study time while schools were closed. Unsurprisingly, the consensus was that study times varied greatly. This was evident, for example, between the poor and strong performers, but also between children with non-academic and academic parents. There were also differences in terms of quality of study time and the question of what the time was used for *(Huber et al., 2020; Werner & Woessmann, 2021)*. To date, only one study in German-speaking Switzerland has examined learning progress during school closures in that results of the Mindsteps[13] collection of tasks created shortly before the schools closed were compared with those originating from when the schools were closed *(Tomasik et al., 2021)*. Learning progress among secondary school pupils remained about the same as with onsite lessons during the distance learning period in spring 2020. Primary school pupils, on the other hand, learned a lot less while at home than when in school.

Normally it should have also been possible to measure the influence of distance learning on the competency acquisition of Swiss pupils through cantonal diagnostic testing. However, many cantons decided not to conduct such surveys given the extraordinary situation in 2020. Other cantons postponed the tests by several months in some cases, so the tests predating the pandemic were no longer comparable with those conducted post-pandemic as they were conducted at different times (→ figure 44). Analyses were only possible for specific subjects or school levels in the few cantons where the tests were conducted regularly *(→ chapter Primary school level, page 53; → chapter Lower-secondary education, page 83)*. figure 45 shows an overview of the diagnostic testing in all cantons in the school year 2020/21.

13 Mindsteps is a learning platform. It provides schools with a collection of 245,000 tasks for the subjects German, English, French and Mathematics (Cycle 2 and 3 of *Lehrplan 21*).

44 Conducting of cantonal diagnostic assessments following school closures

Conducted in 2019/20 school year

Data: EDK-IDES, cantons

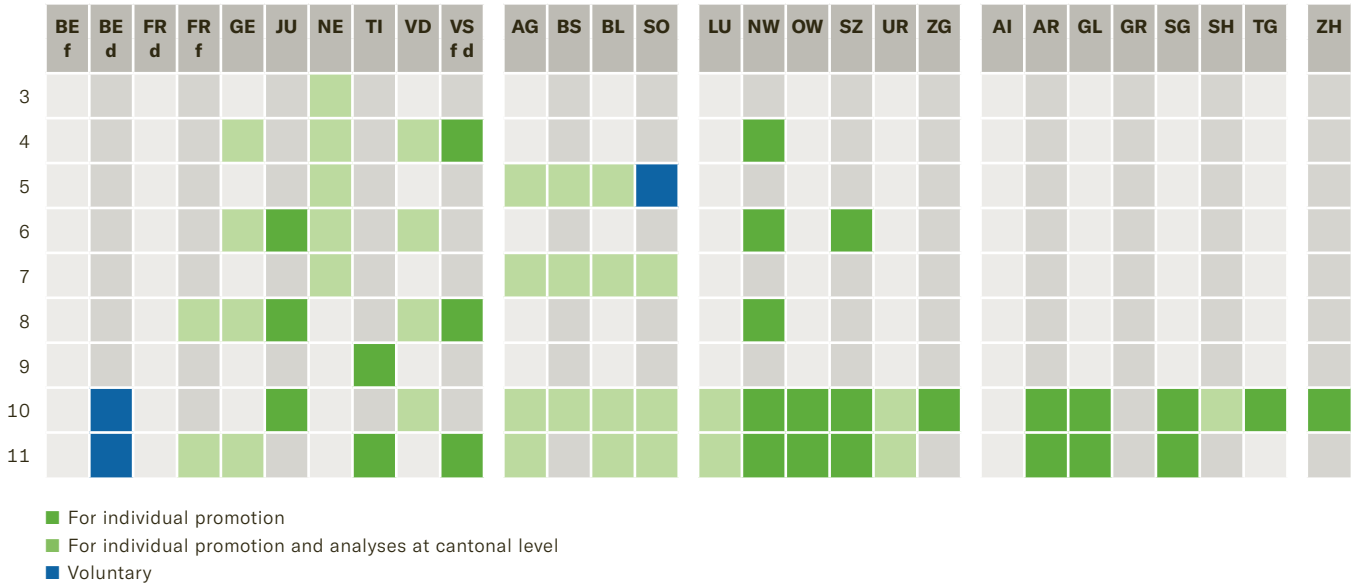
Diagnostic testing	Cantons
Not completed	FR-f, GE (H4, H6, H8), GL, LU *(Stellwerk 8)*, NWCH* (Check S3), SZ, SH (Stellwerk 8), TI, VS-d/f, VD (H10)
Conducted regularly	GE (TAF), LU *(Stellwerk 9)*, NE, NW, NWCH* (Check P3), OW, VD (H4, H6 und H8), ZH
Survey postponed, partially carried out in autumn 2020	AR, BE-d, NWCH* (Check P5, Check S2), SG, TG, UR, ZG
No obligatory surveys	AI, BE-f, FR-d, GR

NWCH* AG, BL, BS, SO

Stellwerk test 9 in Canton St. Gallen was voluntary, as in Canton Appenzell Ausserrhoden and Canton Uri. In the latter instance, however, all the pupils took part in the test. The implementation period was extended in cantons Uri and Zug, as it was for *Stellwerk* test 8 in Canton St. Gallen.

45 Cantonal diagnostic assessments by canton and school year, 2020/21 school year

Data: EDK-IDES



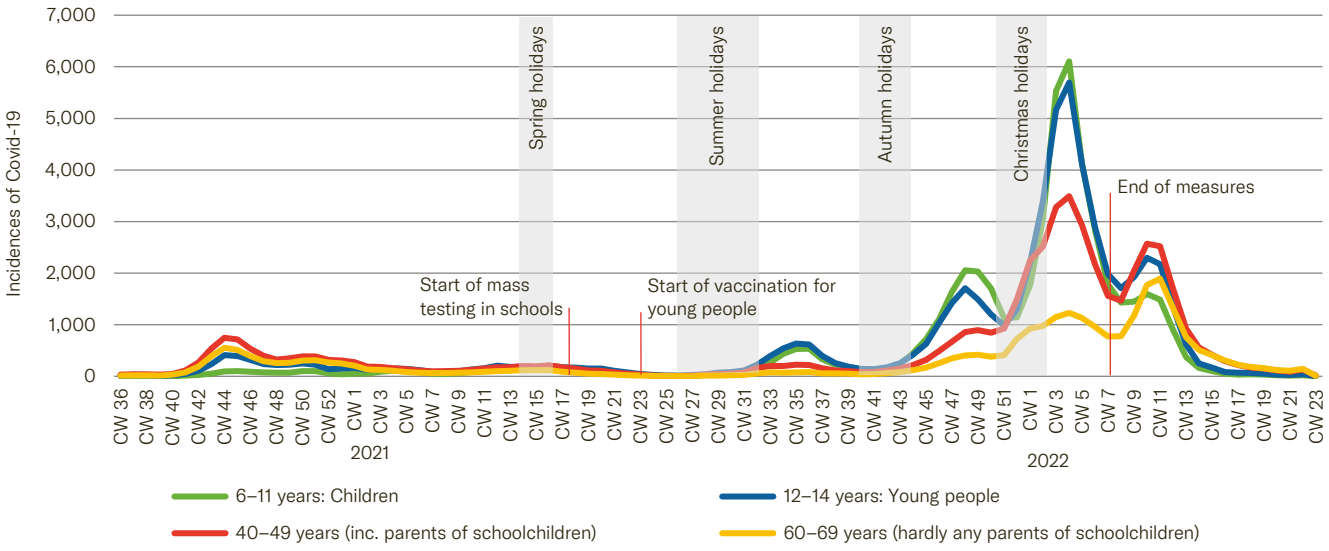
Quarantine cases in schools

Children and young people received media coverage as drivers of the Covid-19 pandemic. The most varied developments influenced this discussion. The asymptomatic presence of the infection in children meant they were not tested so often during the initial phase and the infection rate was thus underestimated. Long-term studies such as Ciao-Corona at the University of Zurich or SEROCoV-Schools at the University of Geneva show that the proportion of children who were infected and developed antibodies increased tenfold from June 2020 to April 2021. The infection rate was thus comparable with that of the parents and school staff *(Lorthe et al., 2022; Ulyte et al., 2020)*. Mass testing in schools from May 2021, on the other hand, led to disproportionately high testing of children and young people, which was again reflected in the infection rate. This increased for children and young people after the end of each vacation, as for the rest of the population. The increase in schools was disproportionately high after the outbreak of the omicron variant at the end of 2021 (→ figure 46). This was also due to the fact that vaccination was available much later in children and adolescents than in the rest of the population and that many schools had reduced the strong protective measures that were still applied in the winter of 2020/21.

Quarantine measures were reintroduced in schools for individual pupils, entire classes and even entire schools during the second wave of the pandemic. These quarantine cases posed major challenges to teachers and families. The figures are not available to determine how many classes or schools were actually impacted in 2020. At the start of 2021, when infection rates rose, the EDK therefore started to monitor the number of school closures in the cantons, whereby not all the cantons delivered the data. At primary level, entire classes were quarantined more often than

46 Development of incidences by age category, August 2020 till April 2022

Data: FOPH



at lower-secondary level due to the number of infections. The peak levels following the summer holidays, however, never exceeded the 1.5 percent mark (per week), which equates to about 286 classes being sent to quarantine every week.

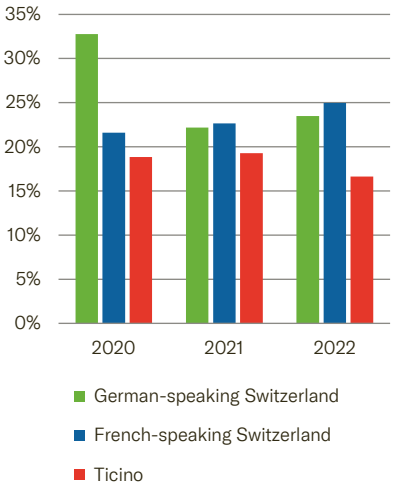
Digitalisation

Until recently, there was no national data basis that would have enabled periodic and standardised snapshots of the status and development of digitalisation in schools. Specific reports and surveys *(Educa, 2021)* documented on the basis of various data – gathered at different times and covering different pupil populations and school levels – that schools in Switzerland had improved their infrastructure in recent years and that digital technologies were being more widely used. As there were no real-time and regular surveys before the Covid-19 pandemic covering all school levels and types, such a survey was introduced in 2020 providing up-to-date results for three surveys (autumn 2020, spring 2021 and spring 2022). This national monitoring covers compulsory and upper-secondary level schooling and reports on the status of digitalisation from the perspective of the pupils and those undergoing vocational training. The survey covered the availability of digital facilities and their use *(Oggenfuss & Wolter, 2021a, 2021b)*.

47 Private acquisition of digital end devices

Share of pupils who report that their family has acquired an end device; monitored for different individual characteristics

Data: *Monitoring Digitalisierung*; calculations: SCCRE

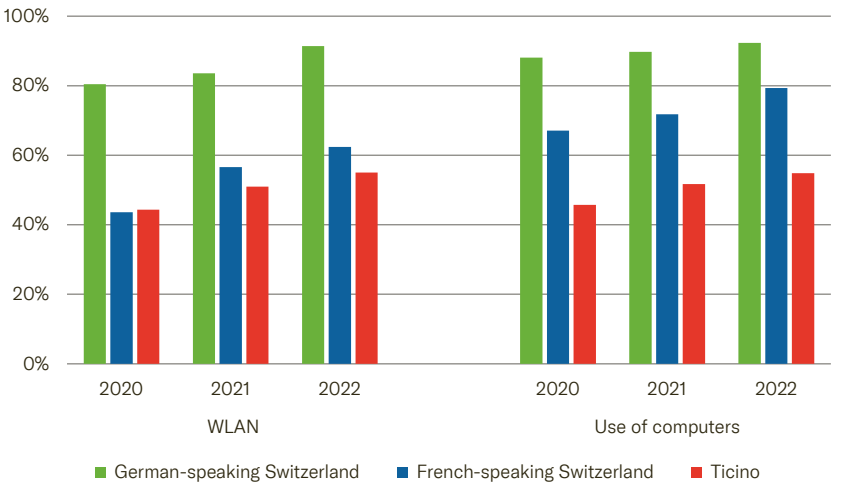


This monitoring only started in autumn 2020 in contrast to the numerous studies on school closures. The question was whether and to what extent experiences with distance learning in spring 2020 had a sustainable impact on an expansion and acceleration of digitalisation in education. Since the first survey up to 2022, there was an increase in the use of computers in schools and specific digital applications. However, as there was no direct comparison with data before the pandemic, this increase cannot be attributed to the pandemic. The only short-term boost was in autumn 2020 in connection with the private acquisition of digital end devices. 30% of pupils in compulsory schooling said their family had acquired at least one new device in spring 2020 (when the schools closed). This proportion fell markedly in follow-up surveys (22%), mainly due to German-speaking Switzerland. A catch-up effect was noted in French-speaking Switzerland (→ figure 47). There are major language-regional differences not only in the private acquisition rate of digital end devices, but also in the equipping of schools and use of digital aids (→ figure 48), which were also evident in 2022. The requirement of being able to study with digital aids therefore does not apply to the same extent throughout all the linguistic regions.

48 Internet availability and use of computers in schools by language region

Share of pupils saying they have WLAN at their school or who say that they use computers at school; monitored for different individual characteristics

Data: *Monitoring Digitalisierung*; calculations: SCCRE



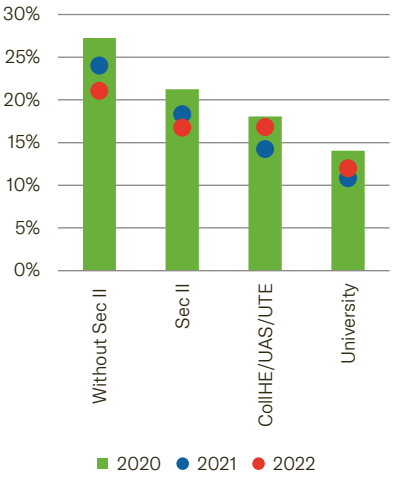
Even if the documented availability and intensity of use does not reflect the relevant information on quality of use for the learning process *(Educa, 2021)*, the following can still be said: In those places where digital devices are not so widespread, the degree of digitalisation is lower and it is also lower when the devices are available, but used sparingly. Moreover, there are major differences between the different educational levels in terms of use *(→ chapter Primary school level, page 53)*. It should also be borne in mind that broad distribution of digital devices and their intensive use in lessons does not actually say anything about the effectiveness of teaching with digital aids. Monitoring will not provide the answer to this fundamental question, instead it must be subjected to further research *(→ chapter Lower-secondary education, page 83)*.

Monitoring also shows differences with regard to internet speed at home. This is connected to the parents' education level. Speed of internet access has emerged in research as a central condition for the effective application of digital education. It is not in itself sufficient but is is indispensable to the effective application of digital teaching and learning approaches. For all surveys, almost twice as many pupil respondents whose parents do not have any post-compulsory education thought their internet connection at home was too slow relative to respondents whose parents have a university degree (→ figure 49).

49 Assessment of internet quality by parents' education

Share of persons who think their internet access at home is too slow, monitored for various individual characteristics; without Sec II: no post-compulsory educational qualifications

Data: *Monitoring Digitalisierung*; calculations: SCCRE



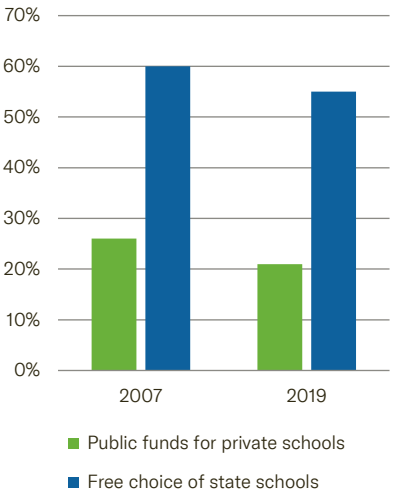
Private school, private tuituion and homeschooling

Only a small minority of pupils in Switzerland attend private school during their compulsory education. Private school attendance across Switzerland is at 4.6% (2019/20 school year) and has been stable over the past decade. There is therefore no evidence of growing demand for private education at national level. This outcome matches the results of two representative surveys of the Swiss population in 2007 and 2019 (→ figure 50). In 2019 and about ten years earlier, most adults surveyed were not in favour of using public funds in support of private schools. Only a free choice of school in the public school system was supported by the majority *(Diem & Wolter, 2013)*. A higher proportion of foreign pupils attend private schools. At 7.5%, it is almost twice as high as the proportion of Swiss pupils (→ figure 51). However, this difference has also remained constant over the years. Private school attendance, however, is not generally higher among pupils of a foreign nationality, it applies more to those children whose parents are well educated, irrespective of whether the parents speak the school language at home. The ratio of private schools in cantons with a high share of well qualified foreign nationals (Basel-Stadt, Geneva and Zug) is accordingly much higher than in other cantons.

50 Support for private schools and agreement with free choice of school

Approval rate among the Swiss population (only those entitled to vote); representative surveys

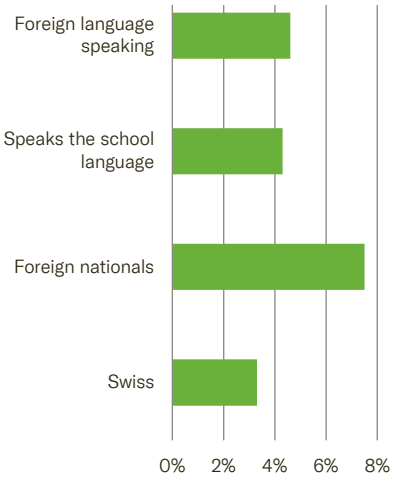
Data: Centre for Research in Economics of Education, University of Bern



51 Private school ratio by first language and nationality, 2020/21

Visit to a non-subsidised private school; excl. pupils who attend a special school; monitored for individual characteristics

Data: FSO (LABB); calculations: SCCRE



There is a statistically significant difference between the foreign language and non-foreign language group and between Swiss and foreign nationals.

Before the pandemic-induced school closures and classroom measures, the individual cantons reported an increase in requests from parents to teach children privately or to be privately taught. Subsequently, individual cantons revisited their relatively liberal approach to their regulations and increased their demands or were more exacting with their requirements for homeschooling (e.g. Aargau 2019 and Bern 2022). The Covid-19 pandemic led to twice as many children being taught at home in some cantons during the 2020/21 school year than in the years preceding the pandemic. In spite of the strong uptake in homeschooling in some cases, it remains marginal in Switzerland, as under 1% of pupils undertake home tuition.

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION AND TRAINING

PRIMARY SCHOOL LEVEL

Context

Early childhood education and care

Early childhood education and care involves supporting children during their learning process from birth to starting primary school. In most cantons, pre-school age is the time from birth to the fourth birthday *(Dratva et al., 2019)*. According to the HarmoS Agreement, the child's schooling begins when they reach the age of four *(→ Institution, page 60) (EDK, 2007)*. Besides general offers for the early nurturing of children and their families (e.g. in play groups, daycare centres or with childminders) there are also special offers for the early nurturing[1]. This is for families with children in need of specific support to enhance their resources (e.g. courses for foreign-language speaking children, therapeutic early education, special educational needs measures). Even though all types of canton have conducted projects involving early language learning among foreign-language-speaking children from a migration background for a number of years, to date only cantons Basel-Stadt and Thurgau have established an obligatory selective scheme for attending such courses. The feedback is positive for this comprehensive early language screening for children who don't speak German at home. It is not yet possible to scientifically gauge how effective these courses are as they are relatively recent *(Grob et al., 2014, 2019)*.

Pre-school care: supply and demand

Subsidised federal projects since 2018: As of 2018, there is another federal project to subsidise the cantons and municipalities. It aims to reduce daycare costs for parents. There are also subsidies for projects contributing to the optimisation of the daycare offering by adapting it more to parental requirements *(FSIO, 2018)*.

Childcare offered outside the family circle is important to ensure compatibility of work and family and to support the child's development *(FSO, 2017a)*. The activity programme of the Swiss Conference of Cantonal Ministers of Education (EDK) for 2021–2024, improving cooperation to that end with the Swiss Conference of Cantonal Social Services Directors (SODK) is explicitly stated as a goal *(EDK, 2021c)*. Based on a parliamentary initiative (Nr. 00.403), the Confederation launched an incentive programme in 2003 to promote and provide financial support for extra-familial nursery places for children. In the eighteen years since the federal law came into force, 3601 applications have been approved. In response, the childcare offering was significantly increased with the creation of 35,300 new places *(FSIO, 2022)*. In 2017, there were about 62,500 places in Switzerland for pre-school-age children in daycare centres. The comparison with data from the national research programme NFP 60[2] from 2009 and 2011 shows an average increase in the supply rate (number of places in relation

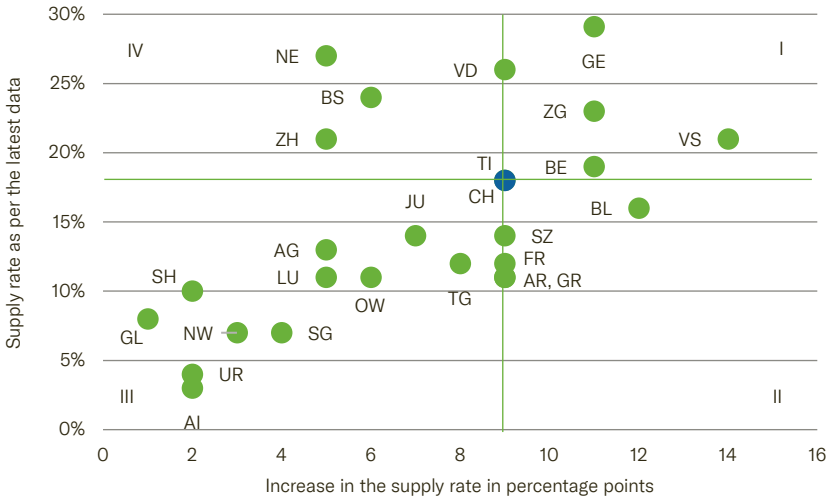
1 Federal Constitution, Art. 62 para. 3

2 In 2007, the Federal Council mandated research project NFP 60 *"Gleichstellung der Geschlechter"* financed by the SNSF. Between 2010 and 2013, gender equality policy and corresponding measures in Switzerland were investigated in 21 research projects. The research programme was completed in 2014.

to the number of pre-school-age children) of about nine percentage points *(FSIO, 2017)*, meaning that the number of childcare places more than doubled. Nevertheless, the supply rate remains very low at well under 20%. The current supply rate and development thereof varies markedly among the cantons (→ figure 52).

52 Care for pre-school-age children and development in the supply rate between 2009 and 2017

Data: *FSIO (2017)*



Legend
Canton Geneva (Quadrant I) has a high supply rate and above-average increase in the supply rate (11 percentage points). Canton Basel-Stadt (Quadrant IV) has a high supply rate, but it has only increased slightly (6 percentage points).

In the second assessment date, the supply rate correlates with the increase in the supply rate during the previous eight years. Current differences in supply rates in most cantons are thus a consequence of the recent development in the creation of daycare places. However, this most recent development, as shown by figure 52 does not result from the different take-up levels of federal subsidies as they are not correlated to the development of the supply rate. Instead, they must be due to cantonal characteristics.

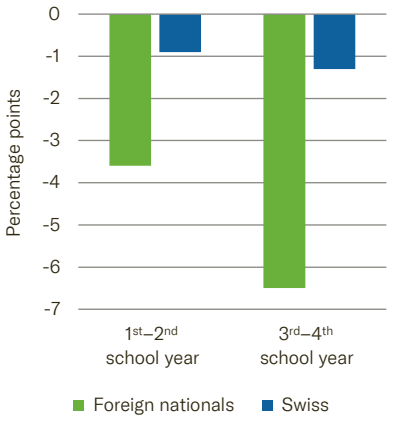
Support in applying for a place at daycare

A study from Germany proves that support programmes for families applying for a daycare place can reduce socioeconomic disparities. The application rate and take-up of a daycare place among less educated families could therefore be significantly increased. The measure did not add value for parents with a higher level of education *(Hermes et al., 2021)*.

53 Effect of early childhood education and care

Reduction in the repetition rate

Data: FSO, FSIO; calculations: SCCRE



Heterogeneous use and effect of pre-school care

Many studies show that pre-school-age care offerings in daycare centres have a positive impact on children's development and on their educational and employment prospects in later life *(Hermes et al., 2021; Fryer et al., 2015; Grob et al., 2019)*. However, other studies also indicate negative effects: the rate of children displaying socially problematic behaviour (e.g. aggression, ADHD symptoms or depression) is slightly higher among children who spend a lot of time in extra-familial care *(Averdijk et al., 2011, 2019; Drugli et al., 2018)*. However, there is no disputing that the quality of care is pivotal to the impact *(Balthasar & Kaplan, 2019; Bleiker et al., 2019 ; Vogt et al., 2022)* and that children from less educated families benefit from extra-familial care. That is why daycare centres can make a major contribution to achieving a fair education system *(Bjorklund & Salvanes, 2011; Camehl & Frauke, 2017; Eryigit-Madzwamuse & Barnes, 2014; Melhuish et al., 2015)*. In Switzerland, the effect of the increase in daycare places financed by federal subsidies was also researched. There was almost no effect on the stability of the education path for Swiss children in the first cycle at primary level. For children from a migration background, on the other hand, there is evidence that attending a daycare centre reduces the likelihood of repeating a school year by up to seven percentage points (→ figure 53). However, this data unfortunately includes no information as to whether children with a foreign nationality made more use of the offering or not. Numerous foreign studies show that children who would derive the greatest potential benefit from attending a daycare centre are those who attend daycare the least *(Cornelissen et al., 2018; Hermes et al., 2021)*.

Besides pre-school extra-familial care, there is also demand for school-age care to improve the compatibility of family and work. The cantons are obliged under the HarmoS Agreement to prepare wraparound care during compulsory schooling *(EDK, 2007)*. This are primarily additional, voluntary childcare modules before and after school and on afternoons where there are no lessons, as well as supervised care at lunchtime (known as midday meal). Moreover, in recent years there have been more projects for wraparound care or all-day schools with obligatory care offerings (e.g. *Zürcher Tagesschulen 2025*, *Ganztagesschulen Stadt Bern*), albeit mainly in an urban setting.

Development of and forecast for pupil numbers

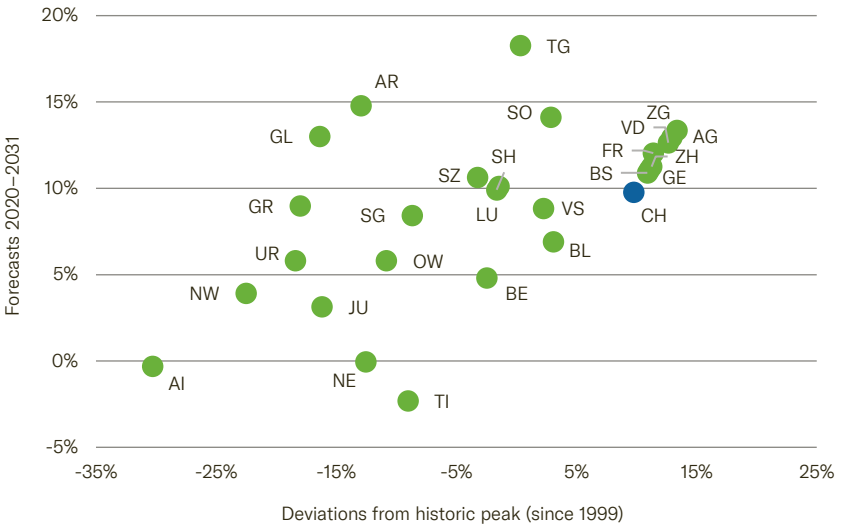
While pupil numbers at primary level (3rd–8th school year) continued to fall throughout the 2000s, they have grown by 22% since 2010 (94,680 children). In the 2020/21 school year, the primary level accounted for 530,230 pupils. In connection with the structural harmonisation (HarmoS Agreement), there was a further, non-demographic increase in pupil numbers in the first and second years at primary school level (kindergarten). Due to the introduction of compulsory attendance or the mandatory offer of the first and second school years, the number of children attending the first and second years at primary school level has risen consistently.

The strong growth of the past decade should also apply throughout the coming decade according to the Federal Office of Statistics' (FSO) reference scenario *(FSO, 2021k)*. According to these forecasts there will be an increase throughout Switzerland of 10% from 2020 to 2031 (3rd–8th school year). Developments in cantonal pupil numbers deviate very strongly from the Swiss median value in keeping with the different dynamics of population growth in the individual cantons (→ figure 54). The effects of these developments in terms of infrastructure adaptation and need for teaching staff depend on whether the cantons can achieve new highs with growing pupil numbers. The latter will trigger new investments and new appointments. The historical highs since 1999 will be greatly exceeded inter alia in cantons Aargau, Fribourg, Vaud and Zug.

54 Development in pupil numbers and forecasts, 3rd–8th school year at primary level

Deviations from the historic peak since 1999 and from 2020 to 2031 on the basis of the reference scenario

Data: FSO; calculations: SCCRE



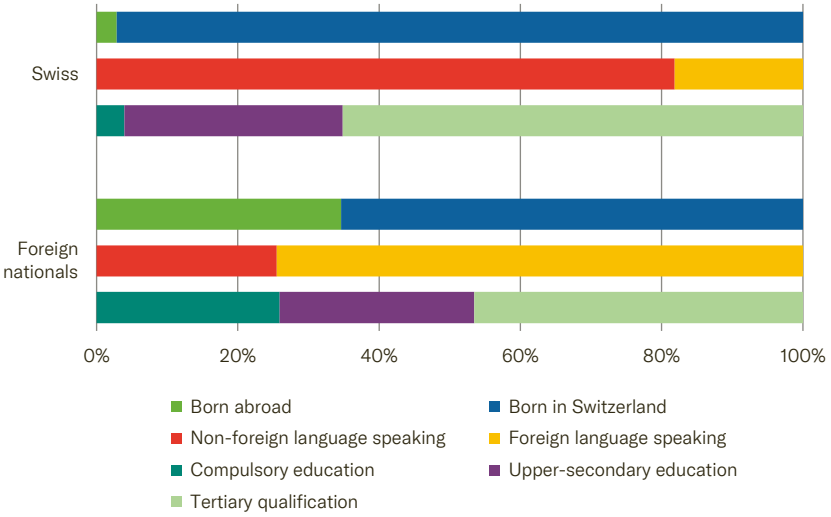
Composition of pupil population

Sociodemographic pupil characteristics, such as origin (migration background) and first language, are important framework conditions for school and tuition *(→ Equity, page 78)*. In the 2020/21 school year, about 73% of primary school pupils (3rd–8th school year) had Swiss citizenship. Only 3% of them were born abroad; 18% spoke another language to the school language at home (→ figure 55). The nationality of the pupils is not a static value at the primary level. While naturalisations already play a role at primary level, their significance for lower-secondary level and in particular upper-secondary level is more pronounced still *(→ chapter Lower-secondary education, page 83; → → chapter Upper-secondary education, page 111)*.

55 Pupils by migration background, language and parents' education, 2020/2021

Primary level, 1st–8th school year, incl. special schools and private schools

Data: FSO (LABB); calculations: SCCRE



Schools facing special challenges

A highly heterogeneous pupil population poses a major didactic and educational challenge to schools and teachers. Schools with a very high proportion of foreign-language-speaking children, children with a migration background or children from uneducated families are especially challenged *(Cattaneo & Wolter, 2012; Coradi Vellacott et al., 2003)*. These challenges are often met with extra resources, as in cantons Aargau, Geneva or Zurich for example *(→ margin text, page 59)*, where these schools receive additional financing and staff *(Jaeggi et al., 2012; Jaeggi & Osiek, 2008; Maag Merki et al., 2012; SCCRE, 2014)*.

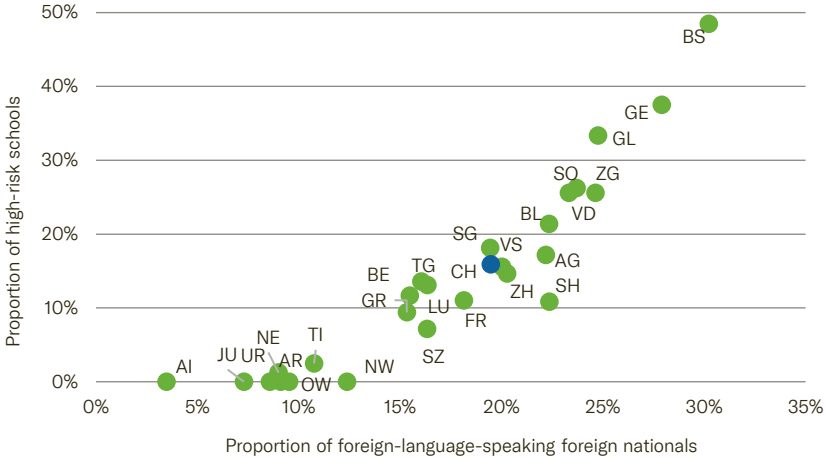
Various studies of academic achievement show that foreign-language-speaking pupils or pupils from uneducated families are more at risk than their peers of poor performance at school *(→ chapter Lower-secondary education, page 83)*. This applies even more, when a child has some of the following characteristics. In Switzerland 11% of pupils (3rd–8th school year, 2019/20) are from uneducated families (at least one parent does not have a post-compulsory school-leaving certificate); 19% of children are foreign nationals who speak a foreign language. The share of children, at about 6%, displaying all three risk factors, i.e. foreign-language-speaking, foreign national and uneducated, is relatively low.

Pupils with risk factors in Switzerland are unevenly distributed across schools. About 16% of primary schools have a share exceeding 30% of foreign-language-speaking foreign nationals (hereinafter high-risk schools[3]). There are major cantonal differences in the share of such schools and in the share of the high-risk pupils in those schools (→ figure 56). As can be expected, the share of high-risk schools correlates closely to that of foreign-language-speaking pupils in the canton. Nevertheless, if cantons with low proportions of foreign-language-speaking foreign pupils have a relatively high share of high-risk schools, this testifies to a highly uneven distribution of these children among individual schools.

56 High-risk schools and foreign-language-speaking foreign pupils by canton, 2019

3rd–8th school year; high-risk schools: schools with more than 30% foreign-language-speaking foreign nationals

Data: FSO (LABB); calculations: SCCRE



3 When determining high-risk schools, the pupils' social background cannot be taken into account as this information is only available for a sample of pupils.

Resources for multicultural schools

Aargau: Since the 2020/21 school year, resources in state schools have been allocated at a flat rate based on standardised legal and statistical values. This enables linguistic and social factors and the framework conditions to be taken into account on site. The calculation basis is, on the one hand, the number of foreign nationals and proportion of social security claimants and, on the other hand, the ratio of low-income people where each child lives.

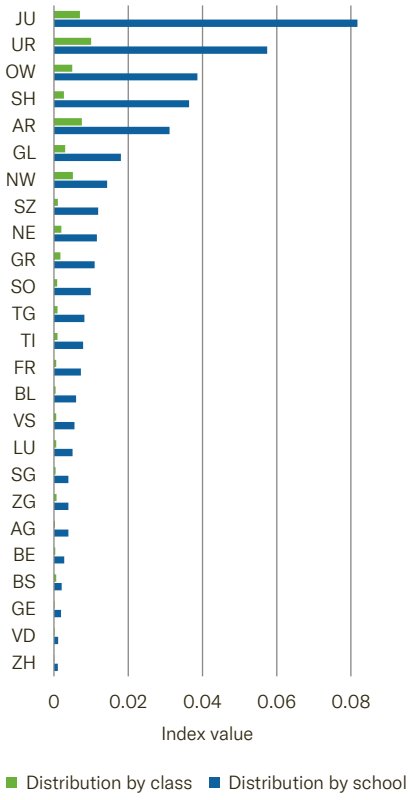
Zurich: Schools with over 40% foreign-language-speaking pupils are included in the Zurich Quality in Multicultural Schools (QUIMS) programme and receive professional and financial support, e.g. through more intensive language tuition and promotion of social integration.

Geneva: In project *Réseau d'enseignement prioritaire (REP)* in Geneva, schools receive extra resources when the following two conditions are met: the proportion of parents with a low socioeconomic status is at least 55% and that of foreign-language-speaking children above 60%. These schools also benefit from the cooperation with the youth welfare office and the presence of socioeducationally oriented staff.

57 Uneven distribution of pupils with risk factors by canton

Appenzell Innerrhoden is not included in the chart for reasons of readability.

Data: FSO (LABB); calculations: SCCRE



The **Herfindahl index** is a measure of concentration that measures the distribution of specific characteristics. In an initial step, an index was calculated per canton, that would apply if pupils displaying risk factors were ideally or evenly distributed across schools and/or classes. The chart shows the deviation of the actual distribution from the ideal value. The higher this index value, the more the actual distribution in the canton deviates from an even distribution.

The Herfindahl index gives an indication of an uneven distribution of foreign-language-speaking foreign pupils in schools (→ figure 57). The values show, on the one hand, that these deviations are larger when gauged at school level. However, the classes are more relevant for teaching than the schools. The distribution of foreign-language-speaking foreign pupils among classes can be steered through the school system, while distribution across schools depends more on factors (e.g. geographic segregation) that schools cannot influence. On the other hand, it is apparent that cantons with very low proportions of foreign-language-speaking foreign pupils normally deviate a lot more from the ideal distribution across schools and classes than cantons with very high proportions of such pupils.

Institution

The primary level lasts eight years in the Swiss education system and covers the first to the eighth school year. The first two school years correspond to kindergarten or the first two years of the entry level. The structural harmonisation has led to changes in the duration and structure of the primary level. Nonetheless, there are still differences in the structuring of the first cycle (1st–4th school year) or the transition to the second cycle (5th–8th school year) at lower-secondary level *(→ chapter Compulsory education, page 27)*.

Organisation of the first cycle

The first two school years can be organised in different ways. The HarmoS Agreement *(EDK, 2007)* has no stipulations in that regard. 17 cantons included two years of kindergarten or the first two years of the entry level into compulsory education. The primary level is accordingly eight years in these cantons. These 17 cantons comprise the 15 HarmoS Agreement signatories plus cantons Aargau and Thurgau. In seven more cantons, the primary level is also eight years, although only seven years of attendance is required (Appenzell Ausserrhoden, Appenzell Innerrhoden, Luzern, Nidwalden, Schwyz, Uri) or six years (Graubünden) (→ figure 58). One year of kindergarten is obligatory in cantons Obwalden and Zug. The municipalities there are not obliged to offer two years of kindergarten *(EDK, 2019a)*. Another way of adding flexibility to the initial school years is the preparatory stage being offered either as a "*Grundstufe*" (two years of kindergarten and the first primary class) or as a "*Basisstufe*" (two years of kindergarten and the first two primary classes). The added structural flexibility brings advantages. Bypassing the selective threshold of transferring from kindergarten to primary school is seen as a gain *(Hutterli et al., 2014; Lanfranchi, 2002, 2007)*. Different cantonal studies address the kindergarten situation, which has changed through structural harmonisation and evaluate the current situation *(Edelmann et al., 2018; Fasseing Heim et al., 2018; Imlig et al., 2019)*. To date, there has been no research on the question as to how these different structures impact the education path over the long term.

School entry age and cut-off date

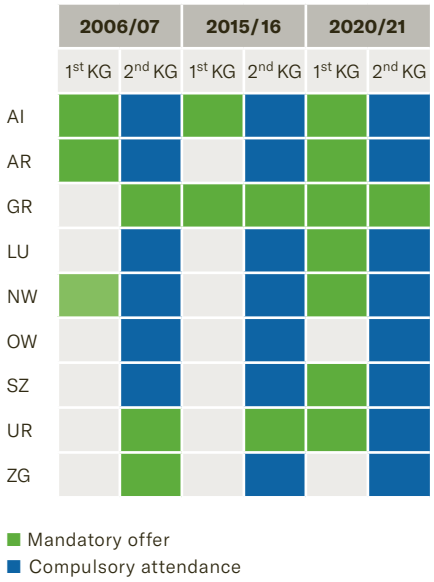
The cantons Basel-Stadt, Basel-Landschaft, Lucerne, Zurich and Valais have incrementally moved the cut-off date back to 31 July over about eight years. The cut-off date in the 2020/21 school year is therefore 31 July in a total of 20 cantons. The other six cantons have other cut-off dates.[4] The earlier the cut-off date in the calendar year, the older the pupils are. In Canton Graubünden, the children are about eight months older than pupils in cantons with the 31 July cut-off date, solely due to the cut-off date (31 December). Different cut-off dates also mean that children of the same biological age can start school one year earlier or later depending on the canton. As a consequence, these pupils also enter the world of work or further education one year earlier or later. In addition, the probability of starting school at the regular time depends on how many days there are between the birthday and cut-off date *(Aune et al., 2018; Balestra et al., 2020; Beatton et al., 2021; Cook & Kang, 2018; Givord, 2020)*. The children are also positioned differently in the class age structure relative to their peers. For example, a child born on 30 March will be the youngest in cantons where the cut-off date is 1 April, whereas in cantons with a cut-off date of 31 July, there will be children up to 3.5 months younger than the child born on 30 March. As a result, children of the same age in cantons with a cut-off date of 1 April have a 33% probability of being put back a year, compared to 7% in cantons where the date is 31 July. However, delayed enrolments are determined much more by cantonal characteristics than the absolute cut-off date. Cantons with the same cut-off date therefore vary much more in this category than cantons with a different cut-off date (→ figure 59). Besides the probability of starting school late, the effect of the relative age (compared to the class) must also be taken into account. The younger a child, the more likely he or she is to perform worse in tests than older pupils due to the biological age difference *(→ Equity, page 78)*.

In Switzerland, it is mainly the structural requirements regarding the number of compulsory kindergarten years, access to the HarmoS Agreement and implementation of the key principles contained therein that decide the ratio of delayed enrolments. If only one compulsory kindergarten year is taken into account when calculating the ratio of delayed enrolments in cantons without two years of compulsory kindergarten, the cantonal ratios for delayed enrolments are practically zero (→ figure 60). Many children do two years of kindergarten, which entails delayed enrolments to the third school year *(SCCRE, 2018)*.

58 Organisation of the first and second school year at primary level

Current situation in the nine cantons without two years of obligatory kindergarten

Data: *EDK (2019a)*

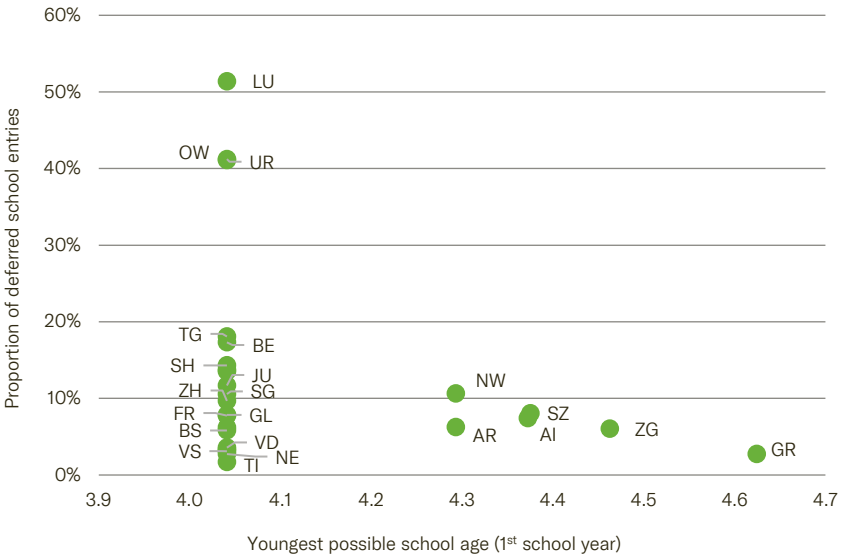


4 In Canton Nidwalden, 30 April was the date for the 2020/21 school year. In the 2018/19 school year, it was still 31 July. Since then, there has been an incremental shift to February (28/29 February from 2021/22). In Canton Schwyz, starting school has been made flexible. In the 2020/21 school year, 31 March could be requested, otherwise it was 31 July.

The cut-off date deviates in six cantons from 31.7, 2020/21: Appenzell Ausserrhoden (30.4.), Appenzell Innerhoden (1.4.), Graubünden (31.12.), Nidwalden (30.4.), Schwyz (on request, 31.3.), Zug (28.2.). Four cantons with the youngest possible schooling age of 4 are not included in the chart (share of delayed enrolment in Aargau (15%), Basel-Landschaft (13%), Solothurn (7%), Genf (3%) .

59 Schooling age and delayed enrolments, 2020/21

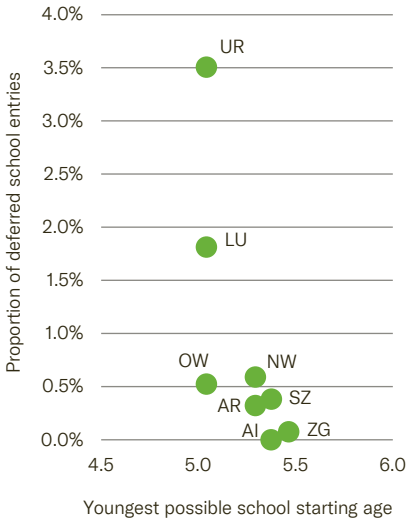
Data: FSO; calculations: SCCRE



60 Delayed enrolments taking account of compulsory kindergarten years, 2020/21

Canton Graubünden is not included.

Data: FSO; calculations: SCCRE



Legend
Only taking account of the second, compulsory, pre-school year in cantons with just one year of compulsory pre-schooling, the share of delayed enrolments in Uri falls from 41% to 3.5%, in Canton Zug from 6% to 0.1% and in Canton Nidwalden from 11% to 0.6%.

The cantonal schooling rules offer another explanation for the marked differences in ratio of delayed enrolments. In practically all cantons, the parents may request early or delayed enrolments if they have justification for doing so. There are, however, marked intercantonal differences in some instances as regards the parents' right to have their say in the final decision. While, for example, in Canton Bern the final decision is mainly left up to the parents, the supervisory authorities of municipal schools have the final say in other cantons. In case of doubt, reports may be requested from the school doctor or psychologist. Whether a canton is more or less restrictive with regard to starting school certainly has an influence on the pupil's individual path *(→ Effectiveness, page 66)*. Children in restrictive cantons[5], where parents have limited influence, are younger on average as the proportion of children born near to the cut-off date and schooled on time is larger. In cantons where parents have a lot of influence, on the other hand, many more children born close to the cut-off date start school later (→ figure 61). Higher ratio of delayed enrolments entails increasing age heterogeneity per academic year.

5 Restrictive cantons: Appenzell Innerrhoden, Basel-Stadt, Graubünden, Jura, Neuchâtel, Nidwalden, Valais (French-speaking part), Ticino and Zürich.

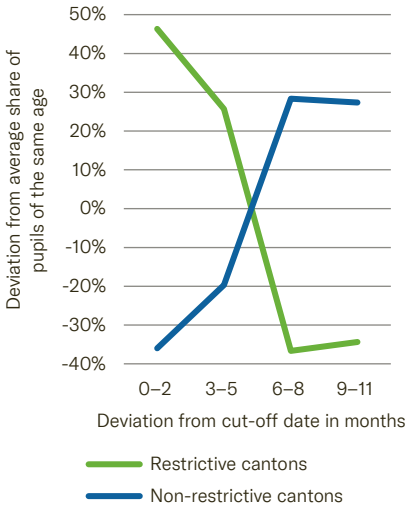
Language-regional curricula and ICT

There have been major changes in curricula in recent years *(→ chapter Compulsory education, page 27)*: besides a second foreign language at primary level, subjects like education for sustainable development have been introduced and given greater weighting; there is also more focus on digital skills. Digital competencies are not a standalone subject in the language-regional curricula, instead they are clustered across disciplines and subjects. In the *Plan d'études romand* (PER), for example, they are included in the curriculum modules "*Éducation numérique*" and "*Formation générale*", in *Lehrplan 21* in the "*Medien und Informatik*" module and in the "*Piano di studio della scuola dell'obbligo ticinese*", they are part of "*Tecnologie e media*" as "*Contesto di esercizio*" in "*Formazione generale*" *(Educa, 2021; IRDP, 2020)*. The cantonal timetables contain provisions regarding whether the digital competencies are taught as a standalone subject, integrated into other subjects or taught as part of interdisciplinary learning environments (→ figure 62). There are also differences in the school year in which the teaching of digital competencies takes place and the number of periods dedicated to that *(Educa, 2021)*.

61 Age distribution in restrictive and non-restrictive cantons

Deviation from national age distribution of pupils in the third school year (ÜGK pupil cohort 2017); restrictive and non-restrictive refers to regulation of starting school or delayed enrolments

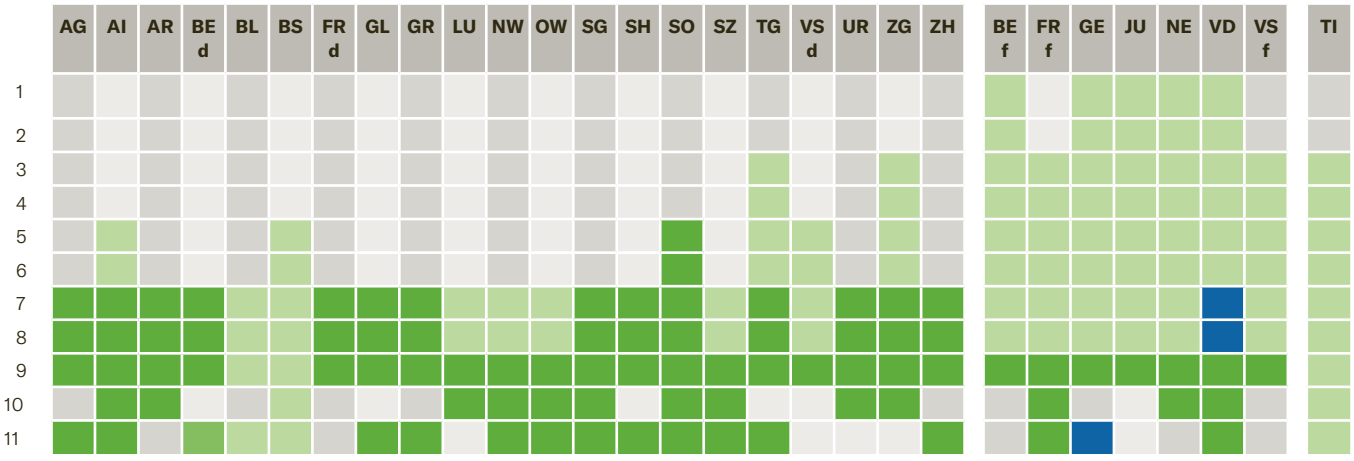
Data: FSO (LABB); calculations: SCCRE



Legend
Across Switzerland on average, 22% of pupils in the third school year were born 0 to 2 months before or after the cut-off date.
In non-restrictive cantons this share (share of people of the same age) is 39% lower.

62 Transfer of media-specific competencies and IT during compulsory schooling

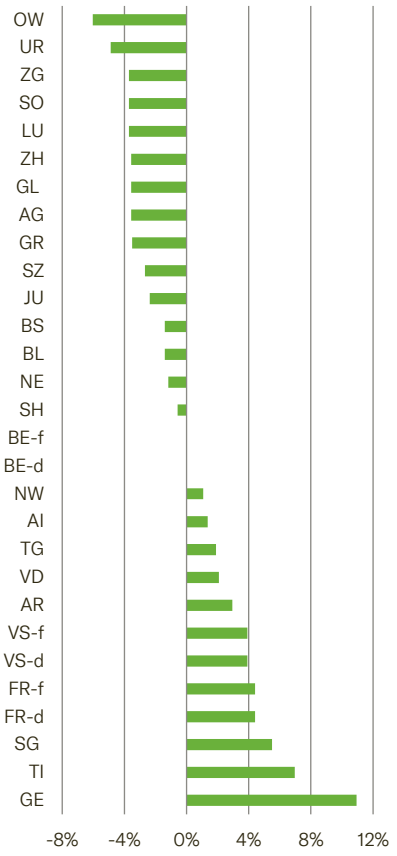
Data: *Educa (2021)*



63 Teaching time at primary level, 2021/2022 school year

Primary level (3rd–8th school year); deviation from Swiss median (819 h)

Data: EDK-IDES; calculations: SCCRE



Teaching time

The average annual teaching time at primary level (3rd–8th school year) is about 819 hours in Switzerland. Cantonal deviations from the Swiss average range from 11% more to 6% less teaching time. Accumulated over six years of primary education, the pupils in Canton Obwalden therefore receive about 830 fewer hours of teaching than their counterparts in Canton Geneva (→ figure 63). The different teaching time in the cantons is reflected first in the lesson time (45 or 50 minutes), second in the diverging number of school weeks (36.5 weeks in Canton Ticino up to 40 weeks in Appenzell Ausserrhoden and Appenzell Innerrhoden) and third in the different number of weekly lessons (e.g. an average of 27 lessons in Canton St. Gallen and an average of 32 lessons in Canton Ticino). Just under half of cantonal differences in the overall teaching duration are due to the differing number of school weeks and just under a fifth by the varying lesson durations.

Integration and separation ratio at primary level

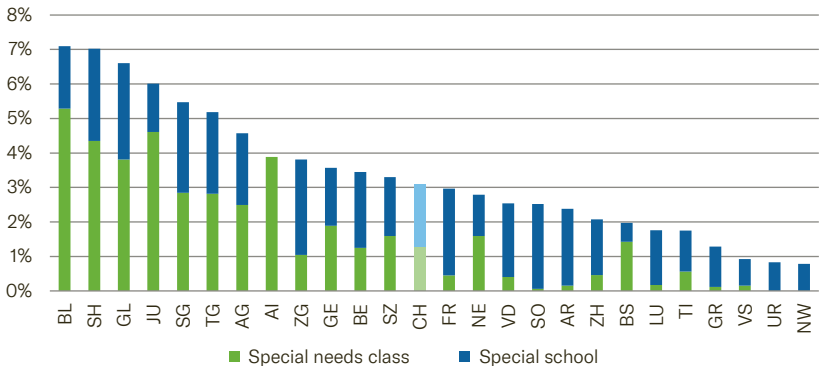
The organisation of special needs education within compulsory schooling has been reoriented since the end of the 1990s. Instead of finding separative solutions, the focus has since been on integrating special needs pupils into regular classes. Since the 2017/18 school year, this reform can also be seen in the special needs education statistics within the context of the modernisation of surveys in the FSO education area *(FSO 2019b, 2020d)*. The proportions of separately educated children vary greatly at the cantonal level, although the national policy aim is to integrate the pupils into classes as much as possible. There are also major cantonal differences in the structuring of the integrative and separative school measures *(Sahli Lozano et al., 2020, 2021)*. A look at the cantonal separation ratios (2020/21) shows that they move in a range of 1 to 7%. Other intercantonal differences are visible for similarly high separation ratios. While the cantons of Freiburg and Neuchâtel show identical separation ratios, 15% of separately schooled pupils in Canton Freiburg are in a special needs class, whereas just under half of these children attend a special school in Canton Neuchâtel. The cantonal ratios for special school classes range from 1 to 5% and for special needs classes from 1 to 3% (→ figure 64).

The different separation and, conversely, integration ratios are also significant against the backdrop that not all special measures have to last during the entire school career. The FSO longitudinal analyses show that about 42% of pupils at primary level who were once taught separately are now again integrated in a mainstream class during primary school. This applies particularly to children who were allocated to a preparatory class of limited duration or a class for foreign language speakers on starting school. On the other hand, a change from special school to a mainstream class is rather rare, which means that being allocated to a special school does impact a child's or young person's long-term education path *(FSO, 2021l)*.

64 Separation ratio at primary level, 2020/21

3rd–8th school year; including private institutions

Data: FSO (LABB); calculations: SCCRE



Separation ratio
The proportion of pupils in separate settings, such as special needs classes and special schools

Special needs classes are preparatory classes, classes for foreign language speakers and other special needs classes *(FSO, 2019b)*. Special needs classes count as part of mainstream school.

Special schools are educational institutions within compulsory school that offer adjusted teaching in special needs classes for pupils with disabilities of varying types, major learning difficulties or pronounced behavioural issues. The transfer to a special needs school is subject to a cantonal authorisation procedure *(FSO, 2019b)*.

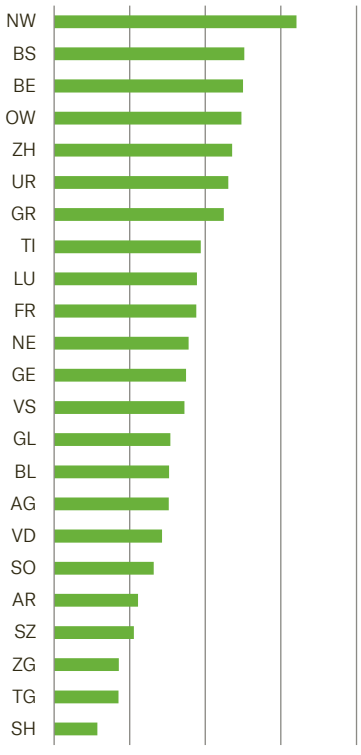
Integrative schooling and its impact

About 4% (2020/21) of all pupils in compulsory schooling receive enhanced special educational measures, regardless of whether they are in a mainstream class, special needs class or special school. Just under half of them are integrated in mainstream classes (inclusion rate). There are also marked cantonal differences here (→ figure 65). The advantages of an inclusive approach (enhanced peer relations, improved wellbeing etc.) have been confirmed by various studies for pupils in receipt of such support *(Balestra et al., 2022; Bless, 2018; Gebhardt et al., 2015; Kocaj et al., 2014; Sallin, 2021; Sermier Dessemontet et al., 2014)*. As children with special educational needs are difficult to statistically track throughout their education and beyond, there is not much empirical evidence on the long-term consequences on the performance at school and labour market integration of these pupils. One longitudinal study with data from Canton St. Gallen, however, indicates positive effects on performance in mathematics and German at lower-secondary level as well as for the subsequent labour market integration and salary level *(Sallin, 2021)*. Empirically, the effect of integrative schooling on pupils with special measures can be assessed as almost entirely positive throughout schooling. However, if there is a high proportion of integrated children in the class, it has an adverse effect on the performance of the other pupils *(Balestra et al., 2022)*. The distribution of children in need of integrative education is thus of central importance. As even a distribution as possible of these children would mitigate the potentially negative consequences for the other pupils. At the same time, the educational path of children with special measures would be influenced in a positive way.

65 Integration ratios, 2020/21

Proportion of all pupils with enhanced special needs measures who attend a mainstream class (1st–11th school year);
Appenzell Innerrhoden: data missing; Jura and St. Gallen: the measures of the pupils in mainstream classes are unknown.

Data: FSO



Effectiveness

The degree of achievement for all types of goals must be reviewed to assess the effectiveness at primary level. That means performance in the core academic subjects (school language, mathematics, natural sciences and foreign languages) has to be measured and personal, social and methodical competencies as well as competencies in such areas as sustainability or digitalisation (cross-disciplinary goals) have to be recorded. The volume of goals shows that comprehensive definition of the degree of goal achievement at primary level is not possible and can only be addressed in sections. In 2011, the EDK formulated national education goals in the areas of languages, mathematics and natural sciences, the achievement of which is only partially reviewed within the framework of Verification of the Attainment of Basic Competencies (ÜGK). For example, at primary level only the school and first foreign language have been covered thus far. There is no national data for other subjects and areas, so that a nationwide assessment of goal achievement at primary level is not possible. However, some cantons conduct cantonal performance tests for other subject fields *(→ Compulsory education, page 27)*, which is why cantonal data is used in these cases. The national tests are part of the national training monitoring. Its goal is to evaluate and compare the performance of the different cantonal education systems *(Consortium ÜGK, 2019b)*.

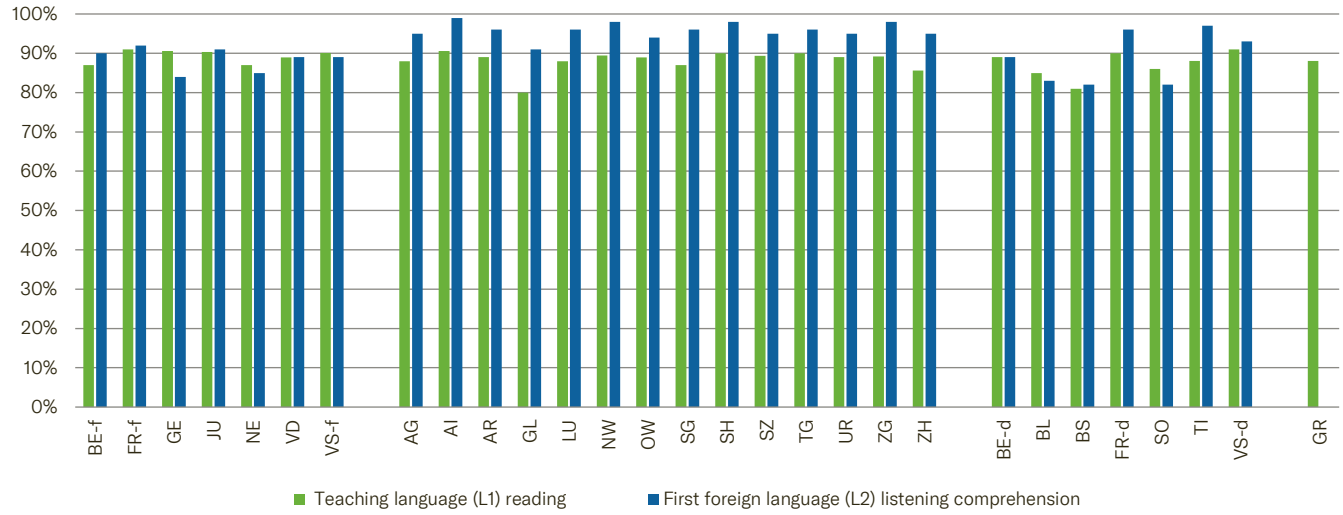
Reviewing achievement of the basic competencies

In 2017, the basic competencies in the school language (reading and spelling) and first foreign language (reading and listening skills) were measured for the first time at the end of primary level. Across Switzerland, 88% of pupils achieved the basic competencies in the school language for reading. The figures at cantonal level vary between 81% and 91% (→ figure 66). With regard to achievement of the basic competencies in the first foreign language, the figures differ depending on the first foreign language and competency area. 86% of pupils who learn English as their first foreign language achieved the basic competencies in the area of reading comprehension and 95% in listening comprehension. In cantons with French as the first foreign language, the corresponding ratios are 65% (reading comprehension) and 89% (listening comprehension). In cantons with German as the first foreign language, on the contrast, the ratios are 72% (reading comprehension) and 88% (listening comprehension) *(Consortium ÜGK, 2019b)*. To explain the different results between and within the cantons adequately, it would take more information on classes or teaching staff; they are only available to a limited extent, if at all. For a reliable interpretation of results, especially the differences between cantons, the classes and teaching staff identifiers would have to be checked *(Bonefeld & Dickhäuser, 2018; Glock & Kovacs, 2013; Krkovic et al., 2014; Lavy & Megalokonomou, 2019)*. However, they were inadequately accounted for in the surveys.

66 ÜGK basic competencies in the school language and first foreign language

Share of pupils who have achieved the basic competencies

Data: *Consortium ÜGK (2019b)*



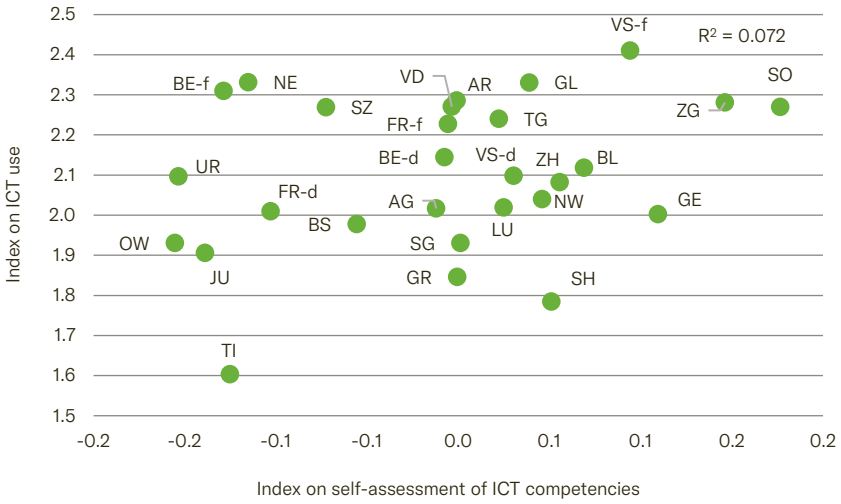
Use of digital technologies in school

The education goals for digitalisation are refer, inter alia, on the teaching staff using suitable digital teaching aids and media and the children being competent in using digital aids *(EDK, 2019a; 2021)*. Therefore, there was also a self-assessment of pupils' skills with information and communication technologies at the end of primary level as part of the ÜGK. This data shows – like many international studies *(Falck et al., 2018)* – a descriptive positive connection between intensity of use and the evaluation by pupils of their own ICT competencies (→ figure 67). However, this connection cannot be interpreted as causal. Research has also shown that there is only a tenuous connection between self-assessment and actual competencies in dealing with digital technologies *(Aesaert et al., 2017; Educa, 2021; Porat et al., 2018; Senkbeil & Ihme, 2017)*.

67 Use of ICT at school and ICT competencies

Self-assessment of pupils in the context of ÜGK 2017, 8th school year

Data: ÜGK

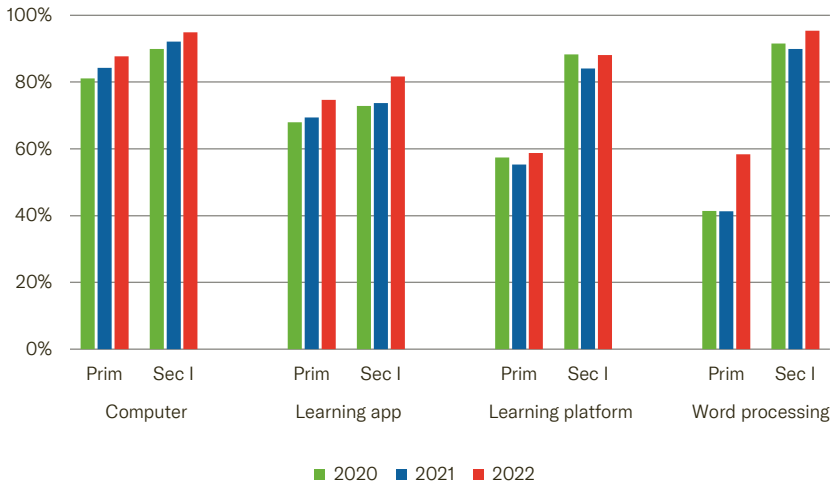


The focus on availability and use of digital aids grew with the outbreak of the pandemic and associated remote teaching. Three waves of surveys between 2020 and 2022 led for the first time to the availability and use of digital aids recorded in schools across Switzerland and across educational levels *(Oggenfuss & Wolter, 2021b, 2021a)*. As regards the use of digital aids, these surveys show major regional language differences *(→ chapter Compulsory education, page 27)*, as well as differences between education levels. As expected, computers, learning platforms and text processing programmes at lower-secondary level are used more often than at primary level (→ figure 68). Age plays a unique role in this regard. The older the children, the more often they work with digital technologies *(Educa, 2021; Oggenfuss & Wolter, 2021a)*.

68 Use of digital aids in school

Share of pupils reporting use for or at school; monitored for individual characteristics; primary level: Pupils from 8 years of age

Data: Monitoring Digitalisierung; calculations: SCCRE



COVID-19 pandemic and development of school performance

At the start of the Covid-19 pandemic, there was an unprecedented cessation of face-to-face teaching and nationwide remote schooling. In connection with the pandemic-induced extraordinary situation, the influence on school closures and pupils' acquisition of competencies in Switzerland is also of particular interest. Internationally these findings are not uniform and are based on differential robust data bases *(Contini et al., 2021; Engzell et al., 2021; Grätz & Lipps, 2021)*. Regular learning progress evaluations at cantonal level would be a prerequisite to gauge how school closures impacted performance at school. The data thereby obtained would have allowed for a comparison of results before and after the schools closed. Adjustments to measuring instruments or postponements of the timing of the survey in the 2020 pandemic year, however, render any comparison with other test years impossible in many cases *(→ chapter Compulsory education, page 27)*.

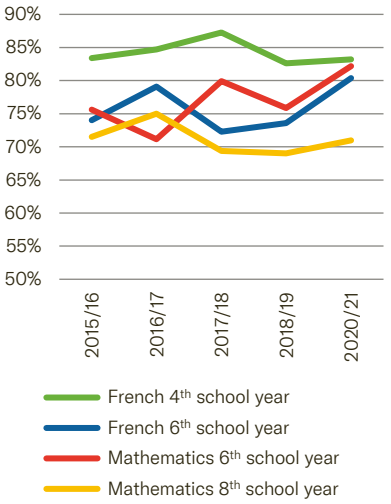
In the 2020/21 school year, the only available data for the primary level is from the cantonal performance test in Canton Vaud and for the fifth school year (so-called Check P3) from the cantons of Northwestern Switzerland (Aargau, Basel-Landschaft, Basel-Stadt and Solothurn). Comparing the results of the surveys in 2020 with those of the last tests before the pandemic[6], there is a small performance improvement following the school closures in Canton Vaud and in the north-western cantons. At first glance such performance gains are unexpected, but similar outcomes have also been observed to a certain extent in other countries *(Borgonovi & Ferrara, 2022)*. Taking account of the test results from the years preceding 2019, the test results consistently show fluctuations, some of which are extreme. In Canton Vaud, depending on the field, the cantonal

6 No surveys were conducted in the canton of Vaud in the 2019/20 school year.

69 Test result fluctuations, Canton Vaud

The average share comprises the points achieved as a ratio of the maximum points; there were no surveys in the 2019/2020 school year.

Data: Canton Vaud; chart: SCCRE

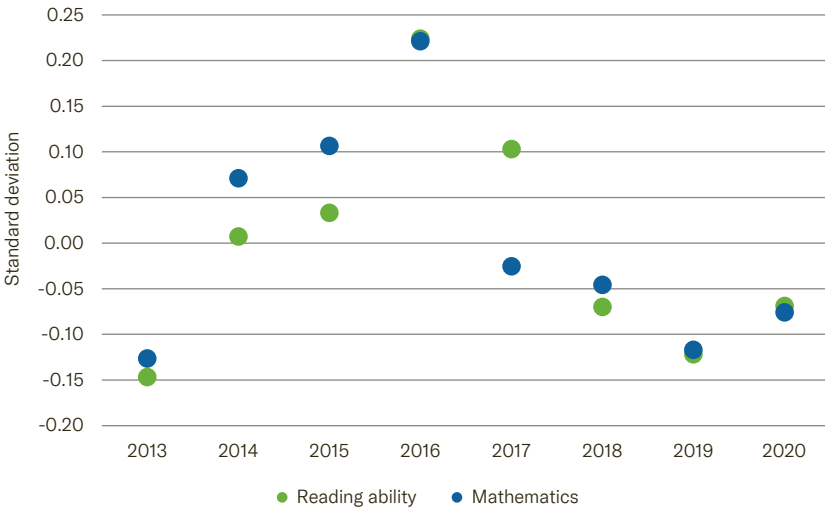


average of the points total achieved in the different subjects (mathematics, French or natural sciences) shows a fluctuation of up to 10% (→ figure 69). Therefore, bypassing a straightforward comparison of the performance data following the school closures with the previous year's data and comparing it with the long-term average instead, for the cases reviewed, there was no significant increase or decline in test performance for 2020. In the case of north-western Switzerland, there are also two trends in time in evidence: one rising up to 2016 and one decreasing afterwards (→ figure 70). If a forecast had been made for the test results in 2020 based on the 2016 trend, the performance improvement after the school closures would have been far more positive than a simple year-on-year comparison would have indicated. Overall, however, it is reasonable to assume that cohort-specific effects, changes to test questions or measurement errors over the years lead to much greater changes than the year-on-year deviations witnessed in the year of the school closures. These performance measurements only help to a certain extent to measure the effects of extraordinary events *(→ chapter Lower-secondary education, page 83)*.

70 Fluctuations in the test results, north-western Switzerland education area

Standardised values per test subject, measured over the whole period for all four cantons; deviation from the longstanding average (2013–2020) per subject

Data: check data from the Northwestern Switzerland; calculations: SCCRE, Centre for Research in Economics of Education at the University of Bern



Efficiency/costs

In order to adequately measure efficiency, it takes comparable data on the real or monetary input indicators, on the one hand, and meaningful outputs on the other (performance measurements for the system). The relationship between use of resources and target achievement could be evaluated in two ways on that basis: one way is to analyse how economical non-monetary or monetary means can be used to achieve education targets, or whether the resources used can yield a maximum return. While the data on monetary inputs (public education expenditure) is of good quality, there is only limited data at the national level for the real input and output factors. Currently, the only national performance data on outputs is ÜGK 2017 (school language and first foreign language). It is further complicated by the data often only being at cantonal level and not at school level *(Wolter et al., 2020)*, leading to outcomes that are either difficult to interpret or liable to inadmissible comparisons. For that reason, as with the entire Swiss education system, it is almost impossible to make any statements regarding efficiency for the primary level, so that only the differences between the real inputs (class sizes, student-teacher ratio and repetitions) as well as between costs are outlined below, without any reference to corresponding outputs.

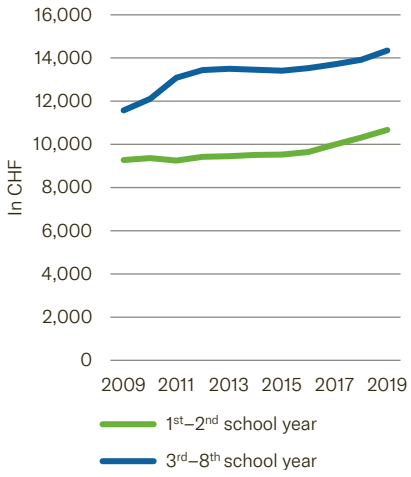
Development in public education expenditure

The statistics on spending for primary level education are based, as for the entire field of compulsory education, on calculations that take account of payments made at municipal and cantonal level. Such financial figures are often subject to compulsory or at least optional referenda. As a result, the aggregated figures for each educational level are only known after a considerable delay. The latest figures relate to 2019. The calculations of cantonal expenditure are still not based on a uniform cost accounting model. Therefore, only some expenditure categories are considered, for which the maximum possible comparability eligibility is likely. This includes figures on staff pay or rather for teachers' pay. On average, real education costs in Switzerland increased between 2008 and 2019 by 19% per pupil in the first and second school year and 30% per pupil in the third to eighth school year (→ figure 71). In many cantons, the public cantonal education expenditure (only teaching staff) has risen in real terms per pupil since 2008. Although more was invested in each schoolchild on average, education costs for compulsory schooling per adult (the over-20 age category was used for simplification purposes) did not rise in all cantons. Where they did rise, the increase was normally smaller than expenditure per pupil (→ figure 72).

71 Development in education expenditure at primary level, 2008–2019

Only teacher remuneration; education expenditure per pupil

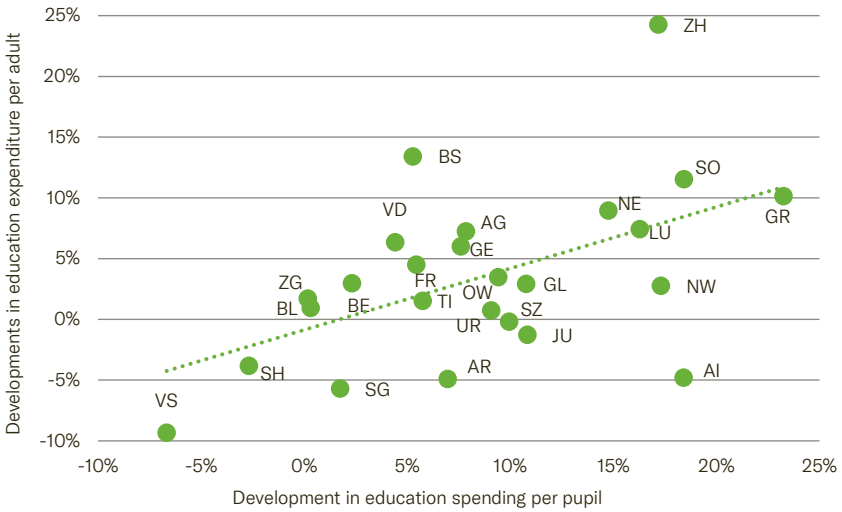
Data: FSO; calculations: FSO



72 Education expenditure 2008–2019 per pupil and per adult

Only teacher remuneration; compulsory school 1st–11th school year overall
(current data per canton not available by level); data for Canton Thurgau is missing

Data FSO; calculations: SCCRE



Class size development

In the past 20 years, the number of pupils and the number of classes at primary level have both increased. Over the same period, class sizes at primary level have been relatively stable on average at about 19.4 pupils per class. However, there is a marked difference when the deviation (2020/2021 school year) from the longstanding average is considered in terms of small, average and large classes. The number of small (+13%) and medium classes (+12%) increased significantly relative to the long-term average (2000–2020). The number of large classes with over 24 pupils, on the other hand, were about 40% lower relative to the long-term average. However, as there was only a small number of large classes at the start of the 2000s, this marked reduction has a minor influence on average class size at primary level. While earlier evaluations on class size development in connection with pupil numbers indicate that the number of large classes increases in tandem with growing pupil numbers *(SCCRE, 2014)*, current developments show that rising pupil numbers are being absorbed by more small and especially medium-sized classes.

Class sizes and municipality-specific characteristics

In the 2020/21 academic year, Swiss municipalities had an average class size of 19.1 pupils at primary level. Interestingly, class sizes in municipalities with a small number of pupils are not generally small, instead they fluctuate greatly. If the number of pupils increases in a municipality, the average class size increases and evens out at around 20 children per class. The major differences in average class size between the cantons, are only based to an extent on the different topographical situation of the municipalities

or different demographic samples (→ figure 73). With or without considering these factors, the intercantonal differences remain just as significant *(SCCRE, 2018)*. Taking into account that the literature on the effects of class sizes on pupils' performance shows no or only a limited effect of small classes on pupils' performance *(Angrist et al., 2019; Filges et al., 2018; Leuven & Lokken, 2017)*, it is reasonable to assume that there is considerable potential for efficiency increases in municipalities with fewer than 300 pupils and in some cantons.

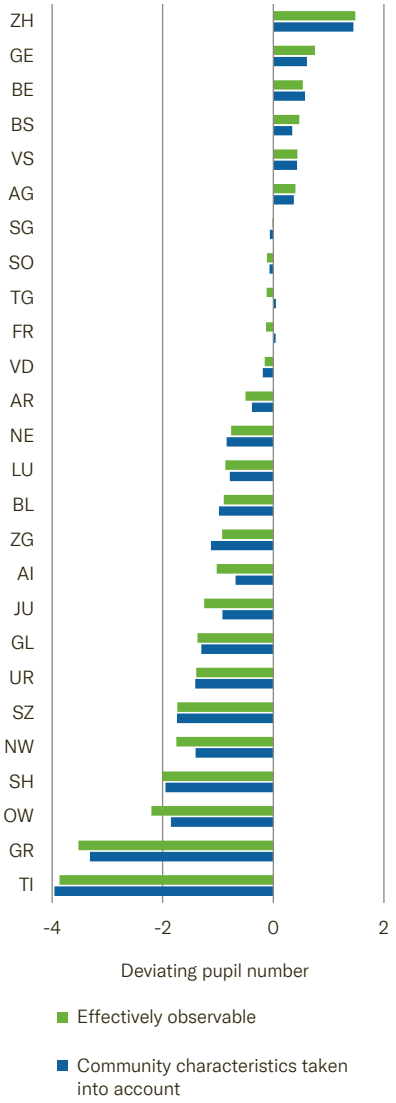
Intercantonal comparison of student-teacher ratio

Class size is much less of a factor than the student-teacher ratio as regards education costs: the student-teacher ratio is a more reliable indicator for calculating costs than average class size alone, as it takes more than one teacher to teach a class – calculated as full-time equivalents (FTE). Even when a class is large, it doesn't necessarily mean the student-teacher ratio is bad. This is often overlooked when analysing the effects of class size (effectiveness) on pupil performance. The national average student-teacher ratio is 14.9 pupils per FTE of a teacher (average class size is 19.1 children, mainstream classes). A comparison of average class sizes against student-teacher ratios at cantonal level (→ figure 74), shows that the classes in cantons Valais and Zurich are disproportionately high as are the student-teacher ratios. The classes in Canton Graubünden are small and the student-teacher ratios disproportionately low. While it is clear in terms of costs, that small classes and good student-teacher ratios cost more *(→ Student-teacher ratio and costs, page 74)*, it is hard to gauge, inter alia, the effects of both factors on pupil performance. It is also not clear how a specific relationship of both factors impacts pupil performance – i.e. whether large classes with an improved student-teacher ratio are better for school success, or whether an average student-teacher ratio and small classes are more advantageous. That the effect of both factors cannot be assessed is due to an extent to there being different ways of structuring the teaching staff to children ratio. There is a weak positive correlation (→ figure 75) between the student-teacher ratio and the level of reading comprehension in the school language data (ÜGK 2017) if possible structural specifics are left out of account.

73 Cantonal deviation from average class size, 2020/21

Only mainstream schools; 3rd–8th school year; cantonal deviation in number of pupils from municipality average; green bars: number of pupils, size of the municipality, urbanisation level considered

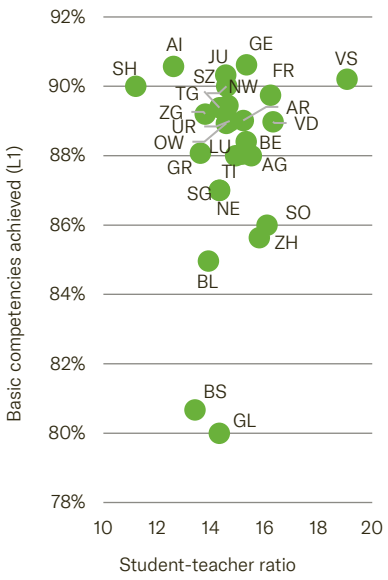
Data: FSO; calculations: SCCRE



75 Reading performance and student-teacher ratio at primary level

Proportion of pupils having achieved basic competencies in the school language (L1; reading comprehension) (ÜGK 2017); student-teacher ratio: 3rd–8th school year in the 2016/2017 school year

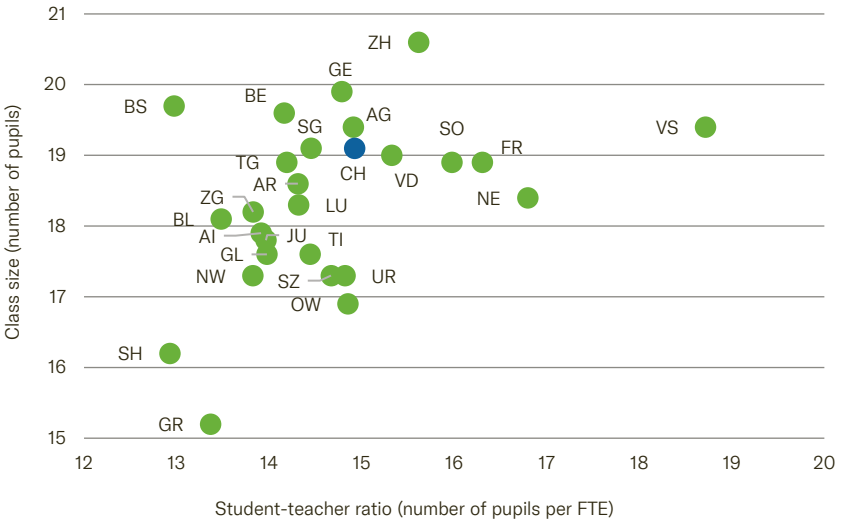
Data: ÜGK, FSO



74 Student-teacher ratio and class size at primary level by canton, 2020/21

Only mainstream classes (3rd–8th school year); student-teacher ratio: number of pupils per teacher as full-time equivalent (FTE)

Data: FSO; calculations: SCCRE



Student-teacher ratio and costs

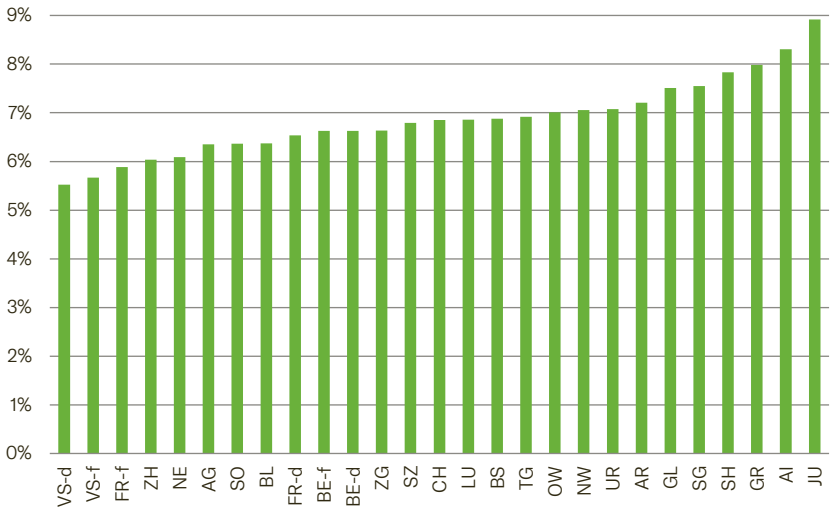
Besides the rising cost of hiring teachers and financing various new tasks (e.g. including kindergarten in compulsory schooling) the class size reductions or student-teacher ratio improvements are major cost drivers *(SCCRE, 2018)*. This measure is often counted among the top education policy priorities, even if it is costly and has a questionable influence on the effectiveness of education. It not infrequently stems from the hope that smaller classes have a positive impact on pupil performance. Such effects, however, are not generally backed up by the data. If such an effect occurs, it can often only be proven for specific pupil groups and under very precise conditions *(Bach & Sievert, 2019; Filges et al., 2018)*.

The cost impact of smaller classes ultimately depends on different Factors (OECD, 2016c, 2019b, 2021a). The calculation model of the Organisation for Economic Co-operation and Development (OECD) is a helpful tool for calculating the cost of improving the student-teacher ratio – specifically the reduction of the student-teacher ratio by one pupil per teacher (FTE) – and comparing this result against other cost parameters. Conversely, the results also show by what percentage the average teacher salary could be raised if the student-teacher ratio were not improved. Salaries could be increased by at least 5.5% (Canton Valais) and a maximum of 8.9 % (Canton Jura). The amounts vary in absolute terms among the cantons from plus CHF 5620 a year (Canton Valais) and plus CHF 9030 (Canton Jura) (→ figure 76); the national average is CHF 7150 a year.

76 Pay increase for teachers if student-teacher ratio is raised

2019/20 school year; increase in teacher salary per year in percent if an improvement of one pupil in the student-teacher ratio were to be waived; due to missing data on teacher salaries, the cantons of Geneva, Ticino and Vaud have been omitted.

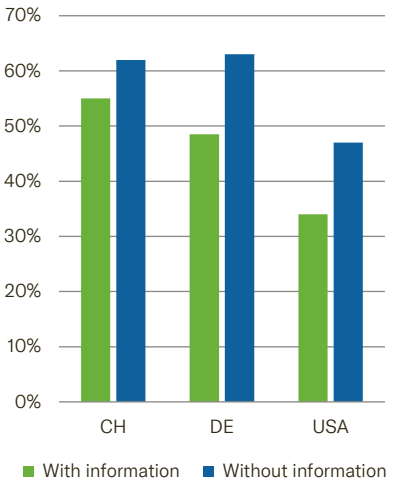
Data: BKZ, SER; calculations: SCCRE



77 Public opinion on smaller classes

Agreement on smaller classes; population survey with and without information on education costs (see comment on chart below)

Data: *Cattaneo & Wolter (2021)*



These calculations are far from trivial and provide an effective means for assessing the efficiency of the education system as they show there are always alternative ways of allocating additional funds. International surveys show *(Cattaneo & Wolter, 2021)*, that the population prefers for smaller class sizes, but only if they don't know the ensuing costs (→ figure 77). The specific choice of expenditure can only be evaluated if the impact is also known. If increasing teachers' salaries had a more positive impact on pupil performance (selection of better teachers, motivational effect etc.) than reducing class sizes by one child, this variant would be both more effective and more efficient; it would thus be preferable to reducing class size.

The Swiss population has been surveyed on various education topics for about ten years (Opinion surveys on education). Regarding increased education expenditure, they were asked, which of the following three measures they would prefer: lower class sizes, higher teachers' salaries or more money for new books and technologies. Only a subsample was informed about the costs of the measures *(Cattaneo & Wolter, 2021)*.

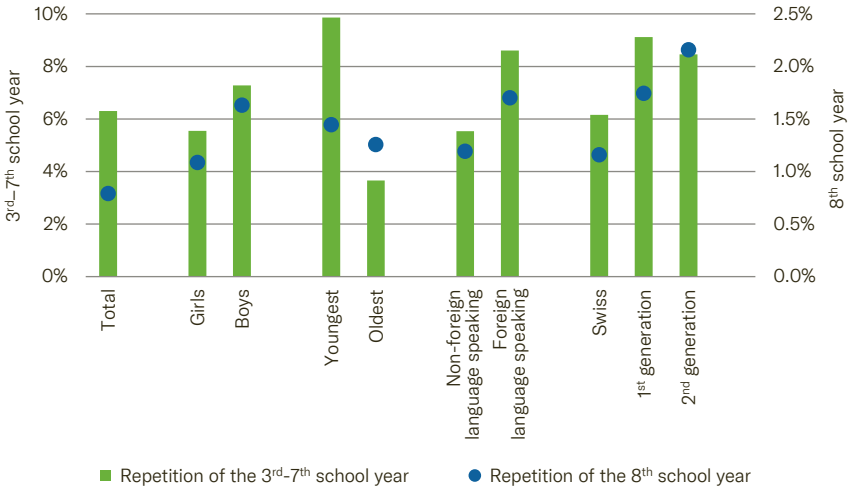
Education paths and repetitions

The efficiency of an education system is also reflected in the average individual duration of compulsory schooling. However, duration only provides limited information on efficiency, as the impact of repetitions is also one of the inadequately researched subjects. In order to measure efficiency, it must be known which repetitions would have been avoidable if adequate measures had been taken in the education system. It would also be important to know whether the costs of avoiding repetition would have been lower than the actual repetition costs. If pupils derive some benefit from repeating a school year, that would have to be factored into the cost of repeating a year.[7] The longitudinal data for compulsory schooling allows us in the first instance to calculate the actual duration of schooling of the pupils at primary level *(FSO, 2021l)*. About 7% of pupils repeat a school year at primary level. Boys, children with a migration background and pupils whose parents are less educated are more likely to repeat a year (→ figure 78).

78 Repetition rate at primary level by individual characteristics

Average values for primary level (3rd–8th school year; monitored for various background variables; 1st generation: Foreign nationals born outside Switzerland; 2nd generation: Foreign nationals born in Switzerland

Data: FSO (LABB); calculations: SCCRE



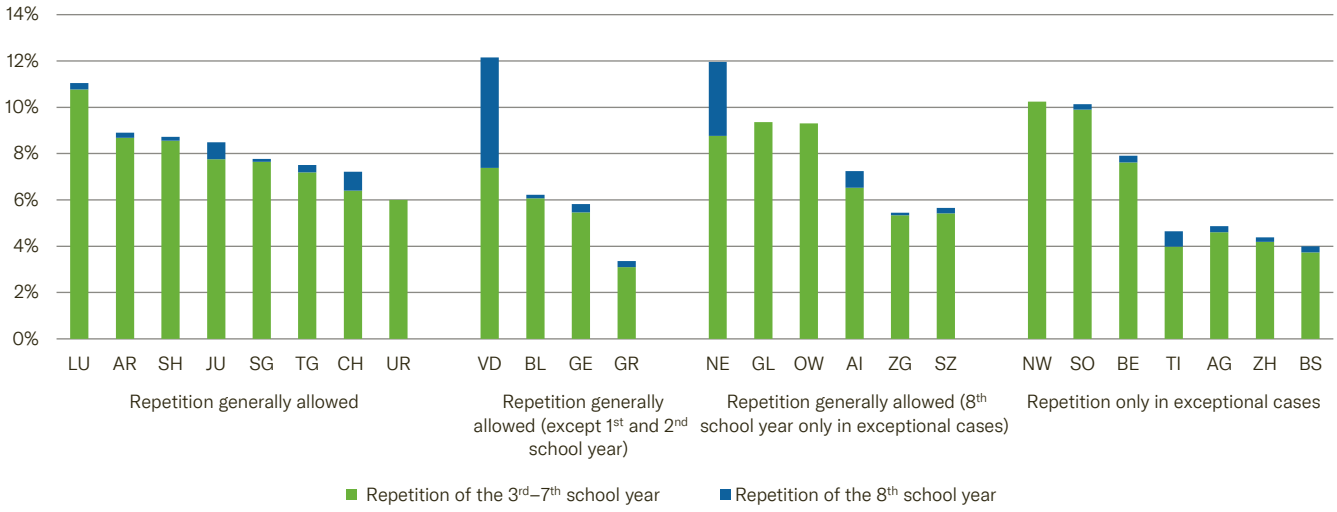
7 As it is not known whether repetitions are good or bad for the individual child, the subject of repetitions is not included in the Equity chapter.

The repetition rate averages 1.2% over all school years (3rd–8th school year). The last year of primary school is an exception. Only 0.7% of children repeat it, so it is extremely rare. In cantons Glarus, Nidwalden, Obwalden, Uri and Zug, the last year of primary level is not repeated at all (→ figure 79). In some cantons, repeating the last school year of primary school is regulated more restrictively than repeating an earlier class. Nonetheless pupils do still repeat the last year in these cantons as well (e.g. Canton Neuchâtel).

79 Repetition rate at primary level by canton

School cohorts that joined the 3rd school year in 2013/14, observation up to 2018/19; only children enrolled in school on time considered; Fribourg and Valais missing because they cannot be clearly assigned; TG: only once during primary level, AI: Repetition of the 8th school year is not possible, GR: repetition of the 8th school year is not possible if it influences the requirement profile (lower sec.).

Data: FSO (LABB), EDK-IDES; calculations: SCCRE

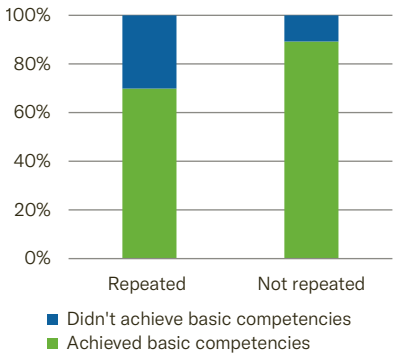


Regardless of how the repetitions are regulated in the cantons, the cantonal repetition rates vary strongly. Assuming that the effectiveness of repetition and its efficiency do not vary greatly among the cantons, the major cantonal differences indicate that there are either too many repetitions in some cantons or too few in others. In view of the social and private costs, it would thus be worth taking a closer look at the effectiveness and efficiency of repeating a year. The comparison of achieving basic competencies between pupils who have or have not repeated a year (→ figure 80), can neither be an indication of the effectiveness nor ineffectiveness of repetitions: it is unknown how many children who have not achieved basic competencies and have not repeated a year would achieve the basic competencies by repeating a year. At the same time, it is unclear how many pupils who repeated a year and achieve the basic competencies would have succeeded in doing so without repeating.

80 Repetition rate and performance

Repeating from the 5th–8th school year; basic competencies in reading performance (school language), monitored for various background variables

Data: FSO (LABB); calculations: SCCRE



Equity

Equality of opportunity at primary level can be considered on the basis of various criteria. The question is whether all pupils are given the same opportunity to realise their full educational potential regardless of their gender and social background. This question cannot be answered at primary level due to a lack of repetitive and standardised performance tests. Moreover, this question cannot normally be conclusively answered for an individual or a specific group of pupils, as their educational potential is unknown. Nonetheless, group-specific performance differences or differences in the educational path are analysed in this chapter. Such comparisons carry the most impact when applied to groups of people, for example boys and girls, about whom it can be assumed that they would have the same average educational potential. We allocate persistent differences in the educational performance of these groups mainly to a lack of equity. The other group comparisons must always be viewed subject to the caveat that differences do not always have to stem from a breach of the equity requirement.

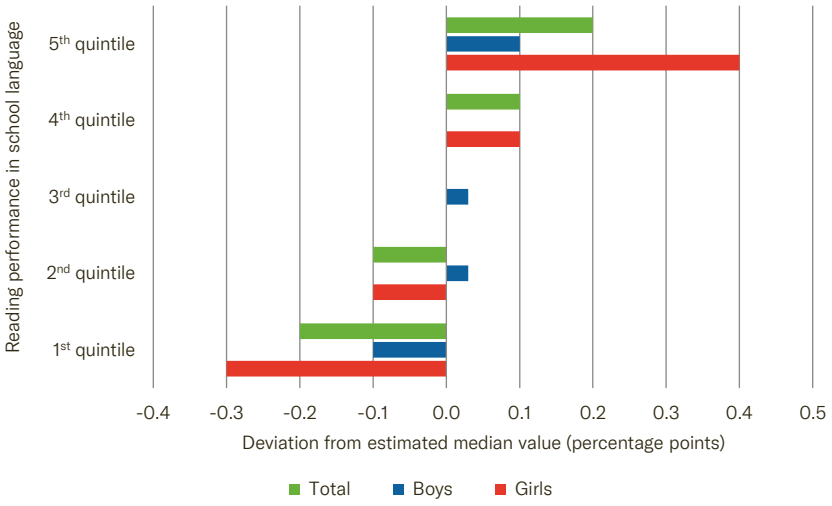
Age-dependent performance in the 2017 ÜGK survey

School performance is not only influenced by the duration and intensity of the schooling, but also by extracurricular learning activities, which can be both formal and informal. The possibility of benefiting from these extracurricular activities depends on the pupil's age. That means pupils from the same school year perform differently at school depending on their biological age *(Dhuey & Bedard, 2006; Elder & Lubotsky, 2009; Fumarco et al., 2022; Givord, 2020; Sprietsma, 2010)*. As the biological age is not taken into account when assessing performance at school, pupils who are among the youngest in a class are at a potential disadvantage. If all the children in the year were to start school according to their birthday, the maximum age difference in a class would be twelve months. However, if some children are kept back for strategic reasons, because the parents hope they will benefit considerably from an even greater age difference, the disadvantages for their younger fellow pupils can be even worse. These complications can make their presence felt over an extended period and even for the duration for the younger pupils' education *(Görlitz et al., 2019)*. These relative age effects (RAE) can also be empirically observed in Switzerland. They are apparent in reading performance at the end of primary level: the closer the child's birthday to the cantonal cut-off date, the worse their ÜGK performance. For every extra month in terms of age, the likelihood of being in the worst performing group decreases by 0.2 percentage points (→ figure 81). Although this effect does not appear significant at first glance, it extrapolates to a difference of 2.4 percentage points over a year. Interestingly, these relative age effects almost always apply to girls. They are not statistically significant for boys. The difference between the genders is due to boys who were born closer to the cut-off date for starting school being more likely to be kept back a year than the girls. This practice of keeping the boys back means there are no more relative age effects for boys who start school as soon as they can. However, it also means that those who are kept back would have been among the weaker pupils in terms of performance.

The open question is therefore why this practice of keeping the child back a year only applies to boys and not girls. In other words, why do parents of girls or the school authorities accept the relative age effect for girls but not for boys.

81 Relative age effect by gender, 2016/17

Data: FSO (LABB), ÜGK; calculations: SCCRE



Legend
For each additional month of age, the probability of being in the lowest performance group (1st quintile) decreases by 0.2 percentage points (in total).

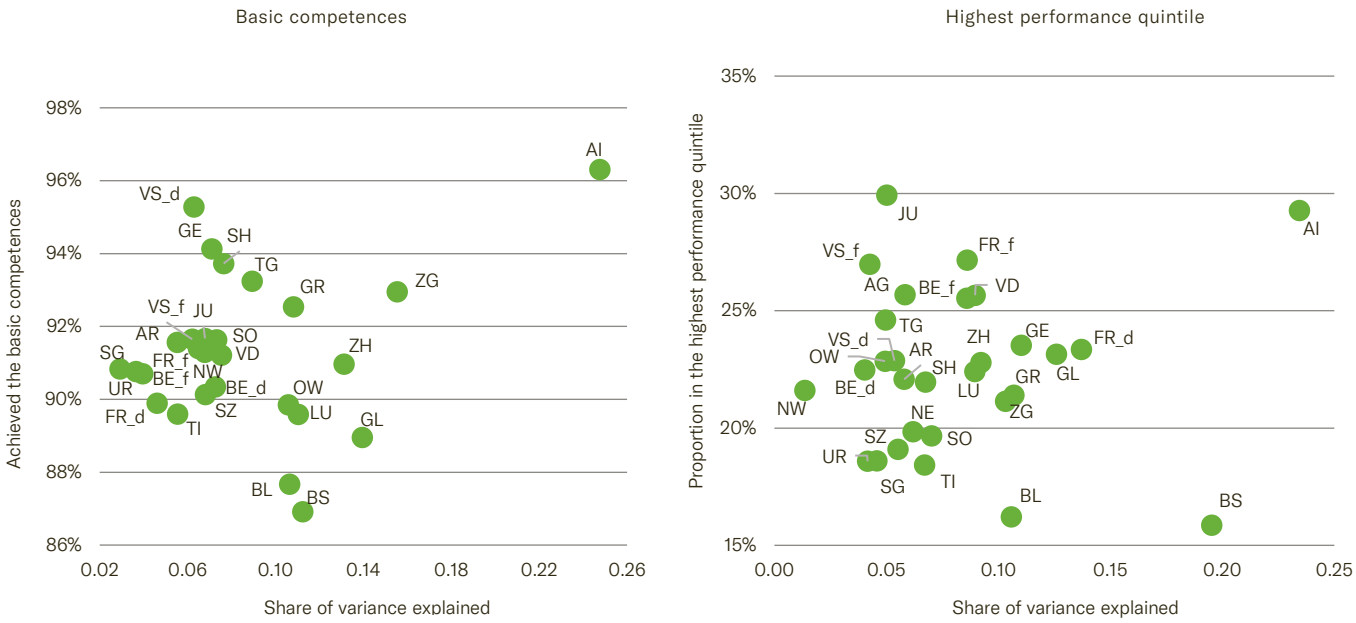
Socioeconomic background and performance in ÜGK 2017

The influence of socioeconomic background on school performance is well documented on the national and international level *(Hussmann et al., 2017; Mullis et al., 2016; OECD, 2021a)*. Across Switzerland, PISA surveys have been used the most to research the issue in the past, as they show the influence of socioeconomic background on school performance at the end of compulsory schooling. With the ÜGK at the end of primary school, this phase of the educational path can now be analysed similarly in all cantons. As shown already with the PISA results, the cantons do not just differ in terms of pupils' average school performance, but how strongly the children's socioeconomic background is related to individual school performance (→ figure 82). In cantons in which socioeconomic background accounts for a very high proportion of individual performance variance, i.e. where the influence of the socioeconomic background is strong, the average number of pupils to achieve the basic competencies is not higher than vice versa. There is thus no evening out effect. This finding also applies to the other part of the performance spectrum (→ figure 82). Intercantonal comparison shows that low socioeconomic influence on school performance does not mean that a canton has many substandard pupils, nor that it has fewer very good pupils.

82 ÜGK reading competencies in school language and influence of social background on performance

The figures show the proportions (basic competences achieved or pupils belonging to the highest performance quintile in Switzerland) given the same composition of pupils. Share of performance variance explained by socio-economic background (SES)

Data: FSO (LABB), ÜGK; calculations: SCCRE



Legend

In the canton of Zug, the proportion of variance in reading achievement explained by SES is above average. Given the same pupil composition, 93% of the pupils in the canton of Zug achieve the basic competencies (figure on the left).

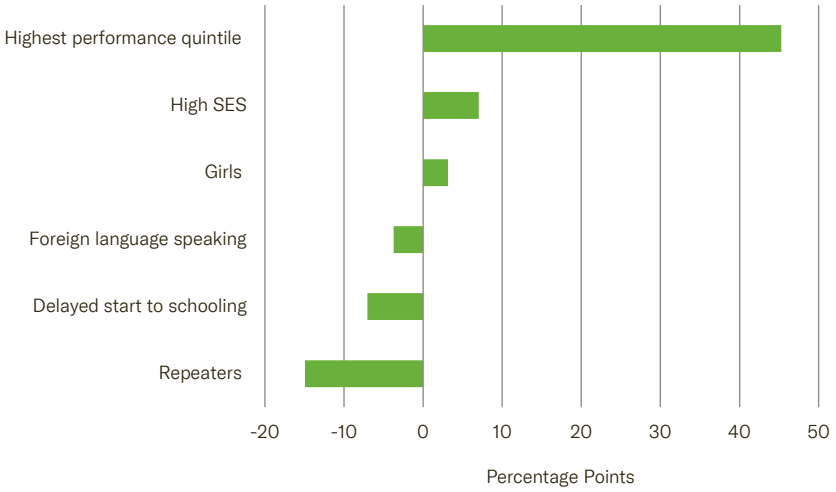
Transfer to a class with extended requirements in Sec 1

Most cantons know the shared model with different requirement profiles at lower-secondary level. The end of primary school time is therefore a key point for many children's educational path, because it leads to a decision as to whether they will transfer to a class with extended requirements or one with basic requirements. The ÜGK (school language and first foreign language in the eighth school year) enables initial calculations of these factors that influence this transfer taking account of school performance when the decision is made (→ figure 83).

83 Transfer to a class with heightened lower-secondary level requirements

Estimated probabilities, taking account various control variables

Data: FSO (LABB), ÜGK; calculations: SCCRE



Legend
Girls have a 3.2 percentage point higher probability than boys of transferring to a class with heightened requirements. Whoever repeats a class, on the other hand, has a 14.9 percentage point lower likelihood of such a transfer.

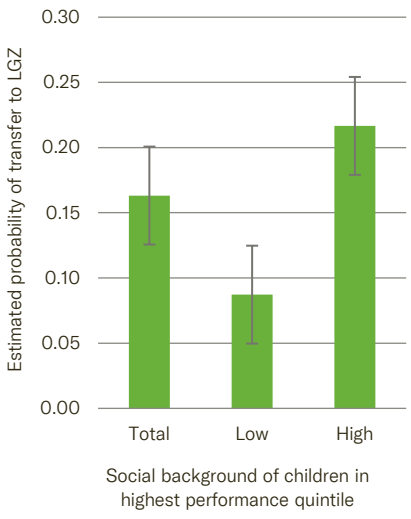
Long baccalaureate cycle and socioeconomic background

In ten German-speaking cantons (Appenzell Innerrhoden, Glarus, Graubünden, Lucerne, Nidwalden, Obwalden, St. Gallen, Uri, Zug and Zurich) pupils can join a long baccalaureate cycle straight from primary level *(→ chapter Baccalaureate schools, page 155)*. About 3000 pupils per year (4.7%) make use of this opportunity in the cantons named. Unsurprisingly, children of the highest-performing group are more likely to join a long baccalaureate cycle. The prospect of joining a long baccalaureate cycle, however, also varies greatly among the best performing children depending on their parents' socioeconomic background (→ figure 84).

84 Transfer to long baccalaureate cycle by social background

Likelihood of transferring to a long baccalaureate cycle (LZG); social background: socioeconomic background and parents' education considered; only pupils in the best performance quintile considered (ÜGK 2017, 8th school year, school language)

Data: FSO (LABB), ÜGK; calculations: SCCRE



COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION AND TRAINING

LOWER-SECONDARY EDUCATION

Context

Forming part of compulsory schooling, lower-secondary education is the continuation of basic primary level education and prepares students for upper-secondary education once compulsory schooling has been completed. The growth in pupil numbers that has been observed at primary level in recent years subsequently became apparent at lower-secondary level as well after a delay of a couple of years. In school year 2020/21, the number of pupils was around 264,800, an increase of 6% since 2016 (lowest level most recently). According to the forecast of the Federal Statistical Office (FSO), this growth will continue. At lower-secondary level, demographic developments led not only to an increase in the number of pupils but also to a change in the composition of the pupil population, particularly in terms of sociodemographic and socioeconomic characteristics.

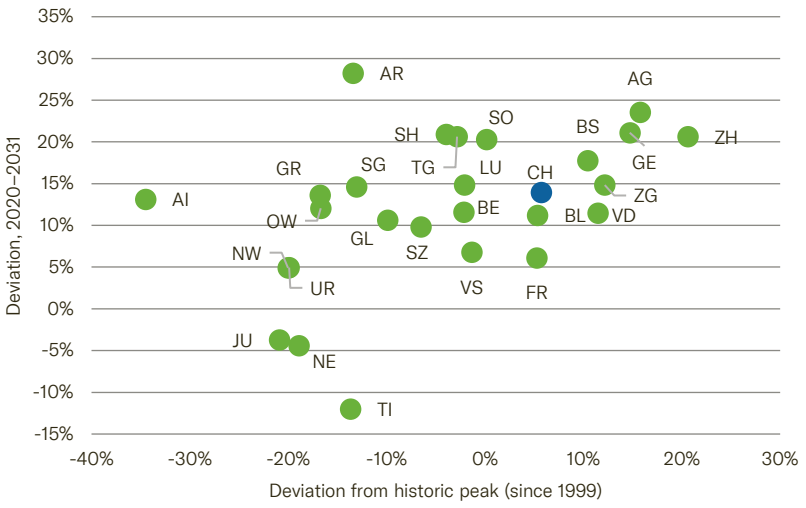
Development of and forecast for pupil numbers

A glance at past years shows that pupil numbers at lower-secondary level reached a minimum in the 2016/17 school year. At that point, the number was 17% lower than in 2005 (highest value since 1999). Under the influence of the demographic trend that had previously had an impact at the lower levels, pupil numbers also began to rise again at lower-secondary level from 2017/18. This is mainly attributable to the increase in birth rates since 2004. According to the FSO's forecast, pupil numbers will continue to grow at all levels of compulsory schooling in the coming years up to 2031 *(FSO, 2021k)*.

85 Development of pupil numbers and forecast for Sec I

Deviations from the historic peak since 1999 and from the 2020 figures until 2031 on the basis of the reference scenario

Data: FSO; calculations: SCCRE



As the dynamics of population growth differ across cantons, the development in pupil numbers will also vary considerably from canton to canton (→ figure 85). In comparison with the highest value since 1999, cantons such as Aargau, Basel-Stadt, Geneva and Zurich will see higher pupil numbers than ever before (see chart figure 85 at top right). Even though these cantons temporarily had falling numbers in recent years and can therefore "fill up" schools in some places, higher investments are nevertheless likely to be required due to the high growth in pupil numbers.

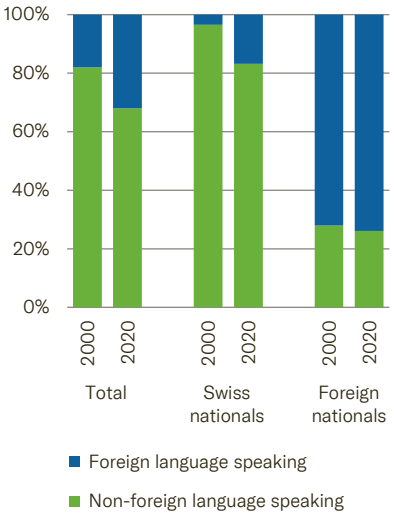
Composition of pupil population at lower-secondary level

The important exogenous parameters for schools and their teaching include the migration background of pupils and their first language, i.e. the language they learnt at home first. Around 20 years ago, 82% of pupils spoke the language of instruction at home (→ figure 86). Between 2000 and 2020, this proportion fell to 68%. This decline occurred during a period in which the share of foreign-language-speaking pupils in the group of foreign nationals remained unchanged. The proportion of foreign-language-speaking children among pupils with Swiss citizenship increased. This development is attributable not to immigration of families from another language region in Switzerland but to naturalisations of foreign-language-speaking pupils. This indicates that the influence of migration flows on Swiss schools will be underestimated if only pupil nationality is considered *(→ chapter Baccalaureate schools, page 155)*.

Anyone who wishes to apply for Swiss citizenship must meet numerous requirements and overcome several hurdles *(FSO, 2020c)*. Naturalisations therefore indicate a certain willingness to integrate. Recent analyses of the causal effect of naturalisations with a quasi-experimental research design[1] suggest that naturalised individuals do subsequently integrate better at a social level and earn a higher income in the long term than comparable individuals who did not acquire Swiss citizenship *(Hainmüller et al., 2017, 2019; Street, 2017)*. In connection with these research results, the increase in the number of foreign-language-speaking pupils at lower-secondary level should not be interpreted merely as a complicating factor for schools but also as a positive development. In Switzerland, almost twice as many adolescents over the age of 15 became naturalised as children under 10 *(FSO, 2020c)*. The reason for this is that older children are more likely to have parents who have lived in Switzerland for at least 10 years, which is a requirement for obtaining Swiss citizenship. This is also evident in the analysis of a pupil cohort of foreign 10-year-olds. Five years later, around a quarter of these children had Swiss citizenship.

86 Pupils in lower-secondary education by nationality and first language, 2000 and 2020

Data: FSO; calculations: SCCRE



1 Since it is not a random matter of who applies for citizenship and who eventually becomes naturalized, naturalized and non-naturalized individuals differ in terms of unobservable characteristics that distort the results. Therefore, analyses of the impact of naturalization require complex research methods that take a systematic selection bias into account.

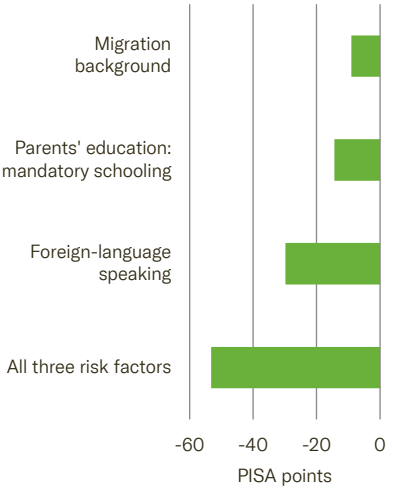
High-risk schools in Switzerland

Various studies of academic achievement show that pupils who speak a foreign language at home or come from less educated families have a higher individual risk of performing worse at school than their fellow pupils (→ figure 87). In addition, the performance of these children can be further weakened if there are many foreign-language-speaking children from uneducated families in the same class. It is therefore especially challenging for schools and teaching when the proportion of pupils with risk factors is high. Many studies show that there is a tipping point for these effects. Where the proportions are low, no change is visible. From a certain share upwards, often around 20% high-risk pupils, the negative effects become apparent and after that achievement deteriorates not in a linear fashion but exponentially *(Coradi Vellacott et al., 2003)*. A further distinction must be made between the effects that relate to the high-risk pupils themselves and those that have an impact on the other children. From a rate of 40 to 50% high-risk pupils in a class, negative effects also become visible in the academic achievements of the other children. Risk factors that are associated with worse school performance include on the one hand the parents' education and on the other foreign nationality combined with speaking a foreign language. In Switzerland, 12% of pupils at lower-secondary level come from uneducated families whose parents completed compulsory education at most. 17% are foreign nationals who speak a foreign language. Around 6% of adolescents have both risk factors. As no comprehensive data is available about the educational background of the parents of all children in Switzerland[2], only the distribution of pupils with the second characteristic can be observed. With a proportion of 17%, an equal distribution of pupils across schools and classes would fundamentally be possible. Looking at schools, 11% of lower-secondary level schools in Switzerland have more than 30% foreign-language-speaking foreign nationals among their pupils (referred to hereafter as high-risk schools). The differences between cantons are significant, both in terms of the share of these pupils in the overall pupil population and the proportion of high-risk schools (→ figure 88). Overall, it is apparent that the distribution of high-risk pupils is less equal at school level than at class level; in other words, the concentration at school level is more pronounced *(→ chapter Primary school level, page 53)*.

87 PISA scores in reading by risk factors, 2018

Deviation from the average PISA reading score of 15-year-olds in Switzerland, taking into account individual characteristics

Data: OECD; calculations: SCCRE



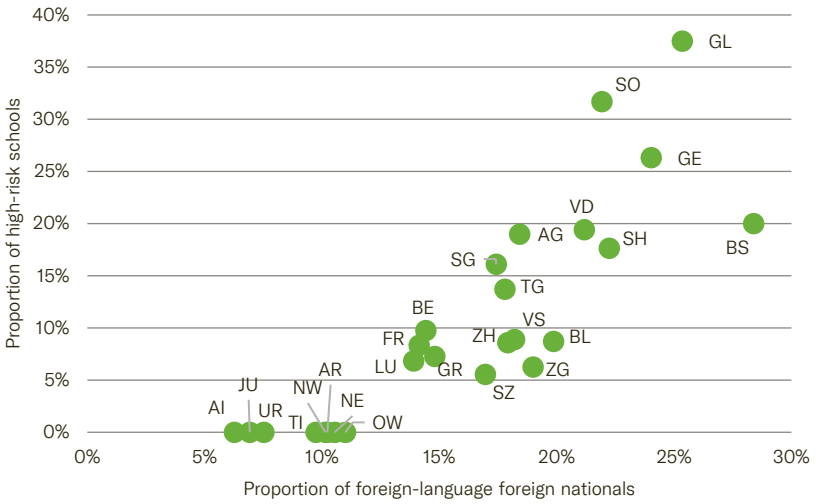
Legend
Foreign-language-speaking school pupils who did not differ from average adolescents in Switzerland in any other characteristics achieved an average PISA score that was 30 points lower than the average of 15-year-olds across Switzerland. This deviation is statistically significant.

2 The educational background of the students is recorded only nationally for a sample. With regard to the group of foreign language speakers, it should be taken into account that this they also include young people whose parents have a high level of education (for example, expats). This is relevant when interpreting the results of those cantons with a large number of well-educated foreigners.

88 Proportion of high-risk schools and high-risk pupils by canton, 2019/2020

High-risk schools are schools with more than 30% foreign-language-speaking foreign nationals; high-risk pupils are foreign-language-speaking foreign nationals

Data: FSO (LABB); calculations: SCCRE



Legend
In Canton Solothurn, a total of 22% of pupils are foreign-language-speaking foreign nationals and 32% of schools are high-risk schools. In Canton Basel-Landschaft, which has a similar total percentage of foreign-language-speaking foreign nationals among school pupils as Canton Solothurn (20%), 9% of schools are high-risk schools. The foreign-language-speaking foreign nationals are concentrated in a small number of schools and account for a higher proportion than they do in the high-risk schools in Canton Solothurn.

Persistent uneven distribution across requirements profiles

As has already been observed in the past *(SCCRE, 2018)*, pupils with potential risk factors are overrepresented in classes with basic requirements. The latest figures also show that the composition of the pupil population differs strongly depending on the requirements profile. With the tertiarisation process *(→ chapter Tertiary-level education, page 193)*, the composition of the pupil population has also changed at lower-secondary level over the last two decades (→ figure 89). In 2003, around 30% of children in the classes with basic requirements had parents who had completed tertiary education. By 2018, this proportion had risen to over 50%. In classes with advanced requirements, the increase was of a similar magnitude, but it began from a higher level. The proportion of pupils whose parents had a tertiary qualification stood at 66% in these classes in 2018. As a result, schools are teaching more pupils whose parents tend to have higher educational expectations than was the case 20 years ago.

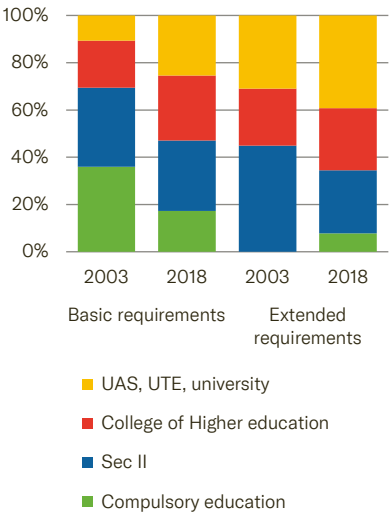
Age heterogeneity in lower-secondary education

When pupils enter the lower-secondary school, they already have very different educational careers behind them that took place with or without delays. On the one hand, there are already differences when pupils start school, particularly given that many children begin kindergarten one year later than scheduled. On the other, 7% of children repeat at least one school year at primary level *(→ chapter Primary school level, page 53)*. This also has an impact on age heterogeneity among pupils when they transfer to lower-secondary school. The youngest are 11 years old, while the oldest have

89 Educational background of pupils, 2003 and 2018

Highest qualification of parents according to PISA 2003 and PISA 2018; pupils in the 11th school year. People who could not be assigned to a requirements profile were excluded.

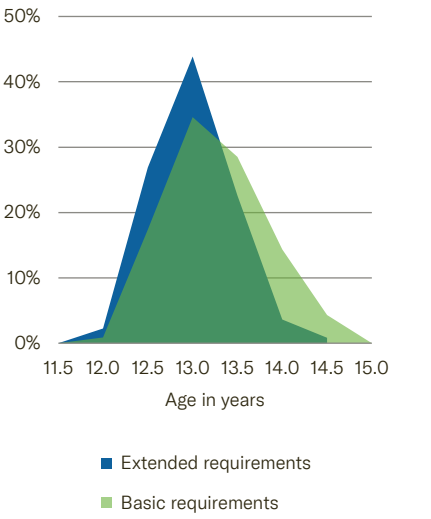
Data: OECD



90 Age distribution by requirements profile

Only public schools, excl. special needs classes and special schools; average figures for 2019 and 2020

Data: FSO (LABB); calculations: SCCRE



already had their 14th birthdays. A comparison of the age distribution of the two requirements profiles shows that pupils in classes with basic requirements are older on average than those in classes with advanced requirements (→ figure 90). This can be explained by both the higher proportion of pupils who were late in beginning primary school and the higher rate of children who repeated a school year at primary level.

Institutions

Since the implementation of the HarmoS Agreement *(EDK, 2007)* , lower-secondary level generally takes three years. This is also the case in cantons which did not sign up to the Agreement. The only exception is Canton Ticino, where secondary school lasts four years. With the introduction of *Lehrplan 21*, the term "third cycle" has also become established to refer to lower-secondary level. In most cantons, the school years are called the 9th to 11th school years, which is attributable to the integration of the first two kindergarten years (previously the pre-school stage) *(→ chapter Compulsory education, page 27)*.

Lower-secondary education models

For over 20 years, Switzerland has had three structural models at lower-secondary level which employ selection to differing extents. In around half of cantons, only one model is permitted. The other cantons allow the municipalities to choose between the different models *(→ margin text, page 88)*. In a slight majority of cantons, either the cooperative model or the integrated model is most common (→ figure 91).

In the **streamed model**, pupils are allocated to two or three different requirements profiles on the basis of an overall assessment. All subjects are taught separately. The requirements profiles are called *Realschule, Sekundarschule* or level A, B and C, for example.

The **cooperative model** usually comprises two streamed core classes. The allocation process is the same as for the streamed model. Mathematics, teaching language and in some cases also foreign languages are taught in level-based courses that span the core classes.

The **integrated model** does not use performance-based selection. The composition of the primary classes is maintained. Mathematics, teaching language and in some cases also other subjects are taught in level-based courses that span classes.

91 Most common model in lower-secondary education

School year 2020/21

Data: EDK-IDES

Model	Cantons
Streamed (number of profiles)	AG (3), AI (2)*, BL (3), BS (3), FR (3), GE(3), GL (3)*, SG (2)*, SH (2), SO (3), SZ (2), ZH (2, 3)*
Cooperative	BE, GR*, TG, VD, ZG*
Integrated	AR, JU, LU*, NE, NW*, OW*, TI, UR*, VS

* The cantons marked also have long-term and preparatory baccalaureate schools

The division into learning environments with homogeneous performance levels makes the teaching of competencies easier as both content and teaching methods can be better adapted to pupils' needs. However, competency development among the less talented or achievement-oriented learners may suffer when classes have homogeneous performance levels. In addition, inappropriate allocations may reduce the advantages expected of selection. Furthermore, separation deprives the weaker pupils in particular of the opportunity to be guided by their higher-achieving fellow students. A current piece of research into the impact of integrated systems on achievement points to a positive effect on the weaker-performing pupils *(Matthewes, 2018)*[3] and for pupils with lower socioeconomic background *(Canaan, 2019)*.

The link between the degree of selection used in a school model and performance and between performance and social origin in relation to the school model has been studied regularly in the research *(Dustmann, 2004; Felouzis & Charmillot, 2017)*. In most studies, the majority of connections reported are correlations rather than causal links.

A change in the requirements profiles is permitted in all school models to correct inappropriate allocations that occur during the selection process. Since a change of level is also possible in certain subjects during the school year in the cooperative and integrated models, these models are more permeable than the streamed model. In total, only 3.5% of pupils switched requirements profile in the years 2019 and 2020 (→ figure 92). As expected, more changes occur in cantons in which only the cooperative or the integrated model is permitted than in those which only allow the streamed model.

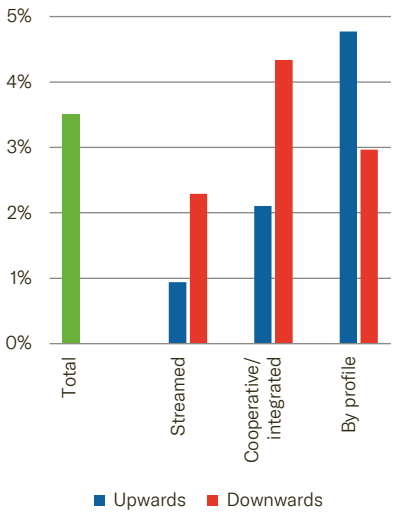
In education statistics, pupils are divided in a simplified manner into two requirements profiles, irrespective of the model: classes with basic requirements and classes with advanced requirements (in the cooperative and integrated models, the allocation is carried out on the basis of the level-based courses attended). The distribution of pupils across the different requirements profiles (→ figure 93) differs greatly from canton to canton, even for cantons with similar models. The proportion of pupils in classes with basic requirements varies from 15% in Canton Lucerne to more than 43% in Canton Glarus. The sociodemographic composition of the pupil population has a part to play in this, but it is not sufficient to explain the stark differences between the cantons.

Ten cantons in the German-speaking part of Switzerland also have long-term baccalaureate schools at lower-secondary level. In the other cantons, pupils enter baccalaureate school after the 10th or 11th school years. Both are possible in most German-speaking cantons, although transition after the 10th school year is the rule. In French and Italian-speaking Switzerland, the transition to baccalaureate school takes place after completion of compulsory education, except in Canton Valais *(→ chapter Baccalaureate schools, page 155)*.

92 Change of profile in lower-secondary education

Public schools, excl. special needs classes and special schools; excl. repetitions; by profile: upwards from a class with basic requirements to a class with advanced requirements and vice versa; average value for the years 2019 and 2020

Data: FSO (LABB); calculations: SCCRE



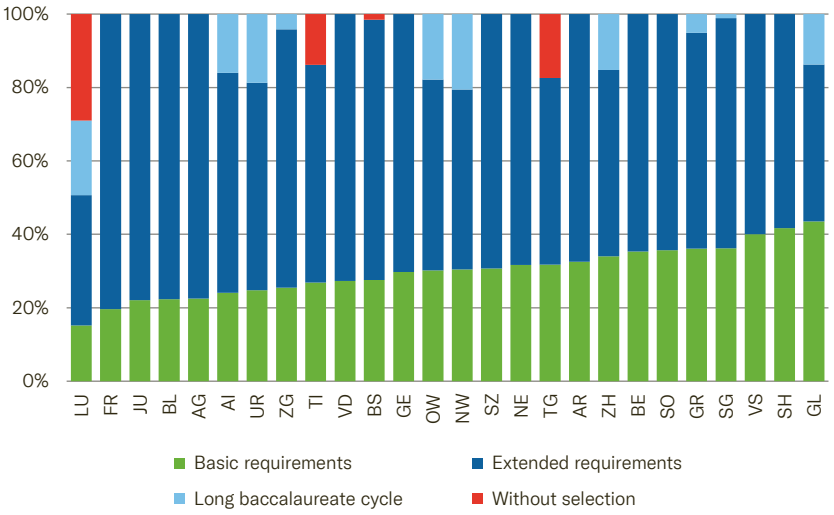
Legend
By profile: 4.8% of pupils switched from a class with basic requirements to a class with advanced requirements without repeating the school year (upwards). In classes with advanced requirements, 2.9% of pupils switched to a class with less advanced requirements (downwards).

3 In research, there is a distinction between within-school tracking (different requirement profiles at the same school) and between-school tracking (allocation of students to different schools or school buildings). The research results refer to the allocation among the various schools.

93 School pupils by requirements profile, 2020/2021

Public schools, excl. special needs classes and special schools; individual cantons which use the integrated model assign pupils to the category "No selection", other cantons allocate these students to the different requirements profiles on the basis of the level-based courses.

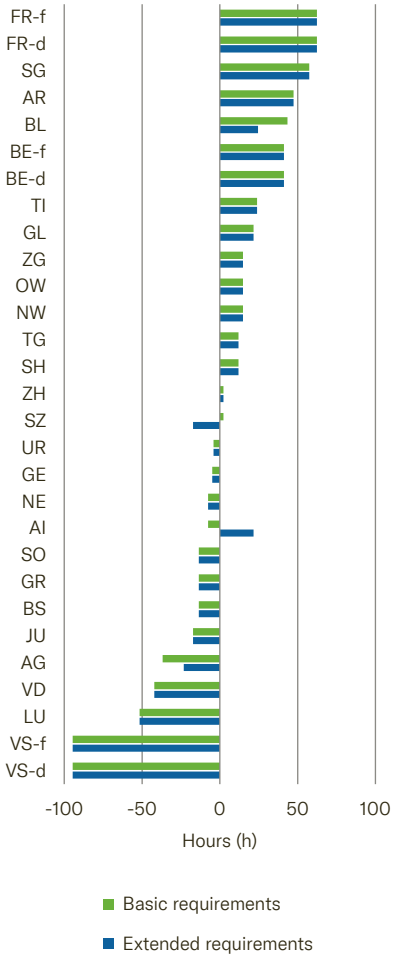
Data: FSO (LABB); calculations: SCCRE



94 Teaching time at Sec I, 2021/22

Deviation from the average annual teaching time in Switzerland (9th to 11th school year)

Data: EDK-IDES; calculations: SCCRE



Teaching time

The average annual teaching time at lower-secondary level is around 982 hours in Switzerland. Cantonal deviations from the Swiss average are substantial, ranging from 6% more to 10% fewer hours of teaching time (→ figure 94). Even where the weekly number of periods remains the same, there are still large differences due to the duration of the periods and the number of school weeks. The most important contributory factor to this is the duration of the periods. Individual cantons have adjusted their timetables in connection with the harmonisation of structures and targets *(→ chapter Compulsory education, page 27)*, but average cantonal teaching times have not converged to a noticeable extent as a result *(SCCRE, 2018)*. A convergence has been observed between the requirements profiles, however: classes with basic requirements only have shorter teaching times than classes with advanced requirements in a small number of cantons (Aargau, Appenzell-Innerrhoden; the opposite is true in Canton Schwyz). This is relevant not only because the amount of teaching time has a causal effect on school performance but also because teaching time does not have the same impact on all pupils. In comparison with a low requirements profile, an additional hour of teaching has double the effect on school performance in classes with the highest requirements profile *(Cattaneo et al., 2017)*. Consequently, pupils in classes with basic requirements would need more and not less teaching time to achieve similar results to their fellow pupils in classes with advanced requirements. As a real input factor in education, teaching time is a relevant parameter when it

comes to drawing conclusions about the technical efficiency[4] of the use of resources. Even if there is a causal relationship between teaching time and individual school performance, the very low correlation between teaching time and the proportion of pupils who achieve the basic competencies *(Consortium ÜGK, 2019a)* at cantonal level suggests that there is potential to improve efficiency in most cantons.

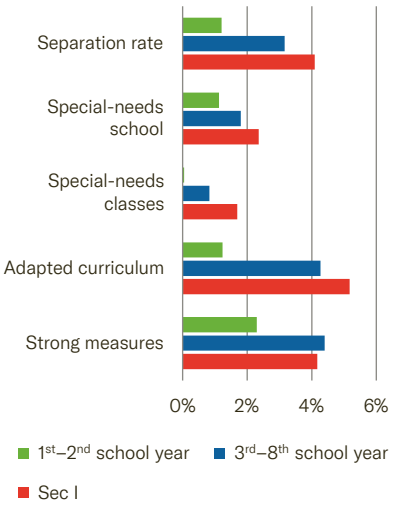
Special needs education at lower-secondary level

The proportions of pupils with individual learning goals and pupils educated separately in special schools varies strongly from canton to canton *(→ chapter Primary school level, page 53)*. However, there are also significant differences between the educational levels in compulsory schooling. A comparison of primary with lower-secondary level shows that the proportion of pupils with one or more individual learning goals is highest at lower-secondary level, where it stands at over 5%. This proportion quadruples between the 1st and 11th school years (→ figure 95). The proportion of pupils in special school classes and special needs classes (introductory classes, classes for foreign language speakers and other special needs classes; classes for foreign language speakers mainly contain children and adolescents who have only recently moved to Switzerland) also increases with the transition from primary to lower-secondary level. This disproportionate increase in separate schooling means that these pupils will not return to mainstream classes as their education path progresses. Instead, the separation is more often permanent *(Kronenberg, 2021; Lanners, 2020)* *(→ chapter Compulsory education, page 27)*. With the increase in the number of separately schooled pupils, the initial differences in terms of gender and migration background also become more pronounced *(Lanners, 2021)*.

95 Special needs measures and separation ratio by level, 2020/21

Proportion of pupils in the following categories: enhanced measures (e.g. intensive special needs support), curriculum adjustment (at least one individually adjusted learning goal), special needs classes (e.g. classes for foreign language speakers), special schools (pupils with disabilities in classes with adapted teaching); separation ratio: total proportion of pupils taught separately

Data: FSO; calculations: SCCRE



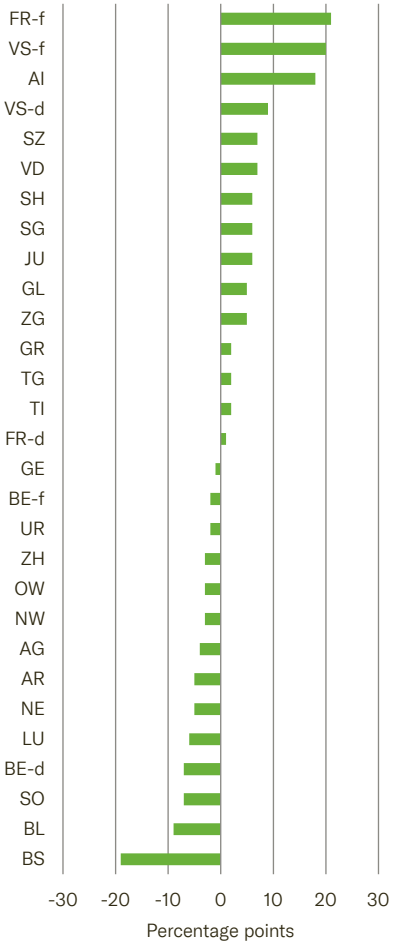
4 For technical efficiency, the real input (school hours in this case) is important. This does not have to be the same as economic efficiency, which considers the costs of teaching. If a canton with a favourable input were to use many school hours, technical efficiency but not necessarily the economic efficiency would be lower than in other cantons.

Effectiveness

96 Attainment of basic competencies in mathematics

Proportion of pupils who attained the basic competencies in the overall mathematics scale; ÜGK in 2016; deviation from average

Source: *Consortium ÜGK (2019a)*



To evaluate the effectiveness of lower-secondary education, it would be necessary to assess the achievement of a wide range of different state school goals to be attained by the end of compulsory schooling. The attainment of basic competencies in mathematics, languages and natural sciences is prioritised at both primary and lower-secondary level in Switzerland. In addition, goals in the area of digital skills are also becoming increasingly important. Alongside classic academic skills, the remit of state schools to train and educate also covers the teaching of inter-disciplinary competencies. As well as political education and education for sustainable development *(→ chapter Compulsory education, page 27)*, this includes personal and social skills, which are also known as non-cognitive competencies *(→ chapter Cumulative effects, page 355)*. If the focus is on effectiveness, it is necessary to consider not just the question of whether this large number of skills are attained (effectively) but also to look at factors that are conducive or detrimental to the achievement of those goals, such as school absenteeism or bullying.

The Swiss Conference of Cantonal Ministers of Education (EDK) formulated national education goals for basic competencies in the areas of languages, mathematics and natural sciences in 2011 and reviewed them throughout Switzerland within the verification of the attainment of basic competencies (ÜGK) *(→ chapter Compulsory education, page 27)*. At lower-secondary level, the attainment of basic competencies in mathematics in the 11th school year was assessed in 2016 (→ figure 96). There is still no data available for other areas at lower-secondary level, meaning that a more comprehensive, Switzerland-wide evaluation of goal achievement is not possible.

To review the effectiveness of lower-secondary education on both a systemic and an individual level, another criterion must be taken into account alongside the competence assessments: the successful achievement of the transition to upper-secondary education *(→ chapter Upper-secondary education, page 111)*. This question is also crucial because the Confederation and the cantons have set an education policy objective that 95% of all 25-year-olds should have an upper-secondary level qualification.

Development of PISA results since 2000

The PISA study remains the only way of comparing the performance of the Swiss education system internationally. Because competencies are recorded using the multi-level competency framework, the results also allow various analyses to be performed at a national level which would not be possible without this data basis. When the verification of the attainment of basic competencies (ÜGK) commenced, individual cantons stopped taking part in the PISA tests with additional random samples, meaning that cantonal comparisons on the basis of the PISA tests are no longer possible (until 2012, there were representative samples for around ten cantons). Twenty years after the first PISA measurements, Switzerland's position in these comparison tests has not changed significantly. While Switzerland is still keeping pace with the best countries in mathematics (515 points in 2018), it is only in the middle of the field of OECD countries when it

comes to reading (484) and natural sciences (495) *(Erzinger et al., 2019)*. Viewed over the full 20 years, Switzerland's adolescents did at least achieve better results in most cases than the 15-year-olds in its neighbouring countries (→ figure 97).[5] Its lead has shrunk considerably, however. The latest PISA assessment, which was scheduled for 2021, was postponed due to the COVID-19 pandemic and is being conducted in 2022 (focus on mathematics). The results will be published after the editorial closing date for the Swiss Education Report. In 2025, the PISA assessment will focus on natural sciences.

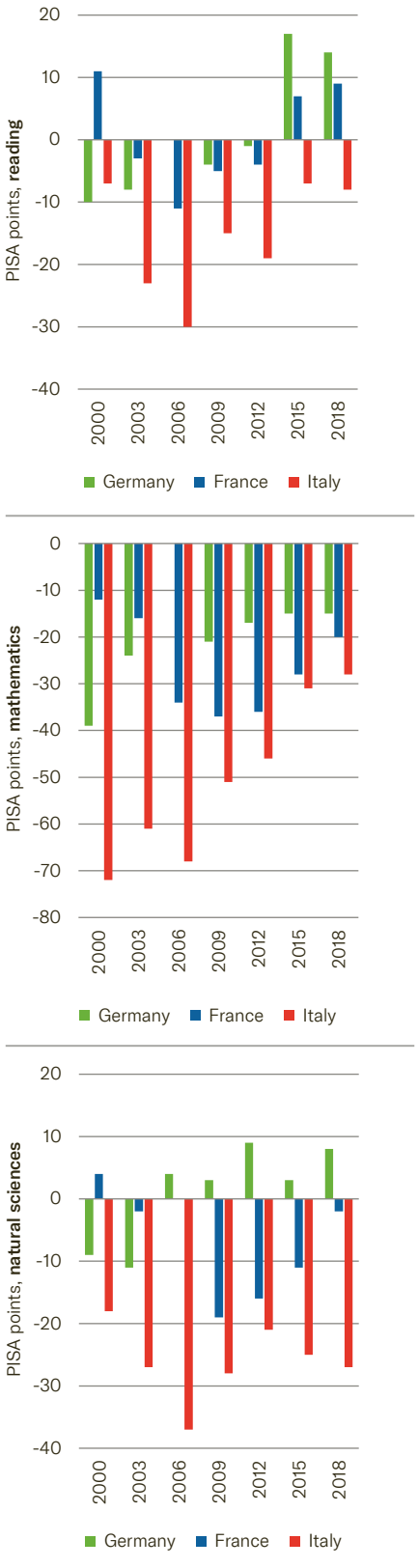
Effects of a change of canton on academic performance

In the Swiss education system, very few changes of school traditionally take place that are associated with a change of canton *(→ chapter Compulsory education, page 27)*. For decades, the low geographic mobility was attributed not least to parents' concerns, on account of the unharmonised school system, that changing to the education system of another canton would have academic disadvantages for their children and that long commutes were therefore preferable to a change of canton. There have been no studies of the effects of a change of canton on academic performance in Switzerland to date. Like the majority of international studies on this topic, studies on changes of school frequently suffer from the problem that the results cannot be interpreted causally. Changes of school can also be a consequence of academic problems rather than their cause. However, when a change of school is associated with a relocation to a different canton, it can be assumed that this is an exogenous event. On the basis of the ÜGK data (2016), an analysis was performed to ascertain what effect a change of canton before the ÜGK test had had on the pupils. No significant effect on their test result was identified. It can therefore be assumed that the pupils would have achieved a similar test result in their canton of origin. However, the effects are heterogeneous (→ figure 98). A statistically negative effect on academic performance was identified for the sub-group of boys, but it was only of a short-term nature: if the change of canton occurred more than two years prior to the test, no negative effect was registered for this group. Among girls, no short-term decline in academic performance was observed either. Psychological research has found indications that girls may be able to integrate into a new environment more quickly *(von Salisch et al., 2014)*, which would explain this difference.

97 PISA test scores, 2000–2018

Deviation from Swiss result for 15-year-olds; from top to bottom: reading, mathematics, natural sciences

Data: OECD

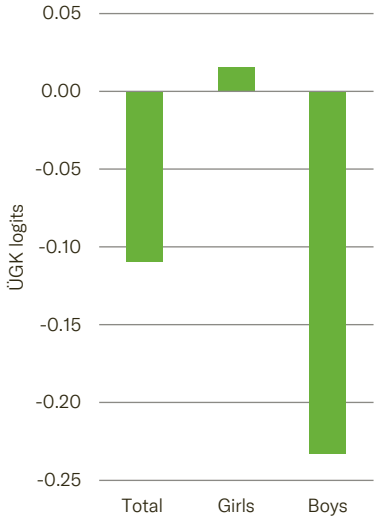


5 Austria changed the sample in 2000, which is why the country is excluded here.

98 Academic performance and change of canton by gender

Deviation in academic performance (ÜGK mathematics 2016) between pupils who changed cantons and pupils who did not change cantons (ÜGK mathematics: performance is reported in logits); boys: statistically significant deviation (p<0.01)

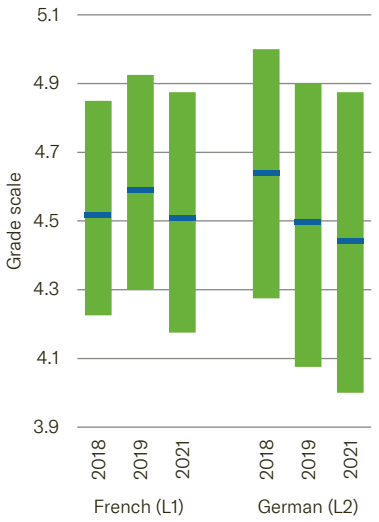
Source: *Angelone et al. (forthcoming)*



99 Diagnostic assessments in the Canton Fribourg, 11th school year

French-speaking part of the Canton Fribourg; grade scale of 1 to 6; blue marking: mean value; green bars: quartile range (performance range of the middle 50% of the sample); the assessment was not conducted in 2020.

Data: SEnOF; calculations: SCCRE



COVID-19 pandemic and school performance

Never before has there been a comparable cessation of on-site teaching and introduction of nationwide remote schooling based on digital technologies as there was at the start of the COVID-19 pandemic in 2020 *(→ chapter Compulsory education, page 27)*. The very sudden switch to remote teaching led to a situation in which teaching varied greatly depending on what equipment the school had and the digital skills of the teaching staff. The influence of school closures on pupils' competency acquisition is also of particular interest in the light of these extraordinary circumstances. Internationally, the findings on this question are inconsistent, and the robustness of the data they are based on also varies *(Contini et al., 2021; Engzell et al., 2021)*. A single Swiss study covering the initial phase of the pandemic showed different effects ranging from neutral to negative depending on the level of education *(Tomasik et al., 2021)*. In various cantons with regular diagnostic assessments, an important basic requirement for investigating the influence of school closures on school performance would fundamentally have been met. However, adjustments to measuring instruments or postponements of the timing of the survey in a number of cantons in the 2020 pandemic year made it impossible to compare the data collected with that of previous years. In addition, the data often does not contain details of the pupils' sociodemographic origin, which rules out any investigation of suspected heterogeneous effects.

At lower-secondary level, results are only available from the French-speaking part of Canton Fribourg and from Canton Geneva. Although the comparison of the Fribourg results in the years 2019 and 2021 (e.g. in French) points to a negative effect of school closures, the inclusion of the results from 2018 shows that the decline vis-à-vis 2019 does not prove a negative impact of the pandemic on school performance (→ figure 99). The reason for this is that the results for 2021 were comparable to those of 2018; what would actually have to be explained, therefore, is the positive performance in 2019 (before the pandemic). This highlights the fact that, in addition to extensive background information (sociodemographic data, information on the measuring instrument and on the implementation of the survey), long-term observations are also required to be able to correctly interpret the effects of extraordinary events. The analysis from the Canton Geneva, which covers several cohorts, also does not provide any indication of a connection between school closures and the school performance of pupils in the 11th school year (school year 2020/21) *(Prosperi et al., 2022)*.

Use of digital technologies in school

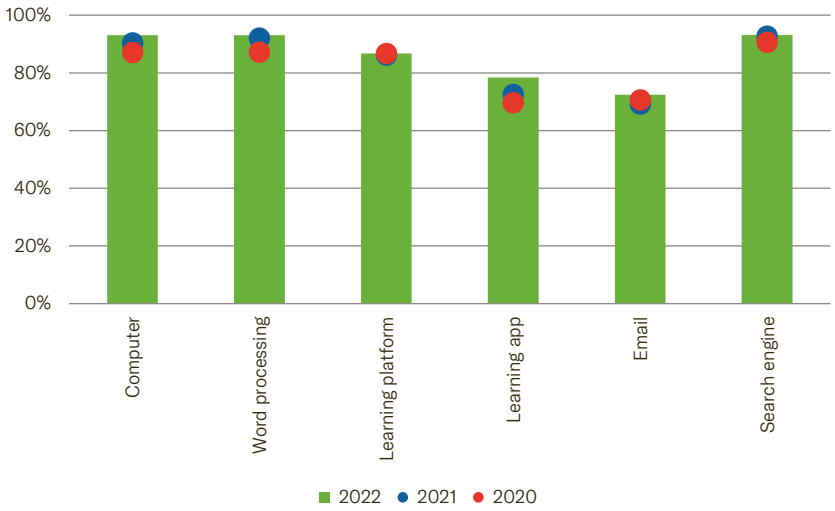
Interest in the availability and use of digital aids grew with the outbreak of the pandemic and the associated use of remote teaching. The same applies to the level of digital skills required for this among both pupils and teachers. It became clear that Switzerland is lacking important statistics in this regard.

According to the federal and cantonal education goals for digital skills, the challenges of digitalisation must be incorporated into the education system *(EAER & EDK, 2019)*. Furthermore, teachers should be able to employ suitable digital teaching aids and media and pupils should be capable of using digital technologies competently *(EDK, 2019c)*. To achieve these goals, it is not sufficient for digital aids simply to be available and in use; the fact that they are does fulfil an essential basic requirement, however. In connection with the pandemic, the availability and intensity of use of digital aids in the school context were assessed for the first time across Switzerland and across the various educational levels in three survey rounds between 2020 and 2022 *(Oggenfuss & Wolter, 2021a, 2021b)* *(→ chapter Compulsory education, page 27)*. Depending on the type of aid, the proportion of pupils who used computers and other digital aids in or for school was between 72 and 93% in 2022 (→ figure 100).

100 Use of digital aids in or for school in Sec I

Yes-proportions after controlling for individual background variables

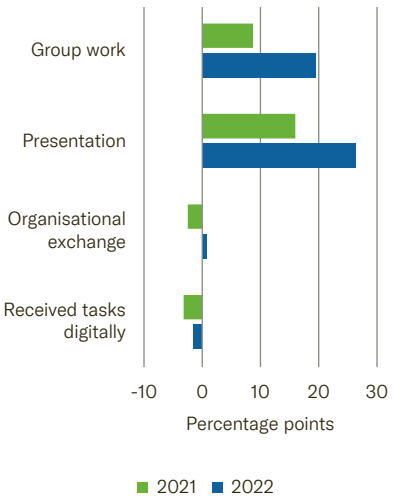
Data: Monitoring Digitalisierung; calculations: SCCRE



101 Type of use of digital aids in schools

Deviation from proportion of lower-secondary pupils who reported using digital aids for the above purposes in 2020 (after controlling for individual background variables)

Data: Monitoring Digitalisierung; calculations: SCCRE



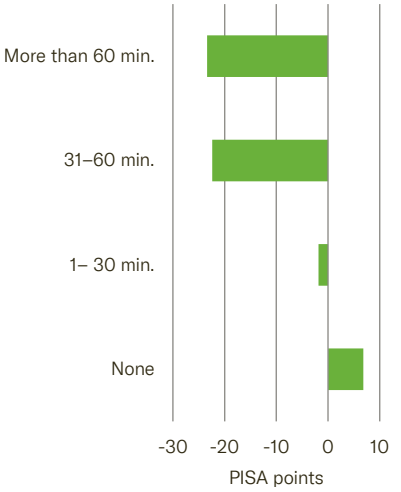
Legend
In 2022, the proportion of pupils who reported using digital aids for group work grew by 26 percentage points in comparison with the first survey in 2020. The difference is statistically significant.

Two years after the school closures, a significantly higher number of pupils reported using digital aids for presentations and group work than had been the case in previous surveys (→ figure 101). There are sizeable differences between language regions, both in relation to the availability and the use of digital technologies *(→ chapter Compulsory education, page 27)*. Although neither the availability nor the intensity of use of digital aids are a guarantee of their effective use for teaching purposes, a low intensity of

102 Use of digital aids in the classroom and PISA reading score, 2018

Deviation from average PISA reading score of adolescents in Switzerland when considering individual characteristics; by duration of use of digital aids in class

Data: OECD; calculations: SCCRE



A lack of data also makes it impossible to assess teachers' skills in the use of digital technologies. It can at least be ascertained from the 2018 PISA study how school management boards assessed the skills of their teachers. Although this assessment was positive overall, it must be assumed that a third of adolescents are being taught by teachers who mostly do not have the required application skills *(Educa, 2021)*.

use is at least an indication that potential positive effects of digitalisation are not being exploited.

Numerous studies show a descriptive correlation between intensity of use and school performance; this does not always have to be linear. However, such correlations generally cannot be interpreted causally. This is also true of the available data from Switzerland, which shows a weak negative correlation between intensity of use in teaching and PISA reading score (→ figure 102). International research literature on the effective use of digital aids indicates that the type of use and the didactic context are decisive when it comes to achieving better school performance with these tools *(Educa, 2021; Falck et al., 2018; Hull & Duch, 2019)*. Furthermore, it is crucial for pupils' future education and for numerous professional fields that they possess skills in the use of digital resources. The curricula for Switzerland's language regions therefore contain corresponding objectives, covering both the use of information and data and application skills in the area of digital technologies *(→ chapter Primary school level, page 53)*. However, target achievement in relation to these points cannot be evaluated for Switzerland due to a lack of data. Certain data on subjective assessments can be derived from the PISA and ÜGK studies. It is also known from research literature, however, that there is only a weak connection between self-assessment and actual competencies in the use of digital technologies *(Educa, 2021)*. Pupils whose application skills are in fact poor tend to overestimate their abilities *(Aesaert et al., 2017; Palczynska & Rynko, 2021)*. During the 2018 PISA study, for example, around 70% of adolescents stated that they had covered the handling of personal data in school *(Educa, 2021)*, which does not necessarily mean that they actually achieved a corresponding learning objective. As part of the 2016 ÜGK survey, application skills were recorded on the basis of self-assessments. Some 14% of pupils estimated their ability to be so high that they could help others to use computers (a further 36% "tended to" agree with this statement).

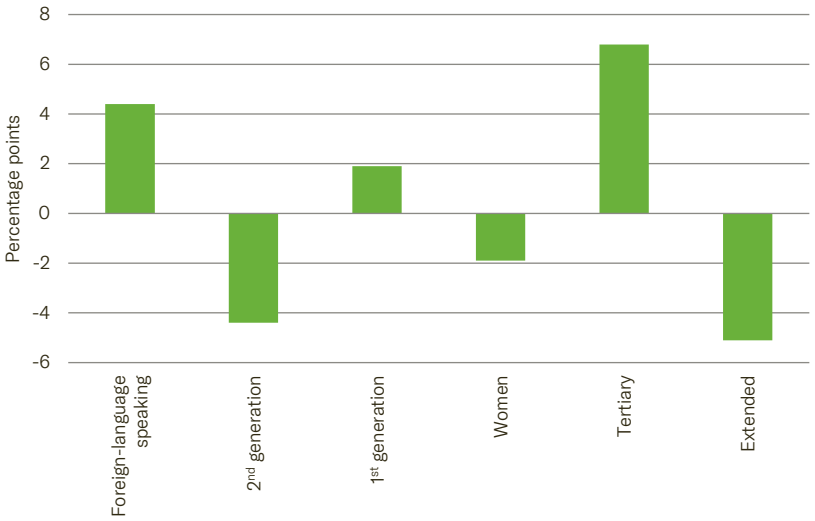
Absenteeism and school performance

Future educational success after compulsory schooling *(→ chapter Upper-secondary education, page 111)* depends not only on cognitive academic skills but also on non-cognitive competencies *(SCCRE, 2014, 2018)*. There are numerous non-cognitive competencies. Many of them are merely approximations of personal characteristics that are important for educational success. To measure non-cognitive competencies that are of high predictive value like conscientiousness, punctuality and absenteeism – i.e. absence from lessons – have proven to be among the suitable parameters *(Almlund et al., 2011; Liu et al., 2021)*. During the 2018 PISA study, a total of a quarter of adolescents reported such unexcused absences from lessons. In this regard, there is a negative correlation between the PISA test results and the probability of being absent from lessons. However, this cannot be interpreted as causal. A comparison of pupils with the same school achievement shows the following: pupils whose parents had tertiary-level education and adolescents who attended a class with basic requirements were absent significantly more often (→ figure 103). Other individual characteristics are not statistically significant.

103 Probability of being absent from lessons

Adolescents who indicated that they had had unexcused absences from school; after controlling for 2018 PISA reading score and various background variables; deviations from the respective reference group: foreign-language-speaking vs. non-foreign-language-speaking, first and second generation migrants vs. no migration background, girls vs. boys, tertiary vs. non-tertiary education of parents, advanced requirements profile at Sec I vs. basic requirements; the proportion of non-responses was 37%.

Data: OECD; calculations: SCCRE



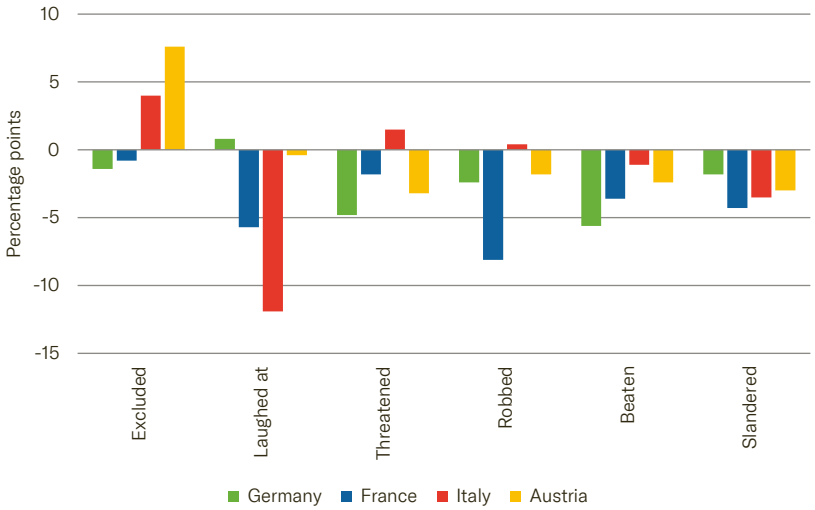
Bullying among adolescents

Relationships with fellow pupils are an important aspect of education in terms of social skills and also with regard to the link between bullying and school performance. The current figures on bullying in the school environment show that this phenomenon at Swiss schools is a problem that must be taken seriously *(Erzinger et al., 2019)*. According to the 2018 PISA study, Switzerland has the highest being-bullied index in comparison with its neighbouring countries. Looking at the individual types of bullying experiences, the picture is quite heterogeneous (→ figure 104). Depending on the type of bullying, between 17 and 42% of adolescents report having been victims of bullying. However, the proportion of non-responses was also very high in Switzerland (38%) and its neighbouring countries. It is unknown whether the high rate of non-responses indicates a lack of interest because no bullying took place, or whether the phenomenon is underestimated because pupils are reluctant to report it.

104 Bullying experiences in an international comparison

Proportion of adolescents who reported having experienced the mentioned type of bullying within one year (PISA 2018); deviation from the proportion of adolescents in Switzerland; proportion of non-responses: Germany 56%, France 24%, Italy 25%, Austria 21%; Switzerland 38%

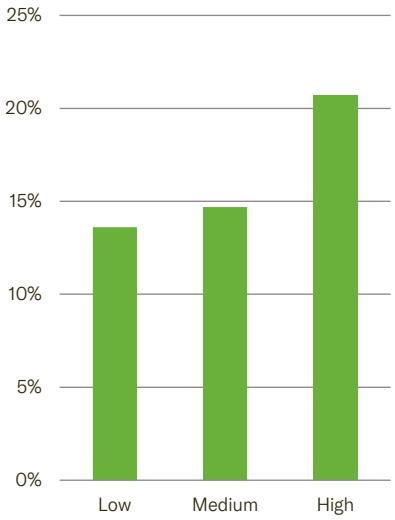
Data: OECD; calculations: SCCRE



105 Adolescents who experienced bullying, based on their relative position

Proportion of adolescents reporting having been threatened; by relative position in school performance distribution; after controlling for performance and individual characteristics

Data: OECD; calculations: SCCRE



Legend
Adolescents who occupied a high relative position in the performance distribution reported having been threatened more often (21%) than adolescents in a low position (13.5%); the difference is statistically significant.

Both adolescents who bully others and those who were victims of bullying perform worse at school than adolescents who have no experience of bullying . In addition, bullying experiences have a negative effect on adolescents' mental health *(OECD, 2019a)*. The causality in connection with school performance has not been established. In addition to absolute school performance, a pupil's relative position in the class can also influence whether that person bullies someone else or is bullied themselves *(Comi et al., 2020)*. In the data from the 2018 PISA study, such an effect is visible at least for bullying victims in Switzerland (→ figure 105). The probability of being bullied increases when the pupil is at the upper end of the performance distribution. Since the PISA study only records the victim's perspective, it is not possible to investigate whether this applies in a similar way to adolescents who bully others. An increasing amount of bullying takes place in the digital domain/on social media *(OECD, 2019a; SCCRE, 2018)*. The latest research results on the COVID-19 pandemic suggest that, although the bullying problem declined substantially for a short time during the school closures (including cyber-bullying), it had already returned to pre-pandemic levels by the autumn of 2020 *(Bacher-Hicks et al., 2021)*.

Political education

Like education for sustainable development *(→ chapter Primary school level, page 53)*, political education is one of the areas in which the Confederation and the cantons coordinate their activities *(EAER & EDK, 2019)*. Corresponding educational objectives are defined in the curricula for the language regions. Whereas the *Plan d'études romand* (PER) explicitly mentions political education, it is incorporated into *Lehrplan 21* on the one hand as a cross-disciplinary principle and on the other as a component of the nature, humankind and society *(Natur, Mensch und Gesellschaft)* subject area *(Thyroff et al., 2020)*. In total, there are only a small number of cantons – for example, Aargau, Geneva and Ticino – which list political or civic education separately in their timetables *(EDK-IDES, 2021b)*. Political education does not feature prominently in teacher training. This fact and the findings on the specialist and didactic competencies of teachers *(Thyroff et al., 2020)* in this field could also indicate why this educational area receives only limited institutional attention. Over the past 20 years, Switzerland has taken part in two international studies that investigated the competencies of 14-year-olds in the field of political education *(Biedermann et al., 2010; Torney-Purta et al., 2001)*. Switzerland's adolescents did well in the second survey: their results were above international average. However, the improvement between the two studies was mainly related to a change in the make-up of the participating countries and should not be interpreted as an indication that skills have actually improved in this field. Since the last measurement, no quantitative data has been gathered that would show the current state of competencies in this area.

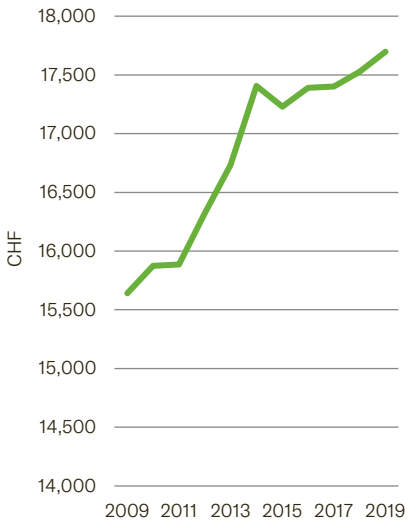
Efficiency/costs

To be able to adequately assess the efficiency of lower-secondary education, comparable data is required on the real inputs, the monetary inputs and the output indicators. In light of this and the fact that only a few of the many objectives of compulsory schooling are reviewed quantitatively on a regular basis, the options for assessing the efficiency of lower-secondary education are strictly limited. This is the case even though relatively good data is available on the monetary and non-monetary inputs. As a restrictive factor with regard to the data situation, it is necessary to add that data is not available at all levels of aggregation. While it would still be possible in some cases with regard to input data to make assertions about efficiency differences between cantons, this would be virtually impossible at the level of the individual schools. Furthermore, efficiency analyses are rendered more difficult or even impossible by a lack of competency data at primary level. If the different (prior) achievements at primary level are not taken into account, this can lead to incorrect assessments of the efficiency of lower-secondary education *(Wolter et al., 2020)*. For that reason, as with the entire Swiss education system, it is almost impossible to make any assertions regarding efficiency for lower-secondary level. The differences between the real inputs (class sizes, student-teacher ratio) and the costs are therefore outlined below.

106 Development in education expenditure at Sec 1

Staff remuneration; expenditure per pupil

Data: FSO; calculations: SCCRE



Until 2010, fluctuations in **class sizes** and student-teacher ratio could be reported effectively for the cantons. However, the modernisation of the education statistics meant that no data are available for the period from 2010 to 2014. On the other hand, the new data structure also includes information on class sizes in the municipalities. The demographic and topographic differences between municipalities can now be taken into account in the analyses, enabling assertions to be made about the differences in class sizes at an inter-cantonal level.

Cantonal comparison of education spending

Like the data on compulsory education as a whole, the statistics on spending on lower-secondary education are based on calculations that take account of spending at municipal and cantonal level. Such financial figures are often subject to compulsory or at least optional referenda. For that reason, the aggregated data on the individual educational levels will only be available after a significant delay. As a result, the currently available figures relate to the year 2019 and cannot be reported by canton for the individual levels *(→ chapter Primary school level, page 53)*. Certain restrictions are applied to ensure that comparability is as high as possible. These include, for example, limiting costs to the category of staff remuneration, which makes education spending and the overall Swiss data for lower-secondary level as comparable as possible, and viewing the lower-secondary level data for the whole of Switzerland. Education spending (staff remuneration) amounted to CHF 17,700 in 2019 (→ figure 106). This constitutes an increase of 18 percentage points in comparison with the figures from 2008. Over the same period, pupil numbers at lower-secondary level fell by around 10 points.

Cantonal class sizes and municipality-specific differences

Changes in class sizes are a key factor when it comes to the real costs in the area of compulsory schooling. Across all municipalities in Switzerland, class sizes range from 6 to 26 pupils per class (the average is 18.7). Classes are not always smaller in municipalities with very low pupil numbers; in fact, pupil numbers fluctuate strongly. As pupil numbers increase, class sizes rise at lower-secondary level before levelling off at around 19 adolescents per class when pupil numbers exceed 300. Part of the divergence in class sizes in the medium-sized municipalities can be explained by differences in urbanisation level or topography. However, there are also many municipalities in this medium-sized group that would have the potential to enhance efficiency if class sizes were to be increased. Even when demographic and topographic differences between municipalities are taken into consideration, there are still sizeable differences in average class size at the level of the cantons (→ figure 107). If one were to compare the cantons under the assumption that they were similar in terms of demographic and topographic aspects, the difference between the canton with the highest and the canton with the lowest average class size would decrease only from six to five pupils per class. A difference of 5.5 pupils in each individual class would amount to additional costs of around 30% for the canton with the smallest classes, assuming identical cost structures. Conversely, pupils' school performance would have to improve by 30% to achieve the same efficiency level as the canton with the highest average class size. Given the known variance in performance tests, it is hard to conceive that this would be possible.

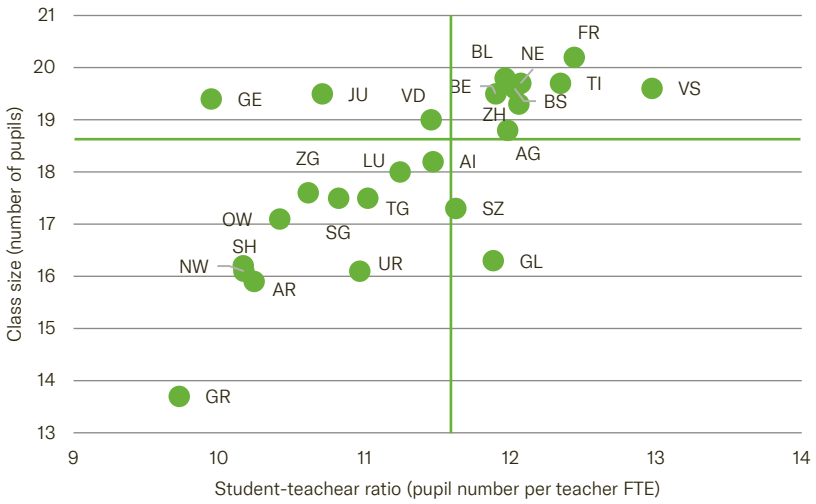
Intercantonal comparison of student-teacher ratio

Class size is not the only decisive factor when it comes to calculating education costs. In fact, costs depend much more directly on the student-teacher ratio. If the student-teacher ratio is good, more teachers are required per class irrespective of the class size, which causes high costs *(→ chapter Primary school level, page 53)*. Furthermore, large classes do not necessarily mean that the student-teacher ratio is unfavourable. In other words, class size does not correctly reflect costs and is the wrong measure for assessing efficiency. The average class size across cantons at lower-secondary level is 18.7 pupils (only regular classes). The average student-teacher ratio for the whole of Switzerland is 11.6 pupils per teacher FTE (→ figure 108). It is not possible to evaluate whether cantons with small classes and an adverse student-teacher ratio or cantons with large classes and a significantly better student-teacher ratio are more cost-effective.

108 Student-teacher ratio and class sizes by canton at lower-secondary level, 2020/21

Regular classes at public schools; the lines mark the overall Swiss average; data missing for the Canton Solothurn

Data: FSO

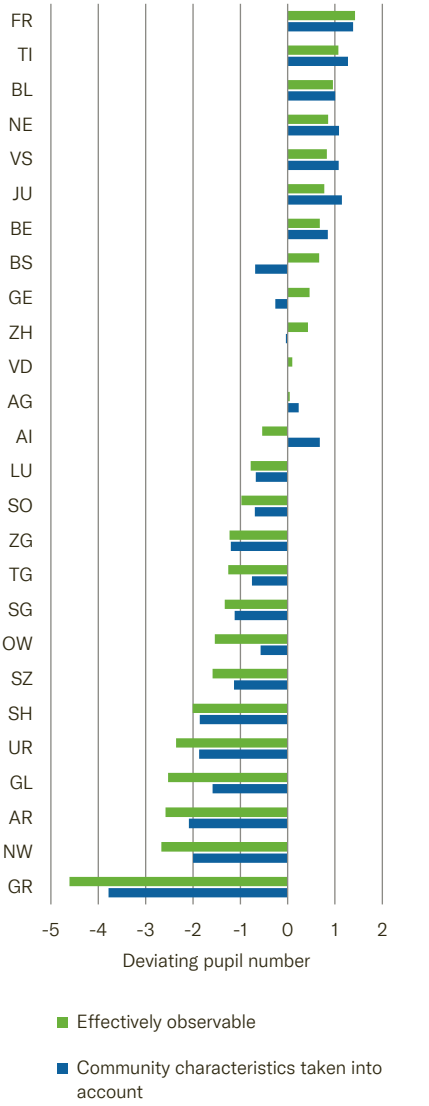


Almost without exception, scientific research literature on the effects of class sizes on pupil performance uses class sizes rather than student-teacher ratios in its calculations. By contrast, there are no studies on the link between student-teacher ratios and effectiveness, even though it is conceivable that there are different ways of structuring the relationship between teachers and pupils. As a result, although it is possible make assertions about whether cantons have higher or lower costs on the basis of differences in average student-teacher ratios, no conclusions can be drawn about the efficiency of improved student-teacher ratios without data on effectiveness. On the other hand, it is clear that the output of the cantons – measured on the basis of the proportion of pupils who achieve basic competencies in mathematics – hardly correlates with the cantonal

107 Average cantonal class size in Sec I, 2020–2021

Public schools (excl. special education classes and schools), cantonal deviation in number of pupils from municipality average; blue bars: number of pupils, size of the municipality, urbanisation level considered

Data: FSO; calculations: SCCRE

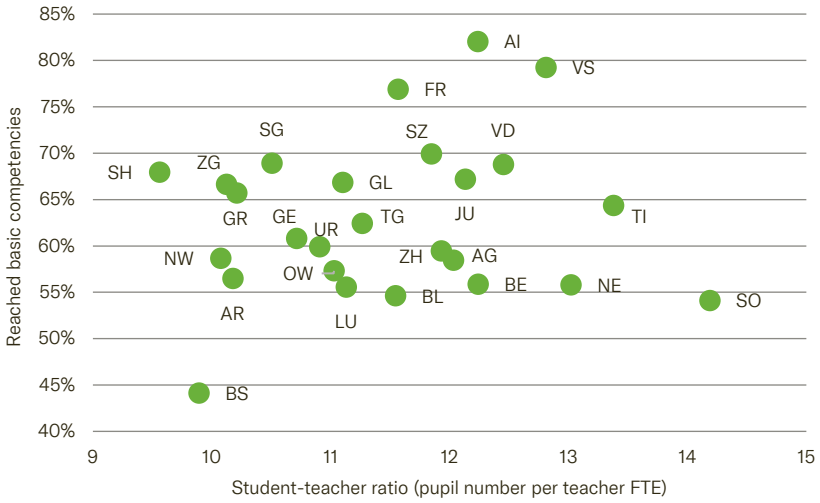


student-teacher ratios at all. This does not mean that the latter could not have an impact on the output, but it does at least signify that individual cantons are considerably more efficient than others in terms of student-teacher ratios (→ figure 109).

109 Maths score and student-teacher ratio in Sec

Proportion of pupils who had achieved the basic competencies (ÜGK) in 2016; student-teacher ratio (pupil number per teacher FTE) in the 2015/16 school year; regular classes at public schools

Data: ÜGK, FSO



Student-teacher ratio and costs

Real education costs per pupil have increased in Switzerland over the last two decades at the same time as both pupil numbers and the number of very large classes have declined *(→ chapter Primary school level, page 53)*. This trend – particularly the improvement in the student-teacher ratio – has also been observed in many other OECD countries *(OECD, 2019b)*. The reduction in class sizes was partly a reaction to demographic changes and partly a consequence of political decisions. The plan to cut class sizes was associated not least with the hope that it would have a positive impact on pupil performance. Such effects, however, are not generally backed up by the available data. If they do occur, it is often only for certain pupil groups under very specific circumstances *(Bach & Sievert, 2019; Filges et al., 2018)*.

If the student-teacher ratio in the OECD countries improves to the extent that each class has one pupil fewer per teacher, this causes additional costs of around USD 300 per pupil per year – assuming no other adjustments are made to offset these costs, such as a change in teaching time of pupils or teachers, or an adjustment of teacher salaries. On the basis of the model used by the OECD, it is also possible to calculate for Switzerland which salary reductions would be necessary to improve the student-teacher ratio by one pupil (→ figure 110). Conversely, the results also show by what percentage the average teacher salary could be raised if the student-teacher ratio were not improved.

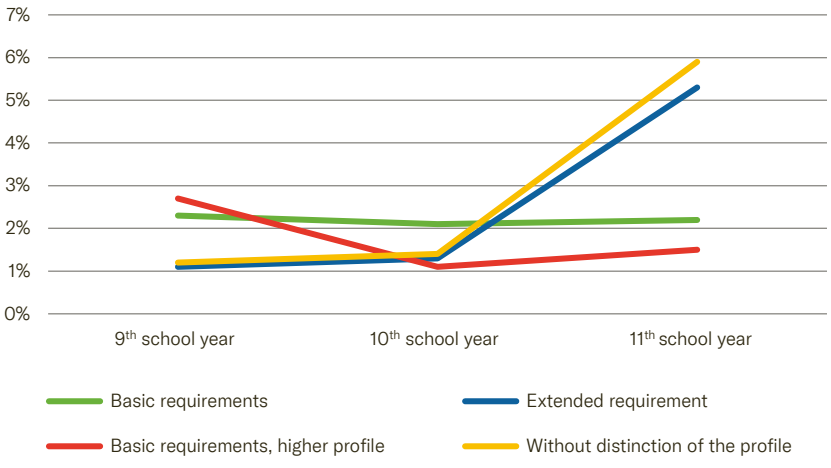
Education paths and repetitions at lower-secondary level

Around 91% of pupils complete lower-secondary school in the regular three years. The remaining 9% repeat at least one school year. Of the pupils who attend a class with basic requirements at the start of lower-secondary school, a total of 10% repeat years, with half subsequently completing a higher requirements profile. A repetition is worthwhile in the individual case if the benefits of completing a class with a higher requirements profile are greater than the costs generated by the additional year of education. This applies to both the person affected and society. Repetitions are somewhat less frequent (8%) in classes with advanced requirements. Boys, adolescents with migration backgrounds and adolescents from less educated families are more likely to repeat years *(→ Repetitions and individual characteristics, page 105)*. While the number of repetitions is lower in the first two years of lower-secondary school (9th and 10th school years) among pupils in classes with advanced requirements or when no distinction is made between profiles than it is in the profiles with basic requirements (→ figure 111), the former repeat the class more frequently in the final school year of lower-secondary level. Among other things, the reason for this increase in the number of repetitions is that the final school year at lower-secondary level can be repeated in some cantons, usually with the goal of then being able to go to a baccalaureate school. In cantons in which the transition to baccalaureate schools takes place after the 10th or 11th school year, pupils begin the baccalaureate school in the first year of education (irrespective of the time of transition). This results in a repetition when the transition takes place after the 11th school year *(FSO, 2021l)*.

111 Repetitions at lower-secondary level, 2016–2018

Repetition rates by school year and requirements profile

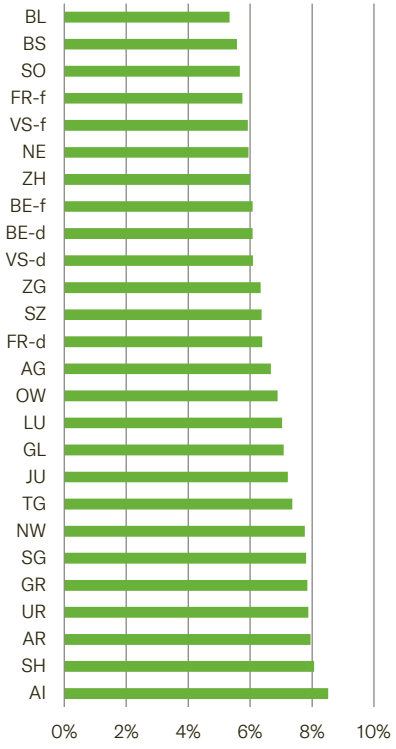
Data: *FSO (2021l)*



110 Pay increase for teachers if student-teacher ratio is raised

2019/20 school year; increase in teacher salary per year in percent if an improvement of one pupil in the student-teacher ratio were to be waived; due to missing data on teacher salaries, the cantons of Geneva, Ticino and Vaud have been omitted.

Data: BKZ, Syndicat des Enseignant/es Romand/es (SER); calculations: SCCRE



The salary calculations are based on information from the D-EDK teacher survey and on data from Syndicat des Enseignant/es Romand/es (the teachers' association of French-speaking Switzerland, SER). The data contains information on the salary systems, teachers' workload and teachers' salary after 15 years of working in the profession.

112 Repetition in lower-secondary education, 2020–2021

Data: EDK-IDES

	Cantons
Only possible under special circumstances (9th–11th school year)	AG, AR, BS, NW, ZG, ZH
In principle possible (9th–11th school year)	BE, GE, GL, GR, JU, LU, NE, SH, SO, TG, TI, UR, VD, VS
Rule for the 9th–10th school year differs from the rule for the 11th school year	AI, BL, FR, OW, SG, SZ

AI, BL: Repetition is possible in the 9th and 10th school years but not in the 11th

FR: Repetition is only possible in the 9th and 10th school years in exceptional cases, in the 11th school year, repetition is fundamentally possible

OW, SG, SZ: Repetition is fundamentally possible in the 9th and 10th school years; in the 11th, it is only possible in exceptional cases.

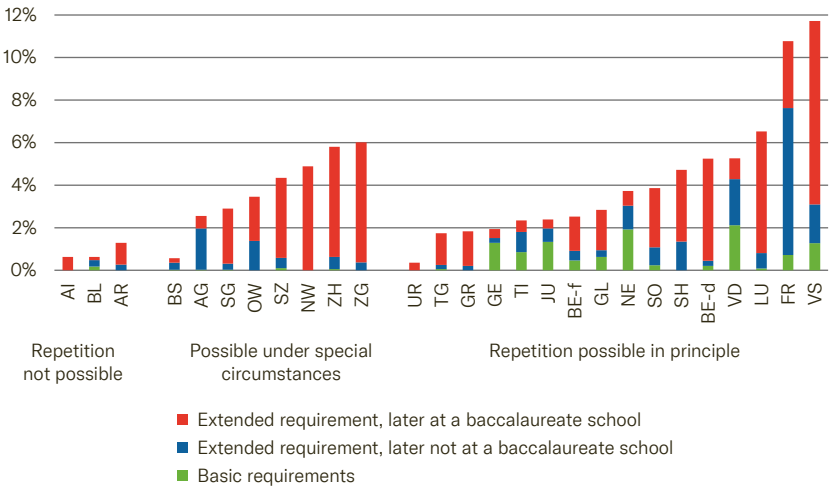
Irrespective of this, the cantons handle repetitions very differently, with the result that the rates in the cantons vary considerably (→ figure 112, → figure 113). To date, these differences in the duration of schooling have been neglected entirely or given insufficient attention in the interpretation of the cantonal performance comparisons (additional random samples as part of PISA) because only the pupil's age was taken into consideration.

Given the substantial costs of repeated years – they alone cause an increase in average public education spending of over 300 million francs a year – it would be advisable to better research the effectiveness of such repetitions. On the one hand, the question arises as to whether the outcome is so much better after a repetition as to justify the additional public and private costs. On the other, there is the question of whether these funds would not be better invested in proactive measures that enable a similar outcome without a repetition.

113 Repetition of the 11th school year by canton, 2018/2019

Public schools, excl. special needs classes and special schools; Canton Bern: language regions shown separately as the structure of lower-secondary education differs (not the case in the cantons of Fribourg and Valais); basic requirements: person who attended a class with basic requirements and repeated the same profile; advanced requirements: person who attended a class with advanced requirements and repeated the same profile.

Data: FSO



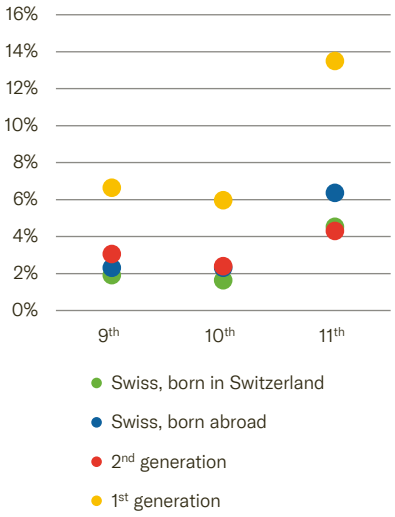
Repetitions and individual characteristics

With regard to repetitions, a trend that already becomes apparent in primary school continues at lower-secondary level *(→ Primary school level, page 53)*: boys, adolescents with migration backgrounds and adolescents from less educated families repeat classes more frequently than other pupils. However, this pattern only applies if repetition of the 11th school year is not included in the analysis. This is because it is mainly pupils in classes with advanced requirements who repeat the 11th school year. This group contains a significantly higher proportion of children whose parents have a tertiary qualification than parents with a lower qualification. Of the children whose parents have a tertiary qualification, every twelfth child *(FSO, 2021l)* repeats the class, with this repetition mostly being related to the transition to baccalaureate school. This finding naturally raises questions about the effectiveness and efficiency of such repetitions, but the factor of equity must also be considered. The fact that more children from educated families repeat a school year in connection with the transition to baccalaureate school poses the question of whether it is right to enable socioeconomically better-off adolescents to get into baccalaureate school by repeating school years. The equity question also arises in relation to the high repetition rates among children with migration backgrounds, although there is a significant difference between the first and second generations of the migrant population in this regard (→ figure 114). Could such repetitions, which also generate considerable costs for those affected, be avoided? Conversely, if repetitions are assumed to be an effective and efficient means of improving school performance, the question of why children without migrant backgrounds benefit from this measure less often also remains unanswered.

114 Repetition rate at Sec I by migration background

Average values for 2016–2019; Swiss nationals, born abroad: also includes naturalised persons; second- generation: foreign national born in Switzerland; first generation: foreign national, born abroad

Data: *FSO (2021l)*



Equity

The term equity refers to the question of whether school pupils are given the opportunity to achieve their full potential in education regardless of gender and social background. Since the latter is unknown, however, the question cannot be answered conclusively for individuals. For this reason, group-specific performance differences or differences in education path are viewed under the assumption that these groups (e.g. girls and boys) should theoretically have the potential to perform at similar levels in school. If persistent, unexplained performance differences emerge between these groups, this is interpreted as an indication of a potential equity problem. Previous editions of the Education Report have focused primarily on analysing performance differences on the basis of the PISA studies between 15-year-olds who are of different genders, who differ according to socioeconomic or sociodemographic criteria or who have different migration statuses. In a new feature, this report analyses the two questions of whether changes to the curriculum or the use of digital aids for teaching have similar effects on pupils.

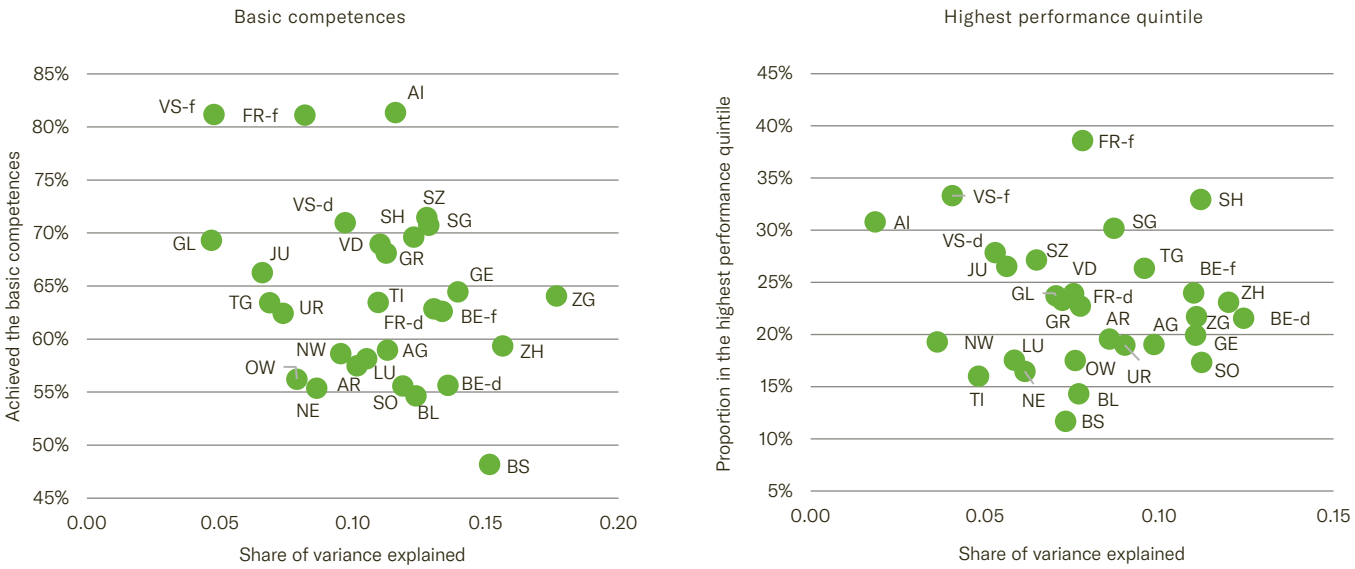
Socioeconomic background and performance

The influence of socioeconomic background on school performance is one of the best-documented links between pupils' membership of a certain group and their school performance in the research literature. As was already shown in the 2014 Education Report with the PISA results from 2009, the cantons differ not just in terms of the average school performance of their pupils but also with regard to the influence that socioeconomic background has on individual performance. In the context of the PISA study, these differences could only be shown for some of the cantons; thanks to the ÜGK results from 2016, they can now be demonstrated for all cantons. In general, the picture was similar to that of 2014 *(SCCRE, 2014)*: As the data from the PISA study indicates, weak student performance attributable to social factors is not necessarily offset by above-average performance in a canton (→ figure 115). This applies both in respect of the number of pupils who achieve the basic competencies and the proportion who are in the top twenty percent in Switzerland. In other words, this means that cantons with higher variations in performance that can be explained on socioeconomic grounds do no better in terms of either excellence or basic competency attainment than cantons in which socioeconomic origin has less of an impact on school performance.

115 Mathematics skills and the influence of social background on performance

The figures show the proportions (basic competences achieved or pupils belonging to the highest performance quintile in Switzerland) given the same composition of pupils. Share of performance variance explained by socio-economic background (SES)

Data: ÜGK; calculations: SCCRE



Attitude towards learning with digital tools by gender

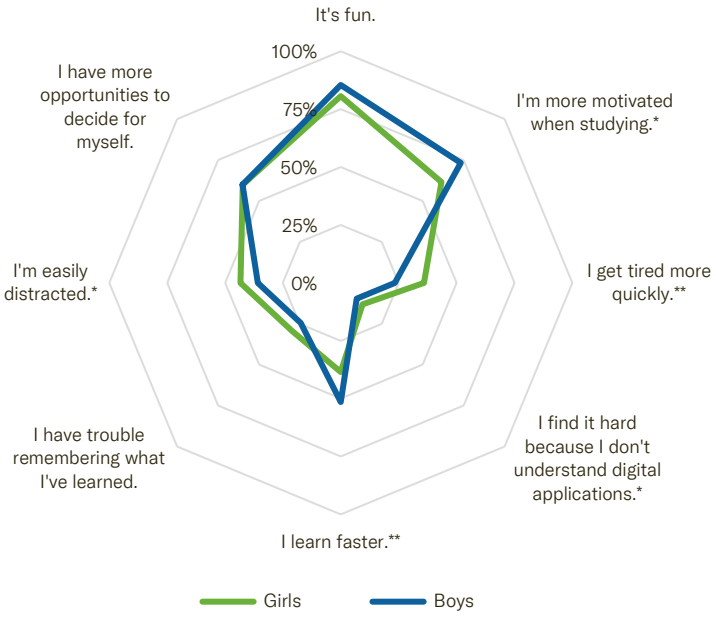
The increased use of digital aids in the school environment leads to an equity issue when some pupils do not achieve their full performance potential because of advantages or disadvantages in the learning process on account of the technology used. If all pupils were affected by the use of a new learning technology to the same extent, the question of whether it makes sense to digitalise learning processes could pertain to effectiveness or efficiency. An equity issue would not necessarily arise in this scenario. Irrespective of the question of whether digital aids make learning processes more effective or not, which is difficult to answer causally, lower-secondary pupils were very positive overall about learning with digital aids in the *Monitoring der Digitalisierung in der Bildung aus der Sicht der Schülerinnen und Schüler* (monitoring of the digitalisation in education from the perspective of pupils) *(→ Compulsory education, page 27)*. At the same time, they did not necessarily anticipate that they would enjoy significant benefits from the use of digital aids. What does stand out, however, is the differences between genders (→ figure 116). Boys are more positive about digital aids, almost across the board. They are more motivated when it comes to learning with digital aids and view the benefits as being higher than girls do. If the use of digital resources in teaching is increased *(Educa, 2021)* and girls are less motivated in this regard, learning with digital aids can be expected to have a different effect depending on gender. However, the question of whether this also leads to worse performance among girls is difficult to answer. That said, analyses show that boys taking computer-based PISA tests of their reading skills were able to cut the achievement gap vis-à-vis girls in comparison with pen and

paper tests *(Jerrim et al., 2018; Zehner et al., 2019)*. Another question that is hard to answer is whether learning with digital aids enables boys to better achieve their performance potential or prevents girls from making the most of theirs. The fact that these effects of the survey method (known as mode effects) only have an impact on boys and have less of an influence on girls suggests that the first hypothesis is more likely to be true.

116 Attitude towards learning with digital aids, by gender, 2022

Proportion of lower-secondary pupils agreeing with the above statements; after controlling for individual background variables; statistically significant differences: ** (p<0.01), * (p<0.05)

Data: Monitoring Digitalisierung; calculations: SCCRE



Legend
A total of 61% of girls agreed with the statement "I'm more motivated when studying" (in comparison with learning without digital aids). In boys, this figure was 73%.
The difference between the genders is statistically significant (5% significance level).

Earlier and intensified foreign language teaching

Since the introduction of a second foreign language at primary level, the number of foreign language lessons for pupils during compulsory schooling has increased significantly *(→ chapter Compulsory education, page 27)*. Such curriculum reforms can have an effect on educational inequality if pupils with certain characteristics (e.g. gender or first language) are at an advantage or a disadvantage as a result of the reform. When learning a second foreign language was moved to primary level, this went hand in hand with the expansion of foreign language teaching during the period of compulsory education. In this context, the questions arise in particular of whether girls – who generally have a greater affinity for language – would be at an advantage due to this development and whether foreign-language-speaking students would be able to cope, especially given that the language of instruction is already a foreign language for them. An analysis which took advantage of the staggered introduction of foreign language teaching and therefore allows causal assertions to be made shows that for most pupils, the aforementioned reform had no significant effects on their

education path after compulsory schooling. Only one clear effect was identified: the probability that boys in classes with basic requirements would transition directly to an upper-secondary education course after completing their compulsory schooling fell by 2.3 percentage points (on average, 73% of the boys in classes with basic educational requirements enter the upper-secondary level directly). This negative effect is concentrated above all in foreign-language-speaking boys and is generally less visible in girls and in adolescents who speak the language of instruction at home. Since no effects of earlier and intensified foreign language teaching on future education path were identified in over 83% of pupils, this reform also did not give rise to a significant equity problem *(Strazzeri et al., 2022)*.

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION
AND TRAINING

UPPER-SECONDARY EDUCATION

CROSS-CUTTING THEMES

The upper-secondary level is the start of post-compulsory education and pupils normally start this phase at 15 to 16 years old. However, not everyone decides to transfer directly from compulsory to upper-secondary schooling *(→ Immediate transitions and interim solutions, page 114)*. The transition comes with a choice – vocational education and training (VET) or general education. General education includes baccalaureate schools and upper-secondary specialised schools. The decision is determined by academic ability, personal preferences, social background and cantonal educational offering. This chapter addresses the different types of transition to upper-secondary level, the choice of school types available and the success rates applicable to pupils while going through and completing post-compulsory education. The education policy objective is for 95% of 25-year-olds to have an upper-secondary level qualification. Current developments, such as digitalisation in schools and the consequences of the Covid-19 pandemic are outlined in this chapter. The chapter concludes with an overview of the external evaluation of upper-secondary level schools as well as of exchange and mobility. More specific issues are addressed in the chapters on vocational education and training, baccalaureate schools and upper-secondary specialised schools.

Development of pupil numbers

The number of 16-year-olds, i.e., pupils in Switzerland of an age to transfer to upper-secondary level will, according to the FSO reference scenario, rise by 14% between 2019 and 2029.
The expected increase in 16-year-olds thus more or less corresponds to the expected increase in pupil numbers. Rising pupil numbers can mainly be attributed to population growth, as most young people in Switzerland complete upper-secondary education at some stage in their life.

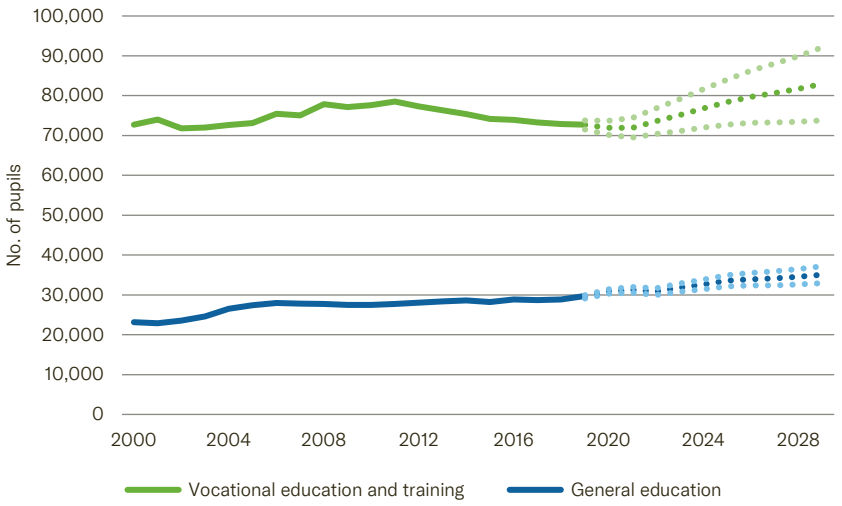
Most pupils still transition to vocational education and training on completing compulsory schooling. Over two-thirds of pupils in the first upper-secondary year opt for vocational education and training (→ figure 117). A general increase in pupil numbers is expected over the coming years due to the rise in birth rates since 2004 *(FSO, 2021k)*. The increase forecast by the Federal Statistical Office (FSO) between 2019 and 2029 amounts to 18% in general education and 14% in vocational education and training.

Regarding vocational education and training, the predicted increase in pupil numbers is more uncertain than in general education. The low FSO scenario for VET only forecasts 1.5% growth, while the high scenario is almost 27%. In general education, the growth forecast for the low and high scenarios comes to 11% and 25%, respectively. The forecast for vocational education and training is more uncertain than with general education because the VET pupil numbers are a lot more exposed to short-term (e.g. economy) and long-term developments (e.g. structural change).

117 Development of pupil numbers at upper-secondary level

Effective pupil numbers (first year) 2000–2019 and development scenarios from 2020–2029; reference scenario as well as high and low scenario

Data: FSO



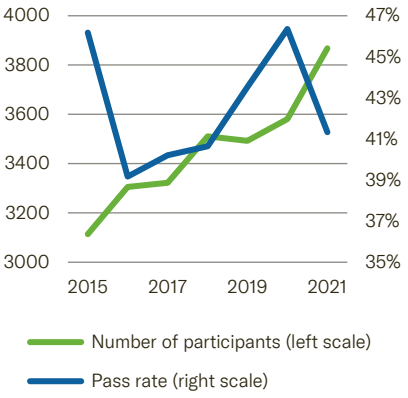
Transitions to upper-secondary education and Covid-19

Most young people transition directly to a certified upper-secondary level course following compulsory schooling. Just under half of school leavers go on directly to vocational education and training, just under every third person proceeds directly to academic baccalaureate school or upper-secondary specialised school. 10% undergo a transition course and another 8% do not transfer directly to upper-secondary level. The majority of both groups then start vocational education and training.

The consequences of the Covid-19 pandemic on the transition to upper-secondary level cannot be conclusively evaluated based on the available data. Initial results, however, indicate that the pandemic did not lead to major changes. At the same time, it did not go unnoticed either regarding the transition from compulsory to upper-secondary schooling (transition I). For example, a fifth of the young people surveyed in the 2020 transition barometer said the pandemic made it harder to decide which course to follow at upper-secondary level *(Golder et al., 2020)*. In the following year (2021), the share of respondents who agreed with that statement reached one third *(Golder et al., 2021)*. Companies often named Covid-19 as the reason why there are fewer apprenticeships on offer in the coming year or why they are unsure regarding the apprenticeship offering. At the same time, the vast majority of companies planned to continue offering apprenticeships in spite of the pandemic, so the number of apprenticeships has not fallen to date *(→ chapter Vocational education and training, page 125)*.

118 Participation and success in ZAP for short-term baccalaureate school

Data: Canton Zurich



Interim solutions are activities targeting entrance to upper-secondary level. These cover:

- **Transition courses,** i.e. the interim solution statistically recorded by the FSO, namely:
  - cantonally financed or subsidised **bridge-year courses**, that are preparation for a transition to upper-secondary school;
  - special educational bridge-year offers, vocational preparation classes in special or remedial schools;
  - schooling on a par with the 12th school year;
- the **motivation semester** financed by the social insurances;
- privately financed interim solutions including language-learning trips and courses, au-pair assignments and placement years.
- **Indirect transitions** to upper-secondary level contain not only interim solutions, but also extra years without (formal) education as well as gainful employment with subsequent entry to upper-secondary level.

The question also arises as to whether school selection was impacted by the Covid-19 pandemic. It could be expected that general education *(→ chapter Upper-secondary specialised school, page 179; → chapter Baccalaureate schools, page 155)* became more popular during the pandemic as pupils experienced difficulties in finding an apprenticeship. Data from Canton Zurich does not indicate that the Covid-19 pandemic led to a marked increase in the popularity of baccalaureate school. Although the number of registrations for the central entrance examination (*Zentrale Aufnahmeprüfung*, *ZAP*) for entry to short-term baccalaureate school rose between 2020 and 2021, this is indicative of a trend that has been ongoing for several years already (→ figure 118). More young people passed the exam in 2020 compared to prior years due to the cancellation of the oral exams.

Immediate transitions and interim solutions

Independently of economic fluctuations, there is a long-term growing trend towards interim solutions. While in 2000, for example, 12.4% of all students in the first year of upper-secondary level completed a transition course, the figure was 14.9% in 2018. The FSO expects the percentage to increase further: according to the reference scenario, this percentage will be 15.6% in 2029 *(FSO, 2021k)*.

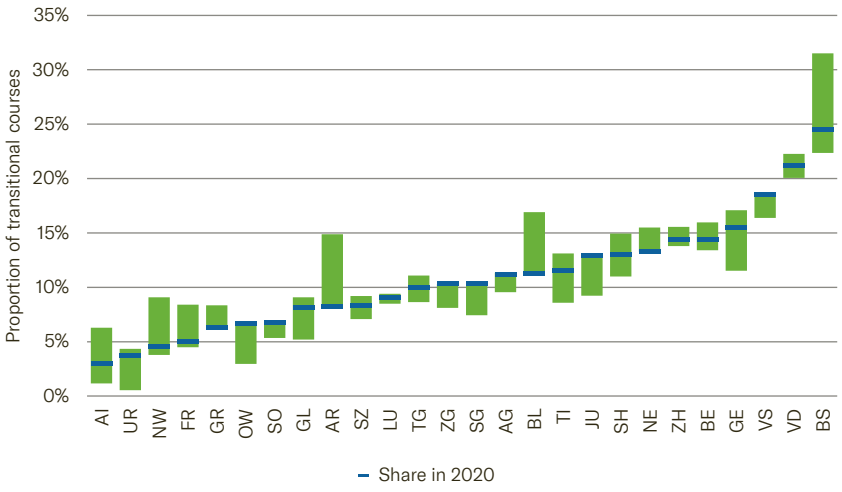
The probability of selecting an interim solution varies markedly between groups of persons. Students who attended the basic requirements profile at lower-secondary level, attended a special school or were taught with a special curriculum, tend to opt for an interim solution. However, these differences only partially indicate that deferred transition to upper-secondary level results from inadequate academic performance. A not insignificant number of young persons defer the transition in the hope that an interim year will improve their prospects of landing their preferred apprenticeship *(Jaik & Wolter, 2019)*.

The consistently high differences among cantonal ratios of interim solutions (→ figure 119) also indicate that supply is an important driver of demand: the more interim solutions are on offer, the more young people will choose them. The ratio fluctuations over the years average out at 3.5 percentage points between the year with the highest and lowest participation rates, while the difference between the canton with the largest proportion and the lowest was about 21 percentage points in 2020.

119 Prevalence of transitional courses, by canton

Share of cohort transitioning to upper-secondary level; the green bar shows the minimal and maximum share from 2014 to 2020

Data: FSO (LABB); calculations: SCCRE

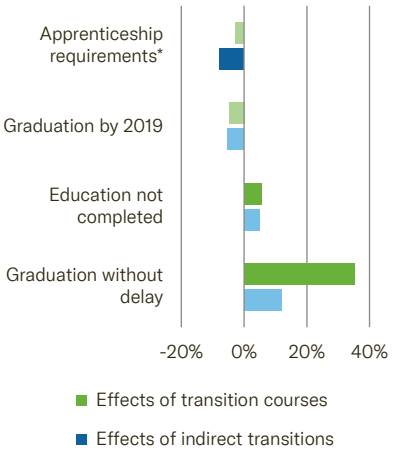


Whether these investments in interim solutions are worthwhile is questionable, even if interim solutions are well thought of among the young *(Kamm et al., 2020)*. Granted, pupils who undertake an interim solution within the school system tend to fare better at upper-secondary level than their counterparts who complete an interim year without formal education, but they are not more successful than those who transfer directly to upper-secondary level *(Mueller, 2016; Sacchi & Meyer, 2016)*. New assessments on the impact of transition courses and indirect transitions on the basis of the PISA 2012 cohort (→ figure 120) show the following: first of all young people who defer entry to vocational education and training (following an interim solution or year out without formal education), tend to select an apprenticeship with lower requirements than those who transition directly *(→ chapter Vocational education and training, page 125)*. The hope for a better apprenticeship following a transition course thus fails to materialise for the majority. Secondly, the results confirm that transition courses increase the likelihood of successfully completing the upper-secondary level without delay (e.g. through repetitions). The time to successful completion of upper-secondary level has nevertheless not diminished for this group through the extra transition year. Third, the transition courses increase the likelihood of dropping out, albeit only slightly. Fourth, there is no better prospect for achieving an upper-secondary level qualification at the age of 22 to 23. The analyses with the 2012 PISA cohort thus confirm the results for the 2000 PISA cohort: young people in an interim solution have better education paths compared to their peers who delay their transition without any (formal) education, but not compared to those who directly attend the upper-secondary level.

120 Transitional courses and indirect transitions

Effects of transitional courses or indirect transitions on choice of career and success at upper-secondary level

Data: SEATS; calculations: Centre for Research in Economics of Education at the University of Berne



* only applies to vocational education and training, the other effects also apply to general education

PISA points and other indicators were used as control variables. In addition, instrumental variables were included. Matt effects are not statistically significant at the 5% significance level.

Legend
People who transfer indirectly to upper-secondary level choose on average an apprenticeship with 8% lower requirements than young people who transition directly to upper-secondary level.

Vocational and general education options

Following compulsory schooling or an interim solution, young people also have to decide which programme to follow, i.e. vocational education and training or general education. Taking all transitions to upper-secondary level into account, i.e. not only those following directly from compulsory schooling, a significant majority of young people still select vocational education and training. Only about a quarter transfer to baccalaureate schools or upper-secondary specialised schools. The differences between cantons and language regions plus the differences between urban and rural areas are still of key importance when choosing a course: in French-speaking Switzerland, Ticino as well as Basel-Stadt and Zug, the proportions of young people who attend a general education school is significantly higher than in the other cantons. Generally, the fluctuations over time are far less noticeable than the intercantonal differences. Moreover, the cantonal disparities have grown even more since 2014: with the exception of Canton Geneva, the share of young people undergoing vocational education and training has fallen in those cantons that already had a low participation rate in 2014 (→ figure 122). However, the share of students in vocational education and training has grown in some cantons like Solothurn, Schaffhausen, Glarus, Uri and Appenzell Innerrhoden. This indicates an increase in heterogeneity as opposed to a broad trend towards general education.

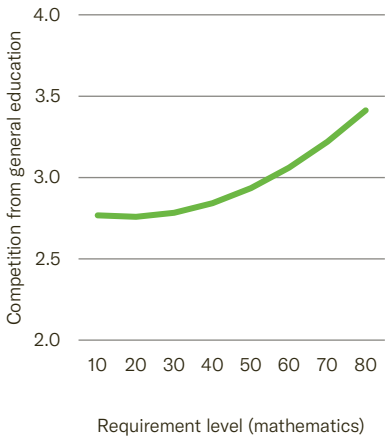
How do companies evaluate the competition from general education schools?

According to the transition barometer data *(Golder et al., 2019)*, competition from general education schools is not seen as very strong by companies involved in VET. This applies especially to apprenticeships with low or average academic skill requirements. However, the higher the requirements of the apprenticeship *(→ chapter Vocational education and training, page 125, text in the margin)*, the stronger the companies perceive the competition from general education schools to be (→ figure 121).

121 Competition between VET and general education

Evaluation of the competition from general education schools according to the companies offering VET; taking account of company size, language region and municipality type (urban, intermediary or rural); scale from 1 (very weak) to 5 (very strong)

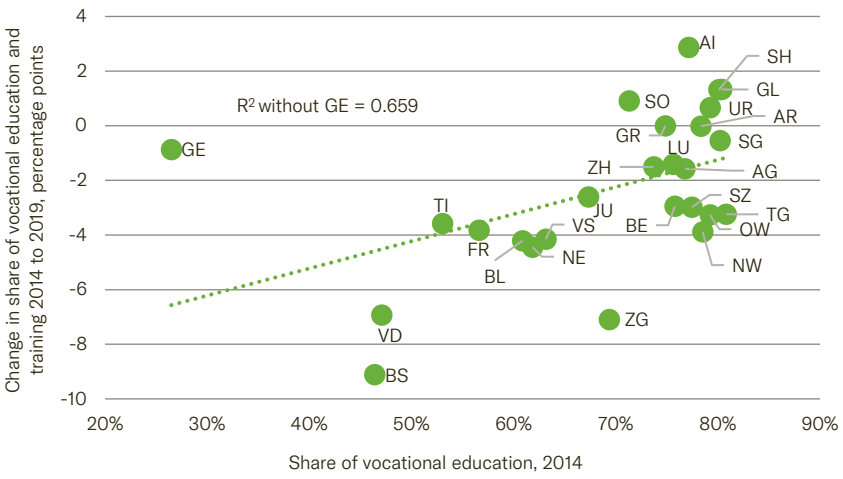
Data: SERI (transition barometer); calculations: SCCRE



122 Cantonal shares of vocational education and training when transitioning to upper-secondary level

Share of pupils who begin vocational education and training in relation to all young people in a cohort entering upper-secondary level

Data: FSO (LABB); calculations: SCCRE



The latest available data from 2020 is not used for figure 122 and figure 123. Instead, data from 2019 is used as it was not affected by the Covid-19 pandemic.

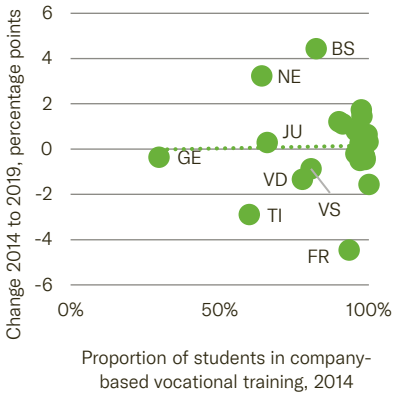
In some cantons, there are also deferrals between company-organised and school-based vocational training. In cantons Neuchâtel and Basel-Stadt especially, a fall in school-based vocational training caused the above-mentioned reduction in the share of vocational education and training; the reduction in school-based education programmes was only partially offset by extra company-based offers (→ figure 123). On the other hand, in cantons Freiburg and Ticino, for example, there was a shift of company-organised apprenticeships to school-based programmes.

Skills, environment and personality are important determining factors for pupils deciding whether to opt for general education or vocational education and training on finishing their compulsory schooling. In addition to personality traits *(Marcionetti & Rossier, 2017)* personal interests and tendencies *(Jüttler et al., 2021)* influence the choice of education programme. Socioeconomic background *(Zimmermann & Seiler, 2019)* and educational preferences also *(Cattaneo & Wolter, 2022)* play a part. In addition, parents influence children's performance at school through the level of support they provide. However, they also influence teachers' expectations of the children, which again has an effect on performance *(Niederbacher & Neuenschwander, 2020)*.

123 Cantonal shares of company-based vocational training

Shares in relation to all students in vocational education and training

Data: FSO (LABB); calculations: SCCRE



Success at upper-secondary level and repetition rates

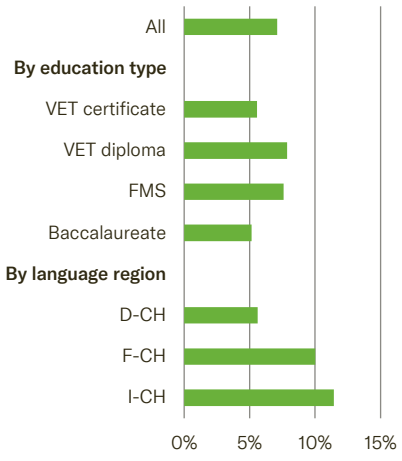
Repetition is relatively common at upper-secondary level if years repeated following a change of course are taken into account (as opposed to purely counting repetitions within the same course). Such a definition of repetition also counts years repeated through students switching to another apprenticeship or baccalaureate pupils transferring to another special subject. If all these repetition years are measured against total years, the repetition rate in apprenticeships with a federal VET diploma is higher than in baccalaureate schools and the same as in upper-secondary specialised schools (FMS) (→ figure 124). At the same time, language regional disparities are greater than inter-programme differences, i.e. between general education courses and vocational education and training. This in turn indicates that the institutional backdrop influences the probability of repetition. For example, in French-speaking Switzerland not only are pupils more likely to switch between courses, they also tend to transfer more often from a general education school to vocational education and training and to drop out of apprenticeships *(FSO, 2021h)*.

Across all programme types, almost 8% of all upper-secondary level pupils have already completed their current education year before and are therefore repeating a school year. Assuming average education costs, the direct public expenditure for these repetition years amounts to approximately half a billion francs a year. In addition to the annual public expense, there are the individual costs as an extra year of education shortens time spent in gainful employment. This begs the question of how many of these repetitions could be avoided by early and adequate intervention.

124 Proportion of repeated school years, 2018–2020

By programme type and language region

Data: FSO (LABB); calculations: SCCRE



Repetition in this context means a year of education where the person has already completed the same education year of the same programme type. When someone has completed the first apprenticeship year, then changes apprenticeship and repeats the first year, that also counts as a repetition year. A transfer from baccalaureate school to vocational training, in contrast, does not count as repetition.

Graduation rates at age 25

In 2006, the Confederation, cantons and social partners agreed on the education policy goal of 95% of 25-year-olds in Switzerland having an upper-secondary level qualification. For the cohort that was 15 in 2010, the completion rate was 91.4% ten years later *(FSO, 2022d)*. The ratio differs between groups of people with different characteristics, especially with regard to the type of education completed by the pupils at 15 years of age (→ figure 125). At 97.2% the education target was achieved for those who transitioned directly to upper-secondary level or attended the 11th school year of lower-secondary level with heightened requirements at the age of 15. The ratio was slightly below the education target for persons in transitional education or in the 11th school year of lower-secondary school with basic requirements. A lower completion rate is also in evidence among apprentices with a delayed progression, i.e. who were in their 9th or 10th school year at the age of 15, as well as for those with special needs. These two groups of persons, however, only account for a small part of the cohort *(FSO, 2022d)*.

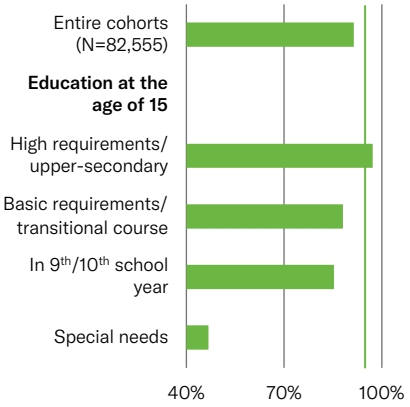
The likelihood of a successful outcome by the age of 25 also differs among people of different migration status. The Swiss have a higher graduation rate than foreign nationals. Foreign nationals born in Switzerland (2nd generation) are in turn more likely to graduate than persons who immigrated more recently to Switzerland (1st generation). An analysis based on SEATS data shows that these differences can be explained partly by the academic skills at the end of compulsory schooling. Taking these into account, the differences between migration status are significantly smaller (→ figure 126). Second-generation migrants are almost as successful as the Swiss assuming the same level of cognitive skills. This demonstrates that migration background is much less of a risk factor than lacking academic skills.

Marked differences emerge when looking at graduation rates in the individual cantons: the ratios vary between 84.0% and 98.6% *(FSO, 2022d)*. The cantonal differences may arise due to different characteristics among the students. For example, more students in rural areas aged 25 have an upper-secondary level qualification than their urban counterparts, and the city cantons of Basel-Stadt or Geneva have low graduation rates. At the same time, these individual characteristics only explain some of the cantonal variation: gender, migration status, place of residence as well as the course selected at 15 are equally significant (→ figure 127). The cantonal graduation rates again correlate with the proportion of students in general education: the more people start with general education, the lower the cantonal graduation rate. This correlation also applies if the probability of graduating is amended in line with the individual characteristics mentioned above. That shows the connection between the proportion of young people in general education and success at upper-secondary level does not result from cantonal differences among students, at least not differences arising from the characteristics mentioned in the figure 127.

125 Graduation rate at age 24

By education type at the age of 15; 1996 birth cohort; the green line represents the 95% target

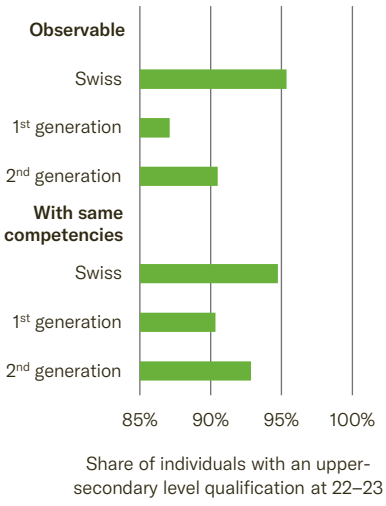
Data: *FSO (2022)*



126 Graduation rate by migration background

The corrected graduation ratios at the age of 25 are not yet available as the latest data relates to the cohorts in the 2012 PISA survey at 22–23 years old.

Data: SEATS; calculations: SCCRE

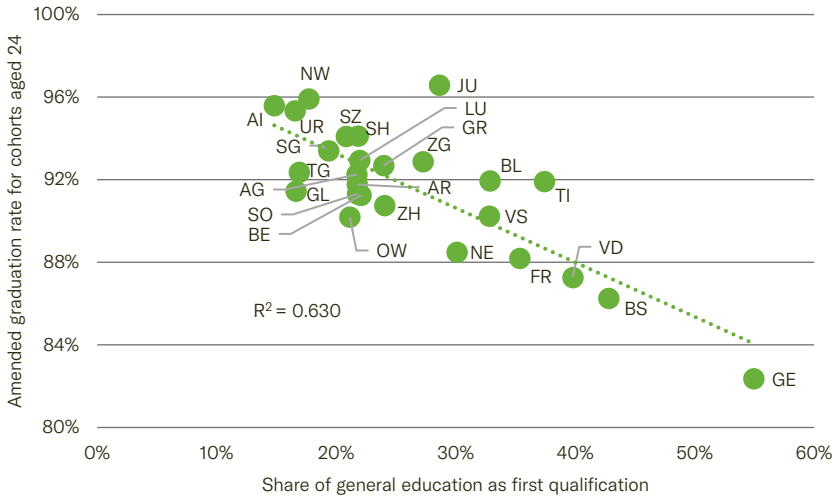


Legend
The graduation rate is 90.5% for persons of a 2nd generation migration background (if these persons are 22–23 years of age). If they had the same academic skills as the Swiss, their graduation rate would be 92.8%.

127 Cantonal graduation rates at the age of 24 and share of general education

Taking account of gender, migration status, place of residence (urban, intermediary or rural), course of education at the age of 15; persons born in 1996; excluding people having emigrated from Switzerland

Data: FSO (LABB); calculations: SCCRE



Success and non-cognitive skills

School or cognitive skills are central to the education path following compulsory schooling. At the same time, international research literature shows that personal characteristics, known as non-cognitive skills *(Heckman et al., 2006)*, must also be taken into account to explain differences in educational achievement. Cognitive skills differ markedly between the education programmes at upper-secondary level, although there are overlaps in the allocations. The situation regarding non-cognitive skills is less clear for two reasons: first because there are different types of non-cognitive skills and they are most probably not all equally important to achieving success in education and subsequently the labour market. Secondly these skills were usually not measured in a representative way *(→ chapter Cumulative effects, page 355)*.

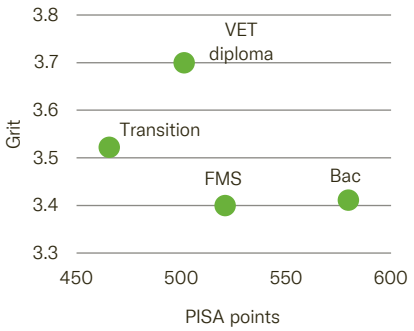
One non-cognitive skill measurement seen as closely related to individual success is known as grit. The concept of grit involves the ability to develop a passion for a specific goal and, in addition, to pursue this goal over years without being thrown off course by setbacks *(Duckworth et al., 2007; Schmidt et al., 2019)*. A comparison of this measure of non-cognitive skills among pupils at upper-secondary level and those doing transitional courses against the average PISA points reveals the following: Students in vocational education and training (federal VET diploma) gain fewer PISA points on average than their counterparts at baccalaureate school. The former, however, have more grit (→ figure 128). This difference is also statistically significant in view of grades, gender and regional differences. High cognitive skills therefore do not necessarily go hand-in-hand with high non-cognitive skills.

The term **cognitive skills** describes such concepts as intelligence and solving abstract problems *(Brunello & Schlotter, 2011)*. Cognitive skills are measured in this chapter using PISA points and the terms cognitive skills and academic skills are used interchangeably. **Non-cognitive skills** on the other hand are personality traits, for example the Big Five *(Nyhus & Pons, 2005)*.

128 PISA points and grit by education programme

Average PISA points in mathematics, reading and natural sciences; grit measured from 1 (minimum) to 5 (maximum), measurement was during lower-secondary level

Data: SERI (transition barometer), SEATS; calculations: SCCRE



VET diploma	Federal VET diploma
Transition	Transition course
FMS	Upper-secondary specialised school
Bac	Baccalaureate school

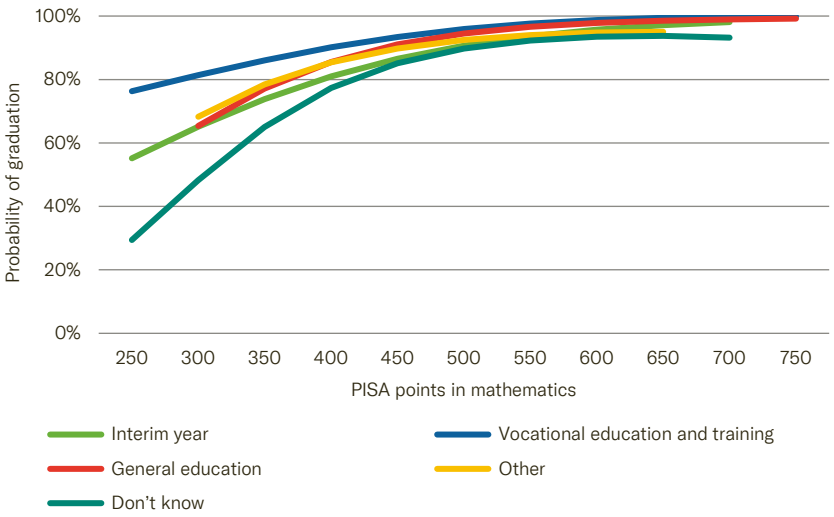
Differing levels of non-cognitive skills among types of education does not invariably mean that they also affect educational choices or vice versa. Some studies, however, suggest that different education programmes do in fact influence non-cognitive skills, for example stress management *(Bolli & Hof, 2018)* or conscientiousness *(Birkelund, 2021)*. Grit also changes as a personal trait between the ages of 15 and 22, especially among people in vocational education and training. However, it is not known whether it is the education itself that causes this change or other (unobserved) factors *(Hoeschler et al., 2018)*.

Studies with international data show that non-cognitive skills correlate with educational achievement indicators as well as cognitive ones *(Gutman & Schoon, 2013)*. However, it is hard to identify a causal effect. Studies in Switzerland also show a connection through correlations between difficulty in selecting an education course and non-cognitive skills, for example the big five personality traits *(Marcionetti & Rossier, 2017)*. A SEATS-data-based analysis shows similar findings (→ figure 129). It shows that difficulty in selecting a course of education poses a risk to the educational achievement of young people with low school skills: young people who had no specific education targets or plans at the age of 15 are more likely to have no upper-secondary school leaving certificate at 22. While the absence of planning among young people with good school skills does not impact their educational achievement, specific educational goals do help pupils with weak school skills to successfully complete their upper-secondary level education. However, indecisiveness does also seem to have an adverse effect on education and training beyond upper-secondary level: high-performing students who were uncertain about how to continue their education at the age of 15 earned about 11% less aged 25 than comparable young people with clear career aspirations at the end of their compulsory schooling *(Covacevich et al., 2021)*.

129 Probability of an upper-secondary level qualification, SEATS cohorts

By cognitive skills (PISA points in mathematics) and training activities; persons aged 22–23

Data: SEATS; calculations: SCCRE



Legend
Among people who achieved about 300 PISA points in mathematics and intended to do an apprenticeship at the time of the PISA survey, 81% had an upper-secondary level qualification at an age of 22–23 years. Among people with the same mathematical skills but who didn't know what to do after compulsory schooling, the probability of having obtained an upper-secondary level qualification is just 48%.

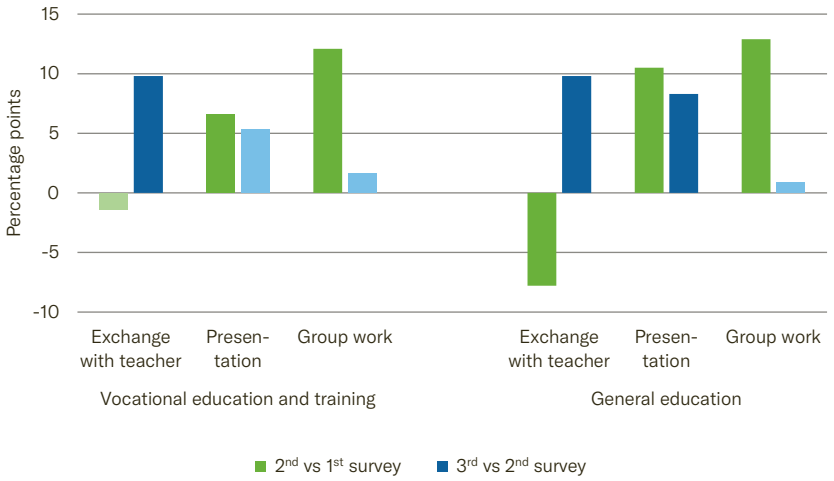
Digitalisation

The theme of digitalisation in education is anything but new. However, its profile increased through school closures and remote learning due to the Covid-19 pandemic. The dissemination and use of digital aids at upper-secondary level was first recorded in autumn 2020 through regular monitoring *(Oggenfuss & Wolter, 2021a, 2021b)*. A second survey followed in spring 2021 and a third in spring 2022. The survey will continue at regular intervals going forward. In all three surveys, the majority of upper-secondary level pupils said they use a computer (desktop, laptop or tablet) for school. In the second survey, the percentage of users was higher than in the first, 88% compared to 85%, and it increased slightly again in the third survey to 89%. In vocational education and training, the frequency of the different types of use varies less over the three surveys than in general education (→ figure 130). The exchange with teaching staff for organisational matters increased between the second and third surveys in both education programmes. Digital applications were also used more frequently for presentations and group work at the time of the second survey relative to the first one.

130 Frequency of use of digital applications from the pupils' perspective

Share of respondents who use digital applications for the purposes below (difference between the individual surveys); taking account of gender, migration and socioeconomic background and language region

Data: Monitoring of digitisation; calculations: SCCRE

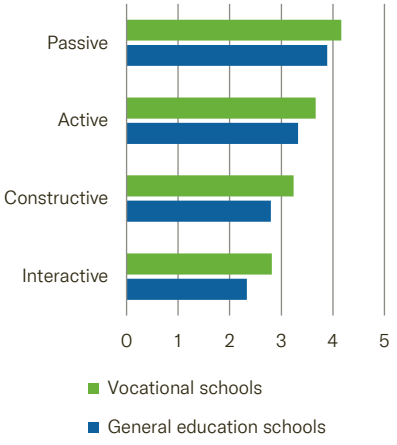


Legend
In vocational education and training, the proportion of respondents who said in the second survey that they present in a digital format in school was up 6.6 percentage points relative to the first survey. Matt colours indicate statistically insignificant differences (5% significance level).

131 Use of digital applications from the teachers' perspective

Frequency of use in teaching (1 = almost never, 5 = in almost every lesson); teachers in Canton Zurich

Data: *Petko et al. (2021)*



Passive: Teachers use digital applications to impart knowledge to pupils

Active: Pupils use digital applications to apply and practise their knowledge

Constructive and **interactive:** Pupils acquire knowledge with digital applications either individually (constructive) or with others (interactive)

If digital applications are included in teaching, it doesn't necessarily mean that the pupils actively use them. A survey by Canton Zurich shows that teaching staff mainly use digital applications to impart knowledge (→ figure 131). Pupils use digital applications somewhat less often to practise learnings delivered by the teacher. It is even more rare for them to acquire the knowledge individually or independently when working in groups. Whether and to what extent different types of use of digital applications influence performance at school is hard to gauge, as there are few studies on the subject *(Educa, 2021)*. Research with international data concludes that school performance increases when digital applications are used to research information. However, performance falls when they are used for exercises based on existing knowledge *(Falck et al., 2018)*.

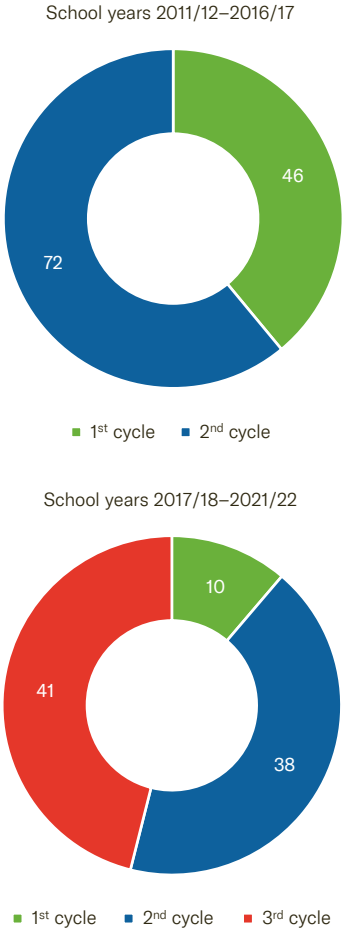
External school evaluation

There have been external school evaluations in recent years spanning all upper-secondary level school types. There is no national legal framework making it obligatory to participate in evaluations. As a result, they have only been conducted in 15 cantons[1] to date. School participation is mandatory in many of these cantons. Many schools have since undergone several evaluation cycles meaning they have been evaluated several times. While only first cycle evaluations were held for school years 2004/05 to 2010/11, two thirds of all evaluations were second evaluations in school years 2011/12 to 2016/17 (→ figure 132). In school years 2017/18 to 2021/22, just under half of the school evaluations were for the third time. There have been over 300 evaluations in total at about 160 general education and vocational schools up to the 2021/22 school year under the aegis of the Institute for External School Evaluations at Upper-Secondary Level (IFES) managing body. In the cantons that conducted the evaluations, about half of the general education schools and a third of the vocational schools were assessed at least once.

IFES was changed to the Swiss Centre for Secondary Schools and for School Evaluations at Upper-Secondary Level (ZEM-CES) at the start of 2022. It has been operating under that name since then. The institutional change makes no difference to the continuation of the external school evaluation offering.

132 Number of external school evaluations by cycle

Data: ZEM-CES (previously IFES)



Exchange and mobility

The promotion of exchange and mobility is anchored in Swiss law (Art. 14 LangA[2]). The national agency for exchange and mobility (Movetia) is responsible for promoting mobility both within Switzerland as well as between Switzerland and other countries. Movetia also gathers and publishes annual statistics on exchange and mobility activities. In the school year of 2018/19[3], approximately 10,000 pupils at upper-secondary level participated in exchange activities *(Movetia, 2020)*. That equates to an exchange rate of just 3%. Exchange activities are more widespread in general education than in vocational education and training: the exchange rate in general education is almost 8%, against a mere 1% for VET. Movetia says this discrepancy is due to VET students having an apprenticeship as well as their school education, which complicates organising an exchange. In contrast to compulsory schooling *(Albiez & Wolter, 2021)* most of the exchanges were outside Switzerland at upper-secondary level. Nonetheless, 42% of all exchanges for pupils in general education were in Switzerland, twice as many as in vocational education and training where only 19% of exchange activities were within the country. That may be another reason why the VET activities lasted longer on average. Half of the VET exchanges took more than two weeks, compared to just a third in general education.

1 The schools in the following cantons were evaluated: AG, AR, BE, BL, BS, GR, LU, OW, SG, SO, SZ, TG, UR, ZG und ZH.

2 Federal Act on the National Languages and Understanding between the Linguistic Communities (Languages Act, LangA) of 5 October 2007.

3 Covid-19 led to an extraordinary decrease in exchange and mobility in 2020 and 2021. Therefore, in this section, reference is made to the school year of 2018/19. The corresponding data was provided by Movetia.

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION
AND TRAINING

VOCATIONAL EDUCATION AND TRAINING

Context

Vocational education and training (VET), and company-based VET programmes in particular, are more subject to external factors than general education. As a market-driven form of education, the number of dual apprenticeship places is determined by corporate demand and by the supply of school-leavers interested in vocational training. The number of students that make up the supply is subject to demographic factors and the interests and preferences of young people. Demand for apprentices or the availability of apprenticeship places are influenced by structural changes, economic cycles, and the willingness of companies to provide training, not to mention by the options within the economy to develop the required skills through hiring graduates from other educational tracks.

Structural change

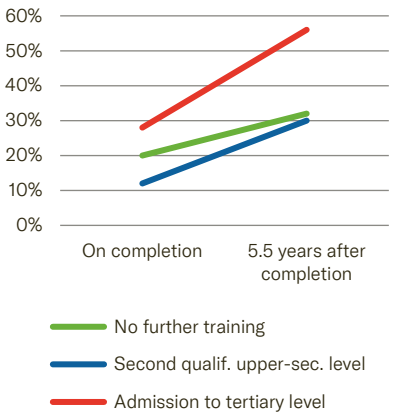
VET programmes must constantly adapt to structural and technological changes to remain attractive and profitable for companies, and it requires a persistent effort to convince such companies to provide this type of training. This happens through adjustments in the skills associated with the occupations, the creation of new occupations, and changes in the number of training places in an occupation. Young people's career preferences do not always dovetail with current demand for skilled workers, which often leads them to change their field after finishing an apprenticeship. In addition to a direct occupational change without further education, young people often also switch by getting a second qualification at the upper-secondary level or by enrolling in a tertiary-level programme. While a shortage of skilled workers affects many fields, it is most pronounced in occupations that require tertiary education, either vocational or academic. Therefore, people who finish a tertiary programme after their VET are twice as likely to work in a field with an above-average shortage of skilled workers than before they started the tertiary programme (→ figure 133). Interestingly, however, people who do a tertiary programme later are significantly more likely to work in an occupation with a skills shortage while still in VET than those who either continue in an upper-secondary programme or do not choose any further education at all in the 4.5 years after completing their apprenticeship *(FSO, 2020a)*. Overall, the selection by the VET system plus the strong mobility within occupations and educational programmes *(→ Mobility by occupation and company, page 144)* ultimately leads to a relatively good match between supply and demand in the labour market. As a result, the skills that people in Switzerland with a VET qualification have match closely with those that companies require *(Aepli et al., 2017)*.

The trend in the number of apprenticeship places in the various occupational fields does not indicate any major change over time in most of them (→ figure 134). Apprenticeships in information technology experienced strong growth in the 1990s, which has steadily tapered off since then. Given the continuously growing demand for information and communication technology (ICT) specialists, the shortage of experts in this field is likely to continue *(Braun-Dubler et al., 2020)*. The construction industry on the other hand shows a different trend: Due to the real estate crisis in the early 1990s, the industry experienced a decline, which has since reversed slightly.

133 Proportion of people in occupations with above-average demand for professionals

Proportion of all those who completed the federal vocational education and training (VET) programme in 2014 or 2015; by activity within 4.5 years after completion of VET

Data: *FSO (2020a)*



Legend

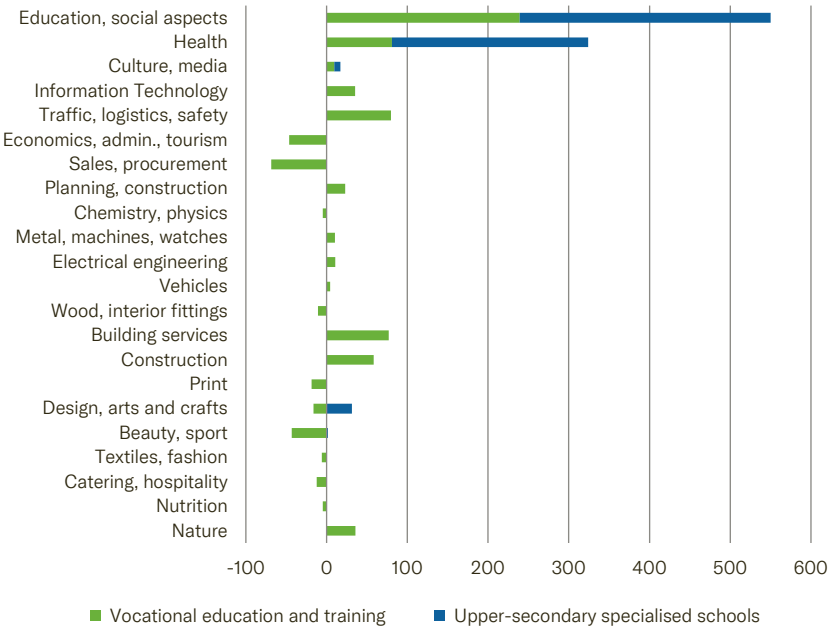
Of those who enrolled in a tertiary education programme 4.5 years after completing their VET, 28% worked in a field with above-average demand for skilled workers on completion of the apprenticeship. 5.5 years after graduation, this group already had grown to 56%.

Occupations with above-average demand for skilled worker are defined based on the "Index of Skilled Labour Demand" of the State Secretariat for Economic Affairs (SECO), which is calculated for each occupation type based on the Swiss occupational nomenclature (SBN). Those with a tertiary qualification (e.g. 31,108 forestry engineers) mostly work in another profession than those without a tertiary qualification (e.g. 11,501 foresters).

134 Annual change in new admissions by occupational field

Annual change between 2000 and 2020

Data: FSO (SBG-SFPI, SDL); calculations: SCCRE



Legend
The number of people admitted to VET programmes in the "Education, social aspects" field increased by 228 annually between 2000 and 2020. In addition, the number of admissions to social work, pedagogy and health programmes of upper-secondary specialised schools increased by 310 annually. The individual occupations were assigned to the occupational fields of the Swiss Service Centre for Vocational Education and Training (SDBB, berufsberatung.ch), whereby one occupation can fall within several occupational fields. The sum of the changes therefore does not correspond to the absolute change in the number of persons.

The major exception in this mostly stable trend in relative shares of apprenticeship fields are occupations in the health and social services sector. They indicate an annual growth of about 200–300 apprenticeships, which comes to about 3.7% of the new apprenticeships in this field. This is largely due to the creation of new training occupations such as Healthcare Assistant or Certified Social Care Worker. However, vocational training is not the only relevant factor when it comes to educating and training specialists in the health sector: More and more people choose upper-secondary specialised schooling as a means of entering the labour market, which further boosts growth in this field *(→ chapter Upper-secondary specialised school, page 179)*.

In the health sector, major differences across language regions influence the choice of upper-secondary level programme, thus affecting the number of entries and transfers to tertiary-level programmes *(FSO, 2021d)*. In French-speaking Switzerland, young people tend to opt for upper-secondary specialised schools and then switch to a university of applied sciences. In German-speaking Switzerland, on the other hand, young people more often complete a VET programme and then enrol in a PET college. In addition, young people are more likely to enter the labour market directly after VET than after graduating from a specialised secondary school *(Esposito, 2022)*.

Economic cycles and the COVID-19 pandemic

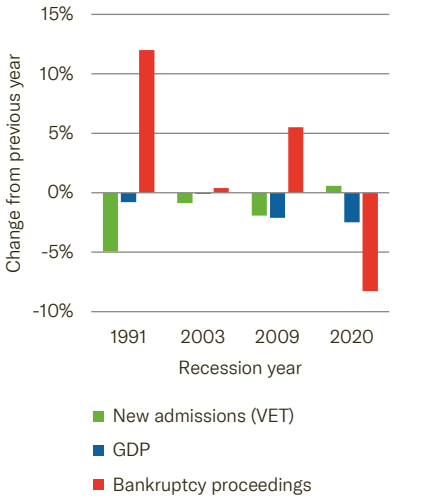
In the past, economic cycles had a weak but still noticeable effect on the number of apprenticeships *(Lüthi & Wolter, 2020; Muehlemann & Wolter, 2021)*: Rising unemployment figures during recessions also meant fewer new apprenticeship contracts (→ figure 135). There are several reasons why the number of apprenticeship places only loosely relates to economic cycles; the important factor, however, is that company-based VET in Switzerland is widespread across all sectors. This means that apprenticeships lost in sectors strongly affected by a crisis could often be compensated for elsewhere, especially by companies whose sectors were less affected by the crisis or that had more difficulties in finding suitable applicants.

In the wake of the economic crisis triggered by the COVID-19 pandemic in 2020, however, there were concerns that the number of apprenticeships could decline significantly more than in previous crises, not least because of the relatively large 6% decline in GDP that was forecast in spring. The economic slump, however, turned out to be only half as severe as had been assumed. In neighbouring countries, about 10% fewer training places were actually offered in the first year of the pandemic *(Muehlemann, 2021)*. Switzerland, on the other hand, saw no crisis in the apprenticeship market *(FSO, 2021c)*. Young people who were looking for an apprenticeship during the pandemic were able to adjust their efforts quickly after the lockdown *(Goller & Wolter, 2021)*. For example, during the third wave of the pandemic in 2021, LENA, the national platform for apprenticeship ads, logged a similar number of queries for apprenticeship ads as before the pandemic (→ figure 136).

However, there are also other reasons for this positive trend during a GDP decline of around 3% in 2020, such as an exceptionally short economic crisis for one thing. Analyses of past economic cyclical swings indicate that companies change their training strategies only when such crises persist over longer periods *(Lüthi & Wolter, 2020)*. The timing of the pandemic was also favourable in this regard, as more than half of apprenticeship contracts for the coming year had already been signed by the spring of 2020. Furthermore, the federal government's measures had a positive effect on apprenticeship places, such as bridging loans and partial unemployment benefits, which were heavily used. Contrary to previous crises, measures to prevent bankruptcies, such as a temporary ban on debt collection, also helped to prevent a decline in apprenticeship places (→ figure 135). Last but not least, the relatively strong backlog in apprenticeships in Switzerland had a positive effect *(→ Demographics, page 129)*: Despite the decline in demand for apprenticeships, there were still enough training and education positions available.

135 New admissions to vocational education and training during recessions

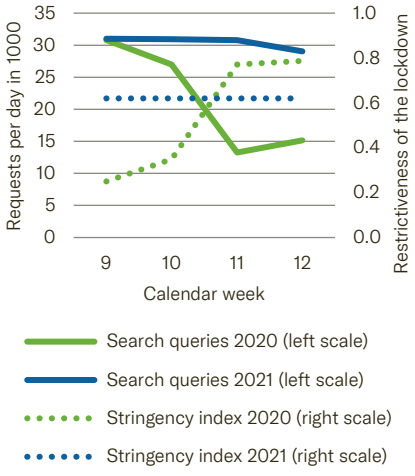
Data: FSO, SECO



136 Search history on the LENA apprenticeship platform

Comparison of 2020 and 2021

Data: Centre for Research in Economics of Education at the University of Berne



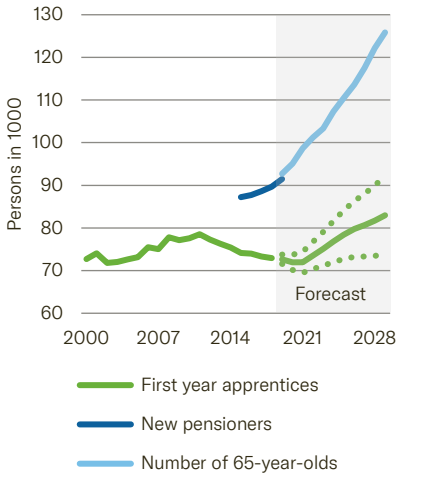
Demographics

The apprenticeship market is more exposed to demographic trends and fluctuations than to cyclical economic effects. For example, the backlog in apprenticeships in recent years was also due to the declining number of school-leavers *(SCCRE, 2018)*. While the decline in the graduating cohort size in compulsory education ended in the school year 2017–2018, the number of school-leavers has again started to increase. As a result, the number of filled apprenticeship positions will increase again in the medium term, which should ease the situation for companies that experienced difficulties finding apprentices in the past. Whether and, if so, when a demographically induced shortage of apprenticeship places may set in is hard to predict, as unforeseeable economic and structural factors also play a role in determining the number of such places.

The scenarios put forward by the *FSO (2021k)* indicate a 14% increase in apprentice numbers in the first year of VET by 2029, a relatively steep increase vis-à-vis 2000. However, the uncertainties – shown by the dotted lines in figure 137 – are considerable: Thus, the "high" scenario forecasts an increase of 25%, whereas the "low" scenario sees an increase of just 3%. While estimates of the prospective number of apprentices at the end of lower-secondary school are reliable, estimates of first-year apprentice numbers are less accurate because they are mainly based on transfer rates among institutions and on unknown factors affecting economic cycles. The inaccuracy in transfer rate figures is mainly due to fluctuations in transfers to other upper-secondary level VET programmes at certificate level, or to interim programmes.

137 Anticipated trend in apprenticeships

Data: FSO



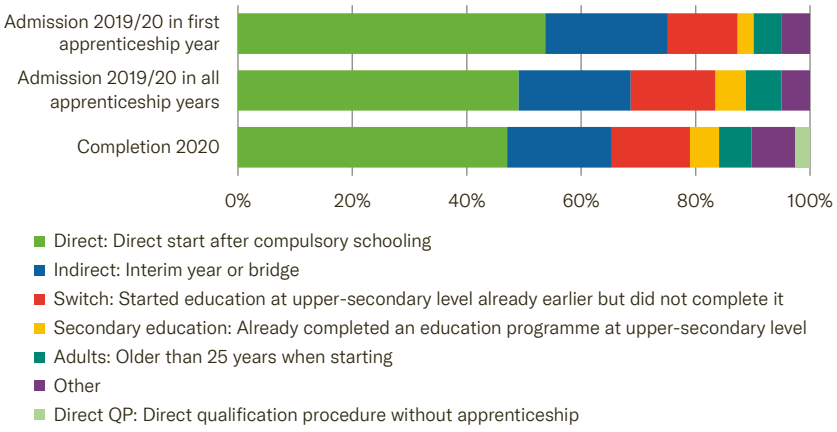
Apprenticeship market

Unlike in the case of general education, many young people in VET do not start in the programme directly after their compulsory schooling (→ figure 138). Depending on the profession, school-leavers who transfer directly fill the minority of new apprenticeships, while the majority first completes an intermediate programme or has already discontinued or completed another apprenticeship, for example. The share of direct programme admissions even decreases slightly when including second-year apprentices, since many young people who change their field or company or who start in a second programme after the apprenticeship contract ends can skip the first or even the second year of the apprenticeship. However, to evaluate how well the apprenticeship market works, it is important to know which educational track apprentices choose. Strong competition from indirect entrants can make it hard to find an apprenticeship, especially for young people with weak grades in their school. Those who do not start an apprenticeship directly after compulsory schooling quite often start vocational training at the certificate level.

Apprenticeship transitions differ not only by training type (VET Certificate vs. VET Diploma, see figure 145) but also by occupation. As can be seen from the duration of the apprenticeship, education and training in the more demanding fields *(→ margin text, page 130)* tends to follow compulsory schooling directly and less often involves a change of training profession or follow an interim year (→ figure 139).

138 Education background of admitted or graduating cohorts

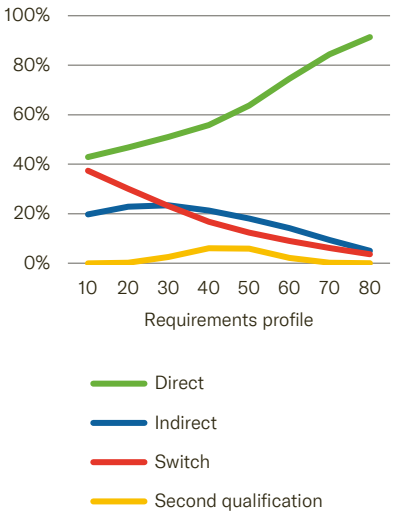
Data: FSO (LABB); calculations: SCCRE



139 Probability of the various education backgrounds

By requirements profiles of the professions

Data: FSO (LABB), anforderungsprofile.ch; calculations: SCCRE



Legend
The probability of direct admission is 48% in the case of occupations with a requirements profile of 20, after accounting for the gender, apprenticeship type and occupational field. With a requirements profile of 70, it is about 86%.

The **requirements profiles** define the basic prerequisites for an apprenticeship in terms of the competences applicant must have in mathematics, science, the language of instruction, and foreign languages (www.anforderungsprofile.ch). The precise figures of all requirements profiles were provided by Walter Goetze (bfb, Büro für Bildungsfragen AG).

This indicates that students rarely take a year off or change their training profession with the aim of acquiring missing skills so as to do a more challenging apprenticeship, or that those with such an intention will not reach their goal. Furthermore, access also differs by language region *(→ Efficiency/costs, page 146),* while the differences between the occupational fields are mostly small.

Occupation-specific competencies

Compared to general upper-secondary education, VET imparts more occupation-specific skills and fewer generic competencies. Such specific competences make it easier to start a career, which tends to go hand in hand with higher incomes on completion of an apprenticeship. International literature, however, raises concerns that specific competences can also have disadvantages. This can be the case when structural changes bring about major shifts in competency requirements, causing job-specific skills to become obsolete more quickly than generic ones. Therefore, a horizontal mismatch between individual competences and the skills needed in the labour market is more likely in VET, a situation that can lead to lower wages in the long term than for general education graduates *(Hanushek et al., 2017)*.

Empirical studies of the vocational education and training system in Switzerland indicate that people in jobs with very specific skills are less likely to change their field and are indeed more at risk of not finding work for longer periods if they become unemployed. At the same time, however, they earn higher incomes at the beginning of their careers compared to those in jobs with more generic skills *(Eggenberger et al., 2018; Rinawi & Backes-Gellner, 2021)*. Moreover, there is an empirical link between low wages and the horizontal mismatch in Switzerland. On the other hand, when considering only changes in this discrepancy over time, the resulting wage effects are very small. This suggests that other (unobserved) factors are causing the observed wage differences. The wage

losses actually attributable to more job-specific skills, on the other hand, are rather small *(Schweri et al., 2020)*. Overall, the negative consequences of specific competencies are therefore likely to be comparatively low in Switzerland.

Digital transformation

Besides technological change, the digitalisation of the economy and society also specifically influences VET in many ways. The fact that digital skills are becoming more and more relevant – both during education and training and in the labour market *(→ Labour market entry and income, page 142)* – leads to new occupational fields and professions, while at the same time forcing current professions to change in terms of their content. Digitalisation plays a greater role in the acquisition of skills while a person is in an education and training programme, a trend that further gained momentum with school closures during the COVID-19 pandemic, and that could lead to more widespread use of blended learning *(Aeschlimann et al., 2020; Rauseo et al., 2021)*. In addition to the changes in the form of instructions at formal learning institutions, new technologies also enable new forms of informal learning and thus create new opportunities to link the different learning venues in VET *(Educa, 2021)*. However, technological change is also relevant in terms of equity, as access to the relevant technologies can vary by place of work, profession or education background. At the same time, it must be noted that new technologies can also make it easier for people with disabilities to access to education and can thus reduce inequality.

In VET, digital competences have long been anchored in the framework curricula of general secondary education. The State Secretariat for Education, Research and Innovation (SERI) and its partners are currently reviewing an amendment to these decrees *(Feller et al., 2021)*. The *SERI (2022)* has also published guidelines for the digital transformation *"Orientierungshilfe Digitale Transformation"* to support professional organisations providing VET programmes. However, it is currently difficult to gain a reliable overview of the degree and trend of digitalisation in VET and its effects, as little data exists. With regard to the digital skills of apprentices, only survey data based on self-assessments are available, which is representative neither for all of Switzerland nor for all occupations. Surveys indicate that VET is relatively effective when it comes to teaching the skills for using digital technologies: Compared to other types of upper-secondary education, apprentices at vocational baccalaureate schools usually rate their own digital skills higher (→ figure 140).

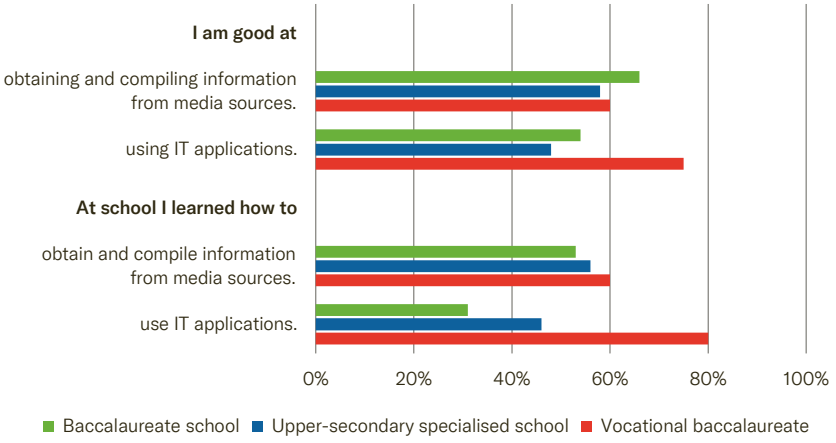
Apprentices at vocational baccalaureate schools also more frequently claim to have learned how to use IT applications at school than apprentices in general education programmes. Such comparisons between school types could, however, be distorted because the survey is not representative (Educa, 2021). Moreover, the survey covers only vocational baccalaureate schools and omits students in vocational schools.

Vocational or general education?
It is generally difficult to establish the causal effects of training. A new Finnish study *(Silliman & Virtanen, 2022)* addresses these problems by analysing only comparable individuals who apply for both general and vocational education programmes, which is common in Finland. The study concludes that VET is associated with wage benefits not only at the beginning of a career but also in the longer term, making the lifelong returns to education of VET comparable to that of general education, especially for individuals with low and medium cognitive abilities. There is no visible long-term benefit from general education due to the generic skills such programmes require. The authors argue that a split into specific and generic skills makes little sense, especially when it comes to meeting the increased demand for manual and cognitive non-routine skills as well as social skills, and that VET is therefore still well suited as a means of providing the skills in demand in the labour market.

140 Self-assessed digital skills by school type

Applicable proportion

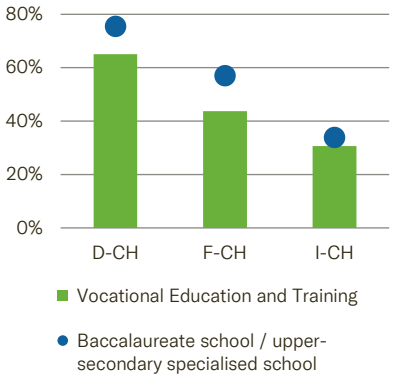
Data: *Educa (2021)*



141 Apprentices who use digital learning apps

Use at school, by region and school type

Data: Monitoring Digitalisierung; calculations: SCCRE



A representative survey on the digitalisation of schools in Switzerland (→ figure 141) shows that VET learners use digital tools at school slightly less frequently. One exception is Canton Ticino, where the use of digital tools is generally rare. A large part of such aids are tools for language learning. Therefore, the differences among education types may also be related to the fact that jobs with a lower need for language skills have a smaller need for digital aids

Institutions

Vocational education and training in Switzerland is provided by the federal government, the cantons and professional organisations, which cooperate as partners. The federal government has a central, national coordinating role, with a view to enabling programmes to train young people who remain mobile throughout the Swiss labour market and even beyond, if possible. Learners therefore depend on the highest possible standardisation of their qualifications. Cantonal implementation not only ensures alignment with regional job markets (industries, occupations, etc.) but plays a decisive role for interaction with state schools and other upper-level secondary education types.

Vocational education and training, 2030

In 2016, the State Secretariat for Education, Research and Innovation (SERI) launched a process with its partners to develop a long-term strategy for vocational education and training, which led to the "Vocational education and training, 2030" initiative one year later. The latter now comprises the mission statement for the longer-term strategy and develops and supports measures for further developing vocational education and

training and improving the surrounding framework, without aiming for a fundamental change of direction.

The initiative also focuses on optimising governance and strengthening partnerships. Based on two expert reports *(Caves et al., 2019; Emmenegger & Seitzl, 2019)*, a concept for implementing and systematising the committee structure in VET was drafted, which has been developed only based on needs because the Vocational Training Act came into force in 2004. The new structure (in force since 2021) is intended to better coordinate the work of the various committees and allow for roles and decision-making to become more transparent, enabling strategic decisions to be more efficient and inclusive of all stakeholders. In addition to the national VET summit, the Tripartite Conference on Vocational Education and Training was created to ensure strategic VET management in partnership with the federal government and to establish dialogue forums, expert groups and project groups at the operational level *(Steuergremium "Berufsbildung 2030", 2020)*. In another project of the "Vocational Education and Training, 2030" initiative, general VET programmes are reviewed in terms of future societal needs and aligned with labour market requirements. For this purpose, the status quo was analysed and evaluated in a report *(Feller et al., 2021)*, followed by a discussion of future scenarios. This provides the basis for the current revision of general education, where there is a need for optimisation, for example in "language and communication", an area in which learners are often weak, and in writing skills *(Hoefele & Madlener-Charpentier, 2021)*.

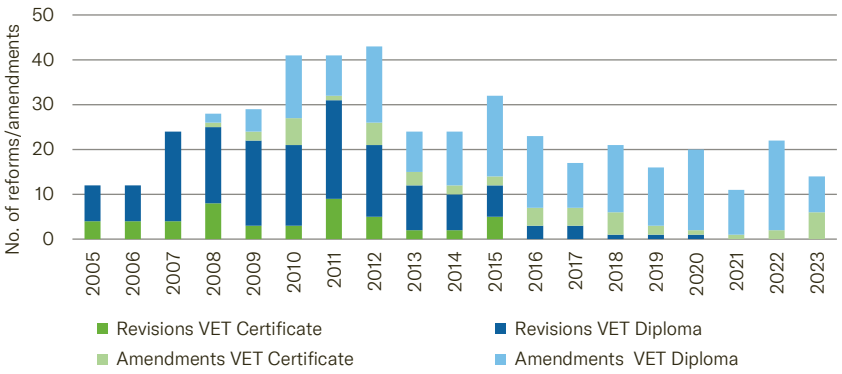
Reforms

After practically all training and exam regulations were reformed and replaced by training ordinances with the introduction of the Vocational and Professional Education and Training Act (VPETA) in 2016, the focus is now on revisions (→ figure 142). The often increased demands on pedagogy that arose from the reforms were a challenge especially for professions with few learners *(Baumeler et al., 2018)* as well as for instructors in general *(Boldrini et al., 2019)*. At the same time, however, it must be noted that reforms also often spur innovation within companies *(Rupietta & Backes-Gellner, 2019; Schultheiss & Backes-Gellner, 2021)*.

Since the adoption of the *Sustainable Development Strategy 2016–2019,* education for sustainable development (ESD) has also been a priority in VET. With this strategy, job profiles and skills for taking action are continuously reviewed in professional development so that all relevant aspects of sustainability are duly taken into account and supplemented in line with the needs of applied fields. For this, the *SERI (2020b)* has developed a guideline that aims to clarify the terms and serve as an instrument for reviewing and developing the sustainability aspects of the professions.

142 Distribution of reforms and revisions since 2005

Data: SERI

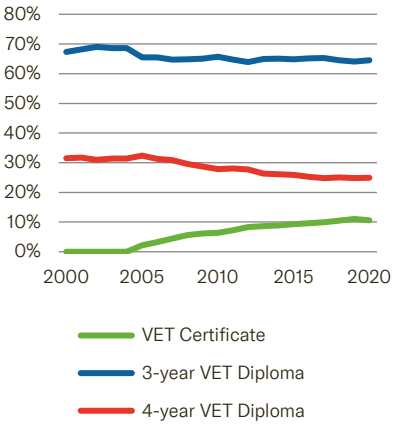


Vocational education and training with certificate

The two-year training courses leading to a certificate (vetC) have replaced both basic apprenticeships and the previous two-year diploma courses. They enable trainees to enter the labour market on completion of the programme or to transfer to a three- or four-year apprenticeship with a VET diploma. Since the introduction, the share of VET certificates in all vocational qualifications has risen steadily, although growth rates have been tapering off continuously. Today, roughly every tenth VET qualification is a certificate (→ figure 143). The proportions of certificates in the cantons have varied greatly since their introduction (→ figure 144). While the increase in the first few years after the introduction was mainly at the expense of three-year apprenticeships, the proportion of the latter has remained relatively constant since 2008, while the number of four-year apprenticeships has decreased. This relative decrease in four-year VET diplomas is due to (at least) two factors: Firstly, the strong increase in the number of apprentices in the specialist health care and personal support field offsets the decrease in the share of three-year apprenticeships. Secondly, some apprentices in the two-year vetC programs continue their training for another year after graduation and thus complete a three-year apprenticeship *(→ Labour market entry with the two-years VET certificate, page 143),* which in turn increases their respective share. The relative decline in four-year apprenticeships therefore exaggerates the trend, while the number of four-year apprenticeships has only declined slightly in absolute terms.

143 Trend in the share of the three apprenticeship types (new admissions)

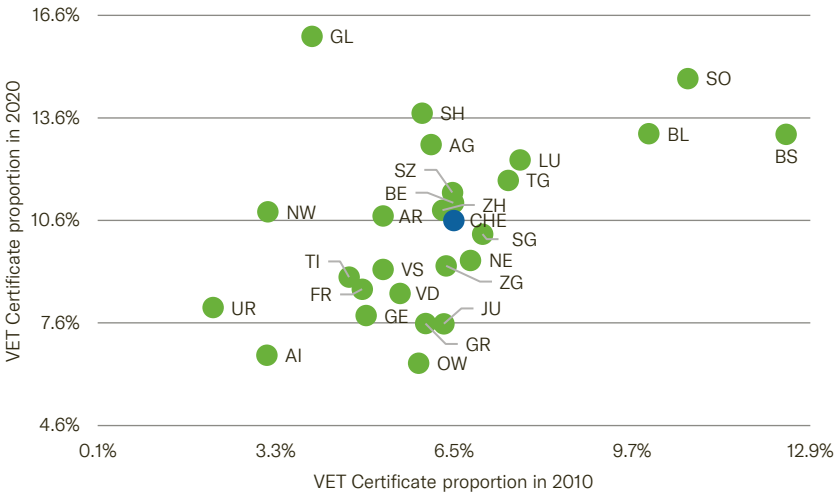
Data: FSO



144 Proportion of VET certificates by canton, 2010 and 2020

Measured against all apprenticeships

Data: FSO (LABB); calculations: SCCRE



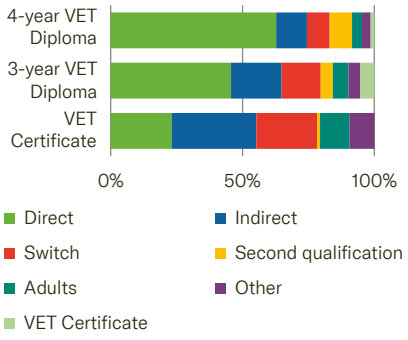
Although certificate apprenticeships have increased steadily in number, they are often not the first choice of apprentices. Fewer than one in four vetC apprentices comes directly from the lower-secondary level, compared to around 45% in three-year VET apprenticeships and 63% in four-year VET apprenticeships (→ figure 145). Roughly every fourth young person starting a certificate apprenticeship was previously in another upper-secondary programme before switching, and 32% had previously completed a bridging or interim year. This again shows that bridging programmes and interim years often fail to help learners acquire the skills that are lacking for the more demanding professions. Even if a vetC apprenticeship is not the first choice for most young people, it is interesting to note that such apprentices are more often satisfied with their decision – especially when it comes to their teachers, compared to apprentices in the VET diploma tracks *(Müller & Schorn, 2021)*. However, this could also be because the latter have higher expectations on their teachers.

Vocational baccalaureate and Passerelle

Learners can qualify for the vocational baccalaureate firstly in parallel with a VET programme (vBac1), secondly by training for at least one year after completing the VET programme (vBac2), or thirdly by passing the Federal Vocational Baccalaureate Examination. In the latter case, they can take the exam without having attended classes in a recognised educational programme. The vocational baccalaureate entitles the holder to enrol in a university of applied sciences without an entrance examination – except in cases where aptitude tests or competence checks are required – and in some cases also to universities of teacher education. The supplementary "federal vocational baccalaureate – university" examination (also known as the "Passerelle Dubs") also provides access to universities.

145 Education background of new admissions 2020 – 2021, by apprenticeship type

Data: FSO (LABB); calculations: SCCRE



Direct: Direct start after compulsory schooling

Indirect: Interim year or bridge

Switch: Started education and training at upper-secondary level already earlier but did not complete it

Secondary education: Already completed an education and training programme at upper-secondary level

Adults: Older than 25 years when starting

VET Certificate: Transition from VET Certificate to VET Diploma

The vocational baccalaureate share has steadily increased slightly in recent decades *(SCCRE, 2018)*. At the same time, vBac1 holders tend to concentrate on a few apprenticeship fields: 75% of them consider only eight occupations, but ones that require a strong performance in school *(Trede et al., 2020)*. Although vBac1 holders generate a lower net benefit for the training company due to their longer absence than learners without a vocational baccalaureate, occupations with a high proportion of vocational baccalaureate holders are often those that already have a low net benefit *(→ Efficiency/costs, page 146)*. These findings indicate that the work-study vocational baccalaureate is a valuable selection criterion for apprenticeship companies: Those who do not meet the conditions of the vocational baccalaureate are less likely to be considered for demanding apprenticeship companies and occupations. Moreover, for many young people the work-study vocational baccalaureate is also a prerequisite for an apprenticeship in the first place rather than attending a baccalaureate or an upper-secondary specialised school.

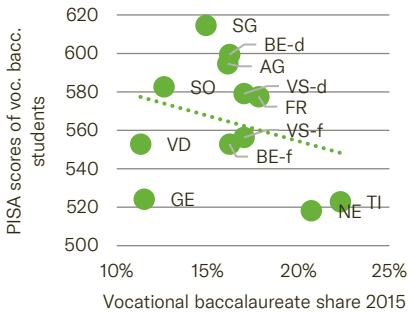
The vocational baccalaureate shares differ strongly among learners in the various occupations as well as among cantons *(SCCRE, 2018; Trede et al., 2020)*. At the individual level, the vocational baccalaureate competes with the gymnasium baccalaureate because a young person must choose either of the two. At the systems level, however, the two baccalaureate shares do not correlate: Cantons with a high vocational baccalaureate share do not also have a low academic share, and vice versa, whereby regional differences in the such shares are at least partly due to cantonal admission regulations *(Hänni et al., 2022)*. In cantons with mandatory exams as an admission requirement, the probability of someone entering a vocational baccalaureate programme is significantly lower than in cantons where grade averages or teacher recommendations determine admission. This is especially true for vBac2 students and socio-economically disadvantaged people.

Such institutional factors lead to large differences in how cantons assess the cognitive skills of vocational baccalaureate holders (→ figure 146). Graduates from a vocational baccalaureate school in cantons Ticino, Neuchâtel or Geneva on average have around 90 PISA points less than those with the same educational background in Canton St. Gallen. Except in the cases of cantons Geneva and Vaud, a strong negative correlation exists among cantons' vocational baccalaureate share and vocational baccalaureate learners' average skill levels before entering the upper-secondary level, as measured by PISA scores: In cantons with a high vocational baccalaureate share, the skills of the holders tend to be significantly lower.

146 Skills of vocational baccalaureate holders

Cantonal averages of PISA points (mathematics) and cantonal vocational baccalaureate shares, 2015; R^2 without GE and VD is 0.609

Data: SEATS, FSO; calculations: SCCRE



Vocational qualification for adults

A main aspect of the vocational training policy is the provision of vocational training for adults. In response to the shortage of skilled workers and the acceptance of the mass immigration initiative in 2014, the federal government made vocational qualifications for adults a priority. At the same time, technological and economic structural shifts have made it increasingly difficult for those with weak qualifications to prevail in the Swiss labour market as a whole. Thus, acquiring an upper-secondary level

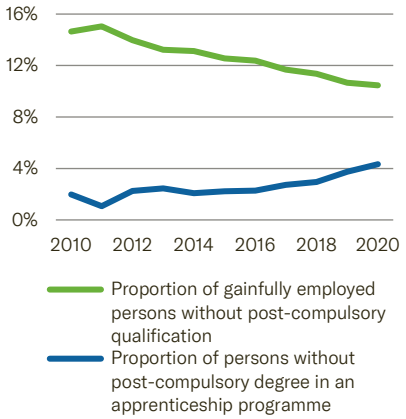
qualification at a later stage has become significantly more important at the individual level.

The efforts of those responsible seem to be paying off. For example, the proportion of gainfully employed persons aged 25 and above with a lower-secondary education as the highest qualification has been declining since 2011 (→ figure 147). On the one hand, this is due to many people without post-compulsory education retiring or no longer being employed; on the other hand, it is because younger generations with better education are taking their place. Moreover, the share of adults without post-compulsory education who are doing an apprenticeship has also been rising since 2016. Adults who participate in the qualification process directly or are in a validation procedure have not yet been factored into the count. Roughly half of all adults choose one of these two options for gaining access to post-compulsory education.

Most gainfully employed persons without an upper-secondary qualification are of foreign nationality. A quarter of all gainfully employed foreigners have only a compulsory educational qualification; for Swiss nationals, this share is 7% *(Schmid et al., 2017)*. At the same time, the probability of starting an adult apprenticeship (regular or short) is lower among foreigners without post-compulsory education than among Swiss nationals. For first-generation migrants, this probability is only about 7%, while for the second generation the share is roughly one third. Among Swiss nationals without an upper-secondary qualification, roughly half complete an adult apprenticeship (→ figure 148). The probability of an adult doing an apprenticeship is about the same when taking into account gender, age, language region and the family situation (children). For first-generation migrants, the stronger preference for general education is likely to play a role *(Abrassart et al., 2020)*. However, it cannot be ruled out that differences in information, personal characteristics, language skills, and discrimination play a role in determining these disparities. It is also conceivable that some employed persons, especially migrant workers, simply have little interest in further education.

147 Adults without post-compulsory education in an apprenticeship programme

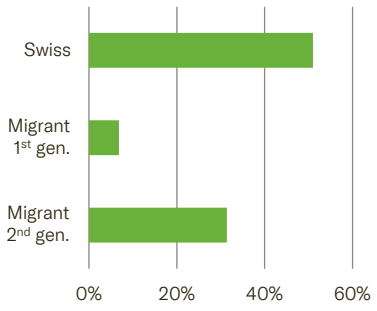
Data: FSO (SAKE); calculations: SCCRE



148 Probability of doing an apprenticeship

For adults without post-compulsory education

Data: FSO (SAKE), calculations: SCCRE



Legend
The probability that an adult Swiss national without post-compulsory education will do an apprenticeship is just under 51%.

Effectiveness

The effectiveness of vocational education and training can be viewed from a systems and an individual level. The systems level involves issues relating to the overall effect of the VET system, for example in terms of growth, competitiveness and innovation *(Backes-Gellner & Lehnert, 2021; Backes-Gellner & Pfister, 2019; Rupietta et al., 2021)*. The individual level, on the one hand, considers effectiveness from the perspective of learners, primarily in terms of the impact VET has on cognitive skills and labour market success *(→ Labour market entry and income, page 142)* , as well as on the acquisition of non-cognitive skills *(Birkelund, 2021; Bolli & Hof, 2018; Hoeschler et al., 2018; Schumann et al., 2017)*. The latter are significant not only for success in the labour market but also for personal satisfaction. On the other hand, the view of companies must be considered as well, as they must be convinced that VET is at least as effective a means for recruiting skilled workers as other education programmes.

Matching demand and supply

The vast majority of prospective VET students are very satisfied with their education and training programme. For 91% of the 2021 entry cohort, the apprenticeship they found matches their skills and interests, while 84% of them regard it as the ideal solution *(Golder et al., 2021)*. But this also indicates that roughly one in six did not find the apprenticeship they were looking for – in other words, he or she had to change the occupation or opt for a different company than originally intended. Success in finding an apprenticeship in the desired field (or company) strongly relates to personal skills and the requirements of the occupation and company. At the same time, apprenticeship fields differ in the level of interest they spark among learners and in how frequently they are in demand. As a result, the challenge of finding the right apprenticeship can vary *(Jaik & Wolter, 2019)*.

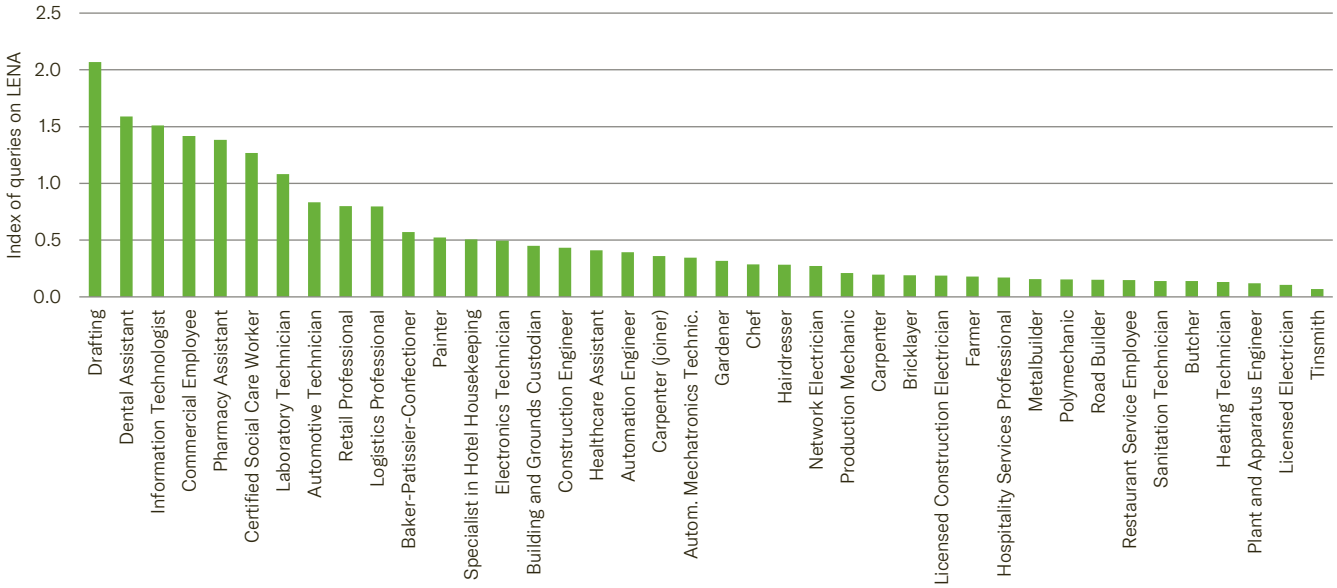
The diverging interest in individual apprenticeship fields can also be seen in the data obtained from LENA, the national apprenticeship platform. On the one hand, the data covers all ads posted on the platform by apprenticeship profession; on the other hand, it shows how often young prospects query the various professions. The subsequently calculated index shows the averages and frequencies of queries for a specific apprenticeship profession per month in relation to the total number of apprenticeships in that profession. Thus, the index becomes a proxy indicator of demand for the individual apprenticeships.

Apprenticeships across all occupations are queried on average just under 40 times per month and ad, and the index value 1 has been assigned to this average. In relation to this index, it is now possible to see that most apprenticeships have a low number of queries, while a few have a very high relative number (→ figure 149). Among the 40 occupations with the most ads, the following have the highest number of queries: Drafting, dental assistant, information technologist, and commercial employee. At the other end of the spectrum are ads for jobs such as plant and apparatus engineer, licensed electrician and tinsmith. Across all apprenticeships, occupations with the highest number of queries per ad mostly have only a few ad postings, for example in fields such as photographer, architectural model maker, interactive media designer, veterinary practice assistant, and veterinary nurse, which are not shown in the figure here.

149 Queries per LENA apprenticeship ad

Index of the 40 most frequent occupations

Data: Centre for Research in Economics of Education at the University of Berne; calculations: SCCRE

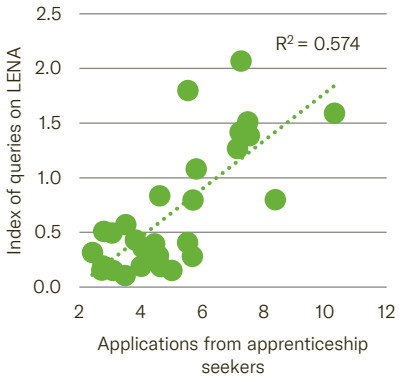


Strong interest or a high index value for apprenticeships advertised online does not necessarily mean that it is more difficult to find an apprenticeship in that field. However, the strong likelihood of such a correlation becomes apparent when comparing the index value with the number of applications that apprenticeship seekers submit on average for a specific apprenticeship position (→ figure 150). The higher the index value, the larger the number of applications tends to be. It is also worth noting that those looking for apprenticeships in fields with a very low index value only (have to) write between two to five applications on average.

150 LENA ad index and application numbers

By occupation

Data: Centre for Research in Economics of Education at the University of Berne, SERI (transition barometer); calculations: SCCRE



Termination of apprenticeship contracts

Approximately one in five apprentices in the VET system terminates the apprenticeship contract early at least once, with men and foreigners doing so slightly more often than women and Swiss nationals. Most of them (80%) start another apprenticeship afterwards and thus remain in VET. Slightly more than half of such re-entrants change their profession, while 46% merely look for another employer *(FSO, 2021h)*.

Many factors influence whether someone terminates the apprenticeship contract early, whereby personal skills, gender, and conditions in the apprenticeship market and at the workplace play an important role *(SCCRE, 2018)*. Personal disasters increase the risk of dropping out of a VET programme, although self-confidence and support from others can lower this risk *(Samuel & Burger, 2019)*. Self-confidence, i.e. trust in one's own abilities to successfully acquire the necessary skills at the workplace, combined with a subjectively good fit with the occupation can boost motivation to complete the apprenticeship *(Findeisen et al., 2022)*. In addition,

non-cognitive abilities, personality traits, as well as time preferences also influence the decision to terminate the apprenticeship contract: Individuals to whom the long-term benefits of current decisions are of little or no concern are more likely to face apprenticeship contract terminations *(Backes-Gellner et al., 2021)*. Furthermore, the risk factors differ based on gender: While men in urban areas who tend to overestimate their own abilities are strongly affected by terminations, risk factors for women include competitive behaviour, external locus of control, and foreign nationality, although these factors do not necessarily feature as causal reasons *(Lüthi & Wolter, 2021)*. The exact circumstances of contract terminations are also important when analysing the causes of contract terminations, as they may vary. For example, apprenticeship contract terminations due to cyclical economic shifts may not be significantly related to learners' overestimating their abilities, but they may be significantly related to poor performance in school. This aspect has been given insufficient attention in research so far, as the data often is based only on information that the affected, terminated learners themself provide and that may not always be accurate.

Apprenticeship completion and qualification procedure

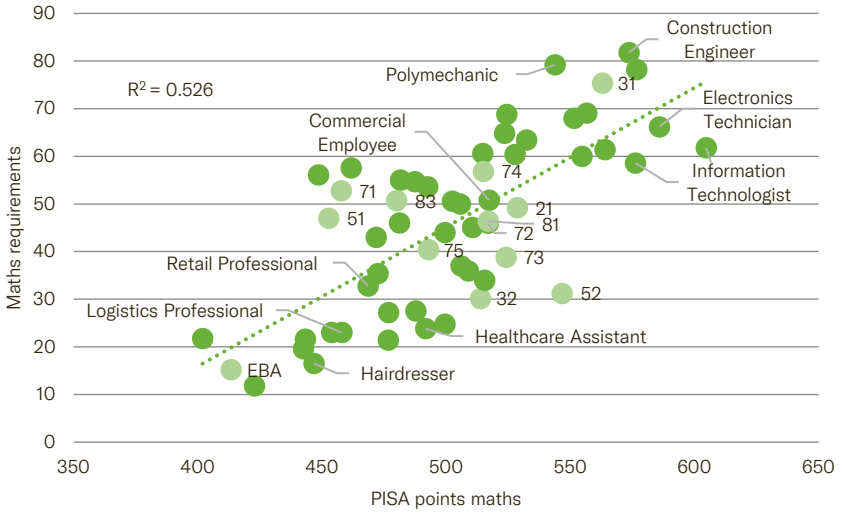
There are no formal entry requirements for vocational education and training: Anyone who has completed compulsory education can apply for an apprenticeship offered by a company. For the apprenticeship companies, however, offering such places is worthwhile only if apprentices meet the prerequisites for the profession. Consequently, apprenticeship places are always filled with those who best meet the company's requirements. This leads to the situation where companies in regions with many academic baccalaureate holders often have to choose applicants with comparatively low skills, as the higher skilled learners usually opt for a baccalaureate school *(Jaik, 2020)*.

The connection between the academic baccalaureate share and the VET learners' skills leads to a large range of average skills within the same apprenticeship profession. The fact that small firms – unlike large, well-known ones – usually face disadvantages when it comes to recruitment contributes further to this effect. On the other hand, the VET system aims to create diversity in entry skills among learners in the various apprenticeship fields as a way to better satisfy the range of skills called for in requirements profiles. The strong correlation between the average skills – based on the PISA survey – and the requirements profiles as defined by experts indicates that such profiles play explicit and implicit roles in recruitment (→ figure 151). This shows that employers and students use these requirements profiles in recruitment as a basis for making decisions.

151 Competencies and requirements profiles by occupation

PISA Cohort 2012; the light green dots are ISCO occupational groups with fewer than 30 observations per occupation

Data: SEATS, anforderungsprofile.ch; calculations: SCCRE



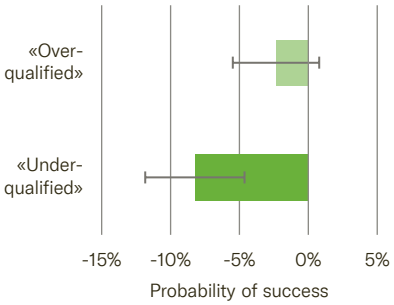
Cognitive skills influence not only who gets which apprenticeship and how well it matches the requirements of the occupation, but also whether the apprenticeship can be completed successfully (→ figure 152). Weak cognitive and academic skills among learners often lead to problems at vocational schools and subsequently to termination of an apprenticeship contract. In rarer instances, a learner may even fail the final apprenticeship exam. In addition to the importance of absolute skills for success in an apprenticeship, relative skills play a crucial role as well, i.e. skills a learner has in relation to those of other cohort members in the same apprenticeship profession. Under-qualified learners with skills at least one level (73 PISA points) below the average of other learners in the same profession are significantly less likely to succeed in the education and training programme. They would therefore be better off if they had chosen a profession with less demanding requirements. No statistically significant effect can be observed for over-qualified learners compared to suitably qualified ones.

The pass rate of the final apprenticeship examination is relatively high with an average of 92% in the years 2016–2020, but lower than, for example, in the case of candidates for the academic baccalaureate examination *(→ chapter Baccalaureate schools, page 155)*. However, there are large differences based on profession, apprenticeship duration, and canton. Apprentices in a two-year VET certificate program are particularly successful, while those in three- and four-year apprenticeships have a slightly lower examination pass rate (→ figure 153). In this respect, however, it must be noted that the number of early terminations of apprenticeship contracts is higher in the case of certificates, whereby a selective group of apprentices takes the final apprenticeship examination. During the COVID-19 pandemic in 2020, the pass rate increased significantly across all apprenticeship types. This is probably because no final exams were administered for vocational and general skills due to the pandemic.

152 Success and suitability of occupational choice

Probability (with 95% confidence interval) of completing an apprenticeship without switching

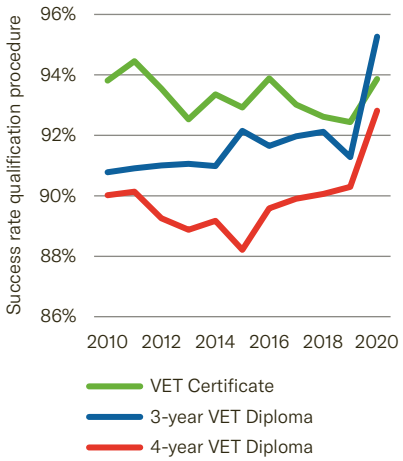
Data: SEATS, calculations: SCCRE



Legend
"Underqualified" apprentices (defined as students with competencies at least 73 PISA points below the average of the job) are 8.2 percentage points less likely to succeed, after accounting for other personal, family and occupational factors.

153 Pass rate of exam candidates

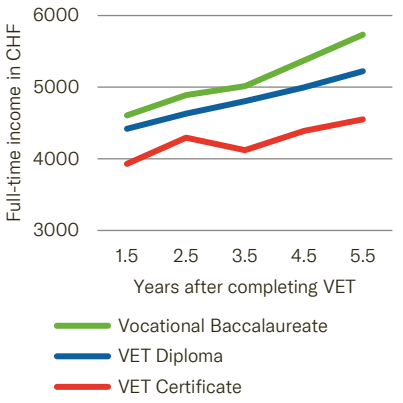
Data: FSO (SBG, SFPI); calculations: SCCRE



154 Entry-level income on completion of an apprenticeship

By apprenticeship type

Data: *FSO (2021e)*



The final grades were calculated based on the past grades and the individual practical project, so that the risk of someone failing the final examination and thus the programme was eliminated.

Labour market entry and income

Those with a VET qualification can enter the labour market relatively easily, especially if they have completed an apprenticeship in the dual, company-based system *(Bolli et al., 2021)*. The vast majority of learners find a job once they have completed their apprenticeship. In addition to the final apprenticeship examination result, personality traits also play a role in the person's ability to enter the labour market. Learners with a present bias – i.e. a stronger focus on present rather than future events – tend to have no job or plan for training shortly before completing their apprenticeship *(Backes-Gellner et al., 2021)*.

VET graduates have significant income differences shortly after they enter the labour market (→ figure 154). These differences depend on the type of training (VET certificate, diploma, or vocational baccalaureate) and tend to increase over the years *(FSO, 2021e)*. Part of the income differences can be explained by divergent requirements for cognitive skills among the vocational qualification types. In addition, the nature of the training and education programmes for the various occupations also plays a role in what the person earns. For example, individuals in fields with a large share of job-specific skills and who spend more time in the training company tend to have higher initial incomes, whereas those in occupations with a large share of general education skills tend to earn higher incomes over the course of their career in that labour market *(Grønning et al., 2020a)*.

However, individual income differences, i.e. among those who have completed the same apprenticeship, are greater than income differences between occupations. A correlation exists between these differences and learners' personal characteristics before starting the apprenticeship. While cognitive abilities influence the occupation choice and training programme type, and thus indirectly also income, they do not explain the income differences among people in the same apprenticeship profession. This is not the case for non-cognitive skills. Students who rate themselves as punctual and persistent already during compulsory schooling earn significantly more than their colleagues after completing their apprenticeship (→ figure 155). This clearly indicates the long-term importance of personality traits, as manifested already during childhood, for success not only in education but also in the labour market.

Technological development and digitalisation are also increasingly affecting the occupations and skills the labour market calls for. Trends such as a decrease in demand for routine, manual work became apparent already in the 1950s, and they have remained equally relevant in recent decades. On the other hand, there is stronger demand for occupations requiring analytical and interactive types of work rather than repetitive tasks *(Aepli et al., 2017)*. The increased demand for such skills in turn affects wages, with analyses showing that wage effects vary by skill area *(Kiener et al., 2022)*. Skills in the "production and control technology" and the "ICT and application development" fields have a larger effect on wages than those in "electrical and systems engineering" and "CNC & CAD programming"

(→ figure 156), although part of these effects can be explained by differences in the requirements of the occupations. While very specific skills often come with a wage advantage in a steady employment relationship, they are not always advantageous if the person changes employers. For example, someone with very specific IT skills is more likely to get a lower salary when changing employers than someone with more genetic IT skills *(Eggenberger & Backes-Gellner, 2020)*.

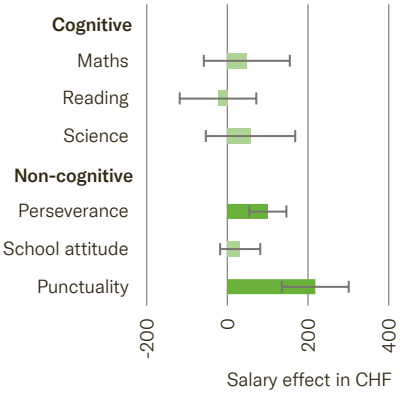
Labour market entry with the two-years VET certificate

Learners who qualify for a two-year VET certificate usually enter the labour market directly on completion of their education and training. Slightly less than half of them continue their education and training at the VET diploma level. However, there are major differences among the various apprenticeship professions with regard to the activities on completion of the programme (→ figure 157). For example, a tyre work assistant will spend an average of only 4 months in education (mostly in a VET diploma program) in the two years after graduation, while an automotive assistant will spend 13.3 months in education. The likelihood of being employed varies as well, and demand in the labour market is thus not equally strong for all persons with a vocational certificate. For example, print finisher and kitchen employees are often unemployed for longer periods after graduation. The situation in the labour market can also influence the decision to continue in an education and training programme *(Hofmann et al., 2020)*. Explanations of the individual patterns of post-VET certificate activities are very occupation-specific and subject to a range of factors, such as wage levels in the industry for skilled and unskilled workers, competition with similar occupations with VET qualifications, and selection on transfer to a certificate programme.

155 Income effects of cognitive and non-cognitive skills

Effects with 95% confidence interval; effects shown in light green are statistically not significantly different from zero

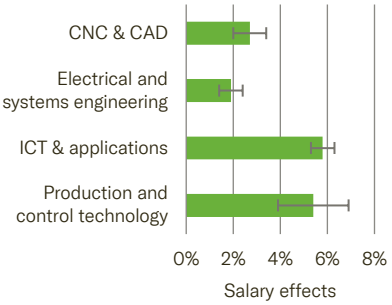
Data: SEATS; calculations: SCCRE



Legend
Individuals who report never having been late to school have an entry-level income 218 CHF higher than their colleagues of the same gender and with the same skills.

156 Effect of digital skills on income

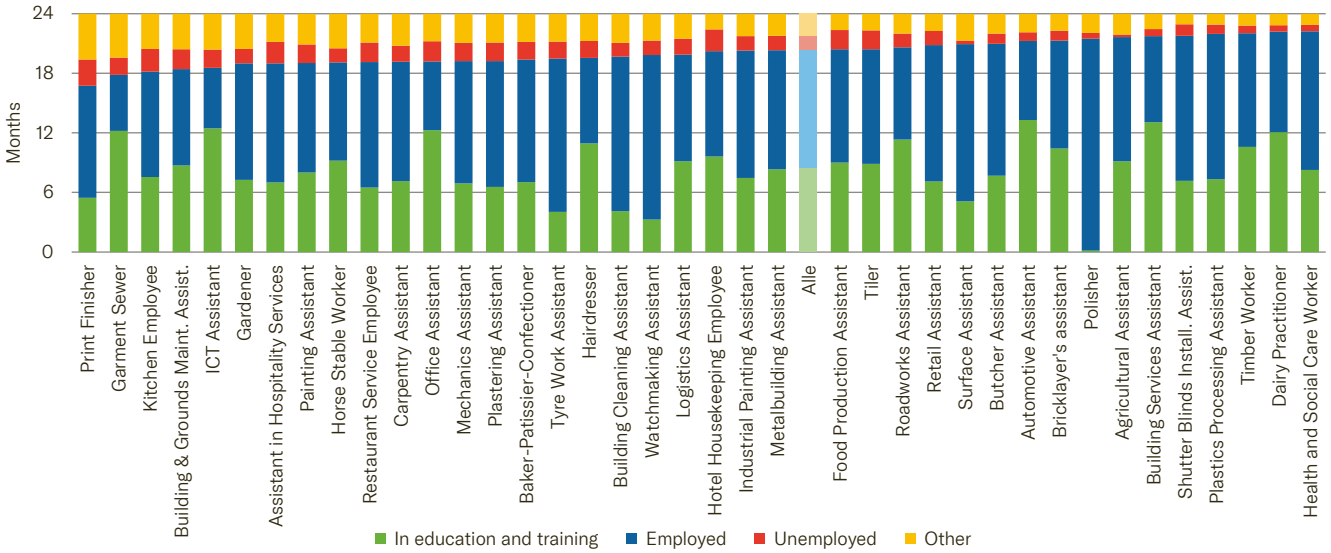
Data: *Kiener et al. (2022)*



Legend
Individuals with a VET qualification in an occupation whose educational plan includes the CNC & CAD skill set have 2.7% higher incomes than those in all other occupations. For this skill set, the educational plan contains, for example, skills relating to CNC, production technology, CAD, manufacturing, documentation, material planning, testing, quality assurance.

157 Activities of VET certificate apprentices two years after the final apprenticeship examination, by occupation

Data: FSO (LABB); calculations: SCCRE



Legend

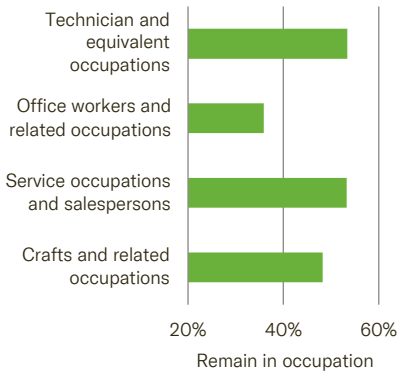
A Print Finisher spends on average 5.5 months in training and 11.3 months in a job two years after completing the apprenticeship. The person is registered as unemployed for 2.6 month and works elsewhere for 4.6 months. These are averages for all persons. In reality, some of those with this profile are likely to be in training for the entire time, e.g. while others are employed full-time.

Mobility by occupation and company

158 Proportion of people who remain in the apprenticeship profession

5.5 years after completion; the population for the analysis includes those who completed their VET apprenticeship in 2014 or 2015

Data: *FSO (2020a)*



After completing their programme, apprentices are highly mobile within occupations and among companies. On the one hand, about two thirds, especially apprentices in small firms, leave the apprenticeship company one year after completing the programme. On the other hand, many also change their occupation, whereby those in a company-based VET programme in particular are most likely to stay in the field immediately after completing their apprenticeship and to switch only in the following years *(Buchs & Müller, 2016)*. Barely half of those who completed an apprenticeship still work in their original profession five and a half years later. Depending on the industry, some graduates are even more mobile: Among office workers and related occupations, just over one third stay in their original apprenticeship profession (→ figure 158). Such changes may also be involuntary, as the data makes it impossible to distinguish between mobility that is voluntary and mobility imposed by labour market conditions. In general, however, differences in mobility reflect the requirements of the labour market: The likelihood of someone changing his or her occupation is higher when demand for such work is weaker *(Buchs & Helbling, 2016)*. Similarly, mobility could also be driven by career intentions. Especially those at age 21 in occupations with low or medium requirements will look for occupations with a higher socio-economic status[1] than those at age 15 *(Basler & Kriesi, 2019)*.

1 In the study, the status was derived from the "International socio-economic index of occupational status" (ISEI) of the desired occupation.

Transfer to tertiary education and training

Approximately three out of four learners with a vocational baccalaureate start in a tertiary education and training programme within five years of graduation. 57% of them study at a university of applied sciences, 10% start in a professional education – mostly at a college of higher education, and just under 5% enrol in a tier-one university or a university of teacher education *(Trede et al., 2020)*. Unlike in the case of academic baccalaureates, those with a vocational baccalaureate more often enrol in tertiary programmes only several years later. However, in terms of labour market integration, they are more often employed and less often unemployed on completion of a tertiary education and training programme than those who enter a tertiary programme from a general education track *(Aepli et al., 2021)*. The wages, resources, and job satisfaction of those integrated into the labour market are comparable between the two education and training types *(Stalder & Lüthi, 2020)*.

A range of factors determine simultaneously whether someone switches to a tertiary programme. For example, the field, gender, socio-economic background, and demands of the apprenticeship occupation play a role. But institutional factors of the occupation also need to be considered: For people who have completed a non-specialised apprenticeship, who completed a large proportion of their programme in school, or who passed a highly standardised final examinations, the likelihood of transferring to professional education and training (PET) programme is somewhat higher *(Sander & Kriesi, 2020)*. At the individual level, lacking or wrong information is also likely to influence the decision of starting a tertiary education and training programme. For example, some young people are wrongly informed about the admission requirements for tertiary education and training programmes and thus overestimate their chances of being admitted. At the same time, many others underestimate the monetary benefit of tertiary education, i.e. the wage difference between those with and those without a tertiary qualification. Such misconceptions became especially apparent in responses to questions about PET programmes *(Bolli et al., 2020)*.

Whether someone starts, postpones or forgoes tertiary education usually depends not least on the economic situation at the time of the decision *(Hampf et al., 2020; SCCRE, 2018)*. In buoyant labour markets, men in particular are more likely to decide against tertiary education. Competition in the labour market also plays a role. When there is strong competition, VET graduates more often try to exploit the situation through tertiary education and training. For example, during the expansion of the free movement of persons, those with basic vocational training living in border regions enrolled in universities of applied sciences more frequently than those from regions further away from a border *(Bächli & Tsankova, 2020)*.

Passing the additional "federal vocational baccalaureate – university" exam (Passerelle Dubs) enables those with a vocational baccalaureate qualification to enrol in a university directly. The number of these additional exams has increased significantly in recent years. Young people with parents without a university degree choose this path more often, while those with parents with a tertiary qualification more often transfer to the tertiary level via the (academic) baccalaureate. Students who enter by passing

the additional exam are similarly successful in their studies as the other students *(Eberle, 2022)*. While their success rate is somewhat lower than that of students with an academic baccalaureate, they are on average also older than academic baccalaureates, which in turn can explain their lower likelihood of success.

In contrast to the enrolments of academic baccalaureates during previous times of crisis, the economic crisis resulting from the pandemic has so far had no significant effect on vocational baccalaureates who transfer to universities of applied sciences: The rate of direct transfers to all universities in 2020 was similar to that in previous years. Only vBac2 learners in the "Business and Services" programme went on to a university at a slightly higher rate *(FSO, 2021f)*. The situation in the labour market probably helped this steady trend in transfers: Thanks to temporary work and other measures, the unemployment rate remained fairly low despite the sharp drop in GDP, which ensured that most VET graduates were able to find a job even in the first year of the pandemic.

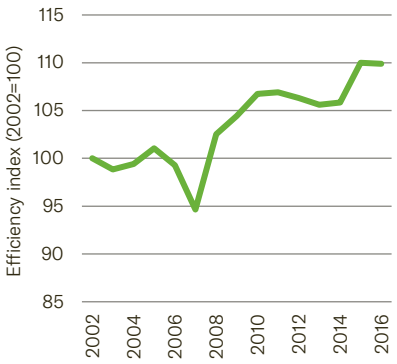
Efficiency/costs

How efficiently resources are used can be assessed from the perspective of the learners, training companies, or the public. For an unbiased assessment and a comparison of efficiency, however, essential data is missing for practically all education levels and types *(Wolter et al., 2020)*. In VET, there is a particular lack of data on the quality and level of skills and knowledge among learners entering and leaving a programme. Without such data, schools whose learners are less competent on entry are deemed to be less efficient than those with initially more competent learners.

However, based on available data and when considering inputs and outputs at the cantonal level, an efficiency comparison over time does not indicate a decline in the use of public expenditures in VET today compared to earlier times (→ figure 159). The analysis considers the number of learners and teachers, the education expenditure as the input, and the number of apprenticeship qualifications as the output. Accordingly, the comparison over time is valid only when assuming that education quality has remained constant. Analyses of contextual factors show that cantons with a high proportion of school-based VET programmes are less efficient, as companies do not contribute to the costs here. Such contextual factors explain a significant part of the differences among cantons.

159 Development of efficiency in vocational education and training

Data: FSO; calculations: Centre for Research in Economics of Education at the University of Berne



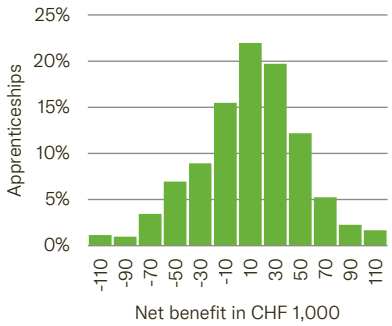
Costs and benefits among apprenticeship companies

In 2020, the federal government and cantons paid approximately CHF 3.6 billion for vocational education and training expenses, most of which was spent on vocational schools *(SERI, 2021)*. These costs have been relatively stable in nominal terms over the past decade. In addition, companies offering training invest approximately CHF 5.0 billion annually in VET programmes. Such company investments are offset by a slightly higher benefit, resulting in a net gain, on average, as shown in the fourth cost-benefit study for the 2016–2017 education and training year *(Gehret et al., 2019)*. Not only do costs and benefits vary between companies and apprenticeship occupations, but also in their ratio: Around 40% of training companies incur net costs (rather than net benefits) (→ figure 160).

Compared to the previous cost-benefit analysis *(Strupler Leiser & Wolter, 2012)*, the results have changed only slightly. Even if the figures for some occupations differ slightly, the changes are largely statistically insignificant (→ figure 161).

160 Distribution of net benefits among apprenticeship companies

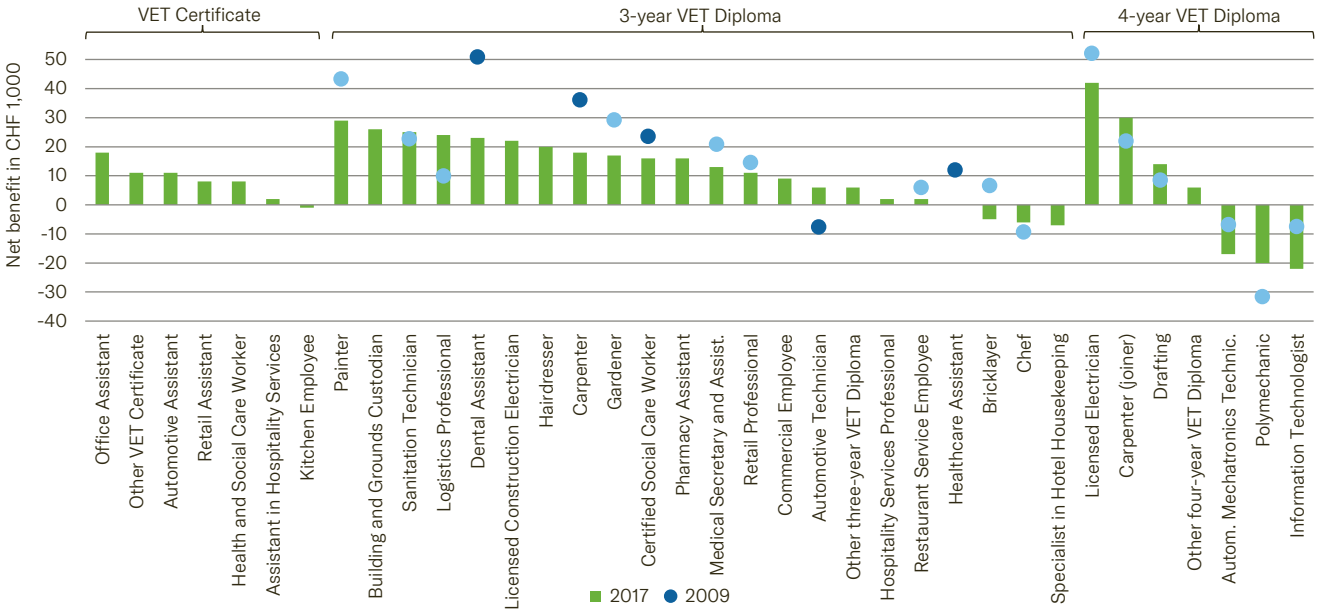
Data: *Gehret et al. (2019)*



161 Average net benefit by occupation

Comparison of 2009 and 2017; the light-coloured figures of the 2009 survey do not differ statistically from those of 2017.

Data: *Gehret et al. (2019); Strupler Leiser & Wolter (2012)*



The most significant changes occurred in the productive performance of learners while on the job. Learners are now increasingly doing the work of otherwise unskilled employees and less frequently that of skilled employees.

In the past, various studies identified the importance of a company's cost-benefit ratio as key to its willingness to offer training positions *(SCCRE, 2014)*. However, net benefits and costs by themselves do not play a role alone, but also the costs of alternate ways of recruiting skilled

employees. In this regard, recent studies have clearly shown that lower costs of recruiting foreign skilled workers during the expansion of the free movement of persons tended to lead to a decline in training activity among companies located close to the border *(Aepli & Kuhn, 2021)*. However, since the free movement of persons also promotes stronger growth in companies close to the border and thus leads to a stronger need for employees, the overall effect on training activity remains negligible *(Oswald-Egg & Siegenthaler, 2021)*.

Large regional differences in reorientations

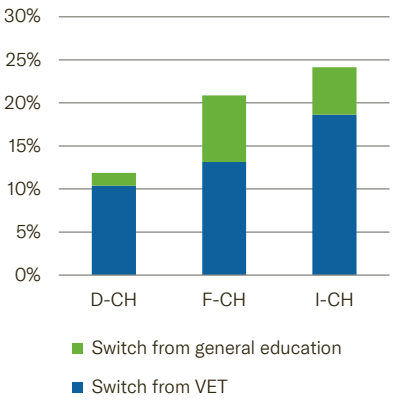
From the perspective of learners, switching the apprenticeship company or occupation can make a lot of sense – depending on the new situation, and such a switch can also be seen as a need for flexibility. From the perspective of apprenticeship companies and the public sector, however, such a change is inefficient if it could have been prevented by means of more effective vocational guidance counselling in the first place. Especially for apprenticeship companies where training expenses at the start of the apprenticeship exceed the benefits, such contract terminations are costly. However, since most companies in Switzerland employ apprentices productively right from the start – mostly for unskilled tasks –, the overall cost that companies incur from those who quit their apprenticeship is still low *(Kriesi et al., 2016)*.

Another form of inefficiency – both for the individuals concerned and the economy and society – arises when someone switches between education types at the upper-secondary level. On the one hand, longer education and training periods shorten the potential employment duration, which leads to negative effects for the person in the form of lower income and for the company in the form of a diminished staff. On the other hand, the public sector also incurs higher education costs. Looking at the proportion of those who start an apprenticeship after previously having started another type of upper-secondary level education and training programme indicates major differences among the language regions (→ figure 162). In French- and Italian-speaking Switzerland, the current apprenticeship of over 20% of first-year apprentices is not their first post-compulsory choice. While most learners previously entered and dropped out of another VET apprenticeship, about 8% of all apprenticeship starters have a general education background. This share is higher in cantons with a high academic baccalaureate share (→ figure 163).

162 Changes in education and training by language region, 2020

Proportion of learners who entered in 2020–2021 and previously had started an upper-secondary programme

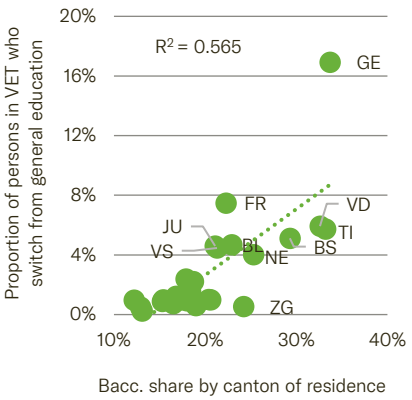
Data: FSO (LABB); calculations: SCCRE



163 Change from general education, 2020

Compared to the gymnasium baccalaureate share 2019

Data: FSO (LABB); calculations: SCCRE



Equity

Occupation choice and gender

Education and training as well as occupational choices in Switzerland are and remain subject to gender-specific factors. Not only do females start in general education programmes more often than males *(→ chapter Baccalaureate schools, page 155)*, but apprenticeship choices within VEt also vary strongly by gender. Learners choose a profession in VET earlier than in general education, i.e. at a time when gender identity still plays a greater role for young people. Moreover, the perceived occupational choices in general education are less gender-stereotypical than in VET. These factors can thus explain gender-stereotypical occupational choices in VET *(Basler et al., 2021; Imdorf et al., 2014)*.

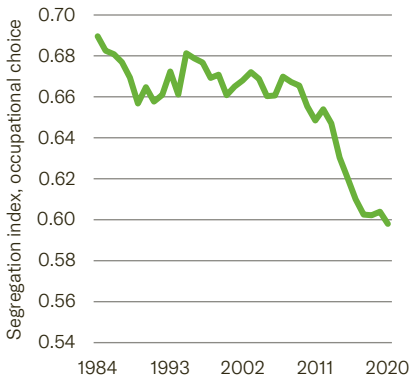
Inequalities within VET, i.e. the gender-stereotyped choice of occupation, have nevertheless decreased significantly in the last decade, as indicated by the trend shown in the segregation index (→ figure 164). This indicates the differences in gender-specific occupational choices, whereby all women choosing a different occupation than men would result in 1 as the value. If men and women are equally distributed in 50% of all occupations, the index would show 0 as the value. In Switzerland, gender-specific occupational choices remained relatively stable for decades, until the trend changed course starting at around 2010. Since then, the index value has been declining. At the same time, large differences among the cantons can be seen in the segregation index (→ figure 165). In French- and Italian-speaking Switzerland and the two cantons of Basel-City and Basel-Country, occupation choices have always been less linked to gender, while learners in the cantons of Central Switzerland and both cantons of Appenzell choose gender-typical occupations more often. But here, too, the differences have decreased. However, there is no explanation yet for the shift towards more gender-neutral occupations that occurred around 2010.

Recent studies show that gender-specific occupational choices are more due to gender-specific preferences among learners and less due to the preferences of companies offering training. This is proven, among other things, by an experimental study in which fictitious apprenticeship applications were sent out and in which researchers had randomly varied the applicant's gender. Differences in companies' responses to female and male applicants could not be established. The former were not systematically invited less often to interviews than men, and vice versa *(Fernandes et al., 2020)*.

One reason for different preferences of women and men are the diverging forms and content of the work in the various professions. Women tend to choose professions that often involve working with others, while men tend to prefer work involving the use of physical objects (→ figure 166). Consequently, a change in the gender ratio of the various occupations would have to originate in the job profiles, either communicatively or through actual changes in the occupational activities. Labour market realities, however, tend to constrain such changes, which means that gender-typical occupational choices based on the variety of preferences cannot be eliminated completely.

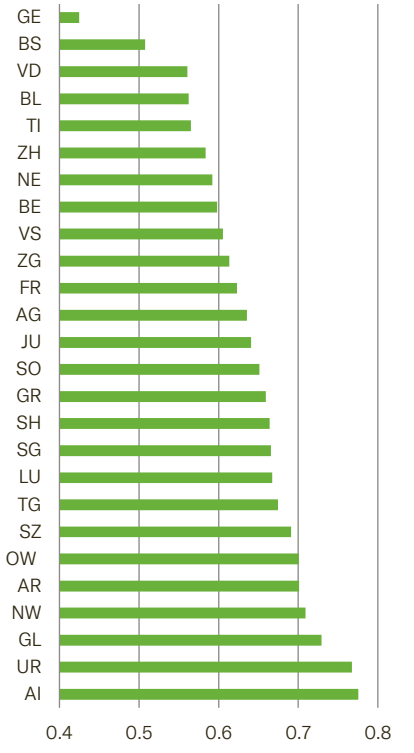
164 Trend in the segregation index

Data: FSO (SBG-SFPI); calculations: SCCRE



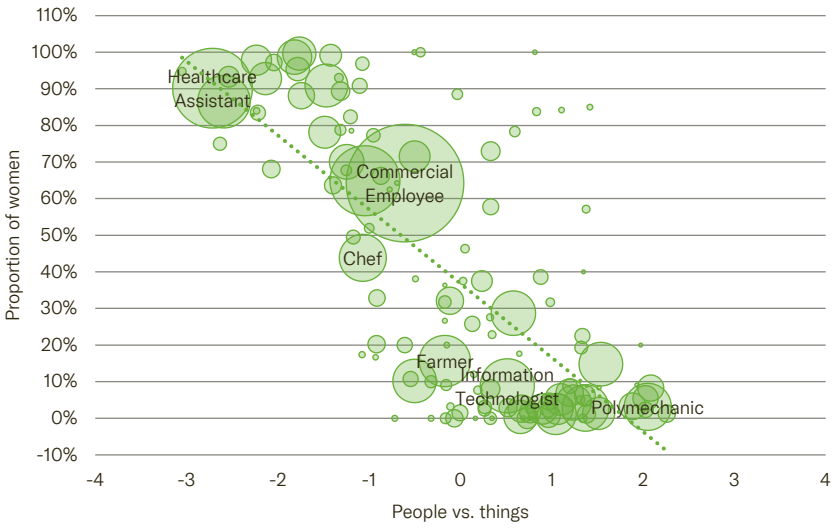
165 Segregation index by canton, 2016 – 2020

Data: FSO (SBG-SFPI), calculations: SCCRE



166 Women's share and the "People vs. things" index in career choice

Data: *Kuhn & Wolter (2022)*



The index divides apprenticeship occupations into a latent dimension of "People vs. things" that is based on the requirements profiles. The index was then validated against actual tasks mentioned in job ads.

Gender-specific pay gaps

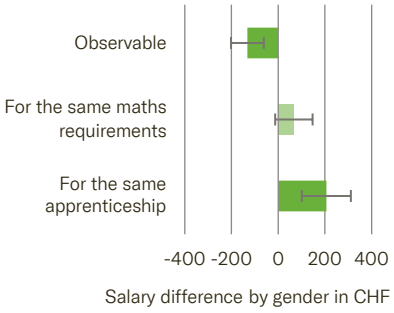
Immediately after completing their vocational apprenticeship, women earn on average around 130 francs less than men, as indicated in an analysis of the income of the 2012 PISA cohort (→ figure 167). The analysis includes only the incomes of those who start working directly and do not start a tertiary programme in the apprenticeship completion year or the following year. The lower wage for women at the beginning of their career is due to their choice of occupation. For example, men more often choose occupations with very specific skills, while women tend to choose ones that require a large share of general education. This gives men a pay advantage at the time when they start their career but not in the medium to long term *(Grønning et al., 2020b)*. When including the mathematical skills required for the occupation in the pay comparison, the pay difference becomes negligible (→ figure 168). Consequently, the initial pay disadvantage is mainly due to women choosing occupations with significantly lower requirements in mathematics. When considering specifically selected occupations – whereby only gender-specific pay differences within the same occupations are compared – women actually earn more than their male counterparts directly on completion of the apprenticeship.

Calculations by the FSO *(2021e)*, which consider the percentage of weekly working hours, occupational field and other characteristics, also do not indicate any pay differences 1.5 years after completion of the apprenticeship. Five and a half years after completing an apprenticeship, on the other hand, men earn just under CHF 200 more on average. Such pay differences may be due to various income trends in the occupations or to changes in labour force participation, which is influenced, for example, by career breaks or part-time work. Unlike the SEATS data, the FSO data does not consider the requirement profiles for the various occupations; however, it does consider the percent of weekly working hours.

167 Differences in pay on entry in the labour market

The pay of women minus the pay of men

Data: SEATS; calculations: SCCRE



Pay corresponds to the effective monthly net amount (not full-time equivalent salaries) earned by those who did not start tertiary education in the year of completing their apprenticeship nor in the following year. Those earning more than the 99% percentile were excluded.

Lower-secondary school type and socio-economic status

Socioeconomically disadvantaged persons choose an apprenticeship significantly more often than a baccalaureate qualification *(Zimmermann & Seiler, 2019)* *(→ chapter Upper-secondary education, page 111)*. Accordingly, it is important for this group to have access, for example by means of a vocational baccalaureate, to the tertiary level on completion of a VET programme. But since vocational baccalaureates tend to cater to those with a strong record in school, they can compensate for socioeconomic differences only conditionally *(Imdorf et al., 2017)*.

The decision of whether to start a VET or a general education programme hinges not only on choices and preferences at the end of compulsory schooling but also on socioeconomic factors in the person's educational background, especially the requirements at the lower-secondary level. The same applies when choosing the apprenticeship occupation: Socioeconomically disadvantaged people tend to choose less demanding apprenticeships than those who are better off. As soon as the comparison includes only those with the same requirements at lower-secondary level, the effect of socioeconomic origin weakens on transition. There is no evidence that those applying for apprenticeships are disadvantaged due to their parents' educational level *(Fernandes et al., 2020)*.

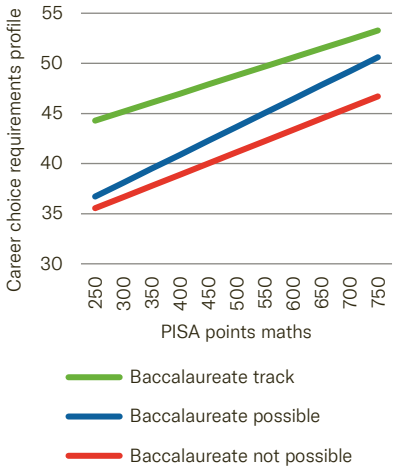
The more decisive factor, therefore, is the type of the lower-secondary level, which in turn is based not only on individual skills. People with direct access to an academic baccalaureate programme (e.g. those from a preparatory baccalaureate schools) significantly more often choose demanding vocational apprenticeships than those who do not have direct access to such a programme (e.g. those in a Sekundarschule), even if they have the same skills (→ figure 168). The latter, in turn, opt for more demanding apprenticeships than those in a track with basic requirements only, such as a Realschule. Consequently, even among persons with the same skills, the school type at the lower-secondary level plays an important role in the choice of occupation *(Meyer & Sacchi, 2020)*.

There is no conclusive information about why the choice of apprenticeship is so strongly influenced by the lower-secondary school type. On the one hand, training companies could regard the school type as additional information, besides grades, about the applicant and use it to gauge whether he or she is suitable for the apprenticeship *(signalling)*. The information about the school type thus serves as assumed or justified proxy information about the person's skills, in addition to school grades. Such information is taken into account especially when other information relevant for the decision of admitting the person remains very uncertain *(Fossati et al., 2020)*. At the same time, the school type could also correlate with young people's preferences, expectations and self-esteem and thus influence their behaviour when looking and applying for apprenticeships. A structured approach for selecting apprenticeships based on a range of requirements and school types would thus allocate talent inefficiently and create equity problems for the young people involved if the information about the school type were to omit any further details relevant for success in the apprenticeship, besides the skills acquired in school.

168 Requirements profile of the occupation choice

Based on skills and lower-secondary school type

Data: SEATS, anforderungsprofile.ch; calculations: SCCRE



Legend
When considering average skills (500 PISA points) and by keeping other personal characteristics (gender, socio-economic status, migration status) constant, those in the academic baccalaureate track choose on average an apprenticeship with a requirements profile of 48.8, while those with the same characteristics but without access to the academic baccalaureate choose an apprenticeship with a requirements profile of 41.1.

Migration and inclusion

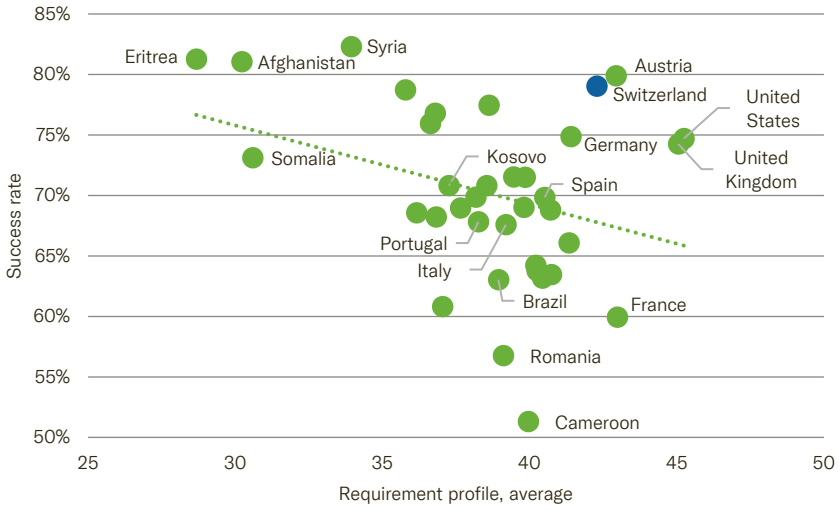
Finding an apprenticeship is not always easy, especially for seekers with foreign nationality or a migration background. Foreigners send out an average of 15 applications for an apprenticeship, compared to only 8.5 for Swiss nationals *(Golder et al., 2021)*. Moreover, apprentices with a migration background are often less successful. The 29% share of contract terminations by foreign-born apprentices with foreign nationality and the 25% share of Swiss-born apprentices of foreign nationality are above the 20% share of apprentices of Swiss origin and nationality *(FSO, 2021h)*. Furthermore, the resumption rate is lower for learners of foreign nationality after their apprenticeship contract has been terminated. To facilitate access to the labour market, federal and cantonal administrators have enacted integration measures *(Barabasch et al., 2021)*, such as preliminary apprenticeships that aim to help learners to integrate.

Yet it remains unclear whether such differences are due to the person's migration status, preferences, or performance in school. Those with a migration background tend to be more optimistic, also with regard to their career opportunities. This positive attitude is one of the reasons why they more often opt for a general education track, even if this involves lower skills *(Tjaden & Scharenberg, 2017)*. Young people with a migration background also tend to choose more demanding vocational apprenticeships than native Swiss nationals with the same performance in school.

169 Success rate and requirements profile of the chosen occupation

By country of birth

Data: FSO (LABB), anforderungsprofile.ch; calculations: SCCRE



The **success rate** refers to the proportion of learners who have passed the qualification procedure without interruption or termination of the apprenticeship contract.
The **basic population** includes all learners of the cohorts who started an apprenticeship (directly or via an intermediate year) between 2012 and 2015. Individuals with countries of birth with fewer than 300 observations were excluded.

It is also important to note that those with a migration background were never a homogeneous group and that diversity has increased in the wake of highly qualified foreigners who immigrate to Switzerland. With respect to completing an education and training programme without interruption, students from Syria and Eritrea – most of whom came to Switzerland as asylum seekers – are more likely to succeed in vocational education and training programmes than Swiss nationals (→ figure 169).

This high success rate also relates to the choice of occupation. They usually choose apprenticeships (often with vocational certificate) with low requirements, but are very successful in them. Their choice is probably due to their language skills and current knowledge gained at school. In contrast, young people from Balkan countries and Portugal, for example, are more likely to opt for more demanding occupations than native Swiss students with the same skills *(Wolter & Zumbuehl, 2018)*.

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION
AND TRAINING

BACCALAUREATE SCHOOLS

Context

The **baccalaureate rate** is the proportion of young people who have gained a baccalaureate certificate by the age of 25 relative to the reference population of the same age. The Swiss Federal Statistical Office (FSO) calculates each year's rate as a three-year average. The rate for 2019 therefore corresponds to the average rates for the years 2018–2020 *(FSO, 2021a)*. In this chapter, unless further specified, the terms "baccalaureate" and "baccalaureate rate" refer to the baccalaureate gained at a baccalaureate school and the corresponding baccalaureate rate.

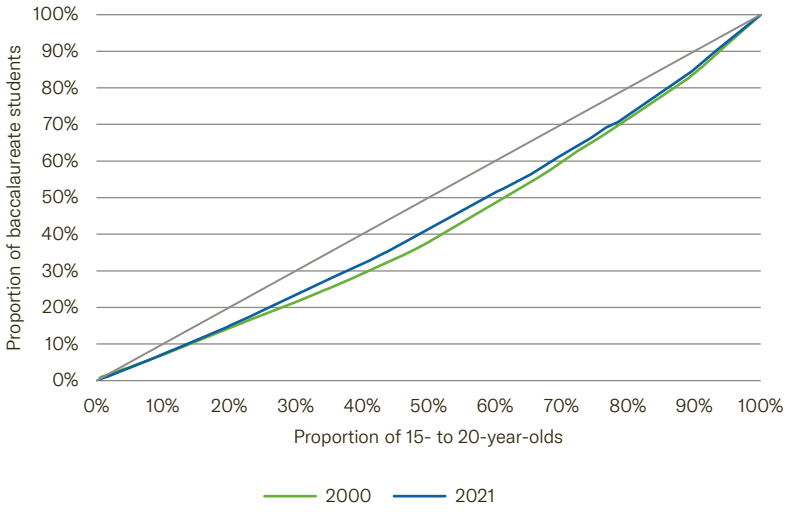
Continuing differences between the cantons

In previous editions of the Education Report, it was demonstrated that there has been practically no convergence between cantonal baccalaureate rates as baccalaureate rates have increased over time *(SCCRE, 2014, 2018)*, with the marked increase between 1980 and 1995 being primarily driven by the convergence of baccalaureate rates for men and women. Differences between the cantonal baccalaureate rates therefore persist to this day. For example, the 2019 baccalaureate rate in Canton Geneva was 33.7% – almost three times that in Canton Glarus, where it was 12.2%. This variation between cantons is seen not only in the probability of achieving a baccalaureate but also in the probability of entering baccalaureate school. At 12.8%, Canton Uri has the lowest rate of admission to baccalaureate schools, with Canton Geneva recording the highest rate, at 48.6%. A more uniform picture emerges when one considers the distribution of baccalaureate students across the cantons. This is because it is primarily the smaller cantons that have very high or very low baccalaureate rates, whereas the rates in the larger cantons tend to be closer to average. If one considers all 15- to 20-year-olds in Switzerland, it is clear that half of them come from cantons that account for 40% of baccalaureate students in Switzerland (→ figure 170). These are the cantons with the lowest baccalaureate rates. The other half of 15- to 20-year-olds come from cantons that are home to the remaining 60% of baccalaureate students. As with the differences between cantonal baccalaureate rates, this ratio is stable over time (2000 until 2021).

170 Distribution of baccalaureate students and 15- to 20-year-olds across cantons, 2000 and 2021

Cumulative proportions (by ascending cantonal baccalaureate rate)

Data: FSO; calculations: SCCRE



The baccalaureate rates differ not only between the cantons but also within them. An examination of baccalaureate rates at the district level reveals that they vary between 8 and 41%, whereas the cantonal baccalaureate rates range from 12 to 34%. However, with the exception of two cantons, the distribution of baccalaureate rates within the cantons is less pronounced than that between them. In addition to the cantonal baccalaureate rate, contributory factors for higher baccalaureate rates in certain districts appear to include the proportion of adults with a tertiary-level qualification (→ figure 171). The impact of the proportion of people educated to tertiary level on district baccalaureate rates can be explained partly by the fact that parents educated to tertiary level prefer the baccalaureate school system for their children *(→ chapter Tertiary-level education, page 193)*. In addition, their children also perform better at school on average *(Nidegger et al., 2014)*. It is also interesting that, at the district level, the baccalaureate rate is not affected by either the proportion of the population with foreign nationality or the federal vocational baccalaureate rate. One obvious assumption would be that lower baccalaureate rates are offset by higher rates of vocational baccalaureates, but this hypothesis is contradicted by the fact that the latter have no significant impact on the baccalaureate rate at the district level.

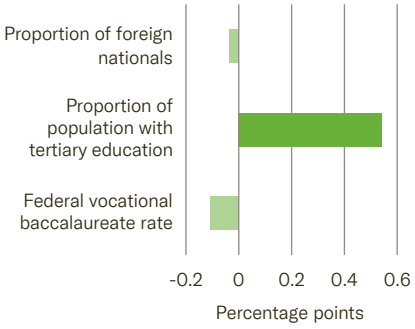
Women and baccalaureate schools

Between 1980 and 2019, the baccalaureate rate in Switzerland rose from 11 to 22%. In an initial phase, this increase primarily occurred in a context of women catching up. This period only saw a slow increase in the baccalaureate rate for men. In 1994, the proportions of women and men at baccalaureate schools were equal (→ figure 172). Until 2004, the proportion of women at baccalaureate schools continued to rise practically at the same rate as it did in the phase when it was still approaching the proportion of men. In 2004, the proportion of women reached 57% and remained stable at that level since then. If the growth had continued at the same rate as between 1980 and 2004, the proportion of women at baccalaureate schools would have reached 67% in 2019. Once the proportion of women stopped increasing, the overall baccalaureate rate also rose less rapidly. Although processes of this kind can never be explained by a single factor, it should be noted that this stagnation in the proportion of women at baccalaureate schools occurred in the period in which the *Diplommittelschulen* (DMS) were renamed as upper-secondary specialised schools (FMS) (2002). The diversification of provision at these schools that went along with it created an alternative to baccalaureate schools for people with poorer academic performance. As a result, people who were seeking a general education but did not meet the requirements for baccalaureate school could opt to attend an upper-secondary specialised school. If all students who gain a qualification at an upper-secondary specialised school – that is, a specialised school certificate or a specialised baccalaureate – entered baccalaureate school instead, the baccalaureate rate would have been 31% in 2019. In that case, the proportion of women at baccalaureate schools would be 62% rather than the actual figure of 57%. The continued increase in the proportion of women at baccalaureate schools after parity was achieved in 1994 can be explained by, among other factors, the fact that women have a higher preference for general education than men.

171 Contributory factors for the baccalaureate rate at district level

Taking account of cantonal baccalaureate rate and political orientation; average baccalaureate rates for 2017–2019

Data: FSO; calculations: SCCRE

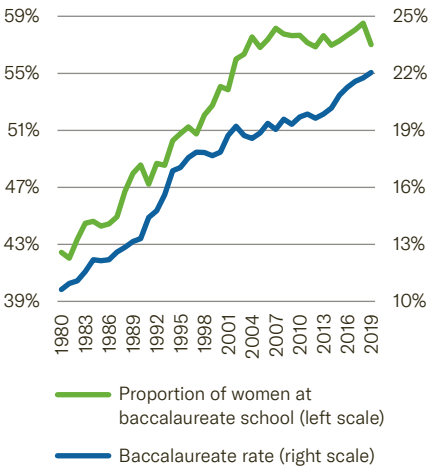


Cantons AI, BS, GE, GL, NE, NW, OW, UR and ZG are not subdivided into districts. For these cantons, only the cantonal baccalaureate rate is available and was used for these analyses. Matt colours indicate statistically insignificant effects (5% significance level).

Legend
If the share of the population with a tertiary-level qualification increases by one percentage point in a district, the baccalaureate rate in that district increases by 0.54 percentage points.

172 Proportion of women at baccalaureate schools and baccalaureate rate, 1980–2019

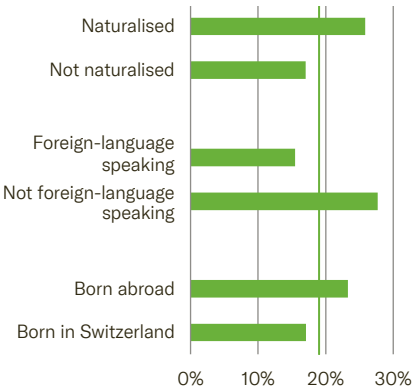
Data: FSO



173 Transition to a baccalaureate school by pupils with a migration background

Estimated probabilities of transition, taking account of gender, type of community (urban, rural, intermediate) and canton of residence

Data: FSO (LABB); calculations: SCCRE



The sample includes pupils who were attending the 6th school year (counted according to the HarmoS Agreement) in 2012 and were foreign nationals at the time. Of this sample, a total of 19% entered baccalaureate school (green line). Pupils who naturalised during compulsory education are counted as naturalised citizens. This analysis did not take account of naturalisations following the transition to upper-secondary level.

Migration and transition to a baccalaureate school

Recent decades have seen increased migration to Switzerland, reaching a climax between 2000 and 2015 *(→ chapter General context of the swiss education system, page 9)*. This has led to an increase in the population with a preference for the baccalaureate school system, as people with a migrant background – as opposed to Swiss nationals – tend to prefer the academic route over vocational education and training *(Abrassart et al., 2020)*. Based on these preferences, one might assume that migrants are more likely than average to enter baccalaureate school, provided it is assumed that they have the same prior academic knowledge on average. However, the statistics show that only 12% of pupils entering a baccalaureate school are foreign nationals. Within the population group of 15- to 19-year-olds, however, the proportion of young people with foreign nationality was 22% in 2020 *(FSO, 2021i)*. Young foreign nationals are therefore significantly underrepresented among entrants to baccalaureate school. This observation – accompanied by stronger preferences for the general education route – may have to do with poorer performance at school at the time of selection for entry to baccalaureate school. Nevertheless, the scale of this underrepresentation is still surprisingly large given that, if their performance at school is the same, migrants tend to opt for a baccalaureate school *(Zumbühl & Wolter, 2017)*. Another explanation is that the proportion of baccalaureate pupils with a migration background is underestimated if only nationality is considered: many young people who transition to a baccalaureate school naturalise before doing so. Moreover, migrants that naturalise at an early stage are more likely than non-naturalised migrants to transition to a baccalaureate school (→ figure 173).

On top of the 12% of baccalaureate pupils with foreign nationality, therefore, there are a further 5.5% who naturalise before entering baccalaureate school. In other words, the proportion of pupils with a migration background is 1.5 times as high if naturalised citizens are taken into account. In addition, migrants born abroad – i.e. first-generation immigrants – transition to a baccalaureate school more often than migrants born in Switzerland. This may have to do with the fact that first-generation immigrants exhibit stronger preferences for baccalaureate schooling than those of the second generation *(Abrassart et al., 2020)*. The decision to attend a baccalaureate school may also be a consequence of the fact that the free movement of people in the European Union (EU) has brought greater numbers of highly skilled parents to Switzerland, whose children have better chances of being accepted into a baccalaureate school. The significance of performance at school is also reflected in the fact that young people who speak a foreign language are less likely to transition to a baccalaureate school than those who speak the language of instruction at home. School testing invariably shows that, on average, the former perform worse at school regardless of their origin.

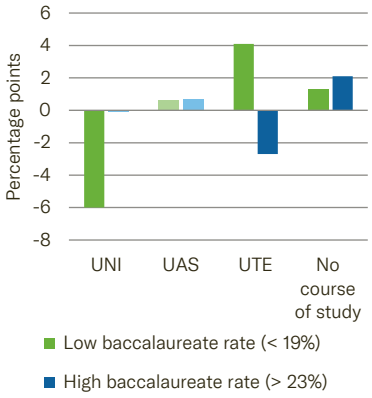
Cantonal baccalaureate rates and transitions to the universities

The baccalaureate rate in a canton is correlated with the chosen type of university or the decision not to take a course of study at all. Baccalaureate pupils from cantons with a low baccalaureate rate therefore have a lower probability of transitioning to a conventional university (UNI) than those from cantons with an average baccalaureate rate (→ figure 174). On the other hand, the probability of starting a course at a university of teacher education (UTE) is higher in cantons with low baccalaureate rates than in those with average rates. One explanation for this may be that, of the twelve cantons with a baccalaureate rate of less than 19%, only three are home to a campus of a conventional university (BE, LU, SG). The distance to the nearest university certainly influences the choice of its type *(Denzler & Wolter, 2011)*. Of the cantons with a baccalaureate rate of less than 19% that lack a campus of a conventional university, five have a university of teacher education *(→ chapter Universities of teacher education, page 285)*. In these cantons, the university of teacher education may represent a more popular alternative for prospective students given the greater distance to a conventional university. Baccalaureate students from cantons with high baccalaureate rates enter a conventional university or a university of applied science (UAS) just as often as those from cantons with average rates. However, as fewer of them begin a course of study at a university of teacher education, significantly fewer of them begin to study at a university at all.

174 Transitions to the universities by baccalaureate rate

Estimated probabilities (difference with respect to cantons with a baccalaureate rate of 19–23%), taking account of age (on completion of the baccalaureate), gender, nationality and special subject; 2019 baccalaureate graduation cohort

Data: FSO (LABB); calculations: SCCRE



Baccalaureate rate < 19%
Cantons AG, AR, BE, GL, LU, OW, SG, SH, SO, SZ, TG, UR

Baccalaureate rate 19–23%
Cantons AI, BL, FR, GR, JU, NW, VS, ZH

Baccalaureate rate > 23%
Cantons BS, GE, NE, VD, TI, ZG

In cantons with a baccalaureate rate of between 19 and 23% (reference category), there is a probability of 79.6% of transitioning to a UNI, 8.0% to a UAS, and 5.6% to a UTE. The probability of not transitioning by autumn 2021 is 6.8% in the reference category. Matt colours indicate statistically insignificant effects (5% significance level).

Legend
At a low baccalaureate rate (< 19%), the probability of transitioning to a UNI is 6 percentage points lower than at a baccalaureate rate of between 19 and 23%.

Institutions

Individuals with a Swiss baccalaureate are free to choose a conventional university or university of teacher education. In addition to the free choice of institution, the baccalaureate provides exam-free access to almost all study programmes – with just a few exceptions (such as medicine and sport). Switzerland differs from many other countries in this regard. Moreover, although it is possible to sit the Swiss baccalaureate examination, Switzerland does not have a centralised baccalaureate examination that is obligatory for all. The majority of baccalaureate students gain a cantonal baccalaureate. These baccalaureate certificates are recognised by the Confederation, which means that the requirements of the 1995 Regulation on the Recognition of the Baccalaureate (MAR 95 Regulation) must be met. Nevertheless, cantons, schools and/or teaching staff have a high degree of autonomy with regard to the education programme. This makes it harder to compare baccalaureate certificates at the national level, and this is one of the issues being addressed as part of the further development of the baccalaureate, which also includes the revision of the MAR 95 Regulation *(→ Further development of the baccalaureate, page 162)*. One objective of the MAR 95 Regulation (Art. 5) is that baccalaureate pupils should gain the skills they need to study at a university (general ability to study) and should reach a level of personal maturity that allows them to take on demanding functions in society (deeper social maturity). Basic subject-related study skills are a key component of the ability to study, whereas deeper social maturity is to be obtained through broad, general education that also includes skills not directly required to study at a university *(Eberle et al., 2008)*.

Admission requirements and time of transition

In relation to the general ability to study, the term **basic subject-related skills** refers to skills that are important prerequisites for most subjects *(EDK, 2016)*. Specifically, these are skills in the first language and mathematics. Although not officially defined as such, English and IT are also referred to as basic skills *(SSC, 2021)*.

Entry procedures and the time of transition to a 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. Canton Solothurn and the two Basel cantons are an exception, as young people from the type of school with the second highest attainment level are eligible if they achieve a higher average grade. In simple terms, cantonal entry procedures can be divided into three categories (→ figure 175): in category A, pupils must sit an entrance exam for admission to baccalaureate school. Category B characteristically relies on previous attainment records for admission to baccalaureate school but does not entail a further entrance exam. Finally, the key feature of category C is that it involves carrying out an overall assessment. In addition to previous attainment records and/or an entrance exam, the decision as to whether pupils are ready to enter baccalaureate school takes account of the recommendation of their teacher at the feeder school. The recommendation is also influenced by factors such as social skills, motivation, willingness to learn or meetings with parents.

175 Admission requirements for baccalaureate school and times of transition

School years counted according to the HarmoS Agreement

Data: EDK-IDES; as at March 2022

Cantons were allocated to category A if the transition to a baccalaureate school is usually determined by an entrance exam. There are some cantons in which the entrance exam is not the norm but can be taken if the conditions for exam-free access are not met. These cantons have not been allocated to category A. In other cantons, an entrance exam must be taken in order to transition to a baccalaureate school, and previous attainment records are also taken into account. These cantons are listed in category A. Cantons in which completion (i.e. a grade of at least 4) of the highest attainment level of lower-secondary school is required for admission to a baccalaureate school have been allocated to category B.

	Transition after 8th school year	Transition after 10th school year	Transition after 11th school year
A Entrance exam	GL, GR, SG, ZH	AR, GL, GR, SG, SH, SZ, ZH	AR, GL, GR, SG, SH, SZ, ZH
B Previous attainment records		SO, VS	AG, BE-f, BL, BS, FR, GE, JU, NE, SO, TI, VD, VS
C Overall assessment	AI, LU, NW, OW, UR, ZG	AI, BE-d, LU, OW, TG, UR, ZG	AI, BE-d, LU, NW, OW, TG, UR, ZG

There are also differences between the cantons when it comes to the duration of baccalaureate schooling and the school year in which the transition to a baccalaureate school takes place. A distinction is to be drawn firstly between the long and short baccalaureate cycle and secondly with regard to the time of transition to a baccalaureate school. The long baccalaureate cycle lasts six years, two of which are spent at a preparatory school, whereas the short baccalaureate cycle generally lasts four years. If pupils receive preparatory baccalaureate schooling at lower-secondary level, then baccalaureate schooling can also be completed in three years. Entry to the long baccalaureate cycle takes place immediately after primary school – that is, after the 8th school year (counted according to the HarmoS Agreement). In the case of the short baccalaureate cycle, entry takes place at lower-secondary level, either following the 10th school year or following the completion

of compulsory education – i.e. after the 11th school year.[1] The long baccalaureate cycle is only offered in the German-speaking cantons of Appenzell Innerrhoden, Glarus, Graubünden, Lucerne, Nidwalden, Obwalden, St. Gallen, Uri, Zug and Zurich, while the other cantons only offer the short baccalaureate cycle. In all cantons that carry out selection for baccalaureate school based on an entrance exam or overall assessment, it is possible to transition to baccalaureate school before completing compulsory education. In cantons where entry to baccalaureate school is decided solely based on grades, the transition to a baccalaureate school can – with the exception of two cantons – only take place following completion of compulsory education.

Subjects offered and special subjects

The baccalaureate subjects encompass ten regular subjects, one special subject and a second supplementary option (Art. 9, MAR 95 Regulation). The regular subjects include the first language, a second national language, a third language (a third national language, English or a classical language), mathematics, biology, chemistry, physics, history, geography and creative art and/or music. In addition, there are also the compulsory school subjects of IT and economics and law. Unlike the regular subjects, compulsory subjects are not taken into account when calculating the baccalaureate grade; rather, they only count towards the grade for the corresponding semester or year. At the end of baccalaureate schooling, all baccalaureate pupils write a baccalaureate essay and sit the baccalaureate examination, which examines the following subjects: the first language, a second national language, mathematics, the special subject and a further subject specified by the canton (Art. 14, MAR 95 Regulation). In terms of the regular components, 30–40% of the total teaching time is allocated to languages, 27–37% to mathematics and natural sciences, 10–20% to the humanities and social sciences, and 5–10% to arts (Art. 11, MAR 95 Regulation). The special subject, second supplementary option and essay account for 15–25% of the time. Apart from the national languages that feature 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 be offered at least a basic course in English (Art. 17, MAR 95 Regulation). Moreover, all pupils choose one special subject from the following eight subjects or subject clusters (Art. 9(3), MAR 95 Regulation): classical languages (Latin and/or Greek), one modern language (a third Swiss language, English, Spanish or Russian), physics and applied mathematics, biology and chemistry, economics and law, philosophy/education/psychology, creative art, music.

An examination of the proportions of the various special subjects between 2012 and 2020 reveals that they vary only slightly over this period (→ figure 176). One might therefore assume that baccalaureate pupils have stable preferences, such that demand for the individual special subjects remains constant over the years. However, the assumption that preferences are stable is hard to reconcile with the fact that the proportions of

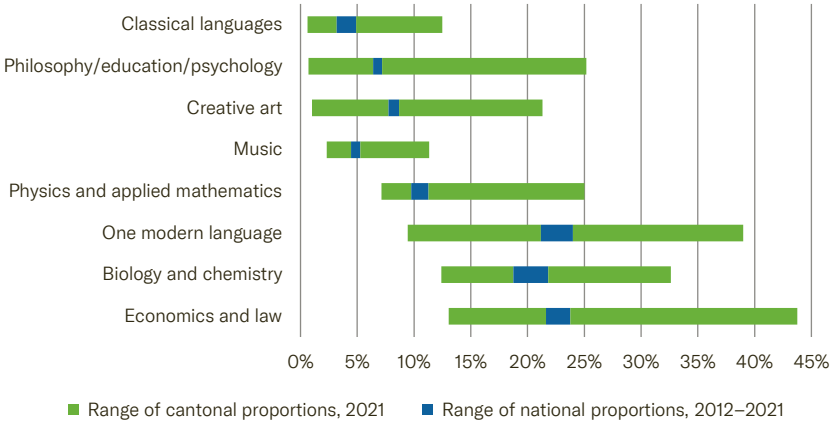
1 The cantons of Appenzell Innerrhoden and Uri also offer the possibility of transitioning after the 9th school year.

individual special subjects vary very strongly between cantons. This would mean that the preferences remained stable over time – in other words, that they were not subject to prevailing trends – but that they simultaneously differed from one canton to another. It would be more consistent with both of these observations to assume that demand for special subjects is driven by the range of subjects on offer. This hypothesis is supported by two observations: firstly, not all of the cantons offer all of the special subjects in the first place and, secondly, not all of the baccalaureate schools within the cantons offer all of the special subjects. Baccalaureate pupils therefore have a limited choice, as it is often only possible to attend a baccalaureate school outside of the canton if additional conditions are met and, even within the canton, not all baccalaureate schools are located in close proximity. It therefore makes sense for the distribution of baccalaureate pupils across special subjects to depend on the subjects offered. At the same time, this would also explain why the proportion of special subjects hardly varies over time. Changes to the range of subjects offered always result in changes to the demand for specialist teachers, and there may not be sufficient scope for adjustments of this kind in the short term.

176 Distribution of special subjects across cantons and over time

Proportions of baccalaureate certificates awarded in the individual special subjects

Data: FSO; calculations: SCCRE



Legend
At just 0.6%, the special subject "classical languages" was chosen by the lowest proportion of baccalaureate students. In the canton with the highest proportion, the subject was chosen by 12.5% of pupils. In the year in which the subject recorded its lowest share, it was chosen by 3.2% of baccalaureate students in Switzerland; in the year with the highest proportion, this figure was 4.9%. This chart does not show zero values, which occur when a special subject is not offered in a canton or was not chosen by anyone.

Further development of the baccalaureate

As part of the project to further develop the baccalaureate (WEGM), work is underway on revising the Regulation on the Recognition of the Baccalaureate (MAR) and the Ordinance on the Recognition of the Baccalaureate (MAV) of 1995 as well as the national core curricula for baccalaureate schools of 1994. This refinement is intended to ensure exam-free access to conventional universities in the long term *(EDK & SERI, 2020b)*. On behalf of the Swiss Conference of Cantonal Ministers of Education (EDK) and the Federal Department of Economic Affairs, Education and Research (EAER), three project groups and several working groups have developed the following four subject areas *(EDK & SERI, 2020a)*:

1. updating of the national core curricula of 1994
2. harmonisation of the minimum duration of baccalaureate schooling
3. revision of further stipulations of the MAR and MAV
4. clarification of responsibilities and competencies of actors responsible for quality assurance and management of baccalaureate schooling (governance).

The aim of the first project group is to revise the baccalaureate curricula in order to improve the comparability of baccalaureate certificates between baccalaureate schools and between cantons *(EDK & SERI, 2020c)*. The new national core curricula are to contain minimum requirements for basic subject-related study skills in mathematics and in the language of instruction, as well as for transversal areas of instruction *(Swiss Confederation, 2022)*. The latter encompass transversal subjects such as political education and education for sustainable development or digitalisation, as well as transversal skills such as scientific propaedeutics.[2] Basic and transversal skills are both seen as important prerequisites for earning the baccalaureate certificate and therefore for achieving the ability to study and deeper social maturity.

Within the framework of the second project group, the minimum duration of baccalaureate schooling is to be set at four years. Until now, it has been possible for pupils to undertake just three years of baccalaureate schooling, provided they have completed preparatory baccalaureate schooling at lower-secondary level. The period of education to achieve the baccalaureate would continue to be 14 or 15 years *(EDK & SERI, 2021; Swiss Confederation, 2022)*.

The third project group examines – with regard to future requirements for the baccalaureate – whether it is necessary to review further stipulations of the MAR/MAV. This includes expanding the range of regular subject areas to include IT and economics and law, which have been defined as compulsory subjects until now *(Swiss Confederation, 2022)*. Cantons would also be free to offer philosophy and/or religion as regular subjects. Another proposal is to adapt the rules on passing the baccalaureate so that the baccalaureate examination carries greater weight.

The revised provisions of the MAR and MAV were presented to the cantons, organisations and other interested groups in summer 2022 as part of a consultation process. The definitive decisions will be made in the course of 2023 and could not therefore be taken into account in this report. The consultation for the review of the national core curricula will take place in 2023, with the corresponding decisions then expected in 2024.

2 The term scientific propaedeutics refers to the preparation for scientific work and thought.

Digitalisation in the baccalaureate school system

Digitalisation has meant that a basic knowledge of IT is essential for many study programmes. As the baccalaureate school is responsible for ensuring the general ability to study, it is fundamental that pupils be given a basic knowledge of IT during their baccalaureate schooling *(SSC, 2021)*. In 2018, the Federal Council and the EDK therefore decided to introduce IT as a compulsory subject. Corresponding amendments to the underlying legislation entered into force on 1 August 2018, making it compulsory to offer the subject from the 2022/23 school year onwards. According to a survey carried out in 2019, eight cantons had already introduced IT as a subject by that point in time *(Educa, 2021)*. Most of the remaining cantons followed suit in the 2021/22 school year, with a small number doing so in the 2022/23 school year. To meet the greater need for IT teaching staff as a result of the subject's being made compulsory, it is possible for teaching staff who have previously gained a teaching diploma for baccalaureate schools to subsequently earn the ability to teach this subject by acquiring a "supplementary diploma in IT" *(EDK, 2018c)*.

Assurance of exam-free access to the universities

In addition to the reform of the baccalaureate system, the EDK defined further projects in 2016 in order to ensure exam-free access to the universities with the baccalaureate in the long term *(EAER & EDK, 2019)*. One such project is known as "joint testing" and aims to define joint national requirements for assessing performance at baccalaureate schools. Since 2021, the project's implementation has been periodically reviewed by the Swiss Centre for Secondary Schools and for School Evaluations at Upper-Secondary Level (ZEM CES) *(ZEM CES, 2022)*. Another project aims to improve the transition from baccalaureate school to university. Here, the EDK reached an agreement with the Rectors' Conference of the Swiss Universities in 2019 with a view to facilitating the transition from baccalaureate school to further study *(EDK & swissuniversities, 2019)*. The aim is to make it easier to choose a course of study thanks to vocational, educational and career guidance. The ZEM CES carries out monitoring activities on behalf of the Swiss Conference of Secondary Education Authorities (SMAK) in order to verify the implementation of this counselling service in the cantons and their baccalaureate schools *(ZEM CES, 2019)*.

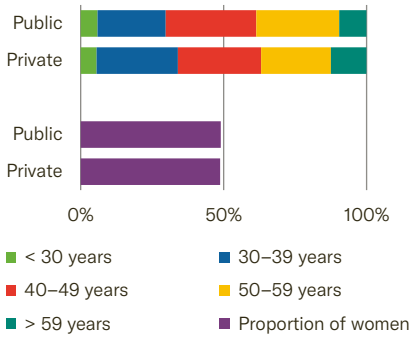
Teaching staff

We see from the age distribution of teaching staff delivering general education courses that a slightly higher proportion of younger teaching staff under the age of 40, as well as a slightly higher proportion of older teaching staff over the age of 59, teach in private schools than in public ones (→ figure 177). The gender ratio is balanced in both types of school. Over 40% of teaching staff at private schools have a degree of employment of less than 50% (→ figure 177). In public schools, this is true of a quarter of teaching staff. Only a small number of teachers have high degrees of employment of 90% or more. At public schools, approximately a further quarter of staff have

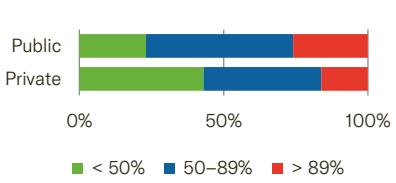
177 Teaching staff in public and private general education

Data: FSO

By age and gender, 2020/21



By degree of employment, 2020/21



General education is education at baccalaureate schools, upper-secondary specialised schools and other forms of general education schools. Upper-secondary specialised schools are often integrated into baccalaureate schools, and the teaching staff often work in both types of education. For this reason, statistical information on the teaching staff is shown jointly for all types of general education.

high degrees of employment, while this is true of one in six teachers at private schools. No detailed information is available on the qualifications of teaching staff in general education.

Effectiveness

Skills and selection for baccalaureate school

In order to assess the effectiveness of a baccalaureate school, it is in the first place important to know what cognitive abilities the pupils enter the baccalaureate school with in the first place. This can be analysed using data on the education pathway of pupils who completed the PISA test in 2012 (data from the Swiss Educational Attainment and Transition Study, SEATS). Based on the high level of academic requirements at baccalaureate schools, one might expect the pupils with the best performance at school in each canton to be those that transition to a baccalaureate school. However, both the average PISA point score and the baccalaureate rates differ between the cantons – and both of these factors contribute to the fact that the cognitive performance of pupils on entering baccalaureate school differs from one canton to another.

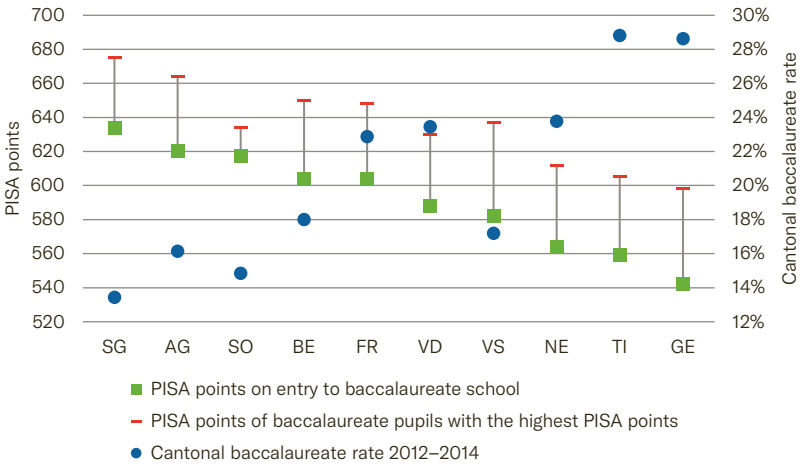
The differences between cantons raise the question of how well cantons exploit their performance potential with regard to the baccalaureate rate. The PISA points of baccalaureate pupils were therefore compared with the PISA points of the pupils who scored the highest points in the PISA test within the canton. The percentage share of the latter is determined by the cantonal baccalaureate rate. For example, if this rate is equal to 20% in a canton, the mean value is calculated for the 20% with the highest PISA scores. If the pupils with the highest PISA scores earn more PISA points than the baccalaureate pupils on average, then the performance potential has not been fully exploited. A comparison of the various cantons shows (→ figure 178) that this is the case in all cantons. However, the differences between baccalaureate pupils and the pupils with the highest PISA scores are no greater in the event of high baccalaureate rates than in the event of low ones. Nevertheless, the lower a canton's baccalaureate rate is, the higher the average PISA points. This is a consequence of the fact that, when baccalaureate rates are higher, less able pupils also transition to a baccalaureate school and earn a baccalaureate.

When it comes to assessing the effectiveness of a baccalaureate school, the key factors include not only the performance potential but also the proportion of pupils in the canton who are admitted to a baccalaureate school. A comparison of Canton St. Gallen and Geneva reveals that average performance at baccalaureate school is influenced by both of these factors. Even if the best pupils were admitted to baccalaureate school in both cantons in accordance with the baccalaureate rate, the performance of an average baccalaureate pupil would be 77 PISA points higher in Canton St. Gallen than in Geneva (→ figure 178). The reason for this is that the baccalaureate rate is more than twice as high in Canton Geneva as in Canton St. Gallen. On top of this difference come the different attainment levels of all pupils in the

178 Differences in the average PISA points between baccalaureate pupils and the pupils with the highest PISA points

PISA points in mathematics; pupils from the 2012 PISA cohort who entered baccalaureate school in 2012–2014; only cantons with a representative sample

Data: SEATS; calculations: SCCRE

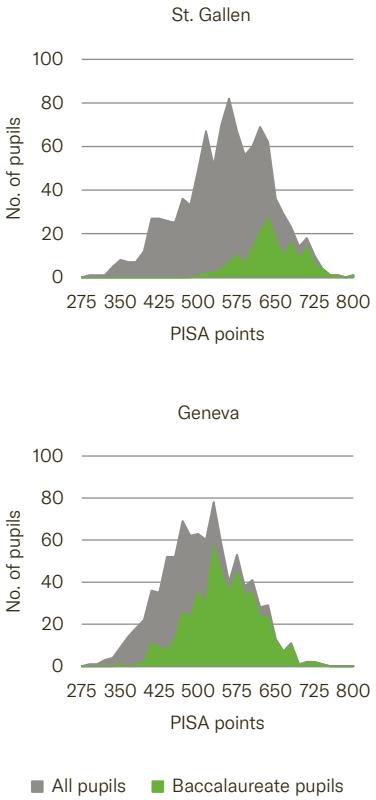


Legend
The pupils in Canton SG who entered baccalaureate school in 2012–2014 scored an average of 634 points in the PISA test. During the same period, the baccalaureate rate in Canton SG was 13.4% on average. If the canton had admitted the 13.4% of pupils with the most PISA points to baccalaureate school, the average PISA points of baccalaureate pupils would be 675. The grey line represents the difference between the two mean values, which is equal to 41 PISA points in Canton SG.

179 Distribution of baccalaureate pupils by PISA points in cantons St. Gallen and Geneva

PISA points in mathematics; pupils who entered baccalaureate school in 2012–2014 and all pupils from the 2012 PISA cohort

Data: SEATS; calculations: SCCRE



canton (→ figure 179), such that the actual performance difference between cantons St. Gallen and Geneva averages 92 PISA points on entry to baccalaureate school. For exam-free transition to the universities, however, one would expect similar performance at the end of baccalaureate school. The performance differences on entry to baccalaureate school would have to be offset either by very large differences in selection during baccalaureate schooling (drop-outs, repetitions or failure of the baccalaureate examination) or by differences in the performance of baccalaureate schools in terms of teaching academic skills. If this is not the case or if the measures are insufficient, the differences in skills will persist even on completion of baccalaureate schooling and may affect the graduation rate. Analyses based on the PISA cohorts of the year 2000 (TREE data) have already shown this to be the case *(SCCRE, 2018)*.

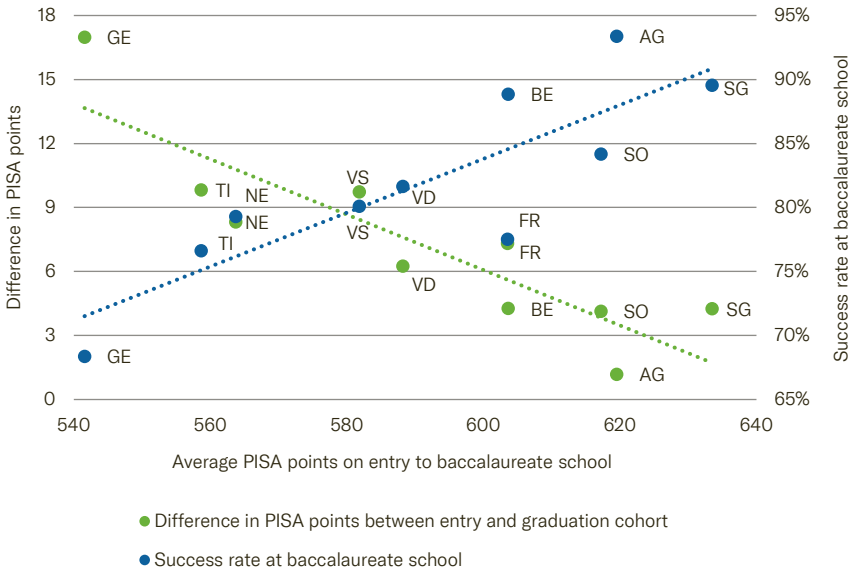
Cantonal selection and success at baccalaureate school

Part of the cantonal difference in performance between pupils entering baccalaureate school is offset by selection during baccalaureate schooling. This is clear from the fact that the higher the average PISA score of pupils entering baccalaureate school was, the higher the success rate of the baccalaureate pupils (→ figure 180). In order for the performance of baccalaureate students to converge, it must also be ensured that cantons with initially low average PISA scores selectively remove those pupils who initially perform badly. Evidence can also be found for this statement. The lower the average cantonal PISA score on entering baccalaureate school, the larger the difference in PISA points between entry and graduation cohorts.

180 Average PISA points for entry and graduation cohorts and baccalaureate success rate

PISA points in mathematics; pupils from the 2012 PISA cohort who entered baccalaureate school in 2012–2014

Data: SEATS; calculations: SCCRE



Legend
Pupils who entered baccalaureate school in Canton GE had scored an average of 542 points in the PISA test. On average, those of them who successfully completed baccalaureate school had performed 17 points better in the PISA test than the entry cohort, scoring an average of 559 points. 68% of those entering baccalaureate school in Canton GE earned a baccalaureate.

In other words, it is primarily those with insufficient performance who fail to complete baccalaureate school. On the other hand, in cantons with high average PISA scores on entering baccalaureate school, the PISA points of successful baccalaureate pupils are close to those of the entrants. Here, the failure to complete baccalaureate school appears to have less to do with insufficient performance at school and more to do with other factors, which could be personal in nature or simply down to chance. Despite this selection effect, however, there are still considerable differences in the graduation cohorts. Canton St. Gallen has the highest average PISA score in the graduation cohort, with 638 PISA points. Canton Geneva has the lowest figure, with the cohort graduating from baccalaureate school scoring an average of 559 PISA points. Assuming that the quality of baccalaureate schooling is of a similar level in all cantons, performance differences will therefore manifest at the time of the baccalaureate. This has already been demonstrated by evaluations as part of EVAMAR II *(Eberle et al., 2008)*.

Success at baccalaureate school during the COVID-19 pandemic

As a result of the COVID-19 pandemic, many cantons did not hold the written and oral baccalaureate examinations as normal in 2020. Some cantons held no examinations, whereas others held only parts of the examination (generally the written and not the oral parts). Examinations were only

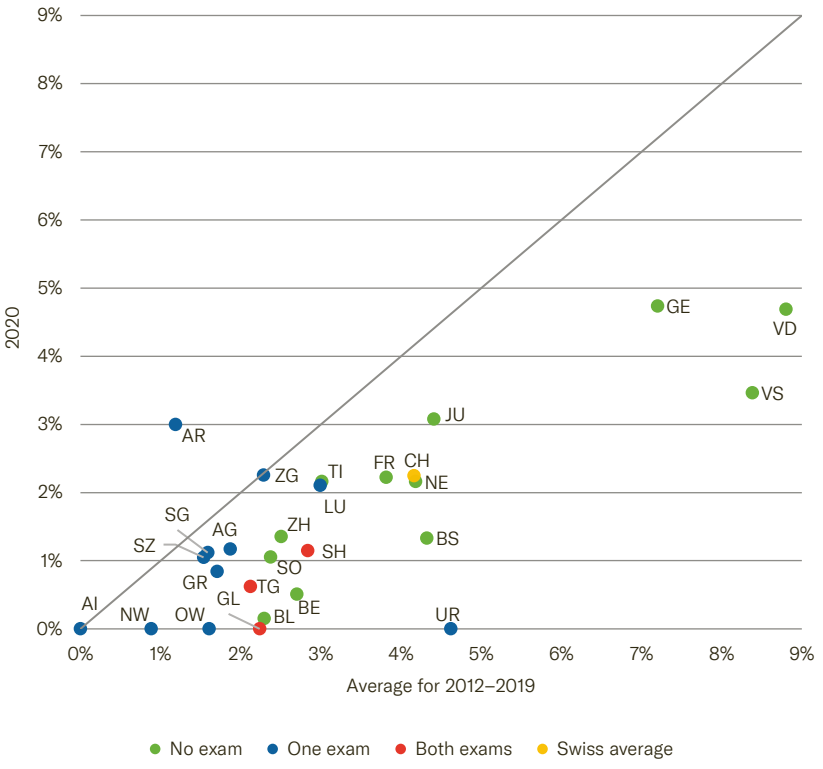
held as normal in three cantons (GL, SH and TG). 2% of baccalaureate candidates did not earn a baccalaureate certificate in 2020, which represents a halving of the failure rate compared with the mean values for the years 2012 to 2019. As the latter had practically always been at the same level in previous years, this reduction can be described as statistically significant.

Whereas failure rates have remained quite stable over the years as a national average, they have always been very different between the cantons (→ figure 181). In practically all cantons, however, the failure rate in 2020 was lower than in the years 2012–2019. There was no risk whatsoever of failing to earn a baccalaureate due to a failed examination in the exam-free cantons, but the success rates were higher than in previous years even in the cantons that held the examinations. However, even in the cantons where examinations were held, the success rates were higher than in previous years. In 2021, examinations were once again held as normal in all cantons, and the failure rates returned to normal levels (→ figure 182). Unlike in 2020, the failure rates in 2021 were higher than the long-term average in around half of the cantons. At the national level, the average rate was therefore of a similar level to that seen in the years before 2020.

181 Rates of unsuccessful baccalaureate students, 2020

And as an average for 2012–2019

Data: FSO; calculations: SCCRE



Baccalaureate grade, transition to universities and graduation

In terms of the ability to study, the question is to what extent performance at baccalaureate school influences the subsequent graduation rate. National-level data on the grades of baccalaureate students is not currently available. However, data for Canton Aargau *(Diem, 2021)* shows that the baccalaureate grade is linked with the chosen type of university, the time of transition, and success in the course of study. The higher the baccalaureate grades, the sooner the transition to a university occurs in the year of completing the baccalaureate (→ figure 183). With higher grades, the probability of not entering a university at all decreases. Baccalaureate students with higher grades are therefore also more likely to begin a course of study at a conventional university and less likely to begin one at a university of applied sciences or a university of teacher education (→ figure 184). If students have already achieved higher grades at baccalaureate school, they have a higher probability of earning a Bachelor's degree within six years of beginning their studies – be it at a university in general or specifically at a conventional university. The fact that good grades more often lead to a direct transition to a university as well as to a transition to a conventional university doesn't necessarily mean that baccalaureate students with good grades are better prepared for a course of study. It may also be the case that grades affect baccalaureate students' expectations. However, the correlation between baccalaureate grades and graduation rate suggests that the grades contain relevant information regarding the ability to study. Nevertheless, it is important to emphasise that this is a correlation and not a causal relationship. This is because the grades could also correlate with factors that are non-cognitive in nature (e.g. perseverance) and that are also decisive in determining the graduation rate *(Karlen et al., 2018)*.

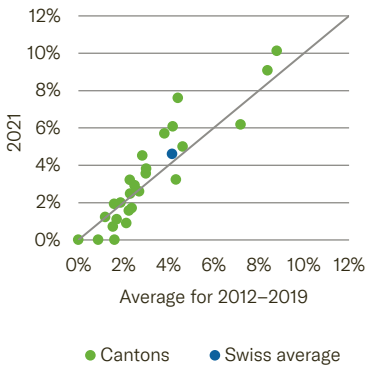
Influence of individual baccalaureate schools on graduation rate

Data from Canton Zurich shows that the graduation rate of baccalaureate pupils varies between 63 and 85% depending on the baccalaureate school *(Gerhard & Bayard, 2020)*. This wide variance raises the question of whether the graduation rate might not also be an indicator of the quality of education at baccalaureate schools. Based on this assumption, there have been calls by politicians at the national level to publish the graduation rate of baccalaureate pupils by baccalaureate school *(The Swiss Parliament, 2016)*. The corresponding legislative proposal was ultimately rejected on the grounds that the quality of baccalaureate schools cannot be assessed solely based on the graduation rate. Indeed, studies have found *(Diem, 2019, 2021; Gerhard & Bayard, 2020)* that the graduation rate depends on factors that can barely be influenced by baccalaureate schools: these include, for example, the chosen baccalaureate profile, the chosen type of university (UNI, UAS or UTE) and the field of study chosen at that institution, as well as other factors such as the age of baccalaureate pupils or their parents' level of education. In a nationwide comparison, this would be compounded by the fact that the very different cantonal baccalaureate rates are influenced by politics. This means that – depending on the transition rate to baccalaureate schools – baccalaureate schools are required to educate pupils with different levels of prior attainment. A comparison based

182 Rates of unsuccessful baccalaureate students, 2021

And as an average for 2012–2019

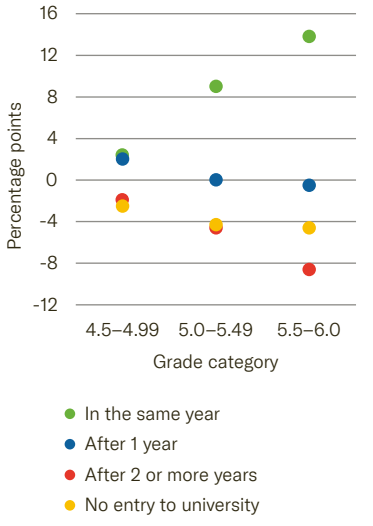
Data: FSO; calculations: SCCRE



183 Times of transition to the universities by grade category

Estimated probabilities (difference with respect to baccalaureate grades between 4.0 and 4.49); 2013–2018 graduation cohorts from baccalaureate schools

Data: Canton Aargau, FSO (LABB); calculations: SCCRE

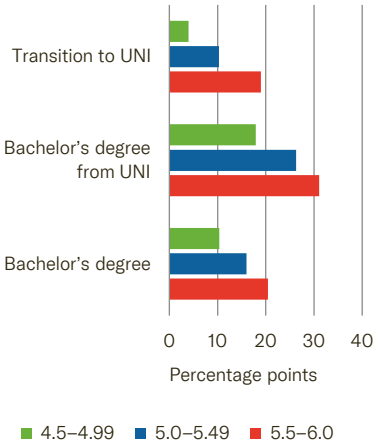


Legend
Pupils with baccalaureate grades between 4.5 and 4.99 are 2.5 percentage points less likely not to begin a course of study at a university than those with baccalaureate grades between 4.0 and 4.49 (reference category).

184 Transition to conventional universities and graduation rate by grade category

Estimated probabilities (difference with respect to baccalaureate grades between 4.0 and 4.49); samples: 2013–2018 graduation cohorts from baccalaureate schools (transition to UNI) and 2010–2014 entry cohorts to UNIs (Bachelor's degrees)

Data: Canton Aargau, FSO (LABB); calculations: SCCRE



on the subsequent graduation rate would therefore only be permissible if baccalaureate schools were free to correct high transition rates to baccalaureate school through stronger selection. The finding that pupils completing long baccalaureate cycles also have a higher graduation rate than those completing short baccalaureate cycles *(Gerhard & Bayard, 2020)* is probably more of an indication that selection effects at the time of entry to baccalaureate school influence the graduation rate just as much as the skills acquired at a baccalaureate school.

Efficiency/costs

As with any stage of education, it is difficult to assess efficiency at baccalaureate schools *(Wolter et al., 2020)* – with the added complication that there are no nationally comparable skill measurements either during or at the end of this period of education, i.e. there is a lack of output measurements for this type of education. The only exception was the evaluation as part of EVAMAR II, which was carried out on a one-off basis in 2007 based on a sample; this would not therefore have allowed all baccalaureate schools to be compared. Given the stark differences both between cantons and between individual schools at the time of entry to baccalaureate school, a reliable efficiency analysis is only possible if it also takes account of the skills at that point in time. The PISA surveys carried out at the end of compulsory schooling are, in principle, suitable for this task, but there is also a lack of such data for all cantons or schools at the nationwide level. As already remarked upon in the section on effectiveness, not only the output measurements for the baccalaureate schools but also the measurements of academic success – that is, outcomes – are limited in term of their availability and scope of interpretation. As in all previous editions of the Education Report, the focus is therefore placed on the input side.

Education spending and pupil-teacher ratio

Education spending differs widely between the cantons in a manner similar to that at other stages of education. The reasons for this include the duration and intensity of education, with the latter referring to the number of lessons for baccalaureate pupils relative to the number of lessons for teaching staff in a full-time position. Other influencing factors include the different pupil-teacher ratios and the salary level of teaching staff at baccalaureate schools. The pupil-teacher ratios explain around 40% of the cantonal differences in spending on teaching staff per pupil (→ figure 185). Higher costs due to lower pupil-teacher ratios can improve performance and should not therefore be equated with a decrease in efficiency. However, there is no empirical proof of such a relationship in Switzerland. At the international level, too, studies tend to point to limited increases in effectiveness with lower pupil-teacher ratios *(Filges et al., 2018)*.

Entry to baccalaureate school

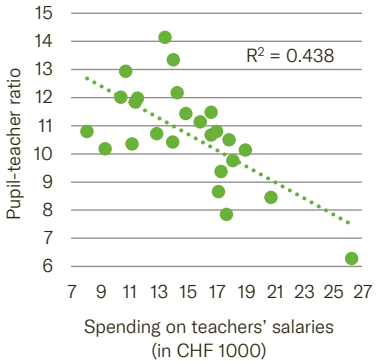
Although it is not possible to analyse the efficiency of baccalaureate schooling, it is still possible to analyse aspects that may point to inefficiencies. One such aspect is the number of repetitions and drop-outs at baccalaureate schools, which lead to inefficiencies at the systemic level as they entail higher spending on education. However, they also result in inefficiencies for those affected – unless the resulting extension of their period of education can be offset by a better educational outcome. This would be the case, for example, if the extended period of education at a baccalaureate school due to a repetition led to an improved educational output or outcome, thanks to the baccalaureate, than if the pupil were to embark on a different education route because of the risk of repetition.

For the first time, individual data from education statistics (LABB data) from the Federal Statistical Office (FSO) now allows deeper insights into the education paths of baccalaureate pupils at the national level. It is now therefore possible to answer the question of whether educational qualifications are earned directly or whether detours are required. Only some 80% of pupils transition seamlessly to a baccalaureate school (→ figure 186). One in five pupils enters baccalaureate school after repeating a year of compulsory schooling, after completing a bridge-year course, after a gap year, or after beginning or completing another form of education at upper-secondary level. The proportion of pupils who needed additional school years to enter baccalaureate school at all is small in comparison with the corresponding proportion for professional education and upper-secondary specialised schools. The efficiency of the transition to a baccalaureate school is therefore relatively high. In addition, the delayed transitions to baccalaureate schools do not lead to further inefficiencies, as the likelihood of success does not differ considerably between direct and delayed entry. This is clear from the fact that the proportion of direct entry is similar among both the entry and graduation cohorts.

185 Spending on teachers' salaries per pupil and pupil-teacher ratios at general education schools

Spending by the cantons and their communities in 2019 (including pupils in preparatory classes for baccalaureate study); pupil-teacher ratios at public schools (average for school years 2019/20 and 2020/21)

Data: FSO, EFV; calculations: SCCRE



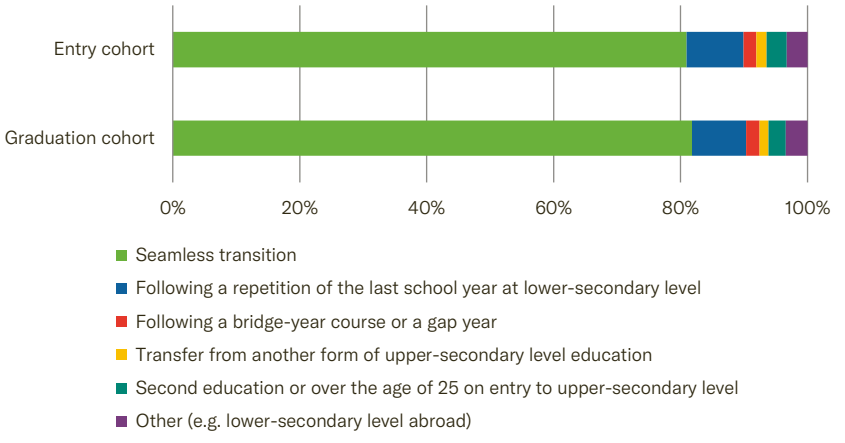
The **pupil-teacher ratio** is the number of pupils per full-time equivalent in the teaching staff. Lower pupil-teacher ratios are therefore associated with smaller class sizes.

Canton SO is missing from this chart because the pupil-teacher ratio is not available for this canton.

186 Education path of entry and graduation cohorts

Pupils who transitioned to a baccalaureate school in the school year 2020/21 (entry cohort) and those who completed baccalaureate school in summer 2021 (graduation cohort)

Data: FSO (LABB); calculations: SCCRE



Repetition and premature exit from baccalaureate school

If we now look back at the education paths during baccalaureate schooling, it is clear that less than three quarters of pupils complete baccalaureate school by a direct route. 17% of pupils repeat a year during the course of their baccalaureate schooling, of whom more than two thirds nevertheless go on to complete baccalaureate school successfully. 14% of pupils do not complete baccalaureate school, of whom just over a third have previously repeated a year. An analysis using data from the 2012 PISA cohort (SEATS data) reveals that lower skill levels[3] on entry to baccalaureate school are correlated with a greater risk of repetition or drop-out. This finding suggests that at least some of the repetitions and drop-outs could have been avoided by better selection at the time of entry to baccalaureate school, which would equate to an increase in efficiency. In addition to individual performance, this is also explained by the cantonal transition rate to a baccalaureate school. A larger cantonal proportion of pupils who transition to a baccalaureate school is accompanied by higher probabilities of drop-out and repetition (→ figure 187). Only about half of the influence of cantonal transition rates is accounted for by the differences in young people's performance. This means that a large part of the higher probability of repetition and drop-out in cantons with high transition rates cannot be explained by the admission of insufficiently prepared pupils, and that other explanations are needed. One explanation may be that PISA scores are a good, but not a complete measure of all the skills that are important for success at baccalaureate school. This is exemplified by foreign language skills. Furthermore, although PISA points provide a snapshot of the skills shortly before the transition to upper-secondary level and are therefore also an indication of further performance development, they are not capable of reflecting all of the processes that occur during baccalaureate schooling. Ultimately, the question is whether the higher repetition and drop-out rates are not the direct result of low or high transition rates – in other words, whether this is a self-fulfilling prophecy. In cantons with low transition rates, stricter selection on entry to baccalaureate school can lead to less-strict selection during baccalaureate schooling. Conversely, in cantons with higher transition rates, it can lead to stronger selection – which can also affect pupils who actually arrived with a good foundation for baccalaureate schooling but did not withstand the pressure of selection. As highlighted earlier in this chapter, the performance differences on entry to baccalaureate school are at least partly offset by differences in the strictness of selection *(→ Cantonal selection and success at baccalaureate school, page 166)*.

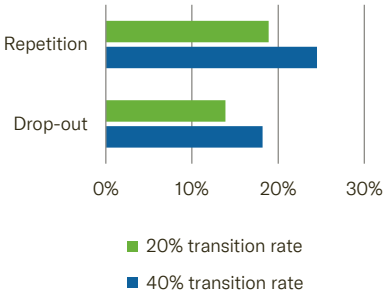
Just as important as the performance itself is the means by which it was achieved. If, within a group of pupils with comparable performance, those who received tutoring at lower-secondary level are compared with those who did not, it is clear that the latter achieve greater success at baccalaureate school (→ figure 188). One possible explanation for this is that pupils who only achieved the performance demonstrated in the PISA test with the help of tutoring were already closer to the limits of their performance than fellow pupils who performed comparably without receiving tutoring. However, there are also other conceivable explanations for this disparity *(Zumbühl et al., 2022)*.

3 PISA points in mathematics and reading (language of instruction) were considered in order to measure skills.

187 Repetitions and drop-outs at baccalaureate schools with transition rates of 20 and 40%

Estimated probabilities, taking account of PISA points in mathematics and reading, gender, socio-economic status, migration background and other control variables; pupils from the 2012 PISA cohort who entered baccalaureate school in 2012–2014

Data: SEATS; calculations: SCCRE

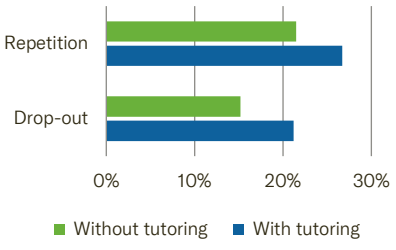


The 20 and 40% rates of transition to a baccalaureate school correspond to the first and third quartiles of the cantonal distribution. A quarter of cantons have a transition rate of less than 20%, and a further quarter have a rate exceeding 40%.

188 Repetitions and drop-outs of pupils with and without tutoring

Estimated probabilities, taking account of PISA points in mathematics and reading, gender, socio-economic status, migration background and other control variables; pupils from the 2012 PISA cohort who entered baccalaureate school in 2012–2014

Data: SEATS; calculations: SCCRE



Equity

When it comes to the concept of equity, the question is essentially as follows: do pupils with the same performance at school have the same opportunities regardless of their socio-demographic and socio-economic background, gender and place of residence? Specifically, in the case of baccalaureate schools, the question is whether the probability of entering baccalaureate school and completing it successfully depends only on performance or also on the above factors. If disparities are identified, then they are to be interpreted as equity problems, especially when they are conditioned by the system and its participants (e.g., the teaching staff) and not by differences in pupils' or parents' preferences. For Switzerland, there are indications that preferences for baccalaureate school vary depending on language region, gender and socio-economic background *(Cattaneo & Wolter, 2022)*. These different preferences are likely to have an impact on whether pupils opt for baccalaureate school at all.

Cantonal disparities for pupils with the same performance

The cantonal disparities in transition rates to a baccalaureate school and in baccalaureate rates could constitute an equity problem if the probability of entering a baccalaureate school or earning a baccalaureate depends on the canton of residence. However, a simple comparison of the transition and baccalaureate rates between the cantons does not provide sufficient evidence that opportunities are unevenly distributed, as it does not take account of performance at school. A comparison of cantons St. Gallen and Geneva shows that inequalities exist even when performance is taken into account. For individuals who achieved an average score in the PISA mathematics test, the probability of transitioning to a baccalaureate school is significantly higher in Canton Geneva than in Canton St. Gallen (→ figure 189).

189 Probability of entering baccalaureate school and completing it successfully with comparable performance

Pupils who scored between 480 and 580 PISA points in mathematics and entered baccalaureate school in 2012–2014; the mean score for all pupils in Switzerland is 531 PISA points

Data: SEATS; calculations: SCCRE

Canton	Probability of entry	Proportion in relation to all entrants	Success rate	Success rate of all baccalaureate pupils
St. Gallen	3%	16%	74%	91%
Geneva	29%	54%	72%	71%

Over half of pupils from Canton Geneva who transition to a baccalaureate school achieved an average score in the PISA test. In Canton St. Gallen, on the other hand, this figure is just under a sixth. These pupils, who

originally exhibited similar capabilities, have an equal probability of successfully completing baccalaureate school in both cantons. This suggests that the pupils are subject to similar benchmarks when moving up into the next class and when completing baccalaureate schooling. Baccalaureate pupils whose performance is around the Swiss average are some of the worst-performing pupils in Canton St. Gallen, whereas in Canton Geneva they are in the mid-range. Accordingly, the success rate of this group in St. Gallen is lower than the success rate of all baccalaureate pupils, whereas the two rates are similar in Canton Geneva.

Equality of opportunity in terms of education path and success

The probabilities of success at baccalaureate school vary depending on gender, socio-economic status and migration background. Without information on performance at school, however, it is impossible to say whether the different education paths are linked to these characteristics or whether the difference is not instead caused by performance differences within the stated groups. From the PISA points, it's clear that the differences in the probability of success between these groups are partly down to differences in performance. Women have a significantly lower probability of dropping out of baccalaureate school or having to repeat a year than men (→ figure 190). This disparity persists even when performance differences are controlled for and is therefore most likely due to behavioural differences during the period of baccalaureate schooling.

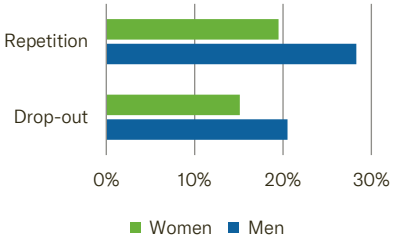
When it comes to the influence of socio-economic status on education path, there are also differences that cannot be explained by observable performance differences at the start of baccalaureate schooling. The probability of repetition does not differ between individuals with high and low socio-economic status, even when performance differences are taken into account. However, even when performance differences are taken into account, the two groups differ in terms of their risk of dropping out (→ figure 191). In the absence of empirical analyses, explanations for these two findings would be merely speculative in nature.

Baccalaureate pupils with a migration background are at significantly higher risk of repeating school years or dropping out of baccalaureate school without a baccalaureate when compared with those without a migration background. However, these differences can be almost completely explained by weaker performance at the start of baccalaureate school. Once this performance, as reflected by the PISA score, is taken into account, the differences diminish to such an extent that no statistically significant difference can be observed between baccalaureate pupils with and without a migration background.

190 Repetitions and drop-outs by gender

Estimated probabilities, taking account of PISA points in mathematics and reading, socio-economic status, migration background and other control variables; pupils from the 2012 PISA cohort who entered baccalaureate school in 2012–2014

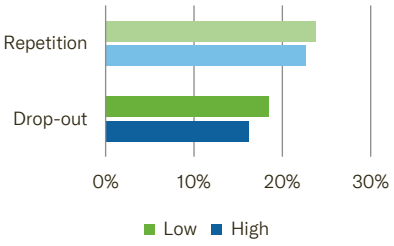
Data: SEATS; calculations: SCCRE



191 Repetitions and drop-outs by socio-economic status

Estimated probabilities, taking account of PISA points in mathematics and reading, gender, migration background and other control variables; pupils from the 2012 PISA cohort who entered baccalaureate school in 2012–2014

Data: SEATS; calculations: SCCRE



The "low" and "high" categories include pupils whose parents are among the 25% with the lowest and the 25% with the highest socio-economic status. Matt colours indicate statistically insignificant effects (5% significance level).

Gender and choice of STEM special subjects

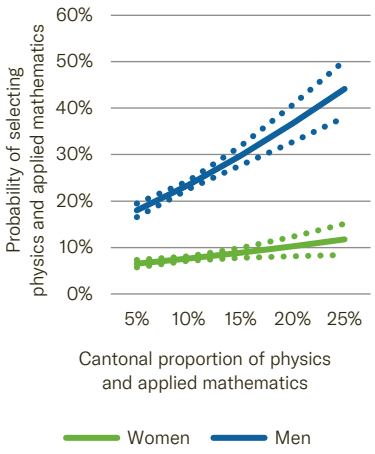
As previously shown, the proportions of special subjects vary strongly between the cantons (→ figure 176). The differences in the subjects on offer in the various cantons may also influence the proportions of men and women in the various special subjects. This would not constitute an equity issue if these differences were solely due to differences between the preferences of pupils in the various cantons. However, if the choice of a special subject is partly determined by the range of subjects offered in the canton and if pupils' preferences in turn influence the choice of study and their future career path, then this is indeed a question of equity. Various evidence suggests that the choice of special subject is influenced by the range of subjects offered *(→ Subjects offered and special subjects, page 161)*. The choice of special subject also influences the chosen course of study *(Oepke, 2017)*, as shown in previous editions of the Education Report. This relationship is also confirmed by the latest education progress data (LABB data). In other words, a larger cantonal proportion of STEM subjects leads to a higher probability that pupils will subsequently choose a STEM subject as their field of study *(SCCRE, 2018)*. Lastly, labour market data shows that subject choice is correlated with expected salaries and employment prospects. Of particular relevance to the question of equity is whether the special subjects offered by the canton for baccalaureate pupils has a different impact on women and men.

A pronounced gender effect is not seen for the special subject "Biology and chemistry", but the opposite is true for the special subject "Physics and applied mathematics". The more frequently this special subject is offered in a canton, the more often it is selected by men, leading to a greater gender difference (→ figure 192). This is an indication that the range of special subjects offered doesn't simply have a general impact on subject choice – as shown here using gender as an example – but rather that it affects different groups differently. If a canton adopts measures so that more baccalaureate pupils choose physics and applied mathematics as their special subject, this may well help to reduce the shortage of skilled workers in the STEM professions – but may potentially come at the price of even greater gender segregation.

192 Choice of physics and applied mathematics as the special subject

Estimated probabilities by gender and cantonal proportion of special subject; pupils who completed compulsory education in summer 2018 and entered baccalaureate school no later than 2020

Data: FSO (LABB); calculations: SCCRE

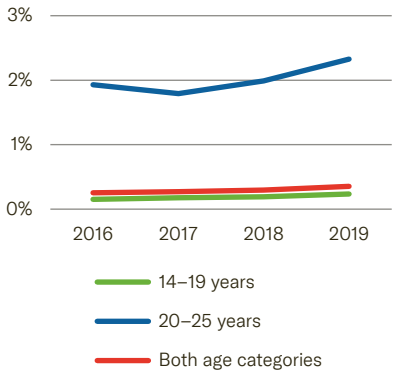


The dotted lines represent the 95% confidence interval.

193 Pupils at general education schools who receive benefits from disability insurance

Proportion in relation to all pupils at general education schools by age category

Data: *Kronenberg (2021)*, FSO; calculations: CSRE



Pupils with disabilities

In accordance with the Disability Discrimination Act (BehiG) 2004, the integration of people with disabilities into compulsory education is to be promoted *(Kronenberg, 2021)*. Figures from the Federal Social Insurance Office (FSIO) show that although the proportion of pupils at general education schools who have received benefits from disability insurance in connection with school education is low overall, the proportion rose between 2016 and 2019 (→ figure 193). This figure is particularly high in the group of pupils between the ages of 20 and 25. It may be that pupils with disabilities suffer from delays in their education more often, for example as a result of starting school later, repeating years, or temporary departures from the education system. This hypothesis is impossible to verify given the absence of corresponding statistical data.

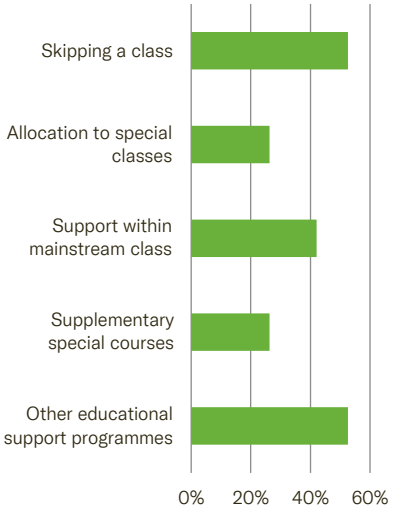
A survey[4] by the Intercantonal University for Special Needs Education in Zurich and Lucerne University of Applied Sciences and Arts shows that dyslexia is the most common disability at general education schools, affecting 6.4% of pupils *(Schellenberg et al., 2020)*. This is followed by mental disorders (5.2%), visual impairments (4.9%), physical disabilities (4.4%) and ADHD (3.2%). These disabilities are also reflected in performance at school. On average, pupils with learning difficulties or mental disorders achieve lower grades than pupils without a disability. This relationship is not apparent for physical disabilities. Common access arrangements include extra time in exams, changes to the type of examination (e.g. oral instead of written) or technical assistance (e.g. spellchecking programs). There are still no studies into the effectiveness of compensatory measures.

Assistance for particularly gifted individuals

In addition to pupils with disabilities, assistance is also to be given to those with special abilities. In terms of exceptional talent, there are not known to be any scientific studies relating to general education schools or baccalaureate schools. Cantonal support programmes include the option to skip a class, individual support within a mainstream class, special courses that supplement the teaching in mainstream classes, and allocation to special classes (→ figure 194). In many cases, the cantons also offer other educational support programmes, including special support programmes in the areas of sport and music, bilingual baccalaureate courses, and the university program for baccalaureate pupils, which allows baccalaureate pupils to attend individual courses at universities. In seven cantons, no specific rules exist regarding assistance for particularly gifted individuals.

194 Cantonal rules on assistance for particularly gifted individuals, 2021/22

Data: EDK-IDES cantonal survey



Legend
Of the 19 cantons with rules on assistance for particularly gifted individuals, ten (i.e. 53%) of them offer the possibility of skipping a class.

4 A survey was carried out for a selective sample in which classes were selected that had at least one young person in receipt of compensatory measures.

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

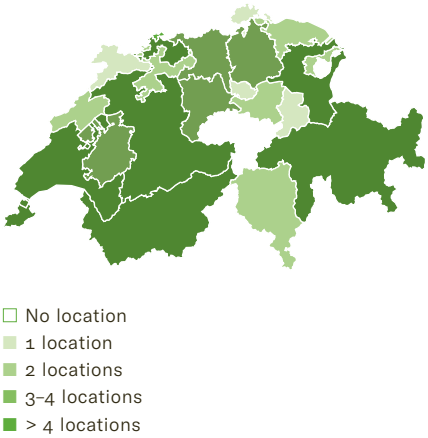
TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION
AND TRAINING

UPPER-SECONDARY SPECIALISED SCHOOL

195 Number of FMS locations by canton, 2022

Data: EDK

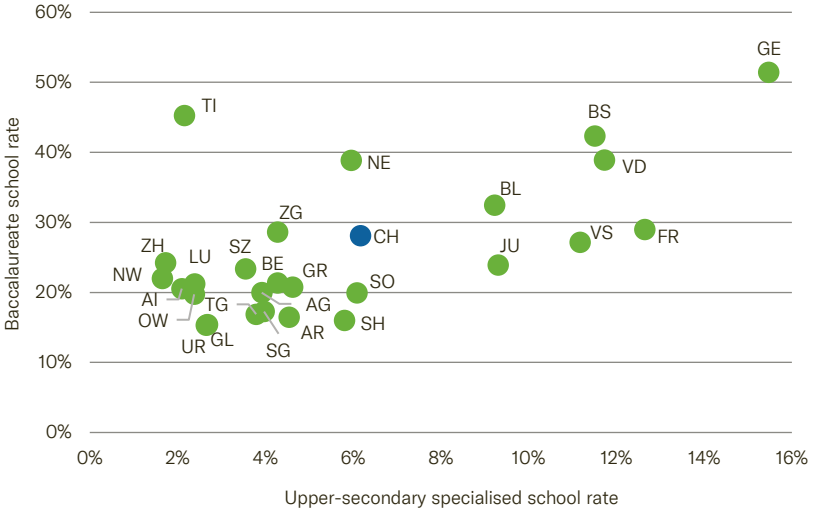


Like baccalaureate schools, specialised schools (FMS) are part of the general secondary schooling system at upper-secondary level. Around 20 years ago, they emerged from the former diploma middle schools[1]. Today, the specialised schools offer a high proportion of general education, as well as a wide range of in-depth occupational field-related training. In particular, they are feeder schools for tertiary education in the areas of health and social sciences as well as for universities of teacher education. Students are admitted once they have completed compulsory education. Graduation with the specialised school diploma after three years affords access to higher education. After an additional year the special baccalaureate may be obtained, which affords access to universities of teacher education and to occupational field-specific study programmes at the universities of applied sciences. The significance of the specialised schools in the education landscape varies greatly from one canton to another. The reasons for this can be found in both the supply (→ figure 195) as well as in the demand; the drivers for the differences between the cantons remain unclear. Not least, the various demands in the cantons reflect the different preferences of the pupil body and their parents for a general education. The various different education and training programmes are often based on traditions or politics. Accordingly, the specialised school ratios vary between values of around 2% (Zurich) up to 16% (Geneva) (→ figure 196).

196 Transition to a FMS or a baccalaureate school, by canton

Average values for the graduates of the compulsory school system (2017–2019); FMS or a baccalaureate school as initial education; by school canton

Data: FSO (LABB); calculations: SCCRE



1 The Federal Act on Vocational and Professional Education and Training [VPETA] from 2002 requires a name change of the diploma middle schools (only tertiary degrees are designated as diplomas). The assumption of responsibility for professional education and training in the areas of health, social studies and art by the Swiss Confederation called for a change in the training concept of the former diploma middle schools. The SNSF project *Fachmittelschulen* (Upper-secondary specialised schools) examined this transformation process and the associated issues of legitimacy, image and implementation from a sociological-political perspective *(Leemann et al., 2019)*.

In cantons with high baccalaureate rates, the specialised baccalaureate rates are also usually high and vice versa. In none of the cantons do the specialised schools have a compensatory function for a low academic baccalaureate rate. There are, however, a few cantons which have a low prevalence of specialised schools, despite an above-average baccalaureate rate.

Pupils at specialised schools

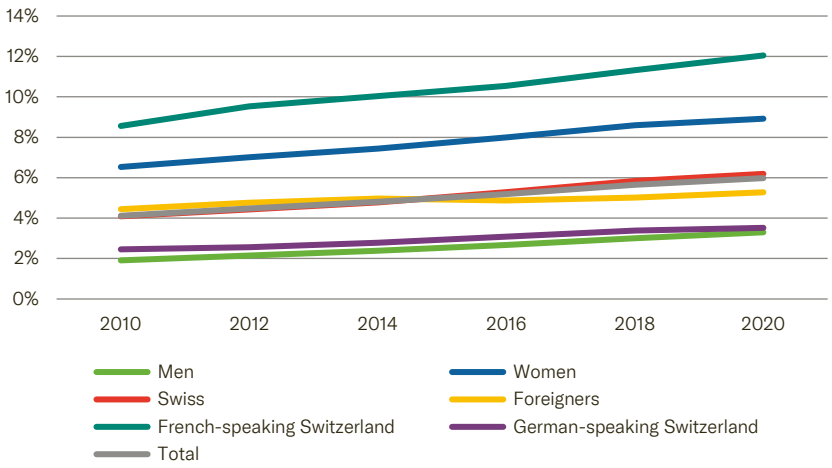
Around 6% of all pupils at upper-secondary level attend a specialised school. This share was 4% in 2010 and has grown continuously since (→ figure 197). Between 2010 and 2015, the offerings in the cantons, in particular in the area of the specialised baccalaureates, was further expanded. In French-speaking Switzerland, the proportion of pupils who attend a specialised school is still considerably higher than in the rest of Switzerland. The preference established there for training at full-time vocational schools at upper-secondary level also reflects the pupil numbers at the baccalaureate schools and at schools which offer a full-time school VET programme *(→ chapter Upper-secondary education, page 111; → chapter Baccalaureate schools, page 155)*.

FSO forecasts up to 2029
In view of the increase in numbers of pupils at lower-secondary level, rising pupil numbers can also be expected in the FMS. The Federal Statistical Office forecasts an increase of 30% by 2029 for the FMS *(FSO, 2021k)*.

197 Proportion of pupils at upper-secondary level

FMS pupils and graduates with a specialised baccalaureate considered; average values of two school years shown (for 2020 only the school year 2020/21 is available)

Data: FSO; calculations: SCCRE



Legend
In 2020, 9% of all women in the upper-secondary level attended a FMS.
In the same year, 3% of all men in the upper-secondary level attended a FMS.

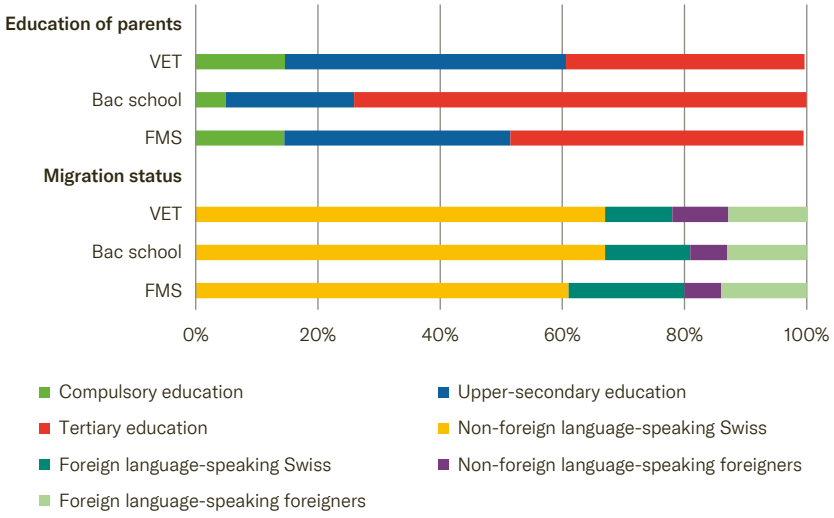
In Canton Ticino, only 2% of pupils attended a specialised school in 2020. At the specialised schools, the proportion of women was 70%, around 5 percentage points lower than five years previously. In recent years, foreign nationals were slightly overrepresented at the specialised schools in terms of their proportion of the entire student body at upper-secondary level. According to current figures (2020/21) the proportion of foreign nationals at the specialised schools is 21%; somewhat lower than the proportion of this group in the entire pupil body of the upper-secondary level (24%).

If one considers the student body of the specialised schools according to the educational background of their parents, it can be seen that 52% of the pupils have parents without a tertiary educational qualification (→ figure 198). Compared to baccalaureate schools, this proportion is twice as high. Accordingly, the specialised schools are more likely to offer an upper secondary general education to young people from less educated families. The educational background of young people in vocational education and training hardly differs, on the other hand, from that of pupils in the specialised schools. The proportion of non-foreign language Swiss nationals is somewhat lower here at 61% in comparison with the other two education types of the upper-secondary level and the proportion of foreign language Swiss nationals is highest (19%). Based on the naturalisation figures of young people, the majority of the latter are likely to be naturalised foreigners of the first migration generation *(→ chapter Lower-secondary education, page 83; → chapter Baccalaureate schools, page 155)*.

198 Composition of student body at Sec II by education type

Average values of the years 2019 and 2020 shown; without graduates with a specialised and vocational baccalaureate

Data: FSO (LABB); calculations: SCCRE



Taking into account the performance and other individual characteristics, the preference of young people with a migration background whose parents do not have a tertiary education is confirmed for education at a specialised school. It has already been shown in previous research that foreign nationals prefer education at a general education school *(Abrassart et al., 2020)*. The probability of continuing education after compulsory schooling at a specialised school is the highest for young Swiss nationals born abroad (usually naturalised persons) and whose parents do not have tertiary education, at 10%. For comparable young people without a migration background (Swiss nationals who were born in Switzerland and whose parents are likewise not educated at tertiary level) the value is considerably lower at around 6% with the same performance (→ figure 199).

COVID-19 pandemic and admissions to the specialised school

The transition from compulsory education to upper-secondary level took place under special conditions for young people during the COVID-19 pandemic. However, altogether no major changes can be observed. The transition rate was 6.6% in the school year 2020/21. This is in line with the general upward trend, which could be observed over the last decade even without the pandemic. In around half of the cantons, access conditions were eased due to the pandemic (Basel Landschaft, Basel City, Bern, Fribourg, Geneva, Jura, Neuchâtel, Obwalden, Solothurn, Uri, Vaud, Valais and Zurich). However, the stronger growth rate in some cantons cannot be attributed to this.

Education and training programme at specialised schools

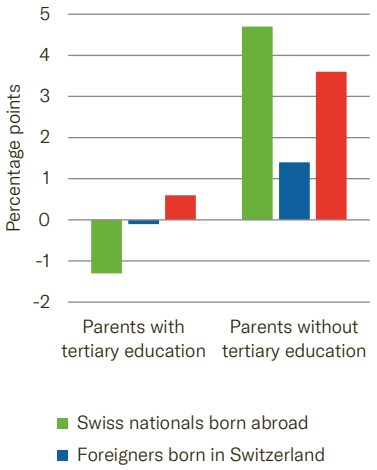
22 cantons in Switzerland have specialised schools. They are mainly attached to baccalaureate schools[2]. Education is offered in six different occupational fields and sometimes also combined (such as health/social work). However, not all cantons cover all occupational fields (→ figure 200). In 2018, the Swiss Conference of Cantonal Ministers of Education (EDK) revised the recognition rules and the core syllabus and thus took into account the further development of the specialised schools. Now, at least 50% of the teaching must be devoted to general education and at least 20% to the occupational field-related education. In addition, the occupational field health/natural sciences has been introduced as a variant of the occupational field health *(EDK, 2018a, 2018b)*.

The distribution of the student body over the occupational fields shows that the specialised schools have focused on training and education in the areas of health, pedagogy and social sciences. In 18 of the 22 cantons, over 80% of pupils completed specialised school in the occupational fields health, pedagogy or social work (→ figure 201). The low proportion of pedagogy in Canton Bern is striking. The occupational field of pedagogy was until recently only offered in the French-speaking part of the canton.

199 Probability of attending a FMS

Difference from the probability of Swiss nationals (born in Switzerland) to attend a FMS; controlled for PISA-performance and other socio-demographic characteristics; only direct transitions considered

Data: SEATS; calculations: SCCRE



200 FMS offers of the cantons by occupational field, 2022

Cantons Appenzell, Innerrhoden, Nidwalden, Obwalden and Uri do not have any FMS; sports is not a nationally recognised occupational field in Switzerland.

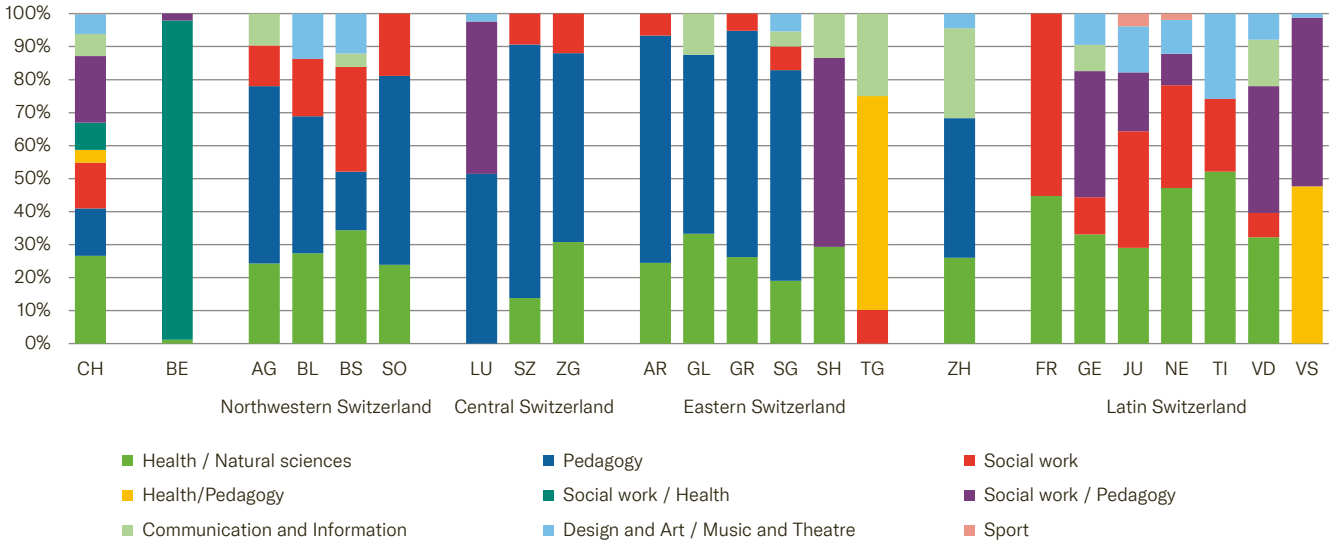
Health/Natural sciences	All 22 cantons
Pedagogy	21 cantons without TI
Social work	21 cantons without GL
Communication and Information	AG, BS, GE, GL, SH, TG, VD, ZH
Design and Art	AG, BL, BS, GE, JU, SG, VD
Music and Theatre	BS, GE, JU, LU, SG, TI, VD, ZH
Sport	JU

2 The expenditure on education is reported for the general education schools as a whole, which is why no separate information can be provided on the costs of the upper-secondary specialised schools. The expenditure for the pupils corresponds to the information for the baccalaureate schools *(→ chapter Baccalaureate schools, page 155)*.

201 Pupils at FMS by occupational field and by canton, 2020/21

Without pupils in the basic year, without specialised baccalaureate graduates; the occupational fields design and art as well as music and theatre have been combined here.

Data: FSO; calculations: SCCRE



Admission requirements and entrance skills

Despite considerable differences between the admission procedures in the cantons and the admission procedures between the two general education types at upper-secondary level within the cantons *(→ chapter Baccalaureate schools, page 155)* these can be split up into three broad categories (→ figure 202). Sometimes participation in the expanded requirement profile at lower-secondary level is a condition. In addition, the minimum value of the preliminary mark and the way in which this is taken into account also differ. Based on the legal principles, it can in general be established that the requirement for the baccalaureate school is higher than that of the specialised school *(EDK, 2022)*.

202 Admissions procedure for baccalaureate schools and FMS, by canton

Cantons Appenzell Innerrhoden, Nidwalden, Obwalden and Uri do not have any FMS

Data: *EDK-IDES (2022)*

	Bac school	**FMS**
Normally not subject to an entrance exam	BL, GE, JU, LU, NE, VD	BL, GE, JU, NE, VD
Entrance exam, if the conditions an entrance without examination are not met	AG, BE, BS, FR, SO, TI, VS, ZG	AG, BE, BS, FR, SO, TI, VS, ZG
Normally subject to an entrance exam	AR, GL, GR, SG, SH, SZ, TG, ZH	AR, GL, GR, LU, SG, SH, SZ, TG, ZH

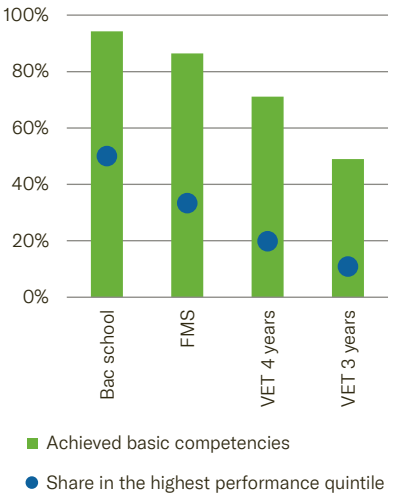
The verification of the attainment of the basic competencies (ÜGK) at the end of compulsory education of the year 2016 enables the presentation of the pupils' entry level competencies in the area of Mathematics after their upper-secondary level education: 86% of the pupils who entered the specialised schools in the school year 2016/17 achieved basic competencies in Mathematics; one-third belonged to the highest-performing fifth of all pupils in Switzerland (→ figure 203). In a comparison with the pupils of other education types, it is taken into consideration that boys achieve better Mathematics skills on average, and at the same time attend a specialised school less frequently, instead opting for a four-year apprenticeship. In general, the demands in the area of languages are higher in the education programmes at the specialised schools than in a four-year apprenticeship. Conversely, the requirements in the area of Mathematics in the four-year apprenticeships are usually higher, because they are very often connected with technical professions. Due to the lack of performance data on the linguistic competencies at the end of the compulsory education, it is not possible to compare the education types based on language competencies.

Cognitive competencies are an important explanatory factor for the education trajectory following compulsory schooling. At the same time, non-cognitive competencies must be taken into account, in order to be able to explain differences in educational success *(→ chapter Upper-secondary education, page 111)*.

203 Mathematics performance after education at upper-secondary level

ÜGK mathematics performance at the end of compulsory schooling (school year 2015/16) after the first-choice education at upper-secondary level (only direct transitions); controlled for gender; highest performance quintile: Pupils who are in the best fifth on a national basis

Data: ÜGK, LABB; calculations: SCCRE



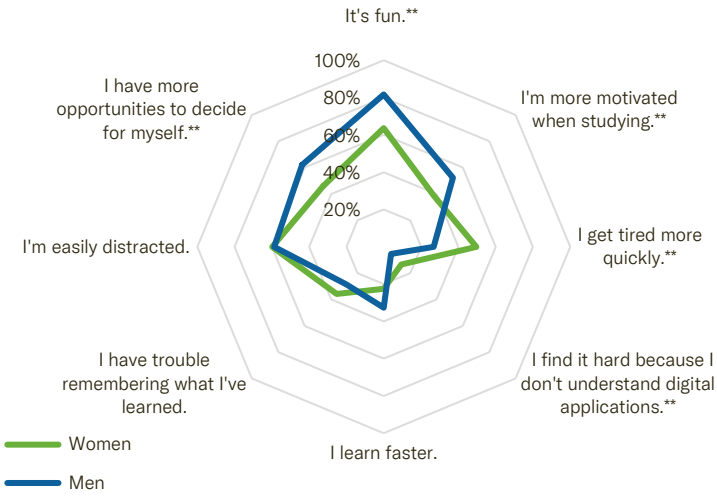
Digitalisation and learning with digital aids

In the core syllabus for specialised schools, dealing with digitalisation at work and in everyday life is, among other things, defined as a goal in the area of generic competencies *(EDK, 2018a)*. Due to lack of data, it is not possible to check the achievement of goals. With the monitoring project *Digitalisierung in der Bildung aus Sicht der Schülerinnen und Schüler* (Digitalisation in education from the pupils' perspective) *(Oggenfuss & Wolter, 2021a, 2021b)* the availability and the use of digital tools in schools were recorded in three surveys between 2020 and 2022 throughout Switzerland, and for the first time across all levels, from the primary level up to and including the upper-secondary level *(→ chapter Compulsory education, page 27; → chapter Upper-secondary education, page 111)*. Even if certain questions cannot be answered with this data, such as whether learning processes can be made more effective by means of digital aids *(→ chapter Lower-secondary education, page 83)*, the information collected here shows, amongst other things, the subjective attitude to learning with digital aids. The pupils are very positive overall regarding learning with computers and digital applications, even though they do not necessarily expect higher benefits from them. What is striking with regard to the attitude about learning using digital aids is that there are significant gender differences (→ figure 204). If digital resources are being used increasingly in lessons *(Educa, 2021)* and the girls are less motivated to learn using these, it can be assumed that the skills development of the sexes will be different. This fact is particularly relevant for the specialised schools with a share of women of 70%.

204 Attitude towards learning with digital tools by gender, 2022

Attitude to learning with digital aids compared with learning without digital applications; proportion of pupils in general education schools at upper-secondary level who agree with the statements made; under control of individual background variables; significant differences: ** (p < 0.01), * (p < 0.05)

Data: Monitoring Digitalisierung; calculations: SCCRE



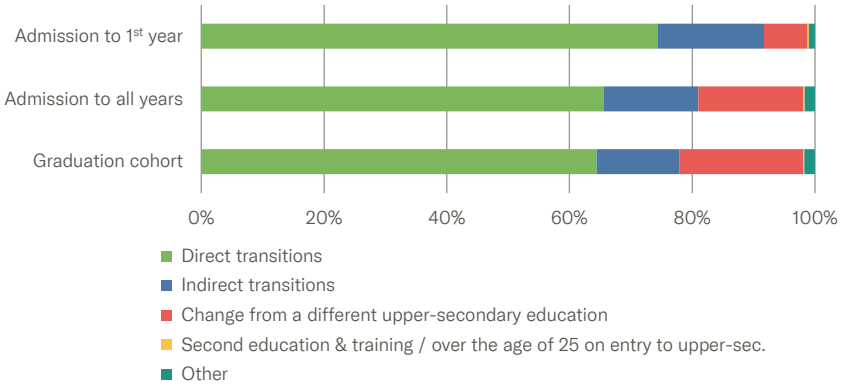
Education trajectories and repetition

Almost three-quarters of the pupils who enter a specialised school do so directly after completing compulsory education (→ figure 205). The proportion of direct transitions thus lies between the corresponding value for the VET programme and that of the baccalaureate school *(→ chapter Vocational education and training, page 125; → chapter Baccalaureate schools, page 155)*. A significant portion of the admissions to the first year of education at the specialised school takes place after an additional educational year following completion of compulsory education (13%). The education trajectories of young people at specialised schools are considerably different from those of young people in other types of education at upper-secondary level: A large number of pupils from other types of education institutions (for example after leaving baccalaureate school without a qualification) do not start their education and training programme with the first year but join in the second or even last year of the specialised school (see figure 205, Admission to all years). Ultimately, the educational pathways at the specialised schools are not straightforward for a large proportion of the pupils. They frequently repeat an educational year (→ figure 206), and the very large differences in regional languages are striking in this regard. The reasons for this cannot be explained with the data available.

205 Educational pathway of the admitted and graduating cohorts

Admitted and graduating cohorts of the FMS, average values for the school years 2019/20 and 2020/21

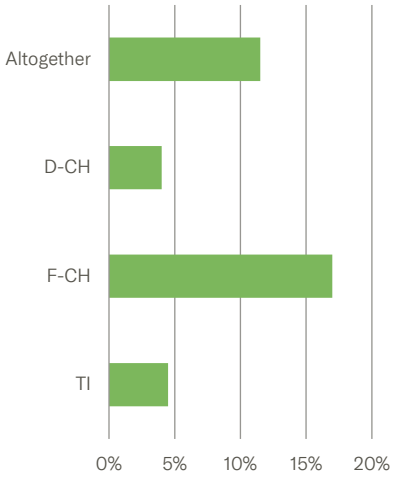
Data: FSO (LABB); calculations: SCCRE



206 Repetitions at the FMS by language region

Proportion of pupils who repeat the first school year of the FMS; average values of the school years 2018/19 and 2019/20

Data: FSO (LABB); calculations: SCCRE

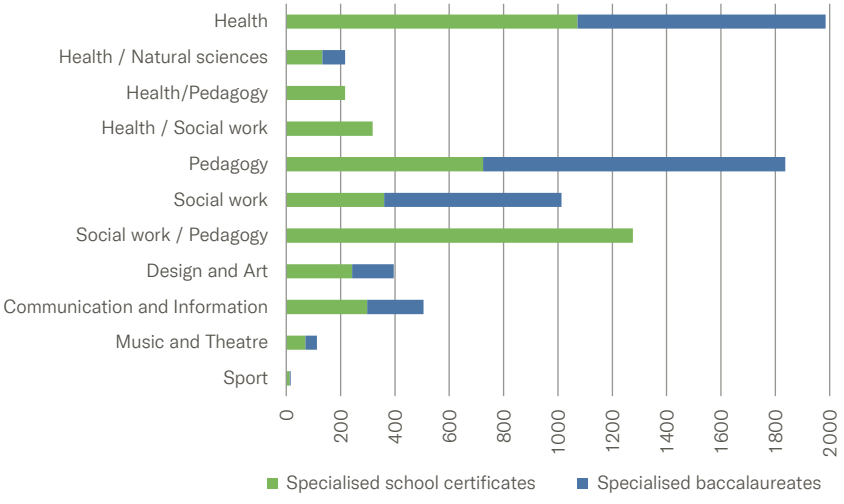


Graduations at specialised schools

Most graduations from the specialised schools are in the occupational fields of health and pedagogy (→ figure 207). This is partly because the specialised school diploma and the specialised baccalaureate in the area of health offers access to the next level of nursing training in the non-academic tertiary sector. The second largest is the number of graduations in the area of pedagogy, which is also related to the fact that the specialised baccalaureate is also an admission qualification to all universities of teacher education *(→ chapter Universities of teacher education, page 285)*.

207 Number of FMS graduations by occupational field, 2021

Data: FSO

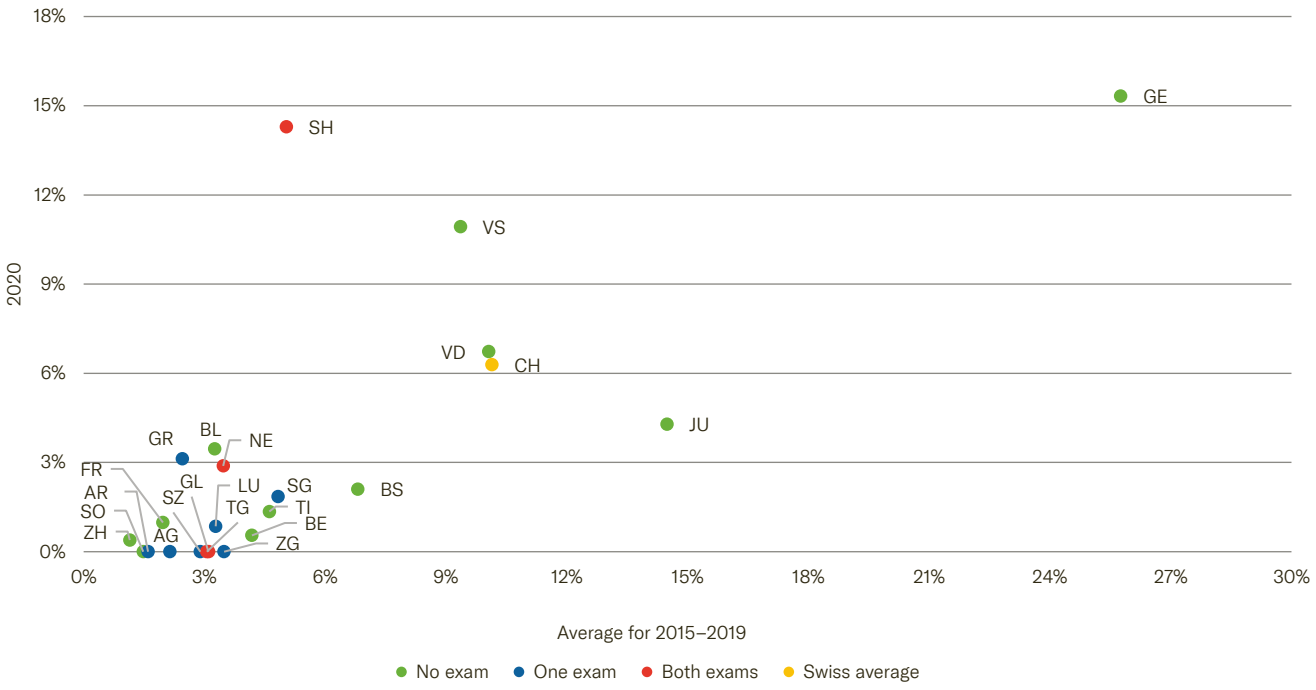


Due to the closing of schools after the breakout of the COVID-19 pandemic, the examination regulations for the final examinations for all three education types at upper-secondary level were temporarily adjusted in various cantons *(→ chapter Baccalaureate schools, page 155)*. In some cantons no examinations took place, while in others, either the written or the oral examinations were held. Only the Cantons of Glarus, Schaffhausen and Thurgau held the final examination for the specialised school diploma. The specialised baccalaureate examination was only held in cantons Schwyz and Thurgau. One exception was the specialised baccalaureate in the occupational field of pedagogy, which in all cantons could only be awarded after the examination had been passed (resolution of EDK of 5 May 2020). In summer 2020, 94% of the examination candidates obtained the specialised school diploma (national average in the whole of Switzerland). Compared with the previous years (2015–2019) this corresponded to a considerable reduction in the failure rate of 10% to 6% (→ figure 208). As there were almost no fluctuations in this rate in previous years, one can assume an effect caused by the changed examination situation. The cantonal failure rates traditionally vary greatly and in the last few years were between 1% and 26% (cantonal average of the years 2015–2019). Regardless of this, there was a reduction in the failure rate in practically all cantons in 2020.

208 Cantonal rate of failed final examinations, 2015–2019 and 2020

Only specialised school diplomas; legend: Examination modalities in 2020

Data: FSO



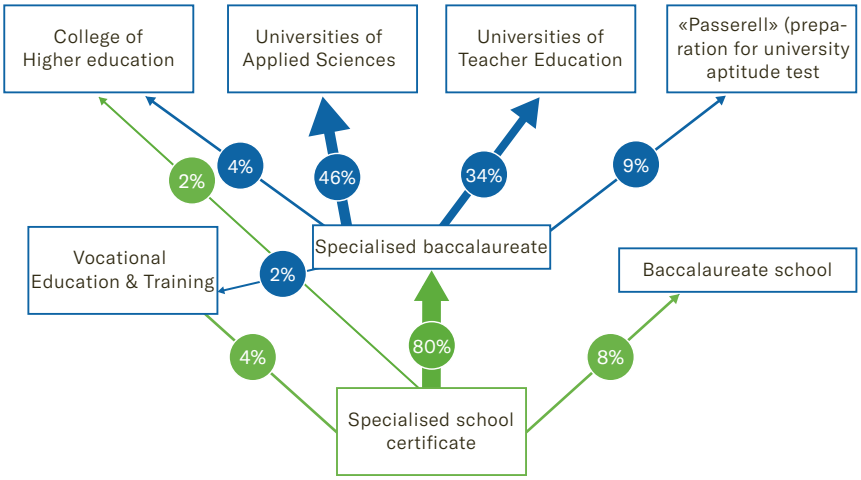
Transitions after the specialised school

After obtaining the specialised school diploma, most of the pupils continue their education at the specialised school and complete the specialised baccalaureate (80%). Around 8% enter a baccalaureate school. The number of pupils who continue their education in the education system after the specialised school diploma is 95%. Around 83% enter the tertiary area after the specialised baccalaureate (→ figure 209). Since 2017, persons with a specialised and/or vocational baccalaureate have access to the preparatory course for the University Aptitude Test (UAT) and can go to university after they have passed the UAT. This further expanded the permeability in the education system; the education and training options of the graduates of the specialised schools were adapted to that of the VET programme. In the years 2019 and 2020, a portion of 7% successfully completed the preparatory course for UAT after the specialised baccalaureate. Among persons with a vocational baccalaureate, the share is the same. The current data also show a similar transition rate to the universities in both groups (→ figure 210).

209 Transitions after the specialised school diploma and after the specialised baccalaureate

Direct transitions and transitions one year after graduation; average values of graduate cohorts 2018 and 2019

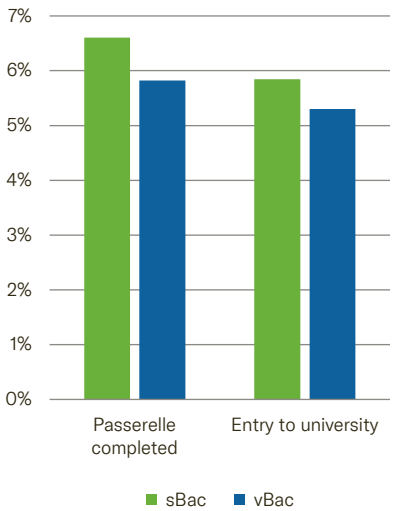
Data: FSO (LABB); calculations: SCCRE



210 Preparatory course for UAT and entry to university

Persons who completed the specialised baccalaureate (SB) or the vocational baccalaureate (VB) in 2018 or 2019; the results refer to persons who successfully completed the preparatory course for UAT between 2018–2020 and were admitted to a university in 2019 or 2020.

Data: FSO (LABB); calculations: SCCRE



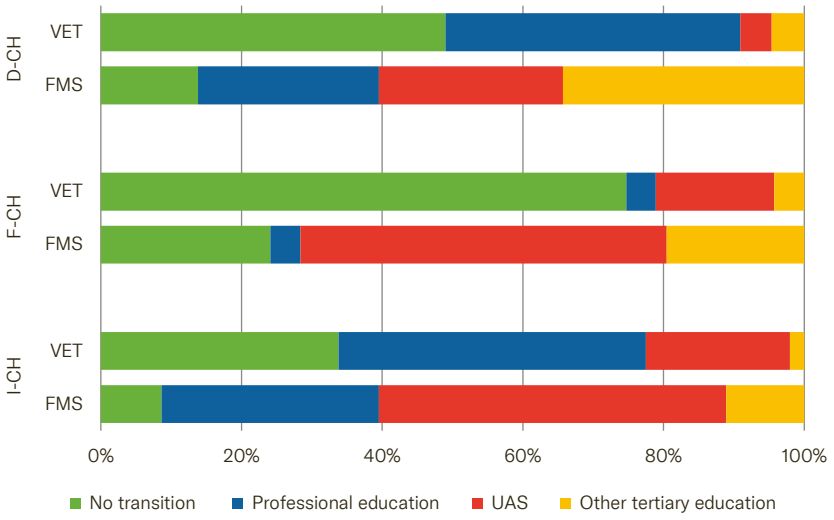
The educational goal of the specialised school – to prepare for education in the non-academic tertiary area and to award the appropriate degrees for this – is decisive for assessing the effectiveness of education. Whether the majority of pupils graduate from further education in the non-academic tertiary area after completing specialised school can be shown for Switzerland using the longitudinal data of the FSO *(FSO, 2021a)*. Considerable regional language differences can be observed here, which are related to divergent education structures, among other things.

Overall, in the area of health, 80% of the graduates with a specialised school diploma enter the tertiary area. Among persons with vocational education and training in the health area, this share is much lower at 47%. It should be taken into account that these two groups differ with regard to the entry qualification. In the group of vocational education and training, around one-third attended a class with basic requirements at the lower secondary level, which also explains the low transition rate to the tertiary level. In addition, persons with a vocational qualification have more possibilities of gaining a direct foothold in the labour market, in contrast to graduates with a specialised school diploma *(Esposito, 2022)*[3]. Similar to the Swiss national average, 76% to 89% of the graduates of specialised schools change to the tertiary area in the various language regions (→ figure 211). However, after the vocational qualification, the transition rates in French-speaking Switzerland are considerably lower. It is important to note that in French-speaking Switzerland, in contrast to German-speaking Switzerland, non-academic tertiary education in health is only offered at universities of applied sciences and thus require a vocational or

211 Transition to tertiary education in the health sector

Graduate cohorts 2015 and 2016; specialised school diploma: exclusively occupational field health; FVD: Specialist Health; admissions to tertiary area up to 2020/21

Data: FSO (LABB); calculations: SCCRE



3 See Esposito (2022) for an in-depth analysis of both courses of education in the field of health.

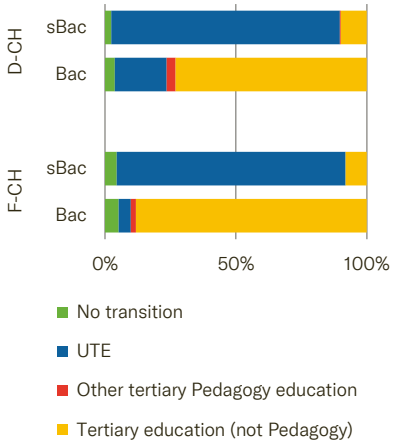
specialised baccalaureate. However, considered nationally, persons with a vocational qualification tend to remain in the health sector more often than persons with a specialised school diploma. After obtaining the specialised school diploma in the occupational field of health, 22% opt for a tertiary education programme outside of the health area. This proportion is considerably higher in German-speaking Switzerland than in the other two language regions.

In the area of pedagogy, the education trajectories of the specialised baccalaureate graduates in pedagogy can be compared with those of the graduates from baccalaureate schools with a specialisation in philosophy, pedagogy and psychology (→ figure 212). Over 95% of pupils transition to the tertiary area after the specialised baccalaureate, a large majority of them start education and training at a university of teacher education. As feeder schools for the universities of teacher education, the specialised schools are of great significance in two language regions *(Hafner, 2022)*[4]. However, there are considerable differences between the universities of teacher education with regard to the admission qualifications *(→ chapter Universities of teacher education, page 285)*. After the academic baccalaureate, although 95% also change to the tertiary area, of these only just under one-fifth complete a tertiary education in the area of pedagogy, which can be explained not least by the broadly oriented focus. The proportion of transitions after the academic baccalaureate to a university of teacher education is 20% in German-speaking Switzerland and 5% in French-speaking Switzerland. This difference is partly due to the fact that in Canton Geneva, teachers at all levels are educated at the University. Most of the transitions from a baccalaureate school to a university of teacher education are made among persons with the specialist subjects music and design or modern languages *(→ chapter Universities of teacher education, page 285)*.

212 Transition to tertiary education in the pedagogy sector

Graduate cohorts 2015 and 2016; specialised baccalaureate (SB): exclusively occupational field pedagogy; academic baccalaureate (AB): Special subject philosophy, pedagogy, psychology; admissions to the tertiary area up to 2020/21

Data: FSO (LABB); calculations: SCCRE



4 See Hafner (2022) for a presentation of education trajectories of pupils with different upper-secondary specialised school profiles as well as for a comparison of education trajectories of baccalaureate graduates with a focus on the arts and with a specialisation in philosophy, pedagogy and psychology.

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION
AND TRAINING

TERTIARY-LEVEL EDUCATION

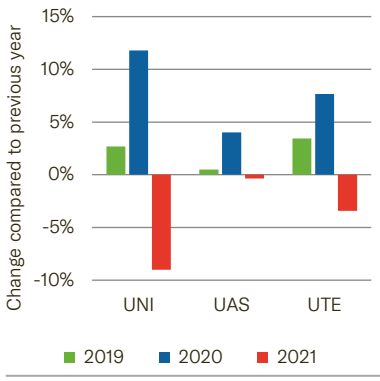
CROSS-CUTTING THEMES

Effects of the COVID-19 pandemic

213 Enrolments at BA level by university type

Change in admissions compared to the previous year

Data: FSO (SHIS); calculations: SCCRE



In 2020, the COVID-19 pandemic led to strong growth in student admissions, especially to conventional universities (plus 12%) as well as to universities of teacher education (plus 8%). The increase came about mainly because students who completed their baccalaureate in 2020 more frequently enrolled in a university directly, which explains why admissions subsequently did not increase further *(FSO, 2021f)*. In the following year (2021), institutions which had an above-average number of direct admissions saw a correction in their admission numbers. This was especially the case in conventional universities (UNI), whose enrolments fell sharply. All students who, due to the pandemic, decided to enrol directly in 2020 instead of taking an interim year off are missing in the 2021 figures (→ figure 213).

The pandemic was especially problematic for teaching. Like the rest of the education system, Swiss tertiary institutions had only a few days to switch their mode of instruction from in-person to remote in response to the Federal Council's measures on 16 March 2020 to combat the COVID-19 pandemic. This led to an unprecedented situation in which the change in mode of instruction relied on digital technologies, some of which had never been used before. They enabled institutions to maintain their teaching schedules as emergency operations until the end of the spring semester because schools had to close immediately due to the extraordinary situation. These measures mainly involved a ban on in-person classes and face-to-face contact, which had a severe effect on teaching. Unlike in the case of the other educational levels, in-person classes were mostly cancelled until the autumn semester 2021. At the end of 2021, the government again required institutions to switch to distance learning.

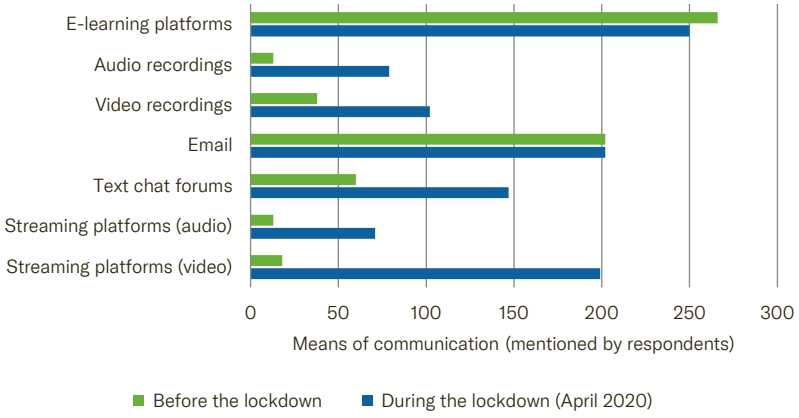
While large digitalisation projects were launched already years before the pandemic, the COVID-19 pandemic made the strengths and weaknesses in universities' preparations for using digital technologies all the more apparent. Before the lockdown, the digital transformation at each university had its own momentum, driven primarily by the strategy of the respective institution. In the wake of the closure due to the pandemic, all teaching had to be fully switched to online mode overnight. This switch involved a range of information and communication technologies, many of which had not been tried previously *(Farnell et al., 2021; Göbel et al., 2021; Hänni & Aeschlimann, 2020; Kaqinari et al., 2021; Marek et al., 2021)*. Despite support from universities in setting up online learning environments, lecturers were mostly responsible for making the change quickly and ensuring the quality of teaching *(Göbel et al., 2021)*. Various surveys at higher education institutions indicate that lecturers used significantly more synchronous (real-time) forms of communication, such as streaming platforms with audio and video conferences, once in-person teaching had been banned (→ figure 214) *(Bachmann et al., 2021; Dilger et al., 2020; Hänni & Aeschlimann, 2020; Oswald et al., 2020; Sieber et al., 2020)*.

Besides ramifications for teaching and learning, the COVID-19 pandemic also systemically effected study programmes *(→ chapter Universities, page 225; → chapter Universities of applied sciences, page 255; → chapter Universities of teacher education, page 285)*, international mobility of studies (→ figure 221), and entry to the labour market.

214 Use of electronic communications during school closures, April 2020

At the University of Zurich; lecturers' preferred electronic means of communication; written survey in April 2020 (N=282)

Data: *Sieber et al., 2020*



The following factors have been identified as helpful when switching to new technologies quickly: a positive basic attitude towards digital technologies, a strong conviction that such technologies are efficacious, and lecturers' strong willingness to make the change *(Göbel et al., 2021; Kaqinari et al., 2021)*. Besides the effort required on the part of lecturers, online teaching also required students to be highly independent and have well-developed learning strategies, which was not always the case *(Kovacs et al., 2021; Ramírez-Hurtado et al., 2021)*. Various studies show that negative attitudes towards digital teaching were widespread in both groups, whereby lecturers generally had a more negative attitude than students. They tended to believe that the support and infrastructure that universities provide should be improved *(Dolenc et al., 2021; Kovacs et al., 2021)*. Surveys also indicate that compared to lecturers, students generally thought switching to online teaching was less effective. Large differences can also be observed in the quality of the fully digitalised classroom. Students themselves believe that they learned less during the lockdown and would have wished for more support and guidance from their lecturers *(Buser, 2020; Dilger et al., 2020; Oswald et al., 2020; Ramírez-Hurtado et al., 2021; Sieber et al., 2020)*. However, one reason why students indicated a slower acquisition of skills may be that they saw a sharp decline in the time they had available during the lockdown *(Grätz & Lipps, 2021; Refle et al., 2020)*.

How effective distance learning and virtual teaching actually are cannot yet be evaluated conclusively due to the subjective, qualitative and often not fully representative nature of the surveys, which do not replace scientific studies that are based on randomised design and control groups. Although experimental studies on the effectiveness of digital teaching were conducted abroad already before the COVID-19 period *(Bettinger et al., 2017)*, their findings cannot always be applied to other countries, educational systems and periods. A recent study from Switzerland on the effectiveness of digital teaching has identified some related effects: *Cacault et al. (2021)* used a random experiment to show that the online classroom (streaming)

leads to a drop in performance among the weaker students while improving that of the stronger ones. An experiment during the COVID-19 period indicated that relying on online lectures had consistently negative effects on academic performance *(Kofoed et al., 2021)*. However, it must be noted that an experiment conducted during the COVID period – i.e. in a time when students were exposed to multiple stress factors at home and in the classroom – may produce different results from one conducted in normal times. Even if no conclusive opinion is possible at this time, it can be assumed on the one hand that the use of digital aids in tertiary education was indispensable as an emergency bridging measure. On the other hand, experience shows that widespread use of digital forms of teaching in normal times does not come close to the effectiveness of in-person teaching. This realisation, however, does not mean that there is no potential for using digital or hybrid forms of teaching.

Tertiary system

Switzerland's tertiary education system comprises the entire university sector as well as the professional education sector. The university sector includes conventional universities – i.e. the cantonal universities and the federal institutes of technology (ETH) – universities of applied sciences (UAS) and universities of teacher education (UTE). The professional education (PE) sector, on the other hand, consists of colleges of higher education as well as various institutions offering federal diplomas of higher education, i.e. professional examinations and mastership examinations (federal diploma).

The International Standard Classification of Education and Training (ISCED 2011) broke tertiary level education and training down into the following levels (→ figure 215): The BA degrees of universities as well as federal diplomas of higher education fall under ISCED Level 6; the MA programmes of universities as well as the advanced federal diplomas of higher education fall under Level 7. Doctorates and post-doctoral work fall under Level 8 *(FSO, 2015a)*. The ISCED classification in force since 2011 no longer distinguishes between tertiary sectors A (academic) and B (vocational). However, countries do not assign national education programmes uniformly to the ISCED classification, as can be seen, for example, in the range of classifications of professional education and training among German-speaking countries. While the mastership examination in Switzerland is classified at ISCED Level 7, its counterpart in Germany falls either under Level 5 or 6, depending on the duration of the programme.

The range of the tertiary-level programmes that the various university types and professional education institutions offer has grown historically and continues the differentiation into a general education sector and a vocational education sector at secondary level. The two sub-sectors differ fundamentally in terms of their entry prerequisites, institutional requirements and funding. The overview chapter, however, treats the tertiary level as a whole. The data available for the university sector is of much better quality than that for the professional education sector and is therefore presented in more detail.

215 Tertiary-level programmes

Data: *FSO (2015a)*

ISCED level	Description	Swiss education programmes
5	Short tertiary education programmes	PE programmes not subject to VPETA regulations
6	BA or equivalent	BA programmes at higher education institutions; degrees at Colleges of higher education; federal examinations; MAS (Master of Advanced Studies); postgraduate degrees
7	MA or equivalent	MA programmes at higher education institutions; advanced federal diploma of higher education (federal diploma or mastership examination)
8	Doctorate or equivalent	Doctorates; post-doctoral work at German-speaking universities and institutes of technology

VPTEA Vocational and Professional Education and Training Act

When considering the distinction between the types of universities, it must be noted that the following explanations regard teacher training at universities of applied sciences within the remit of universities of teacher education in each case, as it is managed according to the rules that apply to universities of teacher education, irrespective of any institutional affiliation. In terms of numbers, the university sector dominates tertiary-level education with four-fifths of all students, which can be explained in part by the longer study periods, especially at conventional universities (→ figure 216). The university sector becomes less dominant when the evaluation is based on the annually awarded number of degrees. For example, the vocational part of the tertiary education system generates about one third of all tertiary degrees each year.

International comparison of education status of population

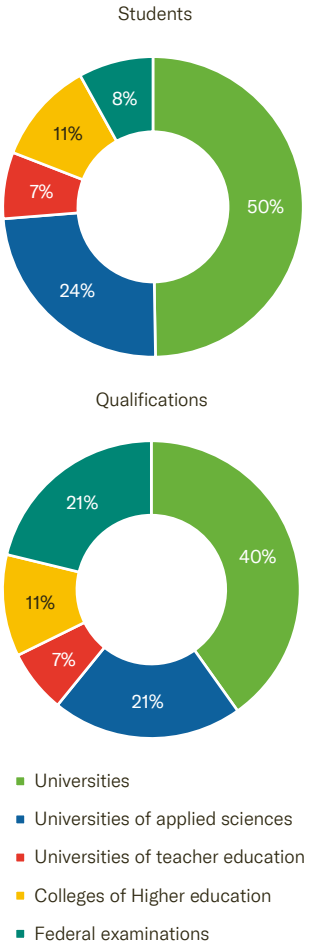
The growth trend in education as stated in previous education reports continues. The tertiary share of 25- to 34-year-olds has doubled since the turn of the millennium: Every second person in this age group now has a tertiary degree. When considering only degrees from universities, the rate of growth becomes even stronger. The proportion of graduates from all types of universities has more than tripled among 25- to 34-year-olds over the past 20 years to around 40% in 2020 (→ figure 217). This growth in tertiary education was driven by the conventional universities to some degree, but mostly by higher education system reforms in the mid-1990s during which the universities of applied sciences and the universities of teacher education were established. The growth is also due to the increased ratio of women in baccalaureate programmes *(→ chapter Baccalaureate schools, page 155)*, which has subsequently led to more women in universities in Switzerland than men.

At 52%, Switzerland has an above-average tertiary education rate among 25- to 34-year-olds compared to OECD countries (→ figure 217). In 2021, the Swiss tertiary education rate ranked eleventh among OECD countries, above that of neighbouring countries and well above the OECD average of 47%. Taking into account professional education, which accounts for around a quarter of all tertiary degrees, Switzerland has a high proportion of people with a tertiary degree, despite its relatively low number of baccalaureates. It makes sense to include professional education in this ratio because other countries without a separate higher vocational education system are more likely to offer such programmes at universities.

216 Students and degrees, 2021

All students and degrees at tertiary level, excluding continuing education and training

Data: FSO (SHIS); calculations: SCCRE

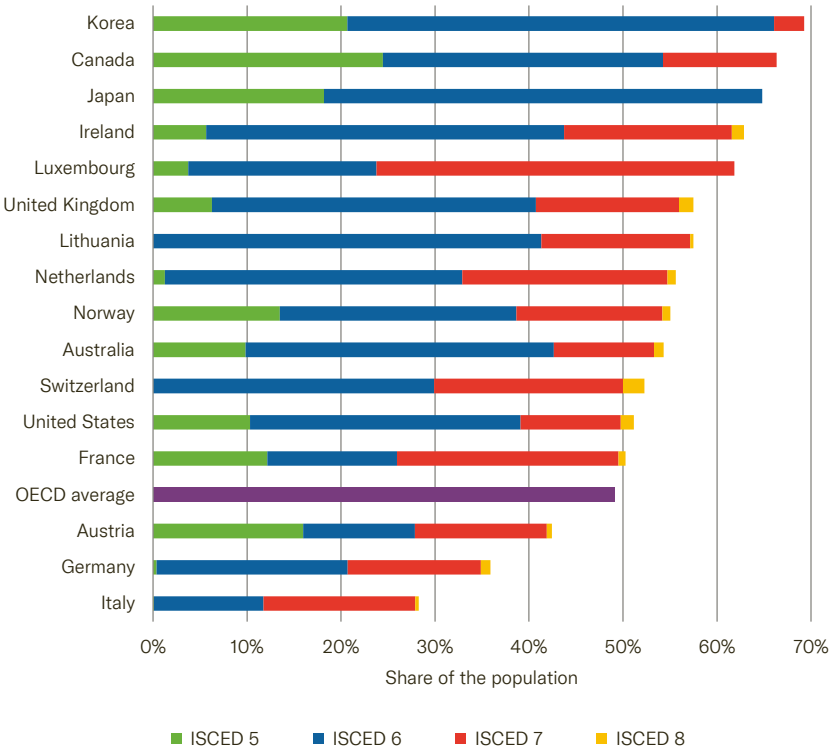


217 International comparison of education status of 25- to 34-year-olds, 2021

Tertiary degrees (Universities and professional education)

Data: OECD; calculations: SCCRE

ISCED 5 Short tertiary education programmes (short cycles)
ISCED 6 BA or equivalent degrees
ISCED 7 MA or equivalent degrees
ISCED 8 Doctorate or post-doctoral degrees



A more precise analysis of the educational level of a population would need to distinguish among the qualification levels of the various tertiary programmes. Especially in countries with above-average tertiary rates, BA degrees or degrees that in Switzerland do not count as tertiary (ISCED 5) tend to dominate. However, considering the share of MA degrees, doctorates and post-doctorates (ISCED 7 and 8) qualifications in the total of all tertiary degrees puts Switzerland in an even better position: While in countries with the highest tertiary rates, including Korea and Canada, less than 20% of the degrees were awarded at the postgraduate level, in Switzerland almost half of all tertiary degrees are at ISCED Levels 7 or 8.

Legal basis for universities

The federal government and the cantons are jointly responsible for coordinating and assuring quality in higher education. The legislative framework enacted by federal government is the Federal Act on Funding and Coordination of the Higher Education Sector (HEdA)[1]; for the cantons it is the Higher Education Concordat. An agreement between the federal government and the cantons on cooperation in higher education defines the scope for the two elements of the legislative framework, declares the aims of the HEdA as joint objectives of the federal government and the cantons, and creates the basis for the joint bodies, namely the Swiss Conference of Higher Education Institutions (SHK), the Rectors' Conference (swissuniversities), and the Accreditation Council. As Switzerland's highest body of higher education policymaking, the SHK is responsible for coordinating the activities of the federal government and the cantons in the higher education sector. The Rectors' Conference (swissuniversities) includes the rectors of conventional universities, universities of applied sciences and universities of teacher education. It is responsible for coordination and cooperation among these institutions. The Swiss Agency of Accreditation and Quality Assurance (AAQ) is responsible for the accreditation procedures, which are governed by the Accreditation Council, an independent body with representatives from higher education and industry. Institutional accreditation is a prerequisite for protection under naming law (i.e. the law that permits an institution to call itself a "university", "university of applied sciences" or "university of teacher education"). It is also necessary for obtaining federal funding (Art. 28, para. 2 HEdA). Accreditation of programmes (BA and MA) is voluntary.

Profiles of university types

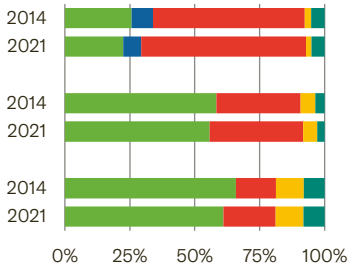
The federal government and the cantons are committed to the shared educational policy goal of ensuring diversity in the various tertiary programmes, each with their distinct characteristics *(EAER & EDK 2019)*, a commitment that is also explicitly mentioned in the HEdA (Art. 3 lit. c HEdA). The various profiles of the university types, which play a role in how federal funding is assessed, also reflect in the different ratios of activity types of employees (→ figure 218). While the main focus of conventional university staff is on research, more than two thirds of staff in general tertiary institutes (UASs and UTEs) are allocated to teaching and continuing education and training *(Böckelmann et al., 2021)*. The strong focus on teaching at universities of applied sciences and universities of teacher education has not changed in recent years, even if there has been a slight shift toward research at the expense of teaching in all three university types *(→ chapter Universities of applied sciences, page 255)*.

1 Federal Act on Funding and Coordination of the Swiss Higher Education Sector (Higher Education Act, HEdA) of 30 September 2011

218 Proportion of activity types by university type, 2014 and 2021

In FTE of academic personnel

Data: FSO; calculations: SCCRE



Teaching: Basic education and training

Teaching: Advanced education and training

Research and development

Continuing education and training

Services

Activity types according to FSO

Teaching
All activities primarily devoted to teaching (BA, MA, diploma and doctoral) and related tasks. A distinction is drawn between regular teaching (BA and MA programmes) and more advanced teaching (doctorate).

Research and development (R&D)
The term refers to systematic, creative endeavours to expand knowledge and to use it to discover new applications and/or to repurpose tried-and-tested scientific achievements.

Continuing education and training
All activities relating to continuous education and training programmes in the postgraduate sector.

Services
All academic and non-academic activities of a predominantly routine nature relating to neither research and development nor to teaching and that are primarily directed at audiences outside of the universities.

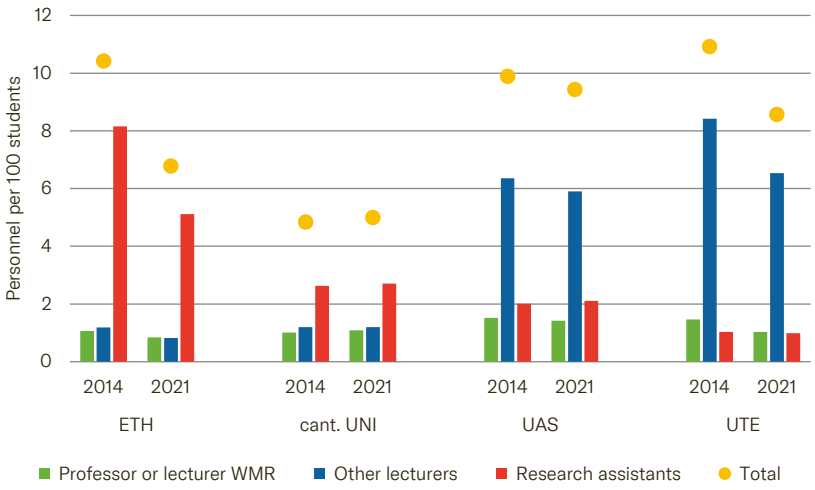
The university types differ in terms of the weighting of the types of services, and the allocation of their personnel varies accordingly: While assistants and research assistants make up the largest proportion of staff at conventional universities – even in teaching, lecturers make up the largest proportion of staff at general tertiary institutes. The high proportion of assistants and researchers at the federal institutes of technology compared to the cantonal universities results in a significantly better supervision factor (→ figure 219). In recent years, the personnel resources of the university types have converged somewhat, in so far as the relative share of academic management staff (professors at conventional universities; lecturers with management responsibility at UASs/UTEs) is now approximately the same in all three institution types. Because the title of "professor" refers to a different function at universities of applied sciences compared to conventional universities, an attempt is now being made to introduce a category "lecturers with management responsibility" at universities of applied sciences and universities of teacher education that is comparable with a university professor.

During the last few years, the staff numbers at federal institutes of technology and universities of teacher education have not developed at the same rate as student numbers. Accordingly, the supervision ratio has deteriorated somewhat at both types of university, although it is still higher than that of cantonal universities. At the same time, these ratios also need to reflect the intensity of the programme *(→ Demand for part-time programmes, page 212)*.

219 Personnel resources for teaching per 100 students, 2014 and 2021

Academic teaching staff (incl. advanced further education and training) in FTE

Data: FSO; calculations: SCCRE



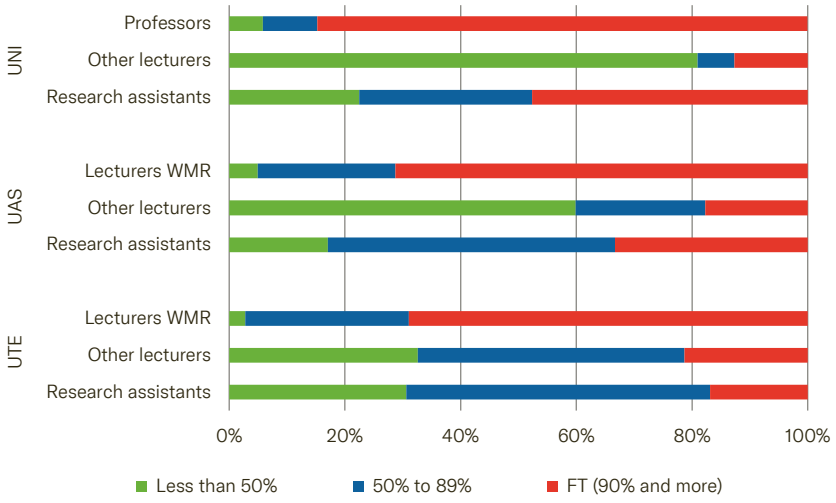
WMR With management responsibility

Because, compared to conventional universities, general tertiary institutes are less research-oriented, they also require fewer assistants and research assistants. In addition, universities of applied sciences and universities of teacher education are not in a position to award doctoral degrees to their graduates. For this they need to work with universities in Switzerland and abroad *(→ chapter Universities of applied sciences, page 255)*. Many universities of applied sciences and universities of teacher education have now adopted this strategy. Such cooperation models raise questions when it comes to supervising doctoral students, integrating candidates into the international research network of peers in the subject area, and assuring the quality of the work.

Finally, the types of universities also differ in terms of academic staff's qualifications *(SCCRE, 2018)*, level of employment, and origin. Lecturers with management functions at general tertiary institutes tend to be frequently in part-time positions with smaller workloads than professors at conventional universities (→ figure 220). On the other hand, other lecturers at conventional universities often have very small workloads, whereas 40% of lecturers at universities of applied sciences are in full-time or larger part-time position *(Böckelmann et al., 2021)*.

220 Employment of academic staff by category and university type, 2021

Data: FSO; calculations: SCCRE

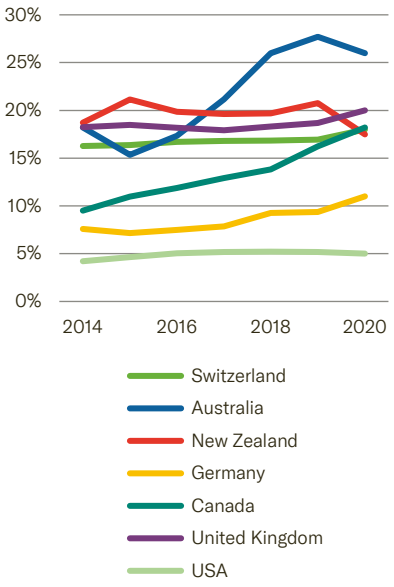


WMR With management responsibility

221 Proportion of international students by destination country, 2014–2020

Proportion of international students as a percentage of total students per country

Data: OECD

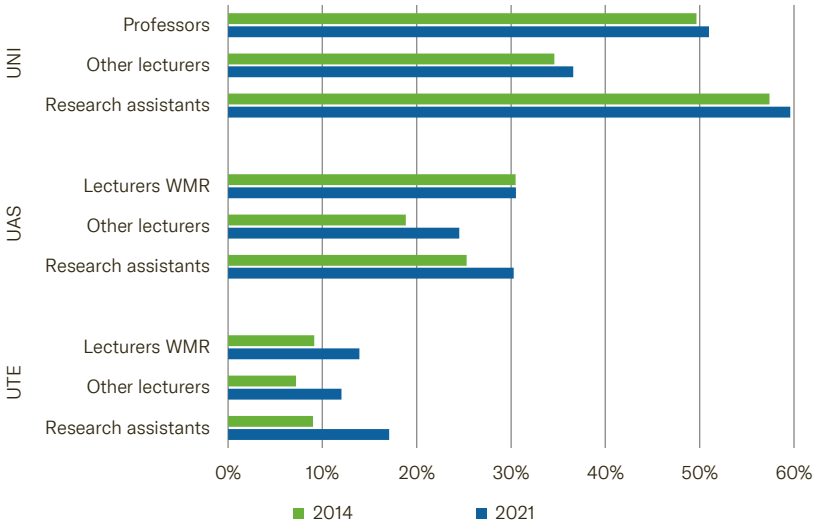


The ratio of foreigners among both academic staff as well as among students is often used as an indicator of the attractiveness of a research centre. In this respect, the Swiss higher education sector appears highly attractive. At the same time, a high proportion of international students compared to other countries does not necessarily indicate research excellence because countries can recommend themselves as educational centres for internationally mobile students through their admission requirements, special programmes (especially the language of instruction), and tuition fees. In recent years, the rate of international students in Switzerland has remained constant at 17%. Australia and New Zealand have a higher proportion of international students, which has declined markedly due to the COVID-19 pandemic and the associated strict restrictions on entry (→ figure 221). Switzerland differs: There was no decline in numbers in 2020 *(FSO, 2022n)*.

Competitiveness is crucial for the reputation of a tertiary education centre, which also means recruiting the best academic talent. Swiss universities in the past were quite successful in recruiting highly qualified foreign academics for teaching and research. According to empirical studies, the high degree of internationalisation among research staff also has a positive effect on research results *(Seeber & Lepori, 2014)*. However, Switzerland's participation in the "Horizon Europe" and "Horizon 2020" programmes of the EU's Framework Programmes for Research and Innovation has currently been suspended, thus creating significant uncertainty for all researchers in Switzerland with respect to funding and cooperation in research. This might hinder the position of Swiss universities when competing for foreign academic staff.

222 Academic staff: Proportion of foreigners, 2014 and 2021

Data: FSO; calculations: SCCRE



WMR With management responsibility

The range of profiles of university types (especially in terms of orientation and research intensity) also reflect nationality profiles in university types. While more than half of professors and assistants at conventional universities are now foreign nationals (→ figure 222), the proportion of foreign staff at universities of applied sciences and universities of teacher education is significantly lower, although growing quickly.

Funding of the universities

The Universities are financed from a range of sources by the federal government, cantons, and private funds. While the sources of such funding potentially increase resources, they also make it difficult to manage the system of universities in a uniform manner.

Except in the case of the federal institutes of technology, universities are in the remit of the cantons, which also bear the main burden of funding, with a share of over 50%. The federal institutes of technology, on the other hand, are funded by the federal government through lump-sum contributions. As in the case of cantonal universities, basic financing of universities of applied sciences and universities of teacher education is provided by the cantons. In addition, there are inter-cantonal university contributions, and the universities of applied sciences and the conventional universities receive basic contributions from the federal government.

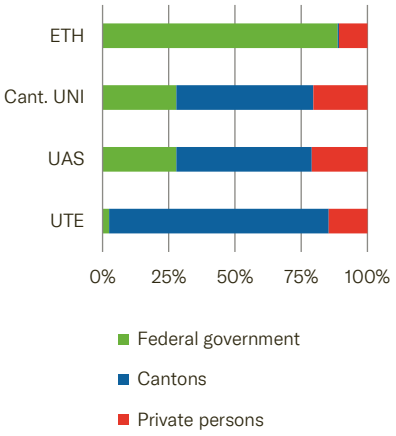
The federal government contributes to the operating expenses of the two types of universities mentioned. At the request of the Federal Council, the Swiss parliament approves the basic contribution amount for four-year periods. Reference costs, which are based on the average cost per person and subject, serve as a basis for the assessment. The federal government covers 20% of these costs for conventional universities and 30% of these costs for universities of applied sciences. The total of the basic contributions is allocated per university type, whereby different ratios apply when allocating amounts for teaching and research. Funds for conventional universities are distributed as follows: 70% for teaching and 30% for research. For universities of applied sciences, the teaching share is 85% and the research share is 15% of the total (Art.7 of the HEdA Ordinance). The distribution of funds among the universities relies on performance-based assessment criteria, whereby the different university profiles are considered. This makes it possible to establish benchmarks for comparing the performance of universities within the same type. Assessment of funding based on performance in teaching draws on data such as the number of students and the degrees awarded. Moreover, the federal government provides funding by means of construction grants and project-specific grants. The latter are used to promote joint projects among universities that are significant for all of Switzerland.

The cantons' contributions are assessed per capita: Based on the Intercantonal University Agreement (IUA) *(EDK, 2019b)* and the Intercantonal Agreement on Universities of Applied Sciences (ICA-UAS) *(EDK, 2003)*, the cantons pay fixed per capita contributions for residents who study at a university outside their canton of origin. Financing in the university sector based on the principle of demand-oriented basic funding of universities – measured by student numbers – tends to create incentives to expand the number of courses offered. This applies in particular to universities

223 Funding of universities by source, 2020

Proportion of operating revenue by source

Data: FSO



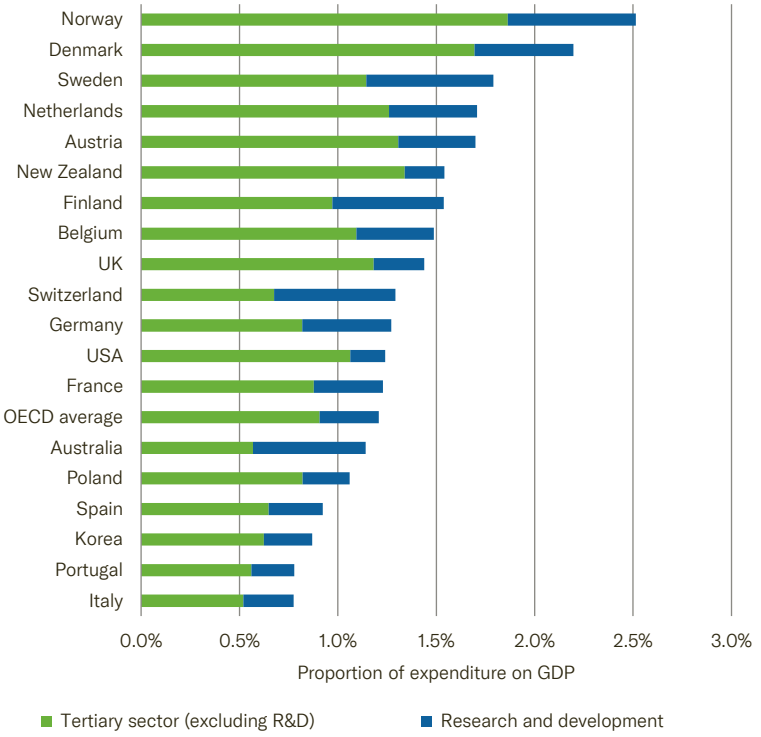
of applied sciences, also because they have a higher cost ratio for teaching compared to conventional universities *(Lepori et al., 2014)*.

The higher education sector (including research) takes around one third of the public spending on education. Of the almost CHF 12 billion in expenditure on higher education in 2020, the federal government (including the Swiss National Science Foundation) and cantons contributed around 40% each. The remainder comes from private sources (tuition fees, private research commissions, grants from foundations and sponsoring). Of the federal government's share, over half went to the two federal institutes of technology (→ figure 223), covering 89% of their total expenses. On average, the universities of teacher education have a similarly large share from one source of funding, with the cantons covering 83% of their expenses.

Total expenditure in the tertiary sector in Switzerland is relatively high in absolute terms. When seen in relation to GDP, the 1.3% is in line with that of industrialised countries (→ figure 224). Making such a comparison, however, must consider the fact that some countries have more significant higher-education rates, resulting in higher GDP shares. The ratio of total expenditure to GDP is therefore of only limited use in country comparisons.

224 Total expenditure in tertiary education, relative to GDP, 2018

Data: OECD; calculations: SCCRE



The ratio of teaching expenditure to R&D expenditure is a more meaningful comparison. Here, Switzerland stands out for its above-average research intensity. It spends 48% of its total tertiary expenditures on research and development. While the OECD average is 25%, Germany and countries such as Sweden and Finland have a share of between 36% and 37%.

Scholarships

In Switzerland, tertiary-level education is largely government funded, but studying also incurs high private costs, which could be a disincentive for households with modest budgets. Individuals who receive little or no financial support from their families may be more likely to work while enrolled at a university *(FSO, 2021j)*, which could prolong their studies and lower their performance due to the additional burden.

To counteract such effects, most countries provide scholarships and student loans. Internationally, evidence largely suggests that scholarships and other financial support help to positively influence the study decisions of individuals with more modest budgets *(de Gendre & Kabátek, 2021; Martini et al., 2021; Nguyen et al., 2019)*. Furthermore, it has been shown that financial aid can shorten the duration of studies and reduce the drop-out risk *(Bettinger et al., 2019; Denning, 2019; Graziosi et al., 2021; Nguyen et al., 2019)*. International comparisons with Switzerland are only of limited use, because such studies consider systems that differ greatly from the situation here, for example with regard to tuition fees borne by the private sector or in terms of university admission procedures. Such issues have not yet been addressed in the case of Switzerland. However, survey results indicate that scholarship recipients work less often or for fewer hours, which potentially leaves them with more time for their studies *(FSO, 2021j)*. One explanation for the lower employment is that the scholarships may be reduced or partially converted into loans if a person's income is too high. Of those who dropped out of their programmes, 12% of mentioned financial problems as a reason but only 4% mentioned rejection of a scholarship application as a reason *(ibid.)*.

The average of scholarships for tertiary level students in 2020 was just under CHF 9,000 per year *(FSO, 2022i)*. In the years when the Concordat was introduced, scholarship contributions increased slightly while the number of recipients decreased (→ figure 225). Since 2016, however, both the amount of scholarship contributions and the number of recipients have been largely stable. With the increase in student numbers, the scholarship ratio, which has already had a downward trend for some time, continued to decrease in recent years for students at universities and in professional education institutions. Overall, the scholarship rate has almost halved since 2004: Currently, 8 to 9% of university students and approx. 2.5% of students in professional education institutions receive scholarships. The reasons for the marked decrease are unknown. However, survey results show that the proportion of students who submitted a scholarship applications dropped significantly from 37 to 27% between 2005 and 2020, while the rejection rate decreased at the same time *(FSO, 2021j)*. The ratio of rejection rate to number of students who submitted a request has remained virtually unchanged. The absence of statistics on the income and financial circumstances of (potential) students and their parents, combined with

The **Covid 19 pandemic** caused some students to lose their jobs and face financial hardship *(FSO, 2022e)*. In response, several universities provided funding to support students in the short term.

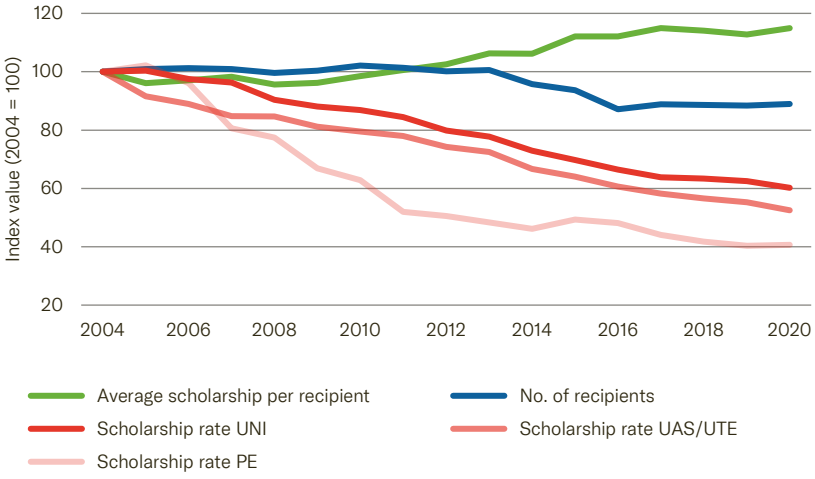
Cantons are responsible for **awarding scholarships**. They decide who is eligible for a scholarship based on the law that governs how scholarships are granted. Since 2013, a Concordat has also been in force to determine the rules and minimum standards for awarding training contributions. Cantons that do not meet the Concordat's provisions for the tertiary level are not entitled to federal contributions. So far, 22 cantons have joined the Concordat (as of August 2022). The Concordat prescribes only minimum standards, and the rate at which scholarships are awarded and the amount in contributions still vary greatly among cantons *(FSO, 2022i)*.

Many cantons now have **scholarship calculators** on their websites that can be used to estimate the chances of getting a scholarship. This could be a reason for the decline in the relative frequency of scholarship applications.

the limited transparency regarding the criteria for awarding scholarships, make it impossible to determine the reasons for the significant decline in the scholarship rate.

225 Trend in scholarship contributions, scholarship rate and number of tertiary-level recipients, 2004–2020

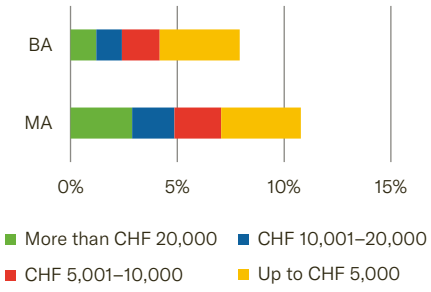
Data: FSO; calculations: SCCRE



Scholarship rate
Proportion of students who receive scholarships in relation to all students who are Swiss residents before commencing their studies and/or Swiss nationals

226 Proportion of students with debts from their studies, 2020

Data: FSO (SSEE); calculations: SCCRE



Students can take out a loan if they have insufficient financial means to cover their school fees and living expenses or do not receive any or only an insufficient scholarship. Unlike scholarships, these must be repaid with interest on completion of the programme. In Switzerland, however, students rarely take out loans. On average, roughly only one in ten students reports having debts in connection with studying. Most loans are granted by public-sector institutions; in rare cases they are granted by the university, a private organisation (foundation) or an employer. The proportion of students with loans is somewhat lower at the BA level than at the MA level (→ figure 226). Moreover, only 1% of BA and 3% of MA students have debts of more than CHF 20,000. The problem of students going into debt because of their studies is much less prevalent in Switzerland than in countries such as the USA, where around two-thirds of graduates with a BA degree have loans averaging USD 30,000 *(Thomsen et al., 2020)*.

Admissions to universities and professional education

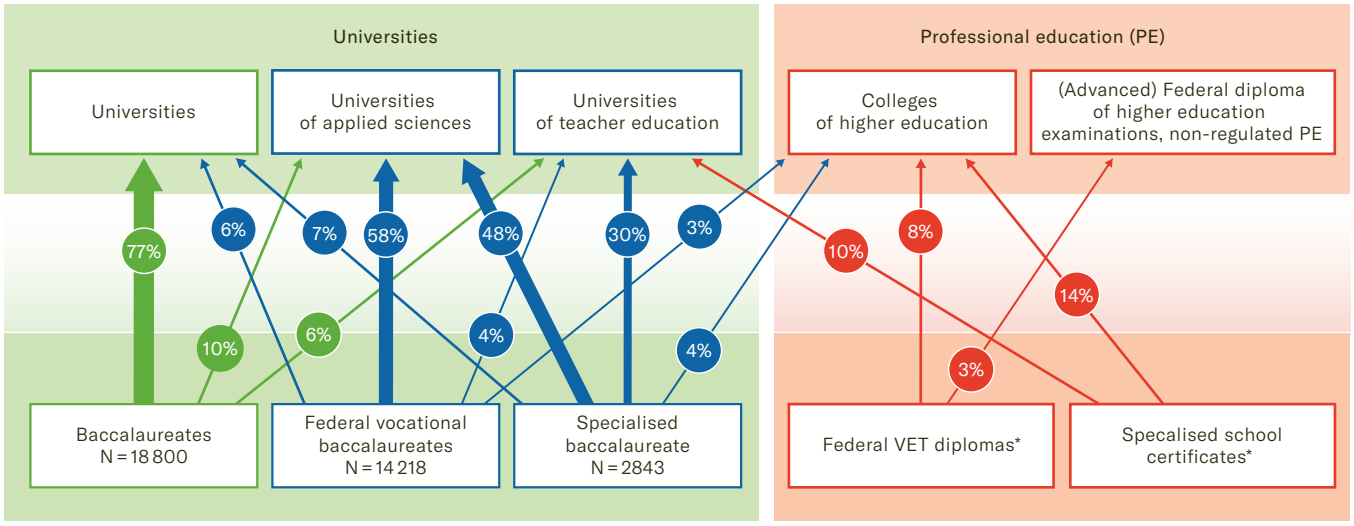
Access to tertiary education requires an upper-secondary qualification, whereby entry to university education additionally requires a baccalaureate or equivalent prior qualification (cf. HEdA). For conventional universities, the primary admission route is the baccalaureate; for universities of

teacher education, it is the baccalaureate or specialist baccalaureate (with a pedagogical focus); and for universities of applied sciences, it is the federal vocational and specialised baccalaureate (in combination with an apprenticeship or occupational field in the subject area). In addition to these admission routes, however, there are also other options, which ensures that students can switch among programme types. Alternative admission types usually require an additional prior qualification. For example, admission to a conventional university requires the applicant with a federal vocational or specialised baccalaureate to pass an additional "federal vocational baccalaureate – conventional university" or "specialised baccalaureate – conventional university" exam (university aptitude test), while admission to a university of applied sciences with a baccalaureate generally requires one year of work experience (cf. UAS Admission Ordinance[2]). The rate of baccalaureate students who transferred to a university of the various types confirms the status quo (→ figure 227). The overall transfer rate is highest among baccalaureate students (93% up to two years after graduation) and lowest among holders of a federal vocational baccalaureate (68%). Of those with a federal VET diploma who have not started in a federal vocational baccalaureate programme, only 11% transfer to a professional education programme in the first two years. The very low transfer rate is because professional education qualifications based on federal examinations are generally possible only after the person has several years of professional experience *(→ chapter Vocational education and training, page 125)*.

227 Transfer to universities and professional education

Transfers of graduates in 2018 up to two years after completion of upper secondary level; transfer rates of less than 3% are not shown.

Data: FSO (LABB); calculations: SCCRE



*Federal VET diplomas and specialised school certificates include only persons without a baccalaureate.

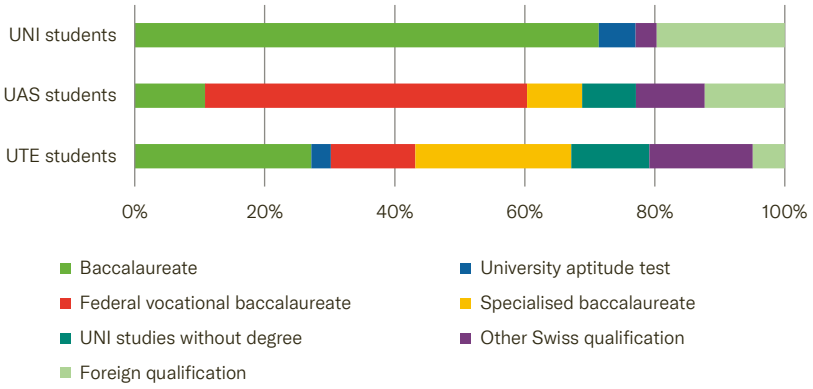
2 *Verordnung des Hochschulrates über die Zulassung zu den Fachhochschulen und den Fachhochschulinstituten (Zulassungsverordnung FH)* of 20 May 2021.

A look at BA students entering the programme in continuation of their previous schooling (→ figure 228) confirms that baccalaureate schools are the main feeder for conventional universities and that federal vocational baccalaureate schools are the main feeder for universities of applied sciences, whereas the student body of universities of teacher education is derived from a mix of prior educational institutions.

228 Breakdown of BA students by university type, 2021

Students starting at a university of the respective type for the first time

Data: FSO (LABB); calculations: SCCRE



Competencies and choice of tertiary education type

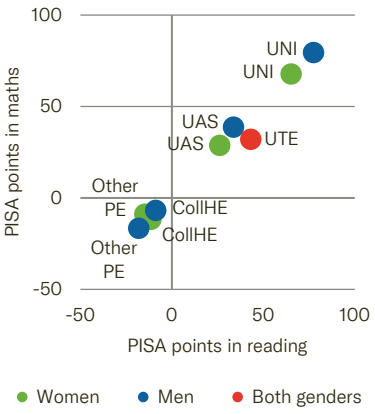
The various tertiary education types require a range of prior skills and knowledge. It can therefore be expected that the choice of tertiary education type also depends on individual competencies. Findings from Canton Aargau show that baccalaureate students with stronger final grades transfer more frequently to a conventional university and less frequently to a university of applied sciences or a university of teacher education than those with weaker final grades *(Diem, 2021)*. However, no standardised data on competencies at the end of the upper-secondary level is available at the national level. The competencies students have gained on completion of their compulsory schooling nevertheless give some indication of the connection between their skills and the programme they choose. Assuming that it also predicts well the differences in competencies on completion of an upper-secondary qualification *(→ chapter Baccalaureate schools, page 155)*, such information helps when analysing decisions on how students choose a tertiary programme.

Compared to the overall population, those who started to study at a university already have above-average reading and mathematical skills that they acquired during their compulsory schooling (→ figure 229), which can largely be explained by selection into baccalaureate schools. Young people who opt for the professional education track tend to have grades at the end of compulsory schooling that are below the (gender-specific) average of the general population. Systematic differences are also evident among the university types: Students at conventional universities have significantly higher competencies than those that enter a university of applied sciences or a university of teacher education. The following competencies ranking therefore applies: 1) conventional universities, 2) universities of applied sciences and universities of teacher education, and 3) professional education; this reflects both genders.

229 PISA score by education type

Deviations in PISA reading and mathematics scores from the (gender-specific) average by education type

Data: SEATS; calculations: SCCRE



Legend
The points shown indicate the difference between the PISA points of the respective group (e.g. men at conventional universities) and the gender-specific average (based on the national sample, PISA 2012). The latter is 526 points in reading and 524 points in mathematics for women, and 490 points in reading and 540 points in mathematics for men.
No gender-specific indication is possible for UTE graduates due to the small sample size.

Transfers and accessibility among university types

The modularisation of courses under the Bologna system was intended to make it easier for students to switch among universities and university types. This proves to be especially useful to those looking to switch from a BA to an MA programme. Transfer to a different university type is possible within a specialised field, in which case the student must complete a maximum of 60 additional credits *(CRUS et al., 2010)*. In the case of BA degrees, universities can also set minimum quality standards for curricula and content and specify minimum grades that students must have obtained while at another university type. Within one university type, all BA graduates can start in the subsequent MA programme in the corresponding field without having to meet additional requirements.[3] For admission to specialised MA programmes, on the other hand, universities can define additional knowledge and skills as prerequisite.

The **Bologna system** structures university education into three cycles:

1st cycle: BA
2nd cycle: MA
3rd cycle: Doctorate (PhD)

Previously legally valid university qualifications at the *Lizenziat* and *Diplom* levels correspond to the second cycle. Only conventional universities can confer doctoral degrees. However, cooperative arrangements in the form of jointly-run doctoral programmes exist between universities of applied sciences or universities of teacher education and conventional universities *(→ chapter Universities of applied sciences, page 255)*.

3 *Verordnung des Hochschulrates über die Koordination der Lehre an den Schweizer Hochschulen* of 29 november 2019.

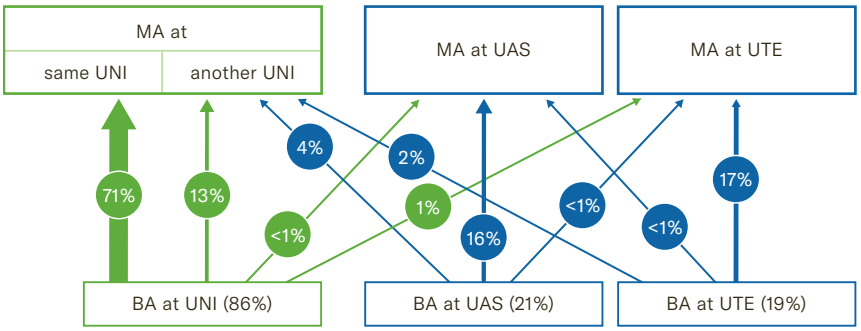
The proportion of BA graduates who continue with MA studies at a different university type is nevertheless small (→ figure 230). Likewise, students rarely use the option of switching from one university to another of the same type.

Transfer to an MA programme after a BA degree from a UTE
Unlike in the case of teacher training for the pre-school and primary levels, students looking to become lower secondary level teachers must complete an MA programme to obtain a teaching license. BA graduates in the lower secondary field usually switch to an MA programme by an university of the same type.

230 Rate of transfer to MA level

Up to two years after completing the BA degree, 2019

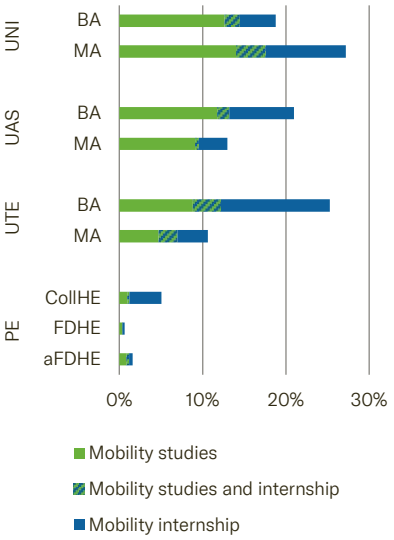
Data: FSO (LABB); calculations: SCCRE



231 Mobility rates by education type and level

Graduates in 2018; survey one year after graduation

Data: FSO (EHA, eHBB); calculations: SCCRE



BA	Bachelor
MA	Master
CollHE	College of higher education
FDHE	Federal diploma of HE examinations
aFDHE	Advanced federal diploma of HE examinations

International mobility

The federal government's international cooperation activities include measures to promote international cooperation in education as a way of developing the quality and competitiveness of institutions as well as the competencies of individuals. Such activities also include support for international mobility of students and academic staff. The EU's education programmes, such as Erasmus+, are particularly important for Switzerland due to its close economic and cultural ties with Europe. In 2014, however, Switzerland lost its affiliation with the current Erasmus+ programmes and now can participate in them only with third-country status. Since then, student mobility has been promoted as part of the Swiss-European Mobility Programme (SEMP), an interim solution for funding outbound and inbound mobility[4] directly. However, universities now must negotiate bilateral agreements with each foreign university, which is not always possible. In contrast to full affiliation, strategic partnerships and cooperation projects as well as political participation also remain significantly reduced or in some cases impossible altogether. As of 2022, however, Switzerland will participate as an associate member in the "European Universities" initiative, which promotes cross-border cooperation projects in teaching, research, innovation and services.

A look at the mobility rates shows that, depending on the type of university and level, between 11% and 27% of students at a university complete a semester or an internship abroad (pure programme mobility: 7–18%) (→ figure 231). In contrast, international mobility is not widespread among

4 Outbound mobility: Swiss students studying abroad; inbound mobility: Foreign students studying at a Swiss university.

graduate of professional education. This can be explained by the fact that practically no comparable training programmes exist abroad. On the other hand, many training programmes count as non-formal further education and training for which there are no mandatory preparatory courses. Comparisons with other European countries suggest that the overall mobility rate in Switzerland is similar to the average of the 28 EU countries *(European Commission et al., 2020a)*.

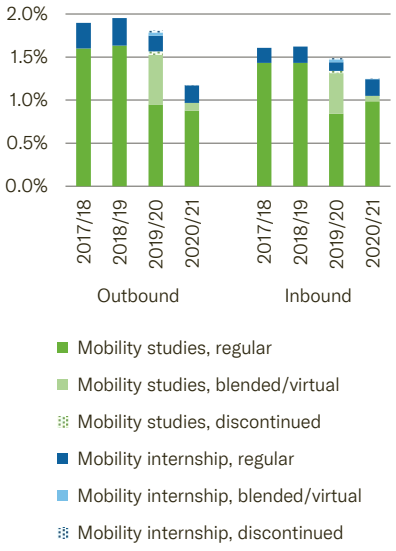
A look at the trend in mobility rates in recent years clearly shows that the COVID-19 pandemic has caused student mobility to decline sharply (→ figure 232). Compared to the academic year 2018–2019, outbound student mobility under the interim SEMP or Erasmus programme dropped by 38% and inbound student mobility by 14% *(Movetia, 2021)*. During the 2020 spring semester when the pandemic first reached Europe, the number of programme participants had hardly decreased. Most students continued their planned stay abroad in a virtual format, often without being physically present on a foreign campus. The big drop in numbers occurred only in the autumn semester of 2020. The sharp decline in mobility clearly indicates that being physically abroad is important to students and that only a few will use purely virtual mobility as an alternative.

Students who go abroad to study can broaden their personal horizons, develop their language skill and learn about other cultures *(Zimmermann et al., 2021)*. This raises the question about the extent to which study-abroad stays influence students' later success in the job market. This question is hard to answer, as mobile individuals differ from those who are not in many ways that are important for success in the job market. Some recent studies that take these differences into account indicate a positive effect on the chances of finding a job *(d'Hombres & Schnepf, 2021; Petzold, 2021)*, while others have identified no significant effect *(Van Mol et al., 2021; Wiers-Jenssen & Støren, 2021)*. The findings are also mixed in terms of the influence of study-abroad stays on wages *(Netz & Grüttner, 2021; Van Mol et al., 2021)*. As with other questions, it is difficult to apply the findings of such studies to other countries due to differences in labour markets – namely in terms of internationality and thus the significance of international experience as a success factor for prevailing in the labour market. However, when measured by the strong internationalisation of the Swiss labour market, the value of experience gained abroad would tend to be high for Swiss students.

232 Annual Erasmus and SEMP mobility rates, 2017–2020

Only BA and MA students

Data: Movetia, FSO (SHIS); calculations: SCCRE



The **"blended/virtual" category** includes partially or fully virtual forms of mobility (i.e. from home without physical presence). In the academic year 2019–2020, this also included forms of mobility where courses were switched to online.

Outbound mobility
Proportion of students who completed an Erasmus or SEMP semester outside of Switzerland in the respective academic year, compared to all students at Swiss universities

Inbound mobility
Proportion of foreign students who completed an Erasmus or SEMP semester at a Swiss university in the respective academic year, compared to all students at Swiss universities

Demand for part-time programmes

Three quarters of students are gainfully employed during their studies, with over half of them working more than 20% of a standard full-time work week *(FSO, 2021j)*. On average, students spend around 35 hours per week on studies, ten hours on their job, and six hours doing household and family work.

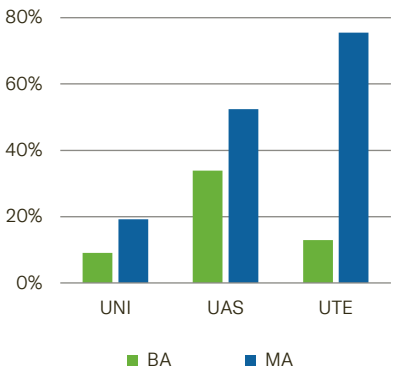
The significant time commitment for holding down a job and doing household and family work indicates a need among students for programmes which are either part-time or afford some flexibility in the schedule. Some universities, namely universities of applied sciences and universities of teacher education, explicitly offer part-time programmes. Other universities do not offer separate programmes for part-time students but allow them to manage their studies flexibly to some extent. A third group requires students to attend all classes in person due to highly structured nature of the programme.

The proportion of students who mentioned that they are studying part-time reveals substantial differences among university types and levels (→ figure 233). Around three times as many students study part-time at universities of applied sciences than at conventional universities. However, this does not conclusively mean that programme intensity at conventional universities is higher than at universities of applied sciences because it can be assumed that by no means all those who claimed not to be part-timers are in fact carrying a full-time workload from the programme (60 ECTS credits per year). Part-time students are significantly more common at the MA level than at the BA level. This can be explained by MA programmes being less structured and MA students already having a qualification that gives them easier access to a job within their field. However, there is a strikingly high proportion of part-time MA students at universities of teacher education, mainly in the programme for teaching at the lower secondary level. In this programme, the MA degree is considered the standard, whereas the BA degree – unlike in the case of teacher training at primary level or of most degree programmes at universities of applied sciences – does not yet count as a sufficient qualification. The fact that most MA students nevertheless are gainfully employed can probably be explained by the severe shortage of teachers. There is no information about how employment during studies affects the graduation rate, the duration of studies, or the quality of the degree. Theoretically, there are likely to be both positive and negative effects.

233 Proportion of part-time students, 2020

Based on students' statements

Data: FSO (SSEE); calculations: SCCRE



The proportions refer to the period before the COVID-19 pandemic.

Labour market opportunities

Over the past 20 years, the employment rate of graduates with a tertiary qualification one year after graduation has ranged between 83 and 97%, depending on the degree type and the economic situation (→ figure 234). From 2007 to 2019, the employment rate was very stable, while in 2021 the rate increased sharply. This is mainly due to the new entry and definition of gainful employment *(→ Margin text, pagina 213)*. The COVID-19 pandemic may also have had a positive effect on the employment rate due to the additional need for temporary workers and restrictions on travel abroad. At any rate, analyses of data on graduates five years after completion of the programme indicate a higher labour force participation in 2021 *(FSO, 2022b)*.

Graduates of universities of teacher education and professional education institutions have the highest employment rates. The lowest rate is among graduates from conventional universities. One explanation for the higher employment rate among graduates from universities of applied sciences compared to graduates from conventional universities is the likelihood that the degree programmes at universities of applied sciences prepare students for a specific profession. On the other hand, many graduates from universities of applied sciences have basic vocational education training and thus, on average, more professional experience, making it easier for them to enter the labour market *(Oswald-Egg & Renold, 2021)*.

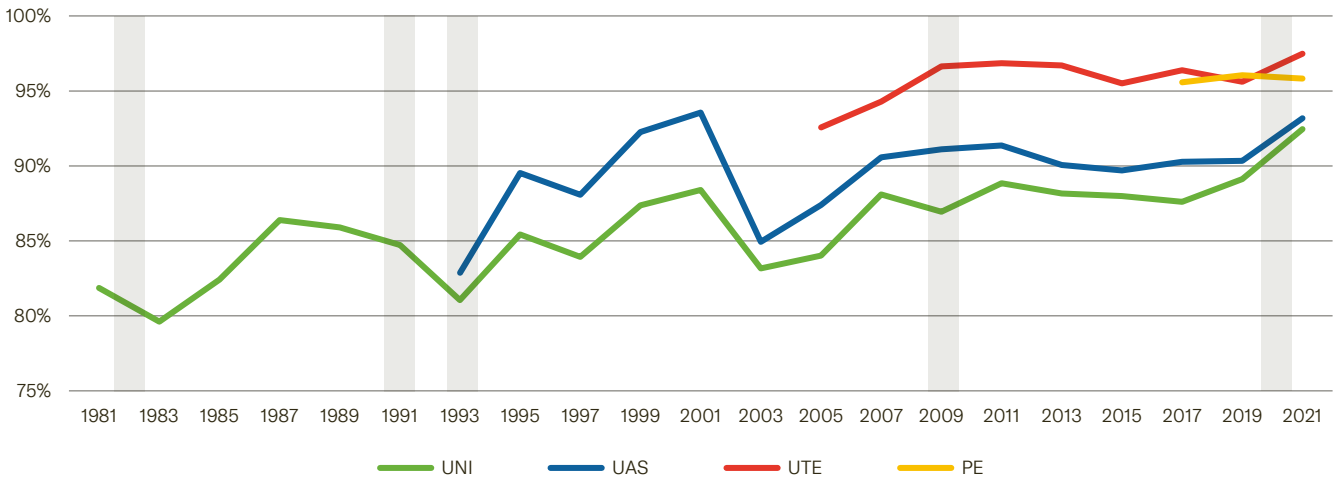
The **employment rate of university graduates for 1981–2019** is derived from the share of those who answered "yes" to the question about being employed, measured against the total number of graduates. Participants in a Regional Employment Centre (RAV) programme do not count as employed persons.

The **employment rate for 2021** differs from the above definition. Based on changes in the questionnaire, from 2021 onwards the definition of "employed" includes all those who during the reference week worked at least one hour for pay, worked without pay in a family business, or had a job even though they were absent at that time. For graduates of professional education programmes, this definition applies already from 2017.

234 Employment rate of tertiary degree-holders, 1981–2021

UNI: only graduates of the second cycle (licentiate, diploma, MA); UAS/UTE: graduates of the first cycle (BA, diploma), provided they have not started an MA at the time of the of survey, as well as graduates of the second cycle; grey bars: years with negative economic growth; year 2021: revision of the survey questions / redefinition of "employment rate"

Data: FSO (EHA, eHBB), SECO; calculations: SCCRE

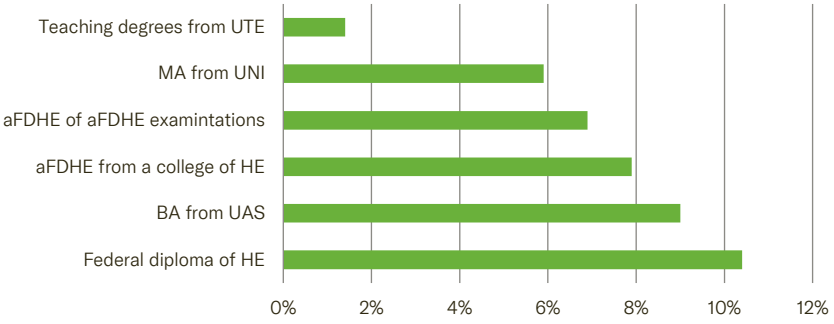


Success in the labour market, however, depends not only on whether someone is merely employed but also on whether the job fits with his or her education and training. A look at the proportion of inadequately employed persons one year after graduation (→ figure 235) indicates that this varies greatly by programme type. It ranges between 1% (UTE teaching diplomas) and 10% (Federal Diploma of Higher Education). In contrast to the employment rate indicator, graduates from conventional universities do comparatively well here. They are less likely to be inadequately employed than graduates from professional education programmes and from universities of applied sciences. The inadequacy rate is by far lowest among UTE graduates, which can be explained firstly by their programmes relating specifically to the profession, secondly by the strong demand for teachers, and thirdly because they actually enter the teaching profession. We can only speculate why graduates from professional education (namely those with a diploma from a college of higher education and with a federal diploma of higher education) and from universities of applied sciences tend to do worse. One explanation could be that such students more often continue in their original occupation despite having a higher level of education – at least for a certain period. However, students' socio-demographic composition, canton of residence, subject area, time when starting to work, as well as the number of job vacancies do not explain the differences *(FSO, 2022g)*. A look at opportunities in the labour market five years after graduation indicates that differences in employment and unemployment rates among university types, as well as the various ratios of those who are inadequately employed when entering the labour market, continue even four years later *(FSO, 2020h)*.

235 Proportions of inadequately employed graduates by degree type, 2019

Data: *FSO (2022g)*

A person is considered to be **inadequately employed** if his or her position a) does not require a university degree (or a tertiary degree in the case of graduates of professional education) or b) does not properly match the professional skills acquired during university education (Level 1 or 2 on a scale from 1 "not at all" to 5 "to a high degree").



BA Bachelor
MA Master
aFDHE Advanced federal diploma of HE
HE Higher education

A look at earned income makes it clear that wages vary greatly by subject area (→ figure 236). Income differences among subject areas are significantly larger than those among university types. Extrapolated to a full-time position, university graduates earn on average between CHF 58,000 and CHF 87,000 per year (median values) one year after graduation. In the subsequent four years, average income rises to between CHF 70,000 and CHF 110,000.

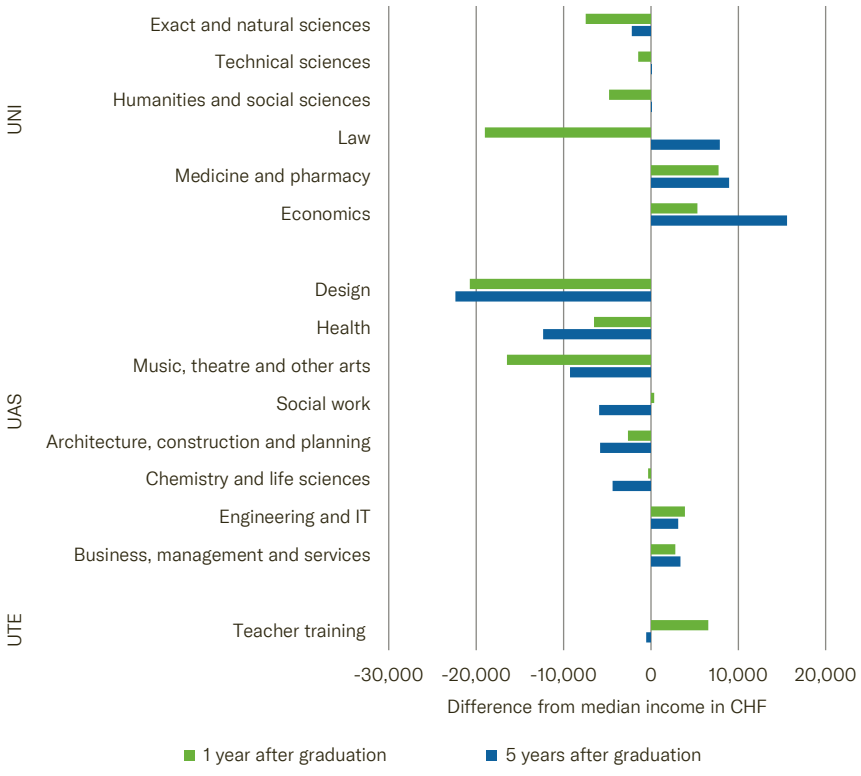
Holders of a teaching qualification have above-average salaries one year after graduation and average salaries five years after graduation. Among graduates from universities of applied sciences, the highest wages are found in the engineering and IT sectors, as well as in business and services. The lowest incomes are in the design, arts and health sectors. For graduates from conventional universities, the highest salaries are in medicine and pharmacy, economics, and law (five years after graduation). The low starting salary or the strong increase in income during the first years of professional life in the field of law can be explained by the mandatory internship for prospective lawyers. In the humanities and social sciences, as well as in the exact and natural sciences, starting salaries are below average.

Starting salaries also reflect the economic situation *(Shvartsman, 2018)*. Unfavourable economic conditions at the time of labour market entry have a negative effect on wages one year after graduation. Income disadvantage even out partially over time; however, five years after graduation, wages are still lower.

236 Differences in income by subject area and university type, 2021

Deviation in gross earned income from the average of all graduates; average earned income estimated using quantile regressions for full-time employment and same age; UNI: only MA degrees; UAS/UTE: BA degrees among those who have not started a MA, and MA degrees

Data: FSO (EHA); calculations: SCCRE



The **median income** one year after graduation (at age 27) is CHF 77,000; five years after graduation (at age 31) it is CHF 92,000.

Research on conventional universities has shown that an internship during studies leads to higher wages after graduation *(Bolli et al., 2021)*. In addition, completing vocational training before studying also has a positive effect on entry-level salaries *(Oswald-Egg & Renold, 2021)*, although no systematic differences can be found five years after graduation. MA graduates generally earn higher wages than BA graduates, and holders of a PhD earn more than those with an MA degree *(Glauser et al., 2019b; Zölitz & Zweimüller, 2021)*. Differences among the levels are also evident in terms of socio-economic status *(Glauser et al., 2019a)*.

Digital skills

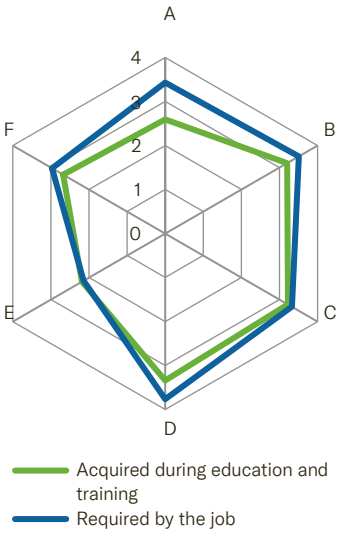
The federal government has made digitalisation in the university sector an important priority. The measures laid out in the "Digitalisation Action Plan" will be continued in the initiative concerning the Promotion of Education, Research and Innovation (ERI) for the period 2021–2024 *(SERI, 2020a)*. In particular, this involves the promotion of applied skills in university teaching. The Rectors' Conference of the Swiss Universities (swissuniversities) has identified digitalisation as a priority and defined various measures. The priority is on training specialists in information and communication technology and strengthening the digital skills of academic staff and students. For example, universities should aim to use digitalisation to improve teaching and make it more flexible and personalised. Challenges to be addressed include redesigning curricula, developing new forms of learning and teaching, making organisational adjustments, and devising new ways of teaching digital skills *(swissuniversities, 2018)*. Project-linked contributions (PLC) were granted for this purpose *(SERI, 2017)*, namely PLC Project P-8 "Digital Skills", with a budget of CHF 30 million for 2019–2024, and PLC Project P-5 "Research Information". The latter aims to promote coordination among universities with a view to improving the range of scientific content *(swissuniversities, 2020b)*.

The data on graduates can be used to gauge how those who completed their studies assess their digital skills. Because the assessment takes place within one year after graduation, and respondents are likely to know the requirements of the current occupation well and are unlikely to overestimate their skills. A comparison of the skills a job requires with those that the job holder has acquired indicates that there is good match: Job holders who require highly developed skills in a particular field will acquire them largely during training. The major exception is skills relating to data protection and security, for which on-the-job requirements are seen to be significantly more stringent than what was taught during training. In addition, the way that graduates choose their job and the selection procedures employers use to fill positions tend to ensure that acquired and required skills are reasonably in line (→ figure 237).

237 Digital skills acquired during training and required by the job, 2021

Graduates' evaluation of how well digital skills they acquired during training match with those the job requires

FSO (EHA); calculations: SCCRE



The Survey of Higher Education Graduates (FSO) identified the following six items in how digital skills are operationalised:

A Skills in data protection and data security
B Ability to create and edit digital content
C Ability to evaluate the relevance and quality of digital information and data
D Ability to collaborate using digital technologies
E Programming skills
F Ability to use digital technologies in new ways

The comparison between the subject areas uses estimated values that include age and gender as well as all factors that significantly affect how skills can be evaluated (→ figure 238). In subject areas where the digital skills acquired during training are rated as rather low, the job requirements are also rated low in this regard. Skills gaps would therefore be a problem only if much higher digital skills are suddenly needed in a field that had previously been less digitised.

International comparison of education quality

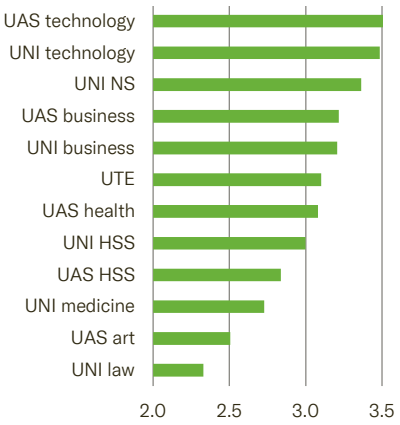
Comparing the quality of tertiary education internationally raises the question of which standards should or can be used. Here, university rankings are the best option, in the absence of better alternatives. Yet using them also raises questions about their value for gauging quality: For example, they do not sufficiently consider different academic cultures, and the comparisons depend heavily on achievements in research and less so on results in teaching. However, university rankings attract a great deal of attention, not least among employers. Moreover, academic research shows that these rankings help students to choose a university *(Koenings et al., 2020)*. Rankings therefore play an important role and can serve as proxy for the quality of the education a particular institution provides.

To enable comparisons among countries, the following section examines the proportion of students who attended one of the world's top 200 universities in their country, based on Shanghai Ranking (→ figure 239). For this indicator, however, a country's place depends not only on the measured quality or output of its tertiary education system but also on the design of the tertiary programmes. For example, incorporating lower-rated universities or subject areas (such as teacher education) into a university that is high on the list will tend to raise the percentage of students at a top-200 university. At the same time, the reverse has also occurred in many cases: Universities have divided themselves up so that the part with strong research capabilities of the former whole institution pushes them up in the ranking. Even though "proportion of students at a top university" as an indicator only roughly captures the quality or effectiveness of the tertiary education system, this evaluation method does put Switzerland in a leading position (→ figure 239). Roughly a quarter of students attend one of the top-200 universities here, while in the country with the highest number of best-ranked universities (USA) this only applies to just under ten percent of students.

238 Digital skills acquired during training

Evaluation of skills acquired during training in the context of applied digital technologies

Data: FSO (EHA 2021); calculations: SCCRE



Estimated values by controlling for age and gender

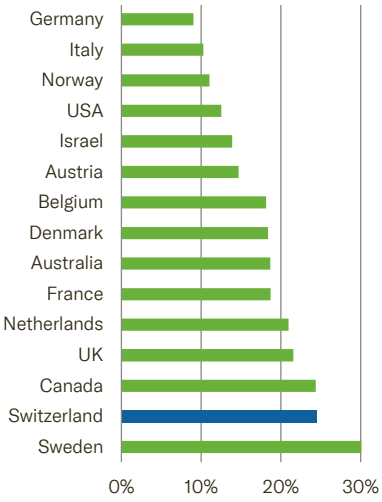
Dimension: Average of 4 items (scale 1–5): Create digital content, evaluate the relevance and quality of digital information, collaborate using digital technologies, use digital technologies in new ways

UNI Students with MA
UAS Students with BA
UTE Students with degree

239 Proportion of students at a top-200 university, 2021

Based on Shanghai Ranking 2021

Data: UNESCO, SCCRE web research; calculations: SCCRE



To more accurately reflect the structures of the tertiary education sector, the comparison uses only ISCED Level 6 (BA or equivalent).

With the **evaluation criteria** used commonly for university rankings, only conventional universities in Switzerland have a chance of making it on to the list of the top 200 universities. In the three most popular rankings – Shanghai Ranking (Academic Ranking of World Universities), Times Higher Education World University Ranking and QS World University Ranking – seven Swiss universities came in among the top 200 in each of the last five years (2017–2022). These seven universities serve almost 80% of Switzerland's university students. The fact that the proportion of students at a top-200 university is significantly lower in figure 239 can be explained by the large number of students at universities of applied sciences, universities of teacher education and in professional education.

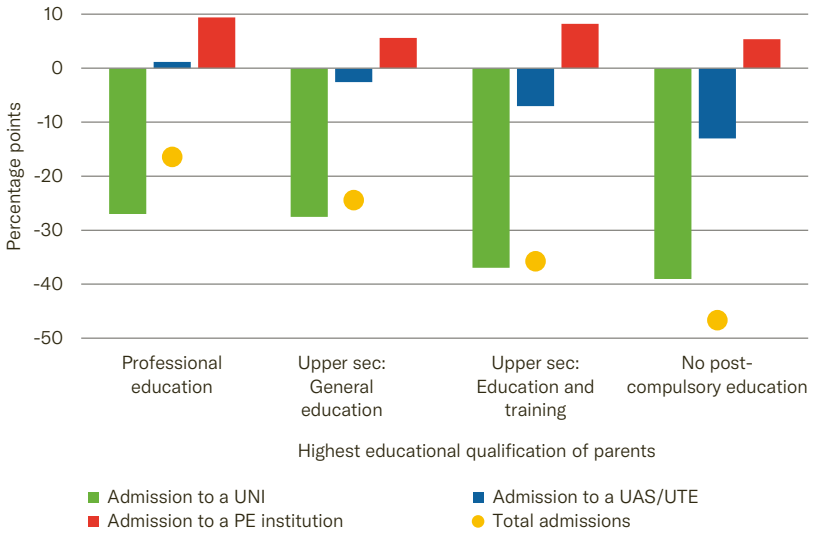
Social disparity

Access to higher education in Switzerland, as in most countries, is related to social background. Children from academic families are much more likely to enter and successfully complete a higher education programme than those whose parents did not study *(Buchmann et al., 2016; Combet & Oesch, 2021; Zimmermann & Seiler, 2019)*. Data from the Longitudinal Analyses in Education (LABB) programme shows that of the children who enter a conventional university, just under half have parents who have a university degree. For the other children, the respective share is almost 30 to 40 percentage points lower, depending on the parents' educational qualifications (figure 240). The differences are somewhat smaller for admissions to universities of applied sciences and universities of teacher education. The professional education is a special case. In contrast to access to university, children with university-educated parents are underrepresented in professional education programmes. They are less likely to start in a respective programme, which has a levelling effect on the overall transfer rate to tertiary education.

240 Admission rate to tertiary education linked to educational origin

Deviations from the admission rates of students whose parents have a university degree; cohorts of compulsory school-leavers, 2011 and 2012

Data: FSO (LABB); calculations: SCCRE



Of the students whose parents have a university degree, 46% started at a UNI, 23% at a UAS/UTE, and 6% a professional education programme by 2021 (total: 75%).

Legend
For students whose parents have a professional education qualification, the conventional university admission rate is 27 percentage points lower than for those whose parents have a university degree. This results in a conventional university admission rate of 19% (46 – 27 = 19), just under half the admission rate of academics' children. Overall, however, the admission rate for tertiary education is "only" 16 percentage points lower than for children whose parents have a university degree. This can be explained by the fact that those whose parents have a professional education qualification are more likely to enrol in professional education, in a UAS or UTE.

However, it is important to bear in mind that these comparisons do not reflect performance in school and its influencing factors because they are not included in official statistics. In earlier studies, however, school performance and its determinants have been shown to be important explanatory factors in a person's decision to study or when choosing a type of tertiary education *(Buchmann et al., 2016; Burger, 2021)*.

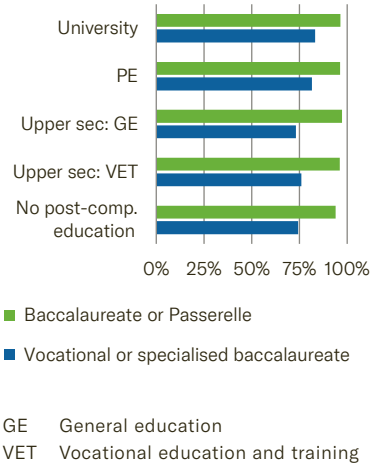
In Switzerland, social inequality is mainly reflected in socially determined access to upper-secondary-level education. As a result, students at conventional universities are a more socially selective group than those at universities of applied sciences and universities of teacher education. Strong social disparities in university access can therefore largely be explained by the fact that children whose parents do not have a tertiary degree more often do not obtain a baccalaureate and therefore do not have the formal qualification to study at a university. When considering only those with an academic baccalaureate, the admission rate to tertiary education hardly differs by educational background (→ figure 241). The differences are moderate for holders of a federal vocational or specialised baccalaureate. However, there are differences in how prospective students choose a university type: Within the group of baccalaureate students, those whose parents have a university degree are more likely to transfer to a conventional university and less likely to transfer to a university of teacher education *(Denzler, 2011; Diem, 2021)*.

There are also differences in the choice of subject area (→ figure 242). The proportion of students whose parents have a university degree varies greatly by subject area. At conventional universities, these subject areas consistently have higher proportions of students whose parents have completed higher education than the corresponding areas at universities of applied sciences and universities of teacher education. The only exception is art, which is taught at universities of applied sciences and has a student body with background similar to that of conventional universities.

241 Admission rate to tertiary education among those with a baccalaureate

By parents' highest educational attainment and baccalaureate type; cohorts of compulsory school-leavers, 2011 and 2012

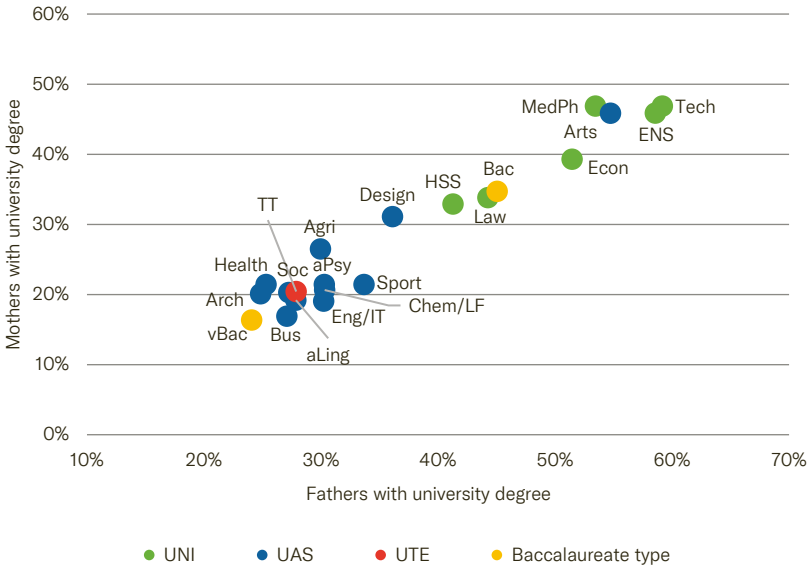
Data: FSO (LABB); calculations: SCCRE



GE General education
VET Vocational education and training

242 Education backgrounds of university students by subject area, 2020

Data: FSO (SSEE); calculations: SCCRE



Subject area

Agri	Agriculture and forestry
aLing	Applied linguistics
aPsy	Applied psychology
Arch	Architecture, construction and planning
Arts	Music, theatre and other arts
Bus	Business, management and services
Chem/LF	Chemistry and life sciences
Eco	Economics
Eng/IT	Engineering and IT
ENS	Exact and natural sciences
HSS	Humanities and social sciences
MedPh	Medicine and pharmacy
Soc	Social work
Tech	Technical sciences
TT	Teacher training

Baccalaureate type

Bac	Baccalaureate
vBac	Federal vocational baccalaureate

The extent to which social disparity in access to tertiary education in Switzerland is a factor compared to other countries becomes apparent when comparing the proportion of students whose father has (or does not have) a tertiary degree with the proportion of men between the ages 40 and 59 with (without) a tertiary degree in the resident population (→ figure 243). Based on this indicator, Switzerland proves to be comparatively less socially selective. Students whose father has a tertiary degree are less overrepresented compared to the proportion of men with a tertiary degree in Switzerland's resident population, which means students whose father does not have a tertiary degree are less underrepresented than in the majority of other European countries.

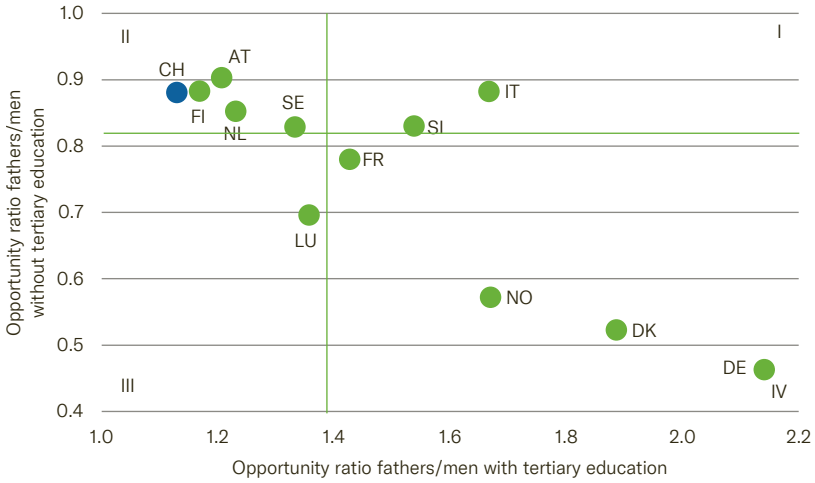
The **"opportunity ratio of fathers/men with tertiary degree"** reflects the proportion of students whose father has a tertiary degree against the proportion of the 40- to 59-year old male resident population with a tertiary degree. The higher the value is above 1, the more overrepresented are those whose father has a tertiary degree.

The **"opportunity ratio of fathers/men without tertiary degree"** reflects the proportion of students whose father does not have a tertiary degree against the proportion of the 40- to 59-year old male resident population without a tertiary degree. The lower the value, the more underrepresented are those whose father does not have a tertiary degree.

The green lines represent the average of the European countries (Eurostudent participant countries). The countries in the second quadrants are the least selective; the countries in the fourth quadrant are the most selective.

243 Social disparities in access to tertiary education, 2019

Data: Eurostudent VII, EU-LFS; calculations: SCCRE

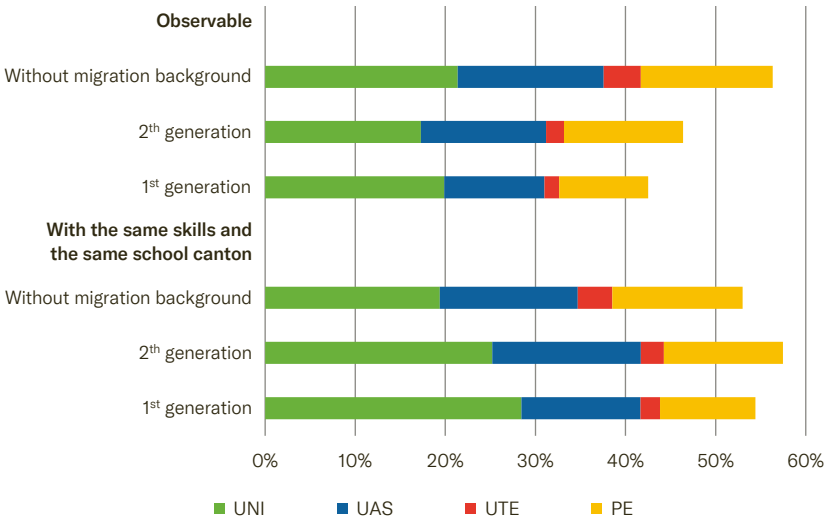


Migration background

People with a migration background are underrepresented at universities. They are less likely to transfer to a university of applied sciences or university of teacher education and tend to study less frequently at a conventional university (→ figure 244). However, the lower probability of studying at a university is mainly due to the weaker skills the individual acquired by the end of his or her compulsory schooling. When considering the same (PISA) competencies, first- and second-generation migrants are even more likely to enrol in a university programme – namely at a conventional university – than persons without a migration background. This finding is consistent with the explanation that migrants on average have higher educational aspirations or show a higher preference for schools with general education programmes *(Abrassart et al., 2020)*. In terms of access to professional education programmes, no significant differences can be observed between people with a migration background of the second generation and those without a migration background. First-generation migrants, on the other hand, enrol in professional education programmes less frequently.

244 Admissions to tertiary education by migration background

Data: SEATS; calculations: SCCRE



Barrier-free access

Access to higher education in Switzerland is firmly anchored in the law for people with disabilities, as is their right to equal participation in study programmes.[5] To ensure barrier-free access to equal and independent study, various measures, such as access to buildings and homepages, must be ensured for blind people and other access arrangements must be implemented in an institutionalised form. A systematic survey on accessibility at universities conducted about ten years ago found that there was still a strong need for action in this regard *(Kobi & Pärli, 2010; Meier-Popa, 2012)*. The extent to which accessibility has improved since then is difficult to gauge, as such data is no longer being collected to a sufficient degree. In the meantime, however, all Swiss universities have set up a contact point for people with disabilities *(Kronenberg, 2021)*. The examples of two universities *(Dietsche, 2015; Passalacqua et al., 2018)* as well as a survey of deaf and hearing-impaired persons *(Hohenstein et al., 2018; Rodríguez Vázquez et al., 2018)* nevertheless make it clear that the ideal of obstacle-free and inclusive universities has not yet been reached. Moreover, stereotypical images and a weak commitment to making inclusion a strategic goal are likely to undermine progress in this area *(Dietsche, 2015)*. Questions concerning whether and to what extent existing barriers hinder impaired persons wishing to enrol in and successfully complete tertiary programmes cannot be answered with the data currently available.

The **project-linked federal contributions** 2021–2024 initiative includes funding for a project to improve the access to the programmes at Swiss universities. Specifically, suitable accessibility measures will need to be developed for a range of problem areas and target groups. In the previous promotional phase, two other projects were funded to develop the basis for barrier-free access to education and study at Swiss universities and to professionalise a network.

5 Art. 8 Federal Constitution, Art. 1 & 2 Disability Discrimination Act, and the UN Convention on the Rights of Persons with Disabilities (0.109)

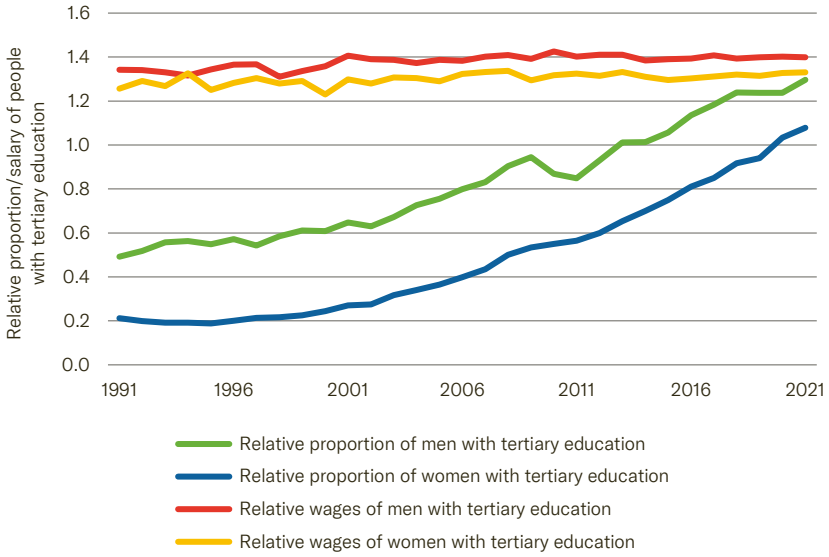
Demand for tertiary education

The strong growth of education observable in Switzerland, as in other developed countries, over the past 30 years has not led to a decline in the return on education. Strong growth in the number of highly qualified job-seekers does not result in lower wages for years of study if the demand for more highly educated workers, driven by technological change, increases to the same extent *(Acemoglu, 2002; Freeman, 1986; Tinbergen, 1974)*. This seems to have been the case for Switzerland over the last three decades, as can be confirmed with data from the Swiss Labour Force Survey (SLFS) since 1991 (→ figure 245). While the ratio of tertiary degree-holders to those with a post-compulsory education as the highest qualification rose from 0.4 to 1.2, the relative wage advantage of the former compared to the latter remained steady at about 40% (wage ratio of 1.4).

245 Relative share and return on education of tertiary degree-holders, 1991–2021

Ratio of tertiary degree-holders to those with upper-secondary education as the highest qualification (25- to 64-year-olds in a job); ratio of median salary of tertiary degree-holders to those with upper-secondary education (ratio indicates the wage advantage).

Data: FSO (SLFS); calculations: SCCRE



Both men and women with a tertiary degree have a constant wage advantage, although the tertiary rate for women increased significantly more. This means that the rise was more than offset by a strong increase in demand for highly qualified women.

Lack of specialists

The fact that growth in tertiary education roughly matches growth in demand for tertiary-degree-holders does not automatically mean that supply and demand are in balance across all subject areas. For example, the shortage of skilled workers in the STEM (mathematics, information technology, natural sciences and technology) and health sectors has been an issue for years. To determine the (future) shortage of skilled workers, an index value was calculated for each educational field and level based on a system of indicators *(SECO, 2016)*, which was applied proportionally to the future number of trained persons *(FSO, 2019a)*. The results suggest that two-thirds of tertiary degree-holders are employed in occupations with an above-average demand for skilled workers. Thus, the majority of educational fields are affected by an above-average need for workers, whereby the three fields with the highest need are in the health sector. Most occupational fields, however, can expect above-average demand for skilled workers – to be offset by an above-average increase in the supply of skilled workers, an indication that the education system is working well. The analyses also clearly indicate that demand for skilled workers can vary greatly within a specific occupational field. Thus, fields with above-average demand for skilled workers may have occupations with lower demand and, conversely, occupational groups with lower demand may see occupations with a high demand.

In the fields of health and STEM, the current trend in tertiary degrees should offset the shortage in the corresponding occupational field somewhat *(FSO, 2019a, 2022m)*. Comparisons with other OECD countries show that Switzerland has a relatively large number of students studying STEM subjects, with a very low proportion of women *(OECD, 2021a)*. Efforts have been made for many years to change this. Although the number of women enrolling in universities has increased steadily over the last 20 years, they remain significantly underrepresented in the STEM subjects. This circumstance is further exacerbated by the fact that women drop out or change their studies more frequently in subjects where they are already weakly represented *(Bostwick & Weinberg, 2022; Diem, 2016)* (→ figure 246).

To increase the **number of degrees in human medicine**, the federal government and the cantons have launched a special programme, with the goal to increase the number of degrees in this field permanently from around 900 (in 2016) to 1350 by 2025. In 2021, 1088 MA degrees were awarded.

246 Drop-out rates by gender and proportion of men in the subject area

UNI BA admission cohorts, 2014 and 2015

Data: FSO (LABB); calculations: SCCRE

Proportion of men: Proportion of men entering UNI BA programmes by subject area, year and university

Drop-out rate: Proportion of students who dropped out of the original subject area (change of subject area or drop-out) per subject area, admission year and universit

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION
AND TRAINING

UNIVERSITIES

Context

Unless specified otherwise, the term **student** as used in this chapter includes all students at Bachelor's, Master's, licentiate and diploma levels, but not students at Doctorate level or students taking part in continuing education and training.

For universities, the number of students is of key importance, as they need to adjust their range of studies (lectures, infrastructure) accordingly. In addition, the financing – in particular in the cantonal universities – depends to a large extent on student numbers *(→ chapter Tertiary-level education, page 193, → Efficiency/costs, page 244)*. The number of students depends on various factors – such as the number of students with a Swiss university admission qualification (which in turn depends on the demographics and the organisation of the feeder schools), study inclination, in other words, the transition rate to universities (which is influenced by the economic situation), the number of entries with a foreign admission qualification (foreign-educated foreign nationals), the number of years of study as well as the position of the university as a competitor of other higher education institutions. There are limits to the possibilities of universities themselves to influence the number of students.

The various factors have led to the fact that the number of students at universities has continued to rise in the last few years. In 2021, around 130,000 individuals were counted, not including students at Doctorate level and those completing further training.

Demographics, academic baccalaureates and migration

In the decade before 2010, a sharp rise in the number of academic baccalaureates was observed, which led in the period 2010–2019 to a significant increase in the student body at universities. From 2010 onwards, however, the number of 15 to 20-year olds in the population dropped slightly, while the academic baccalaureate rate somewhat increased and the transition rate to universities stabilised. This meant that there was not an additional rise in the number of students. On the other hand, as a result of the increasing number of academic baccalaureates in the first decade of the 2000s, considerably more students with an academic baccalaureate entered the Master's level between 2010 and 2019; the increase amounted to 20% according to data of the Swiss Higher Education Information System (SHIS), while it was only 4% at Bachelor's level. During the same period, the number of Passerelle examinations (taken in addition to the federal vocational baccalaureate and the specialised baccalaureate with a view to entering universities) almost tripled. However, as its share is still very low, measured against the number of academic baccalaureates, this development has hardly affected the development of student figures. On the other hand, growth was driven by the fact that the number of persons with a foreign admission qualification strongly increased, in particular at Master's level. The number of entries by applicants with a foreign university entrance qualification (foreign-educated foreign nationals) has increased at this level by around 50%. Somewhat more than half of them are students who have come to Switzerland specially for their Master's, while the others have already graduated here with a Bachelor's. Growth at Bachelor level was less at 11%. However, it is considerably higher than that of entries of students with a Swiss baccalaureate. In the meantime, students with a foreign admission qualification make up almost a quarter of students (status 2021/22). Most of the international students come from neighbouring countries – at Bachelor level it is around two-thirds and at Master's level just under half.

Influence of the Covid-19 pandemic on student intake

The student numbers rose sharply in 2020 as a result of the Covid-19 pandemic. At Bachelor level alone, the number of admissions rose by 2400 students (+12%) compared with 2019. This rise exceeds the increase that would have been expected based on the previous empirical values with the current slump in economic growth. In previous years, a slump in economic growth also led to an increase in the number of new students, because they were less able to finance a gap year through gainful employment. What was also new during the Covid-19 pandemic was that other activities during a gap year – travel, for example – were no longer possible or only possible with major restrictions. The increase in Bachelor admissions in 2020 could be particularly attributed to the fact that the baccalaureate students who received their baccalaureate in 2020 more frequently entered a university directly *(FSO, 2021f)* (→ figure 247). The increase was greater among women than among men, which can be partially explained by the fact that even during the pandemic year 2020 some of the men entered basic military training after baccalaureate school. The more frequent direct entries resulted in a compensation effect in 2021, which was again established as stronger among women than men: The baccalaureate students of the graduation year 2020 who transitioned to a university without a gap year were lacking in 2021. Altogether, the number of entries in 2021 decreased to a similar level as in 2019. Compensatory movements such as these could also be observed in earlier cycles.

According to estimates by the Federal Statistical Office (FSO) *(FSO, 2021f)* the number of academic baccalaureate students who took up studies at a university straight away in 2020 due to the pandemic increased by 8 percentage points or around 1500 persons compared with the previous trend. Under normal circumstances, these persons would have taken a gap year. Unlike other countries, the number of international students in Switzerland has not declined, despite the pandemic, but has actually increased. This can be explained by the fact that the majority of international students come from neighbouring countries *(FSO, 2022a)*; the entry into Switzerland of these persons was less restricted than that of students from other countries. In addition, the less radical Covid-19 measures, in comparison with other countries, in spring and summer 2020 could possibly also have facilitated the growth. In many other countries, the number of newly admitted international students declined abruptly between 2019 and 2020, for example in the USA by 46% *(Institute of International Education, 2021)*. In Australia, the numbers even dropped by 62% – measured against the applications for international student visas *(Hurley, 2020)*. As in English-speaking countries in particular, many universities are mainly financed by international students, this also frequently led to financial problems in the universities concerned.

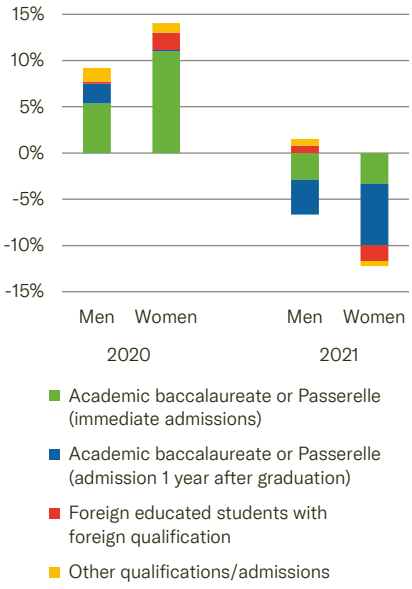
In addition to the quantitative consequences and the effect on the student numbers altogether, the economy usually has an impact on the choice of subjects. Studies from the United States show that pupil cohorts in low economic years more frequently choose fields of studies which are recession-resistant *(Ersoy, 2020)* or which offer higher salaries and better employment prospects. In years like these, women more frequently decide to study male-dominated subjects *(Blom et al., 2021)*. Although the pandemic in Switzerland was also accompanied by a slump in economic output

The **Covid-19 pandemic** did not only have an impact on the number of student admissions, but it also greatly changed teaching activities *(→ chapter Tertiary-level education, page 193)*. In addition, changes in the course of studies were observed *(→ Effectiveness, page 238; → Efficiency/costs, page 244)*.

247 Change in number of Bachelor's degree entrants compared to the previous year

By gender and admission type or qualification

Data: FSO (SHIS); calculations: SCCRE



(GDP), the choice of field of study has at least changed only slightly in the short term *(FSO, 2021f)*. Due to the growth in the number of students, the number of entries in all fields of education has considerably increased, whereby the areas of technology and medicine are exceptions. In medicine, the low growth can be explained by the numerus clausus. In contrast, the reason for the moderate growth in the technical sciences is unknown.

Forecasts for the student figures

The **development of the student figures** mainly depends on the number of academic baccalaureates, the ratio of persons who transition to a university with an academic baccalaureate as well as the number of international students. Creating forecasts for the long-term development is thus fraught with uncertainties.

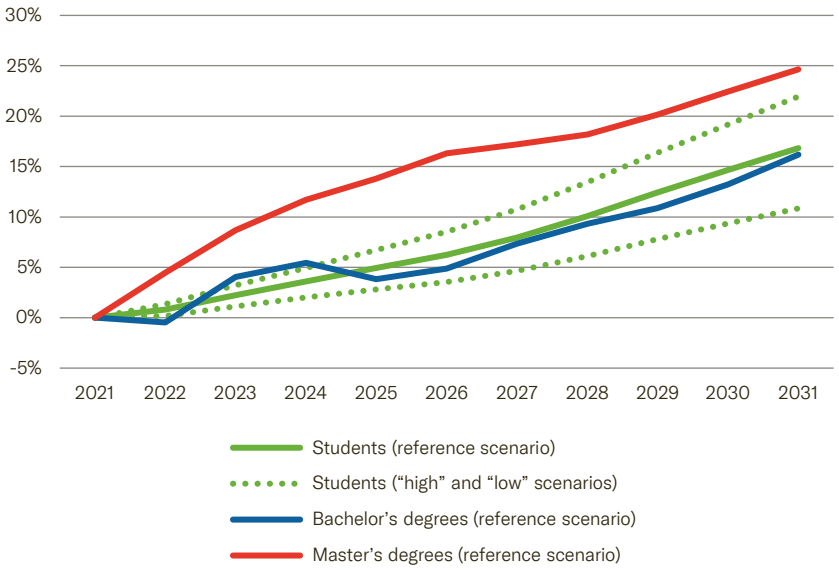
The reference scenario of the FSO for the development of numbers of students up to 2031 is based on the assumptions that the number of academic baccalaureates, the transition ratio to universities, the number of admissions with a different Swiss qualification (such as university aptitude tests federal vocational baccalaureate/specialised baccalaureate – university or degrees from universities of applied sciences and universities of teacher education) as well as the number of admissions with a foreign admission qualification will increase by 2031 *(FSO, 2022m)*. As a result of these assumptions, a growth in the body of students of around 17% is expected by 2031 (→ figure 248). The FSO also shows two other scenarios ("low" and "high"). Depending on the scenario, the growth is between 11% ("low" scenario) and 22% ("high" scenario). In absolute figures, the scenarios "low" and "high" in 2031 differ by almost 15,000 students, which corresponds to 11% of the student body of 2021 and expresses the rather high level of uncertainty with regard to future development. The scenario "high" would lead to the fact that either the student-teacher ratio would increase from 18.7 students per full-time equivalent (FTE) of the academic staff to 22.8 if the staff headcount remained the same; or around 1660 full-time positions (+22%) would have to be created to keep the student-teacher ratio constant.

In accordance with the growing numbers of students, an increase is also expected in the degrees, whereby the increase in the Master's degrees (25% by 2031), according to the forecast of the FSO, will be stronger than that of Bachelor's degrees (16%). The strong growth in the Master's degrees can be explained in particular by the rising number of university Bachelor's degrees as well as the increase in entries to the Master's level with a foreign admission qualification or with "a different Swiss qualification" (than a university Bachelor's degree).

248 Forecast development of student numbers and graduations, 2021–2031

Change compared with 2021

Data: FSO



Free choice of study courses

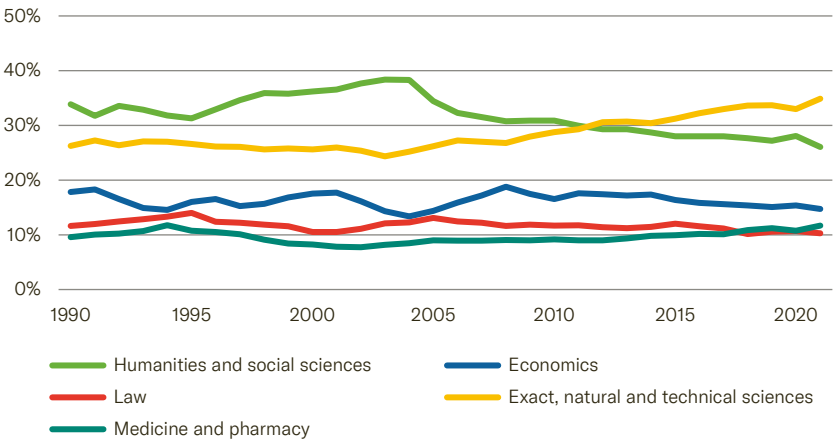
In contrast to the situation in most other countries, students in Switzerland can select both the university as well as the discipline freely. The only exceptions are medicine and sport sciences, for which there are admission restrictions in the universities in German-speaking Switzerland. If the composition of the numbers of students changes in the individual fields of study, this usually occurs in Switzerland because the students change their preferences. Since the mid-2000s, a decline in the Bachelor entries has been recorded in the humanities and social sciences, specifically from 38% in 2004 to 26% in 2021 (measured against the total of all admissions) (→ figure 249). In contrast, the proportion of entries to the study programmes of the exact and natural sciences of both genders rose continuously. In addition, the share of women who took up studies in the technical sciences increased, albeit at a modest level. Growth in the exact, natural and technical sciences cannot be explained by the fact that the share of students with the baccalaureate special subjects biology and chemistry as well as physics and applied mathematics has increased. In contrast, the increasing number of international students which could be observed until 2010 has contributed to the increasing demand for study places in the fields of the exact, natural and technical sciences. However, the positive trend can also be observed among students with a Swiss admission qualification, albeit somewhat less pronounced.

The Confederation and the cantons have explained the long-term **assurance of examination-free admission** to universities with academic baccalaureate as a common educational policy goal *(EAER & EDK, 2019)*.

249 Shares of student intake by fields of studies category, 1990–2021

New Bachelor's or licentiate/diploma students

Data: FSO



A slight increase was also recorded in the field of medicine over the last 20 years. Measured against the registrations for the admission test for studies in medicine, the demand exceeds the limited offer of study places by far. As there is simultaneously a pronounced shortage of specialists in the field of medicine *(→ chapter Tertiary-level education, page 193)*, the Confederation and the cantons have launched a special programme to sustainably increase the number of study places and to thus reduce the dependency on foreign doctors. The aim is to increase the number of annual degrees in human medicine from just under 900 (in 2016) to 1350 in 2025. The initiation of the special programme also meant that individual universities which up to now have not offered any training in human medicine (the two federal institutes of technology [ETH], the universities of St. Gallen and Lucerne as well as that of the University of Italian-speaking Switzerland), are offering new training programmes in cooperation with previous medical faculties.[1]

In addition to the field of study, students are also free to choose the university. A selection by the universities is not permitted at entry to the Bachelor level (or at entry in consecutive fields of study of the Master level) – at least not for holders of a Swiss admission qualification. As a local education provider, universities can basically influence the choice of higher education institution *(→ Institutions, page 233)*. However, the opportunity to influence is relatively low, as the majority of students select the closest university *(Denzler & Wolter, 2010)*. Due to the fact that the competences of baccalaureate pupils vary widely in the different cantons, it can be expected that the competencies of the students also vary widely between universities at student admission. Based on the assumption that the differences in competencies between individuals that exist at the end of the compulsory school level still persist at entry into higher education, *(→ chapter Baccalaureate*

1 In addition, the University of Fribourg is now offering an additional Master's degree course as well as its existing Bachelor's degree programme.

schools, page 155), it can be seen that the universities in French-speaking Switzerland are confronted with students who have lower competencies in comparison with those in German-speaking Switzerland (→ figure 250). In most cases, the PISA competencies of the new students largely reflect the average PISA competences of the respective supporting cantons or of the most important catchment cantons. However, the two ETHs and the University of St. Gallen are exceptions, as they recruit their students from the entire language region. The example of the University of St. Gallen can be used to illustrate the fact that its students on average display less competencies than the baccalaureate pupils at the St. Gallen schools (→ figure 251). This can be explained by the fact that the latter achieve above-average PISA results in a Switzerland-wide comparison and the University of St. Gallen attracted students from outside the canton with comparatively low PISA results. At the University of Lausanne (LS) too, a deterioration can be observed which cannot only be attributed to the inward migration of students from outside the canton with poorer PISA results, but also to the fact that the better baccalaureate students from Vaud more frequently favour ETH Lausanne (EPFL). The two federal institutes of technology in Zurich and Lausanne (ETHZ and EPFL) in turn can, as expected, particularly attract those academic baccalaureate students who excel in above-average mathematics skills in the PISA test. However, the overall picture of a university only emerges after the foreign students have been taken into account, who could not be included in the calculations here as their individual PISA results are not known.

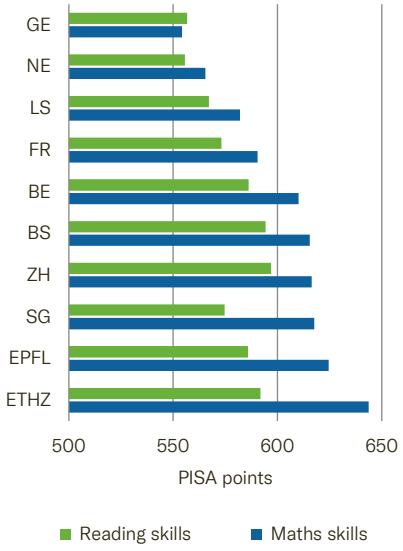
Whereabouts of international students

The labour market for academics is heavily globalised; one of the corollaries of this is that some of the specialists educated in Switzerland emigrate abroad and are no longer available to the domestic labour market. On the other hand, Switzerland can also attract highly-qualified manpower from abroad, whereby the institutional framework conditions of migration including the international cooperation agreements have a considerable influence on the migratory movements. The appeal of the local labour market and the working conditions of course play a key role in the competition for the best talents. Altogether, Switzerland is able to greatly benefit from the internationalisation of the labour market for holders of academic qualifications *(→ chapter Tertiary-level education, page 193)*. Each year, around 20,000 more holders of university degrees immigrate to Switzerland than leave Switzerland *(FSO, 2020e)*. This net gain corresponds to around two-thirds of the annual number of first degrees at university level, which in turn means that meeting the demand for individuals with tertiary-level education is difficult to accomplish just by increasing domestic education.

250 Average competencies by university

PISA competencies of students starting a tertiary education for the first time and who participated in the PISA test in 2012 in Switzerland

Data: SEATS; calculations: SCCRE



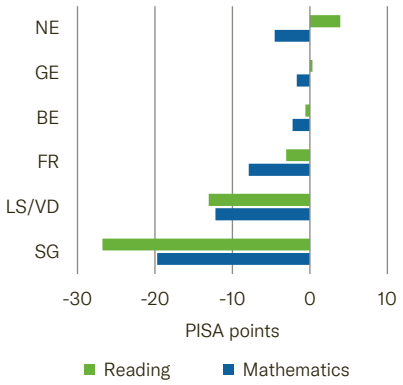
LS University of Lausanne

The University of Lucerne and the University of Italian-speaking Switzerland are not shown because the case numbers are too small.

251 Selection into universities

Differences in skills between new university entrants and baccalaureate pupils from university cantons with representative samples

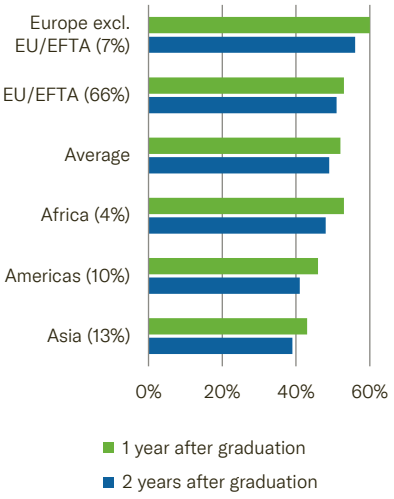
Data: SEATS; calculations: SCCRE



Due to the current regulations of the **work permits and residence authorisations**, specialised experts from third countries who have been educated in Switzerland are forced to leave Switzerland after completing their education if the respective quotas are exhausted. Legal prerequisites are currently being created to allow persons from third countries who have completed a Master's or a Doctorate in an area affected by the lack of specialists in Switzerland can remain in Switzerland on a non-bureaucratic basis and be gainfully employed by being excluded from the annual maximum numbers of residence permits if their employment activity is of highly scientific or economic interest.

252 Retention rate of international students by region of origin

Data: *Lombard (2017)*



The percentage figures in brackets after the regions reflect the share values of the regions of origin of the international students.

In view of the fact that the number of foreign-educated applicants trained in Switzerland has constantly increased and the need for well educated specialists remains sustainably high, focus switches to the question of how successful attempts will be to retain foreigners in Switzerland who have attained their educational qualification here. For the newly educated university graduates, the graduate surveys of the FSO show that foreign-educated foreign nationals return abroad considerably more frequently than persons who have obtained their university entrance qualification in Switzerland regardless of nationality. According to the survey in 2019, the emigration rate of international students one year after graduating with a Master's is around ten times as high as among domestic students; five years after the Master's degree it is still around seven times as high. Considered in absolute terms, around twice to three times as many foreign-educated foreign nationals leave the country as Swiss nationals and Swiss-educated foreign nationals.

However, as those persons resident abroad participate less frequently in surveys than those resident in Switzerland, the emigration numbers might be underestimated. A more recent study based on register data of student statistics and the Central Migration Information System *(Lombard, 2017)* enables the rates of emigration and the whereabouts of international students to be calculated reliably for the first time. On average, around half of the international students are still in Switzerland one year after completing their Master's (→ figure 252); one year later it is somewhat less. Depending on the region of origin, however, there are major differences. Persons from Europe – in particular from non-EU/EFTA countries – remain in Switzerland more frequently than persons from the Americas or Asia *(→ margin text, page 232)*. The graduation grade does not have any systematic influence on their retention rate, according to the evaluations of the graduate survey in 2019 among nationals of neighbouring countries and third countries. In contrast, results for the (remaining) EU/EFTA nationals indicate that those with better grades emigrate more seldom than those with poorer grades, which speaks for positive selection in favour of the Swiss labour market.

Institutions

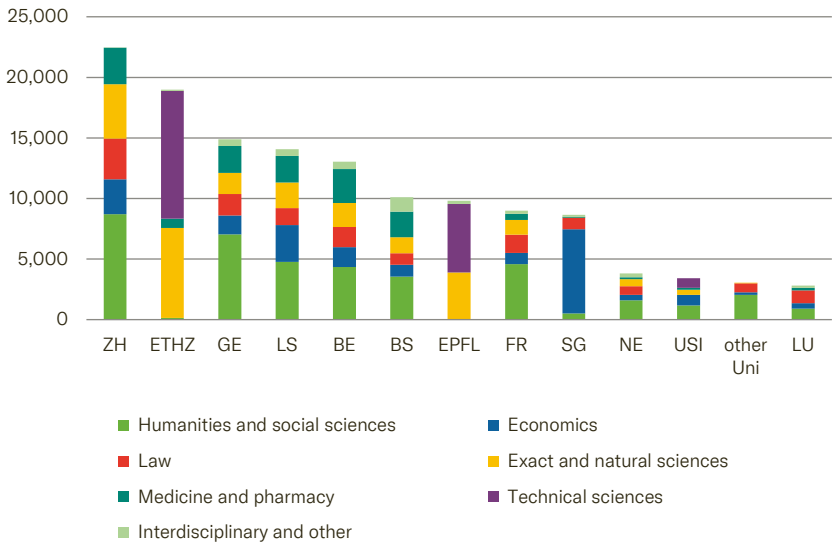
According to the Federal Act on the Funding and Coordination of the Higher Education Sector (HEdA)[2], the university education landscape includes the ten cantonal universities, the two ETHs as well as the accredited university institutions or those deemed to be accredited *(→ margin text, page 233)*. The various institutions of higher education differ significantly in size (→ figure 253). The University of Zurich is the largest university by far with around 22,500 students. The smallest universities include Neuchâtel and Lucerne as well as the University of Italian-speaking Switzerland, with less than 5000 students. The majority of universities are comprehensive universities, whereby the fields of study are composed differently depending on the university. The two ETHs, the Universities of St. Gallen and Lucerne, as well as the University of Italian-speaking Switzerland are specialised universities.

Five **academic institutes organised under private law** are accredited according to HEdA (status July 2022): the UniDistance Suisse in Brig, the Graduate Institute of International and Development Studies (IHEID)[3] in Geneva, the Graduate Institute Schaffhausen, the Franklin University as well as the Swiss Academic Institute for Traditional Chinese Medicine (SWISS TCM UNI).[4] The UniDistance Suisse and the IHEID are recognised under contribution law and receive contributions from the Confederation and the cantons.

253 Student numbers by institution, 2021

Excluding students at Doctorate and further education level

Data: FSO



ZH	University of Zurich
ETHZ	ETH Zurich
GE	University of Geneva
LS	University of Lausanne
BE	University of Bern
BS	University of Basel
EPFL	ETH Lausanne
FR	University of Fribourg
SG	University of St. Gallen
NE	University of Neuchâtel
USI	University of Italian-speaking Switzerland
Other Uni	Other university institutions
LU	University of Lucerne

2 *Bundesgesetz über die Förderung der Hochschulen und die Koordination im schweizerischen Hochschulbereich (HFKG)* of 30 September 2011.

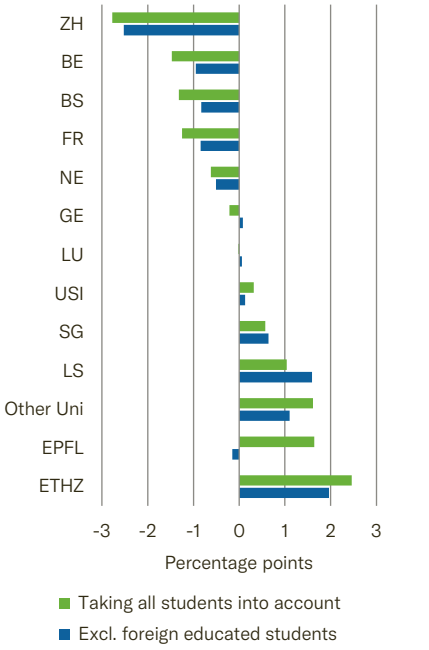
3 The IHEID has been recorded in the statistics of the FSO since 2017 in the category "Other university institutions". Previously, it had been counted as part of the University of Geneva.

4 In addition, Chur University of Theology and the Theological University of Basel are still accredited according to the old university funding law until the end of 2022. Up to the mid-2010s, the Kurt-Bösch Foundation Sion/Wallis and the Swiss Graduate School of Public Administration (IDHEAP), both of which have been incorporated into universities, as well as the former Swiss Central Department for the Continuing Education of Upper-Secondary School Teachers (WBZ) – today the Swiss Centre for the Upper-Secondary Level (ZEM/CES) – also counted as higher education institutions.

254 Change in market shares, 2011–2021

Measured by shares of students in the first and second cycle

Data: FSO (SHIS); calculations: SCCRE



Even as a local education provider, universities can influence future students from other regions in their choice of higher education institution, either through an interesting range of studies, attractive study conditions or their reputation. Over the course of the last ten years, the market shares of the individual universities have also slightly shifted (→ figure 254). ETH Zurich, which has always operated on a nationwide basis, acquired the most students here, while the University of Zurich recorded the greatest losses. The shifts can partially be explained by the changed demand for the individual fields of study: In humanities and the social sciences, demand dropped, while in the exact sciences as well as in the natural and technical sciences, it increased. At ETH Lausanne, the increase in the market share can also be completely explained by the growing number of international students.

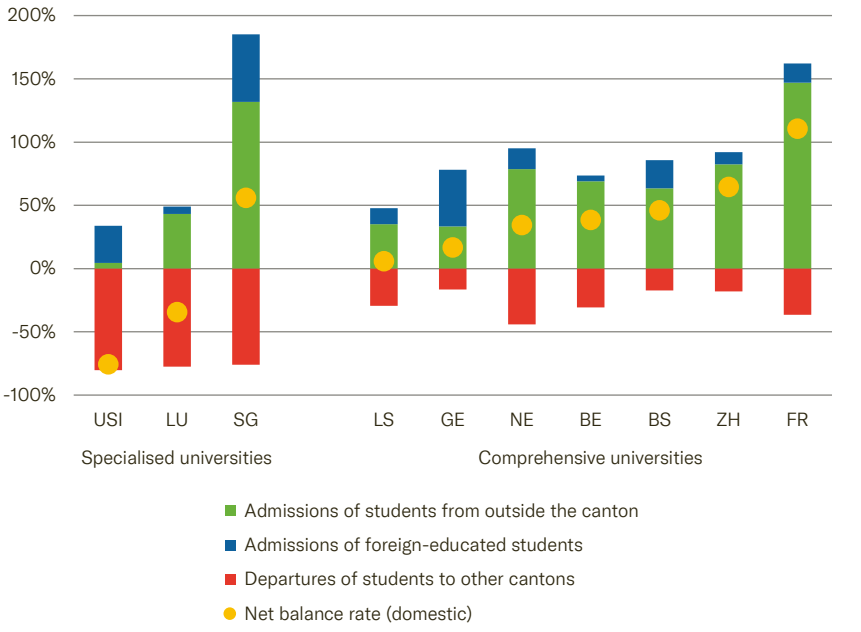
Origin of the students

The entry of students from outside a sponsoring canton and the departure of students from a sponsoring canton (→ figure 255) is of interest with regard to two aspects: Firstly, it can provide indications of the attraction of the individual cantonal universities. Secondly, the origin of the students with regard to the financing of the universities is significant *(→ chapter Efficiency/costs, page 244)*.

255 Influx of students from outside the canton and departures to other cantons, 2021

Proportion of Bachelor's students from outside the sponsoring cantons and proportion of departures measured by number of students from the sponsoring region

Data: FSO (SHIS); calculations: SCCRE



Admissions of students from outside the canton
Proportion of students from outside the supporting canton (resident in Switzerland) relative to the number of students from the supporting canton

Admissions of foreign-educated students
Proportion of foreign-educated foreign nationals relative to the number of students from the supporting canton

Departures of students to other cantons
Proportion of the students studying outside the supporting canton, relative to the number of students from the supporting canton. Students who study at an ETH are not counted in the departures.

Net balance rate (domestic)
Proportion of students from outside the supporting canton (resident in Switzerland) minus the number of students who study outside the supporting canton, relative to the number of students from the supporting canton

Among the cantons with a specialised university, the proportion of students who enter a Bachelor's degree at an out-of-canton university is of course the largest. The cantons of the two youngest specialised universities (Lucerne and Ticino) are, overall, net spenders; they are unable to compensate for the departure of persons who obtained the university admission qualification in their canton with new entrants. In the case of the University of Italian-speaking Switzerland, this can also be explained by the fact that the Italian language is only marginally widespread outside of Ticino and the university only wishes to attract few non-cantonal students accordingly. In contrast to this, Canton St. Gallen with the University of St. Gallen can clearly overcompensate for the departure of St. Gallen students: Considerably more students come to St. Gallen to the university than leave the canton to study elsewhere. Among the cantons with comprehensive universities, Canton Vaud is worst off, while Canton Fribourg is one of the major winners of these student movements.

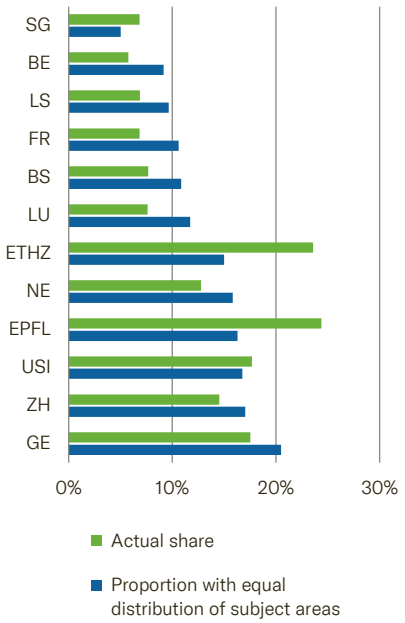
A high level of internationality in the student body can also be an indicator of the high quality and attractiveness or of the high prestige of a university. However, the number of international students also depends on the geographical location of the universities. Thus the proportion of students from neighbouring countries is higher in border regions (→ figure 255). If only foreign-educated foreign nationals from countries which do not border on Switzerland are therefore considered for comparison purposes, it can be seen for the Master's level that the two ETHs are by far the most internationalised (→ figure 256). However, the high degree of internationalisation can be partially explained by the composition of subjects. Engineering and the exact sciences, for example, have a particularly large proportion of international students, while the proportions of students in the historical and cultural studies as well as in the areas of medicine and law are relatively low. If the composition of fields of studies were identical in all universities, other higher education institutions would be more international than the two institutes of technology.

Based on the assumption that the international students studying in Switzerland are a contributing factor to "positive selection", it is to be expected that this will have a favourable effect on educational success *(Feld & Zölitz, 2017; Humlum & Thorsager, 2021)* and the subsequent labour market opportunities *(Humlum & Thorsager, 2021)* of the domestic students due to peer effects. However, negative effects are conceivable for students at the lower end of performance *(Feld & Zölitz, 2017; Thiemann, 2021)*. The influence is likely to depend largely on the abilities of the foreign students and thus on the selection process into and at the domestic universities. Irrespective of this, international fellow students are also likely to broaden the experience of the domestic students. Findings from the Netherlands *(Wang et al., 2021)* also suggest that graduates from international (English-speaking) study programmes achieve a higher income than those from study programmes, favoured mostly by domestic students. However, the salary advantage can be explained by the fact that graduates of international programmes of study more frequently choose a large company for their first position, which has a higher share of international workers and is more frequently active in the commercial sector. The associated salary advantage will remain in the long term. To what extent these results are applicable to Switzerland is not clear from the outset, but there may well be parallels to the Swiss labour market.

256 Share of international students at Master's level, 2021

By university; students from neighbouring countries do not count as international students for comparison purposes

Data: FSO (SHIS); calculations: SCCRE

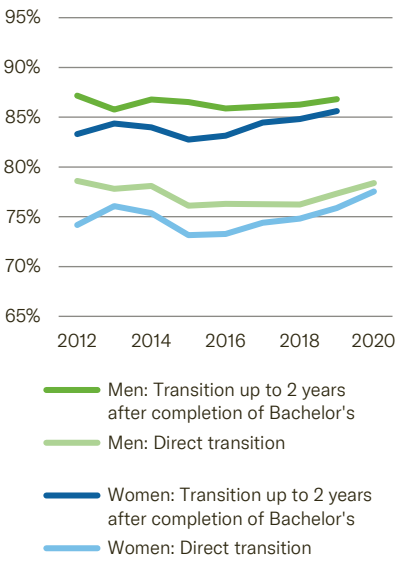


The Master's remains the standard qualification at universities

257 Transition rate from Bachelor's to Master's course by gender

Transition in same year or up to two years following Bachelor's, 2012–2019

Data: FSO (LABB); calculations: SCCRE

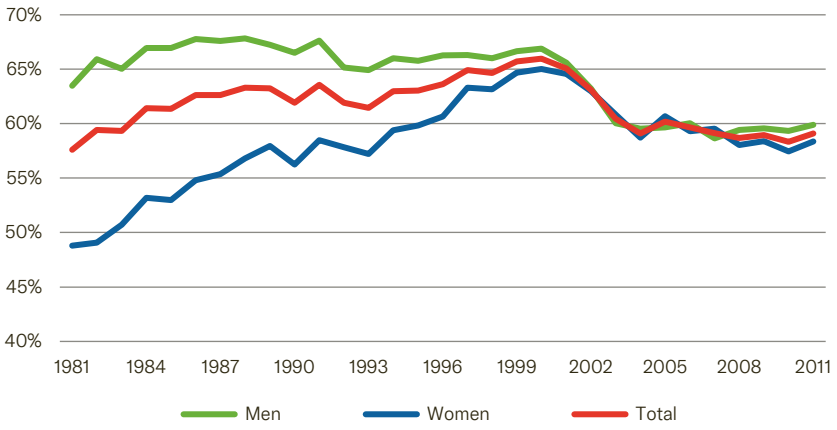


With the Bologna reform, the licentiate or the diploma was replaced by a Bachelor's degree appropriate for the labour market (after three academic years) at universities and a subsequent Master's degree (after a further one and a half to two academic years). Even if students have the option of entering the labour market after only three years of study with a university degree, the Master's degree has remained the standard degree at universities. On average, 86% of Bachelor students continue studies within two years, most directly following the Bachelor degree. The ratio of men transitioning to a Master's study programme is somewhat higher than that of women (→ figure 257). These differences can be explained through the different selection of the fields of study. In the humanities and social sciences, in which women are strongly overrepresented, as well as in economics, only around three-quarters of the Bachelor's graduates attempt a Master's degree in the two years after graduating with their Bachelor's, while in medicine and pharmacy, law and in the technical sciences, 96% and more continue their studies towards a Master's. In addition, most students take up Master's studies in their present universities *(→ chapter Tertiary-level education, page 193)*. The ratio of direct transitions to a Master's degree increased in the years 2019 and 2020. Whether this is due to the Covid-19 pandemic or is a general trend will be seen over the next few years.

In today's Bologna system, almost 60% of the students who have started a Bachelor's degree at a university attain a Master's degree from a (conventional) university within a period of ten years after beginning their studies (→ figure 258). There are several reasons why this share is not higher: First of all, around one quarter of students do not obtain a university degree at Bachelor level *(→ Effectiveness, page 238)*. Secondly, not all students transition to a Master's degree, despite the high transition rate. Ultimately, several students also discontinue studies at Master's level. Due to the possibility of obtaining a first degree after just three years, more individuals obtain a university degree overall under the current system than under the previous system with the licentiate and the diploma. The share of those who graduate from university in the second cycle is considerably less in the Bologna system than in the old system (59% with the 2011 entry cohort versus 66% with the 2000 entry cohort). The Bologna effect is more pronounced among women than among men, which is partially due to the fact that female students take subjects which are characterised by lower transition rates from Bachelor's to Master's studies.

258 Proportion of students with a degree in the 2nd cycle of a university up to ten years after admission to a university, 1981–2011

Data: FSO (LABB); calculations: SCCRE



Only persons who have taken up university studies for the first time are taken into consideration. Persons who have started teacher training or a sports degree are excluded for methodical reasons

Academic staff and junior career pathways

The academic staff at universities consists of a smaller proportion of professors and (other) lecturers as well as a larger proportion of members who are active as part of the non-professorial teaching staff: (Senior) assistants and assistants, postdocs, research associates and individuals writing their habilitation *(→ chapter Tertiary-level education, page 193)*. Professors usually have a permanent position, while the vast majority of the non-professorial teaching staff is employed on a temporary basis. The probability of receiving a professorship in Switzerland is relatively small, even if one assumes that by no means all of the approximately 2000 graduates who obtain a Doctorate in Switzerland each year apply for one of the 200 or so open professorships or the 150 junior professorships. If one also takes into account that, due to the globalised labour market and the distinct competition, around every second professorship is held by foreign academics *(→ chapter Tertiary-level education, page 193)*, the opportunities for a professorship for Doctoral students in Switzerland are only promising to any extent if they apply abroad.

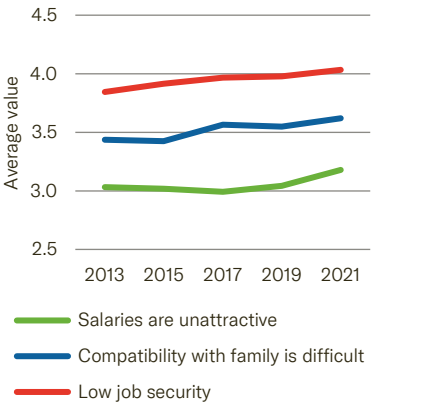
The time from a Doctorate until a permanent position in the academic field is characterised by insecurity and precariousness. For this reason, various initiatives were taken to better manage the time between a postdoc position and a professorship over the last few years. Junior professorships (once again temporary) were created, as well as more tenure-track positions and new funding instruments (scholarships of the Swiss National Science Foundation [SNSF]).

From the perspective of the non-professorial teaching staff, however, the working conditions have not significantly improved over the last few years. The subjectively recorded working conditions (→ figure 259) show that the job insecurity has increased rather than declined over the last few years and that the salaries continue to be rated as moderately attractive.

259 Evaluation of academic career at universities, 2013–2021

One year following completion of Doctorate; average values on an answer scale of 1 "does not apply at all" to 5 "applies fully"

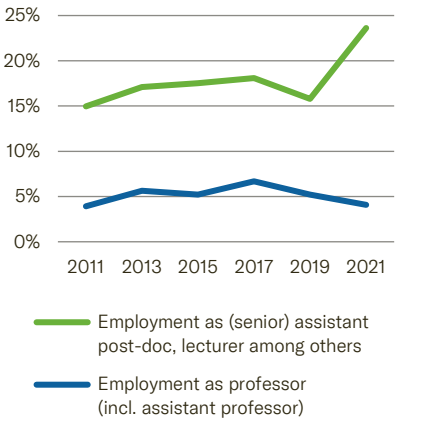
Data: FSO (EHA); calculations: SCCRE



260 Share of persons remaining in academia, 2011–2021

5 years following completion of Doctorate, compared to all completed Doctorates

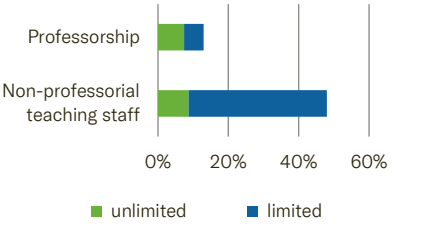
Data: FSO (EHA); calculations: SCCRE



261 Still in academia five years following completion of the Doctorate, 2021

Retention rate of persons who stated one year after completing the Doctorate that they want to follow/aim for an academic career now and in the future

Data: FSO (EHA); calculations: SCCRE



The **qualification framework** for the Swiss higher education sector includes the targeted skills to be achieved by the students by the end of the relevant study cycle, in the following five categories: "knowledge and understanding", "application of knowledge and understanding", "judgement", "communication skills" and "self-directed learning".

Five years after completing a Doctorate, one in five individuals is still active in the academic field of a higher education institution (→ figure 260). Of these, around one quarter hold a professorship and the remaining three-quarters are active as senior assistants and assistants, postdocs, lecturers or in a similar function. With these relatively low retention rates, however, it should be taken into account that a larger share of those persons who left higher education already stated one year after completing their Doctorate that they did not wish to pursue an academic career. How many of these actually had a preference for work outside of academia and how many, despite a preference for an academic career, saw no future in academia cannot be determined. The possibility of attaining a position in the university sector, however, has increased steadily between 2011 and 2017, which could be explained by the expansion of the universities of applied sciences and the universities of teacher education. However, a slight decline is recorded for 2019, the reasons for which are unknown. The sharp increase in the non-professorial teaching staff in 2021 is likely to have been caused by the Covid-19 pandemic.

If only those individuals are taken into account who stated one year after obtaining their Doctorate that they wished to pursue an academic career and aim for it in the future, the retention rate in academia is higher. Almost every fifth person holds a professorship – the majority of them a permanent position – and every second person has a position on the non-professorial teaching staff. However, in the second group, the vast majority has a limited contract (→ figure 261).

Effectiveness

The primary aim of university education is to qualify the students for professional activities that require academic knowledge. The minimum skill level students should have on completing their studies is defined in the qualification framework for Swiss higher education sector (nqf.ch-HS) *(swissuniversities, 2021b)*. The intended learning outcomes are usually defined on the level of an individual programme of study, a module or a course unit. However, it is still difficult to test the acquisition of competencies directly, because the standardised tests required for this purpose are usually lacking. In order to nevertheless obtain indications on the effectiveness of university education, indicators of labour market integration are thus used, even on an international basis (with analyses on returns on education being discussed in the *Cumulative effects, page 355*). These are not a measure of competence, but do provide information on whether the competences acquired at the university are required in the labour market. Indicators on the academic success and the discontinuation of studies also provide information on the effectivity of education at university level. However, these are at least as difficult to interpret as labour market indicators as a measure of the acquisition of competence. On the one hand, this is the case because academic success can be controlled by the universities themselves, independently of the acquisition of competencies. On the other hand, academic success also depends on factors which cannot be influenced by the universities.

Academic success – discontinued studies

The academic success rate can be an indicator of the effectiveness of a study programme or a university. However, only under the assumption that the acquisition of the required competencies is a necessary condition for a successful completion of studies, and vice versa, discontinuation of studies represents a lack of the required competencies, which in reality does not always apply.

In the Bachelor's degree programme, 76% of students on average obtain a university degree in a time frame of eight years from the start of studies, with between 5% and 15% of them obtaining it in a fields of studies category other than the one originally chosen (→ figure 262). If one adds the degrees at universities of teacher education (UTE) and universities of applied sciences (UAS) to this – in other words, the degrees after a change to a different university type – the success rate increases to 85% on average. However, these graduation rates vary considerably between the fields of study.

By international standards, admission to universities in Switzerland is regulated restrictively, which is reflected in the comparatively low baccalaureate rate. Measured against these findings, a substantial proportion of university students do not obtain a university degree. In their declarations on the common education policy goals for the Swiss Education Area *(EAER & EDK, 2015, 2019)* in 2015 and 2019, the Federation and the cantons have thus declared their goal of reducing the number of drop-outs in studies without lowering quality requirements (Goal 5). The measures to be taken should be directed in particular at the transition from the academic baccalaureate schools to universities (strengthening study and career guidance at the baccalaureate schools, cooperation between universities and baccalaureate schools with regard to selection of field of studies as well as advice and support for students at the beginning and during their studies). This focus can, on the one hand, be justified by the expectation that a good fit as well as a high level of integration of students will benefit the successful completion of studies. On the other hand, universities will not be restricted by the measures mentioned in their function of performance selection, which is necessary to maintain quality requirements.

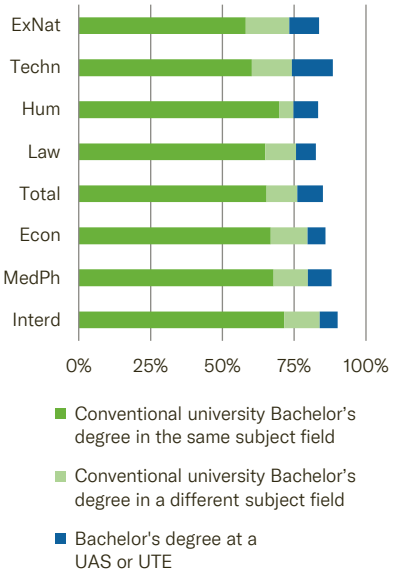
In the last few years, various measures were taken, such as intensifying the preparation for choice of studies, holding information days, mentoring programmes, coaching, self-assessments and preparation courses, with the goal of increasing academic success. However, the effectiveness of this has not yet been systematically examined in Switzerland, or have the findings been published.

Which of these interventions could bring the hoped-for success is difficult to judge because only few measures can be found, even in international literature, which demonstrably have a positive effect on the success of studies *(Oreopoulos et al., forthcoming; Oreopoulos & Petronijevic, 2019; Wild, 2021)*. An example of positive intervention is a measure which was tested in Germany and shows that the signing of a target agreement to adhere to the recommended programme of studies (voluntary self-commitment) increases the probability of completing the examinations successfully and on schedule *(Himmler et al., 2019)*. A change in the default setting when registering for examinations, or more specifically, a change from the opt-in regulation (acceptance regulation) to the opt-out

262 Student success rates by fields of studies category

Bachelor's degree within eight years of starting a course at a university for 2013 entrants resident in Switzerland before starting the course

Data: FSO

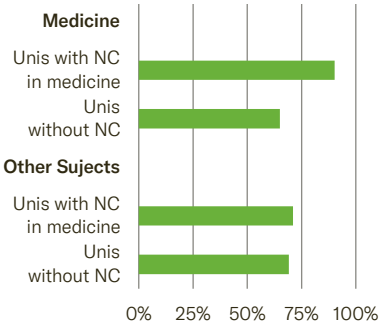


ExNat	Exact and natural sciences
Techn	Technical science
Hum	Humanities and social sciences
Econ	Economics
MedPh	Medicine and pharmacy
Interd	Interdisciplinary and other

263 Student success rate with and without numerus clausus

University Bachelor's degree up to six years following admission, 2014 and 2015

Data: FSO (LABB); calculations: SCCRE

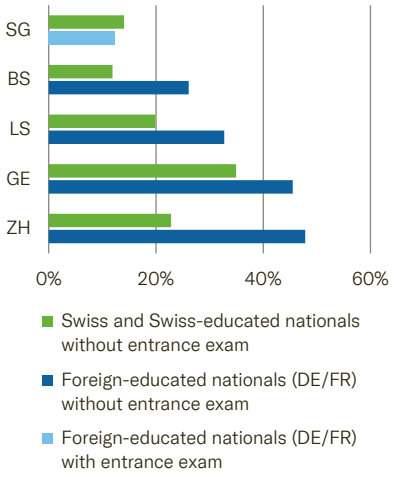


Universities with numerus clausus (NC) in medicine: BS, BE, FR, ZH; universities without NC: GE, LS, NE

264 University drop-out rate with and without entrance exam

2013–2015 entry cohorts in economics

Data: FSO (LABB); calculations: SCCRE



Discontinuation of studies at a university applies if someone still has not obtained a university Bachelor degree six years after commencing their studies and is no longer enrolled at a university.

For comparability reasons, only German and French nationals have been taken into account in the foreign-educated foreign nationals.

regulation (objection regulation)[5] can also increase academic success *(Behlen et al., 2021)*. Feedback on the relative performance can also have a positive effect on academic achievements, but only with students who are above average from a performance perspective, or persons who underestimate their relative abilities *(Brade et al., 2021)*.

Perhaps the most important predictors of academic success include the previous schooling of students, their former performance in school and their willingness to learn *(Larsen et al., 2013)*. For Switzerland too, findings from Canton Aargau confirm a positive connection between good grades at baccalaureate level and the probability of attaining a degree *(Diem, 2021)* *(→ chapter Baccalaureate schools, page 155)*. To what extent the influence of the baccalaureate grade can be explained with cognitive abilities and specialist competencies – or with non-cognitive competencies such as learning techniques or willingness to learn, which are likely to correlate positively with the baccalaureate grades – cannot be explained with the available data.

In addition, even admission examinations can increase the academic success rate, as the better students can be chosen through the selection procedure. It can thus be shown that the numerus clausus system in medicine practised at universities in German-speaking Switzerland leads to a higher rate of academic success, while in the other subjects (without numerus clausus) there are hardly any differences between the universities in German-speaking and in French-speaking Switzerland (→ figure 263). However, in the case of numerus clausus it must also be taken into account that the quantitative admission restrictions could reduce the drop-out rate even without performance-based selection, as the available study capacity is hardly exceeded any more, which greatly diminishes the pressure to select during studies *(Strupler Leiser & Wolter, 2015)*.

Using the example of economics, it can also be seen that the entrance examination for foreign-educated foreign nationals practised at the University of St. Gallen, which is used due to a maximum quota for international students, increases the academic success ratio of these persons by the external selection thus effected or reduces the drop-out rate (→ figure 264). In comparison with this, the drop-out rate of the students with a Swiss admission qualification is higher, while the opposite is the case at the other universities.

5 With the opt-in variant, the students have to actively register for the examinations in order to be able to pass them. With the opt-out variant, the students are automatically registered for the examinations and they need to deregister if they do not want to take them.

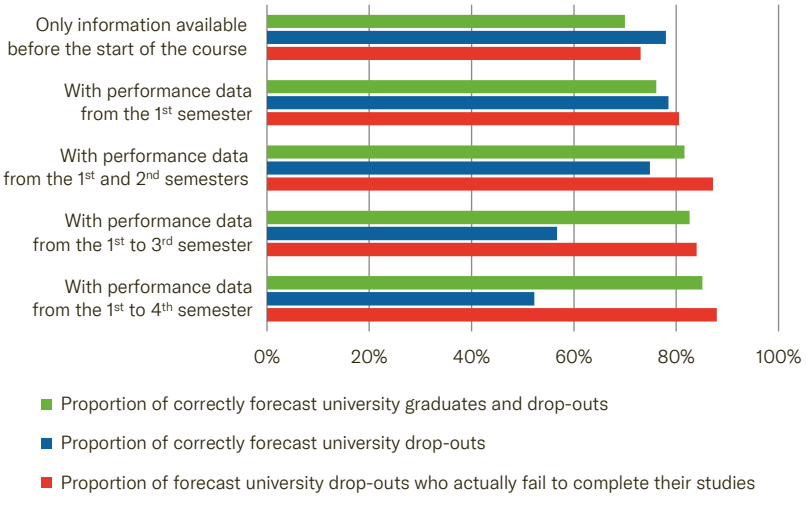
Prediction of success in studies

If it were known which students were at risk of discontinuing studies, they could be specifically supported. "Early warning systems" are being used increasingly with the goal of identifying students at risk of dropping out early on and offering them support *(Berens et al., 2019; Hoffait & Schyns, 2017; Schneider et al., 2019; Villano et al., 2018)*. For Switzerland, findings for the University of Bern suggest that, based on the register data, around 80% of university degrees and study drop-outs could be correctly classified (→ figure 265). Altogether, the forecast accuracy increases over the course of studies, as additional information on the ECTS scores and grades can be used each semester and thus an increasingly certain forecast of the degrees is possible. However, study drop-outs after the third semester cannot be so reliably identified as those which occur in the first three semesters.

A reliable identification of students at risk of dropping out is a necessary measure to be able to use the resources for intervention efficiently. However, it is not a sufficient condition to be able to prevent drop-outs by students. In order to achieve this goal, one would have to know which measures would be successful among the students concerned, as not all measures are effective. Certain measures which might seem promising can even have contrary effects. It is thus possible, for example, that warnings which indicate deficits in studies and recommend offers of help lead to the fact that the students actually discontinue their studies even earlier *(Schneider et al., 2021)*.

265 Forecast of drop-outs in studies at universities

Data: FSO (LABB), University of Bern; calculations: Wuppertaler Institut für bildungsökonomische Forschung, SCCRE



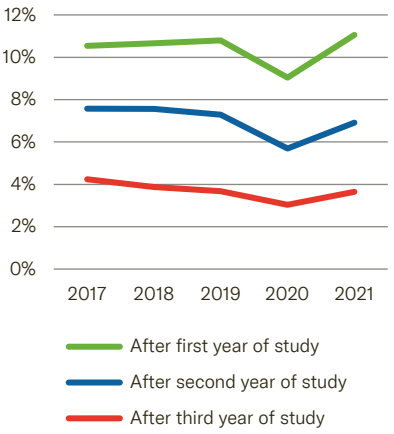
Register data from the University of Bern (which supplies information on the subject studied as well as the number of ECTS credits and the average grade per semester) as well as data from the LABB programme of the FSO provide the data basis for the forecasts. These contain information on the study in the entire higher education system as well as some background variables on the students.

Legend
Using the background information on the students (such as age, gender, admission qualification, etc.) as well as the performance data of students of the first two semesters (number of ECTS credits and average grade per semester), altogether 82% of the students still registered in their second semester at the University of Bern can be correctly classified as graduates or as university drop-outs (green bar). The blue bars show the proportion of student drop-outs which are correctly recognised as such. The difference to 100% thus represents those who remain undiscovered and thus to whom no support measures can be offered. After the second semester, it is one in four persons (100%-75% = 25%). Of the persons who have been classified as study drop-outs, 87% were correctly identified (red bar) and 13% incorrectly identified as such after the second semester. If a forecasting tool had been used in order to offer support measures to all those who had been identified by the system as drop-outs, one in eight persons (or 3% of all students) would have been supported, although these students would actually not have needed this help.

266 Drop-out/interruption ratio by completed academic year, 2017–2021

Students living in Switzerland or with Swiss nationality before starting their course

Data: FSO (LABB); calculations: SCCRE



Legend
In 2020, 9% of university bachelor students discontinued or interrupted university studies after the first academic year (green line). In the previous years as well as in the following year, the rate was considerably higher at 11%.

Influence of the Covid-19 pandemic on the drop-outs in studies

As part of the measures to contain the Covid-19 pandemic, the universities were closed in March 2020 and face-to-face teaching was changed to online teaching *(→ chapter Tertiary-level education, page 193)*. The changes affected the students, the lecturers and the institutions themselves, as not only teaching and the conduct of examinations were disrupted, but in many cases the infrastructures for the new formats first also had to be provided. Due to the lack of comparable tests, little can be said about the acquisition of competencies by the students during the closure of the universities, but it can be shown that the pandemic has not impaired academic success, at least in the short term. The number of student drop-outs and interruptions did not increase in the academic years 2020/21 and 2021/22 (→ figure 266). On the contrary, the number of students who left the university system without a degree after the first or second academic year actually decreased in 2020. The question of whether the students were less inclined to discontinue studies due to the uncertain economic situation or whether the framework conditions in examinations made it easier for students to pass them cannot be answered with the data available.

Further analyses indicate that the Bachelor students also changed their field of study less seldom and completed their studies earlier due to the Covid-19 pandemic *(→ Efficiency/costs, page 244)*.

In **comparison with previous years**, the employment rate in 2021 was somewhat higher. The main reason for the change is the revision of the questionnaire and the associated definition of the employment rate *(→ chapter Tertiary-level education, page 193)*. In addition, the Covid-19 pandemic could also have had a positive effect on the number of the employed.

The **unemployment rate according to ILO** is defined as the proportion of the unemployed in the total labour force. Unemployed refers to persons who were not employed during the reference week and in the previous four weeks actively sought work and were available to take up employment. The group of the employed and unemployed constitute the labour force.

Labour market success

Successful integration into the labour market is a key criterion for the evaluation of higher education, providing information on the extent to which the studies equip students with relevant skills for the labour market. However, the employability of the graduates does not depend only on the training provided by the university, but is also influenced by the competencies which the students acquired even before they started their studies. Even the state of the regional labour market influences labour market opportunities. Ultimately, the labour market success of graduates also depends on selection made during studies.

The vast majority of graduates successfully integrate into the labour market. According to the graduate survey 2021, one year after completing a Master's, on average 92% of university graduates are in employment *(→ chapter Tertiary-level education, page 193)*; according to the definition of the International Labour Organisation (ILO), 3% are unemployed. Graduates of universities compared with 25 to 30-year olds with an education at upper secondary level (as the highest education qualification) thus tend to be somewhat more frequently employed (92% versus 89%) and less frequently unemployed (3% versus 6%). With regard to unemployment, this is partly an entry phenomenon. Five years after graduating, the proportion of unemployed individuals is at 6% and the ILO unemployment rate is at 2%, which is considerably below the Swiss average of all employed individuals. Of those university graduates who are in employment one year after graduating, the vast majority (90%) are in suitable employment based

on their education, in other words, work that requires a university degree or is at least appropriate to the specialist skills acquired during the course of study.

There are clear differences between the subject fields when entering the labour market, both in terms of participation and in the quality of occupation (→ figure 267). In the humanities, which are less career-specific, and in interdisciplinary studies, entering the job market is associated with somewhat larger difficulties, as reflected in a lower proportion of the employed and a larger share of persons employed in jobs that do not adequately match their skills. Employment rates below average are also observed in law and the natural sciences. For persons who completed their studies in 2016, the share of persons employed in a capacity adequate to their education in the period between the first and the fifth year after completing their studies increased by 3 percentage points on average.[6]

267 Labour market situation one year and five years after completion of studies, 2021

Graduates of the second cycle; 2020 graduation cohort (1 year after graduation) and 2016 (5 years after graduation)

Data: FSO (EHA); calculations: SCCRE

The employed count as **employed appropriately to education** if the job that person is doing a) requires a university degree or b) displays a clear match with professional skills acquired during the studies (level 4 and 5 on a scale from 1 "not at all appropriate" to 5 "highly appropriate").

The categories of the "overarching/other" fields of study as well as those with less than 50 observations are not shown, but are included in the average value.

6 The latest cohort is always shown in the graphic. The values relating to the time "1 year after graduation" are from the 2000 cohort and not the 2016 cohort.

Entry into the labour market varies depending on the education cycle. According to the data of the university graduate survey, Bachelor graduates are more frequently not employed or more frequently unemployed (according to the ILO definition) and more frequently not adequately employed as graduates of Master's degree programmes. Holders of a Doctorate have the best opportunities in the labour market. Regarding the differences, it is not clear to what extent they can be attributed to the different lengths of study and to what extent to the selection between the cycles.

Efficiency/costs

If one wants to assess the efficiency – in other words, the relationship between the use of funds (input) and the achievement of goals (output) – adequately in university education, the problem does not only lie in having comparable and suitable data for the output (effectiveness), but also comparable data for the input. Both requirements are only partially met, which is why both assumptions and compromises have to be made. Regarding costs, although the accounting models between the universities have been broadly harmonised, there is no data available on student numbers in full-time equivalents. Data on study intensity is available (based on the number of evaluated ECTS credits), but it is not suitable for calculating the costs per student full-time equivalent due to methodological reasons. Given these difficulties in measuring efficiency, the following comments will focus on comparing the costs incurred by universities and their income. The short-term influence of the Covid-19 pandemic on the length of studies is also discussed. International comparisons will be made in the *chapter Tertiary-level education, page 193*.

Income of the universities

The amount of funds which universities (can) spend on training and education depends on the income which they receive from their sponsors or generate themselves. In Switzerland, the expenditure for research and teaching is covered to a large extent by contributions from the public sector *(→ chapter Tertiary-level education, page 193)*. At the ETHs, the global budget made available by the Confederation corresponds to around three-quarters of expenditure. In cantonal universities, 12% of the expenditure is covered by basic contributions from the Federation as part of the HEdA, two-fifths by contributions from the cantons in which the university is located and at least 10% by contributions from other cantons which is paid under the inter-cantonal university agreement (IUV)[7] for the students from other cantons. Depending on the proportion of students from outside the canton, the share of extra-cantonal contributions varies heavily between the universities. The proportional values are between 5% and 22%.

The IUV was subjected to a review in the past few years. The revised agreement (IUV II) came into force in January 2022. The basic functions –

7 *Interkantonale Vereinbarung über Beiträge an die Ausbildungskosten von universitären Hochschulen (Interkantonale Universitätsvereinbarung, IUV)* of 27 June 2019.

the freedom of movement of the students and the cost compensation between the cantons – have remained the same. However, the fees will now be calculated based on effective operating costs (with deductions for research and location advantage for the university cantons). In addition, the migration discounts, from which up to now the six cantons of Glarus, Grisons, Jura, Ticino, Uri and Vaud have benefited, have been abolished, as not only these but the vast majority of cantons record migration losses *(EDK, 2017)*. Simulations on the new fees show that the contributions of the cantons of origin and the income of the universities only change slightly *(EDK, 2021b)*. In the majority of the non-university cantons the contributions will decrease. Only some cantons (UR, VS, JU) whose deductions for migration losses no longer apply will need to pay higher contributions. In addition, around half of the university cantons (ZH, BE, FR, BS/BL, GE) will be confronted with somewhat lower net revenue.

Around one-fifth of the costs are covered by competitively acquired third-party funds. The majority of these come from public funding institutions. Private third-party funding, acquired in the form of private research assignments and from foundations, cover around 7% of expenditure. To minimise the risk of sponsors influencing research (and their results), the individual universities have adopted their own guidelines on the acceptance of private third-party funding.

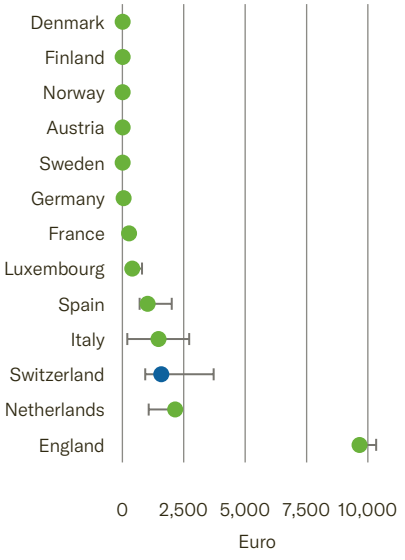
The student fees cover a very small proportion (2%) of the overall costs. At most universities, they are between CHF 1000 and 1700 per year; only at the University of St. Gallen (CH 2460 to 2860) and at the University of Italian-speaking Switzerland (CHF 4000) are fees significantly higher. For students who were resident abroad at the time when they acquired the admission qualification, the majority of universities charged higher fees. The additional fees ranging from CHF 300 to 4000 are explained as the result of higher administrative costs (review of admission file, communication/website in English) and the financial shortfalls that are incurred to the university cantons due to a lack of IUV (inter-cantonal university agreement) contributions. The student fees within a university are generally the same for all fields of study. Since there are substantial cost differences between the various study courses, however *(→ Costs by field of study, page 246)*, the percentage of study costs covered by each student varies considerably. An economics student at the University of Geneva, for example, personally bears 17% of his or her annual costs for basic training and education (excluding research), while a natural sciences student at the same university will only contribute around 4%.

In contrast to Switzerland, no tuition fees are charged at (public) universities in many other countries in Europe, at least not for students from the EU and from countries of the European Economic Area (EEA) or the European Free Trade Association (EFTA). Compared with the rest of Europe, the tuition fees in Switzerland are therefore above average (→ figure 268). However, they are at a moderate level in comparison with England, where fees are on average around 10,000 Euros. As studies of a system change show, moderate tuition fees could already lead to children from educationally disadvantaged homes being less likely to go on to higher education *(Kroth, 2015)*. On the other hand, tuition fees could also have the effect that students complete their studies quicker and more frequently *(Bietenbeck et al., 2021)*. The question of whether there is a causal link between the amount of tuition fees and the amount of the public expenditure on education has

268 Course fees at Bachelor's level by international comparison, 2020/21

Most frequent amount or average amount (points) as well as minimum and maximum amount for an academic year

Data: *European Commission et al. (2020b)*



not yet been examined. It is thus not known whether tuition fees simply compensate for a lack of public investment or are included in education in addition to the investment.

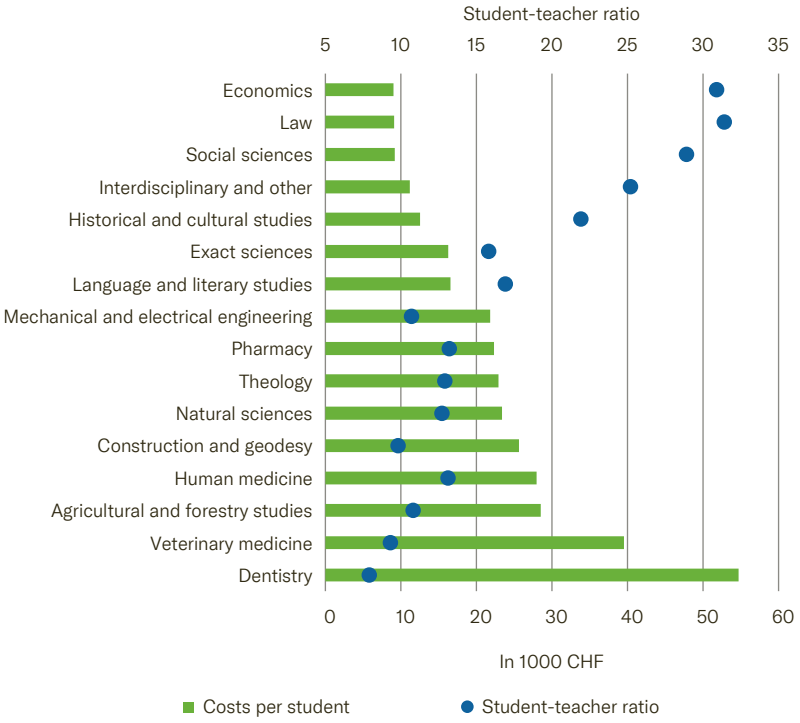
Costs by field of study

Taking into account research **costs** in addition to teaching costs, the annual expenditure per student is between CHF 16,000 (law) and CHF 120,000 (Human medicine).

The annual costs for instruction per student vary very widely depending on the field of study and may range from CHF 9000 (economics, law, social sciences) to CHF 55,000 (dentistry) (→ figure 269). The cost differences between the fields of study are due to a large extent to the different student-teacher ratios. What is not known is what the optimal ratio would be for individual subjects or how far individual subjects and universities are from this optimal ratio. Consequently, the question remains of whether the same results could be achieved with less intensive teaching or whether the student/teacher ratio in certain fields of study should actually be stepped up in order to facilitate more effective education. In general, however, there are indications that larger classes are associated with worse grades *(Kara et al., 2021)*.

269 Costs by field of study, 2020

Data: FSO



Costs per student
Annual costs for teaching (basic education and training) per student

Student-teacher ratio
Number of students per FTE on the academic teaching staff (basic education and training)

Basic training includes the Bachelor's and Master's levels.

Studies using economics students as an example suggest that the academic degree of teaching staff in tutorials does not have any impact on the performance and is only slightly positively associated with the assessment of the lectures *(Feld et al., 2019, 2020)*. The universities could thus reduce their costs in fields of study in which tutorials are used without a loss in quality,

by increasingly using students from later semesters or at Doctoral level for teaching. However, this is already frequently the case in Switzerland.

The costs for each student have decreased over the last ten years in the areas of medicine and pharmacy as well as in the technical, exact and natural sciences (→ figure 270). In the areas of pharmacy and exact sciences as well as mechanical and electrical engineering, the cost savings can be partially explained by a reduction in the student-teacher ratio. The sharp decline in costs in the area of medicine and pharmacy in 2017 can, however, be attributed to a significant decline in costs in human and veterinary medicine, which cannot be explained by an increase in student numbers.

Efficiency of the universities

As mentioned at the beginning, it is difficult to measure the efficiency of universities. The results of an expert report on the efficiency in the Swiss education system *(Wolter et al., 2020)* indicate that the ranking of the universities with regard to their efficiency depends on whether inputs are considered on a real or a monetary basis. In addition, it also depends on which outputs (degree, labour market outcomes, competence gain, third-party funding) are used or involved to measure the efficiency.

The analyses for developing efficiency over time (→ figure 271) on the other hand, suggest, irrespective of the calculation method, that the efficiency of the universities in the period between 2007 and 2017 has increased by around 10 percentage points. In the years between 2007 and 2010 a reduction in the efficiency was recorded, which could possibly be explained by the introduction of the Bologna reform *(Agasisti & Bolli, 2013)*. However, the efficiency developed positively again from 2013 onwards. There are no studies for the development from 2017 onwards.

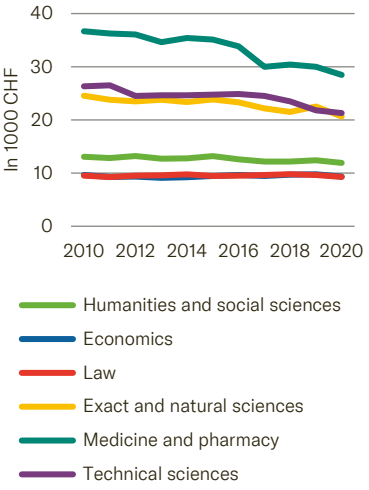
Influence of the Covid-19 pandemic on the length of studies

When the universities had to close in March 2020 because of the Covid-19 pandemic, and face-to-face teaching was changed to online formats *(→ chapter Tertiary-level education, page 193)*, the universities communicated that everything would be done to avoid negative consequences, such as an extension of studies. If one considers the proportion of students who completed their studies in the respective years, the following is observed: The Bachelor students in their third and fourth year of studies tended to complete their studies more frequently in the years of the pandemic 2020 to 2021 (→ figure 272). Thus, the Covid-19 pandemic could have led to the fact that students who were at the end of their Bachelor's studies were more strongly focused on graduation. There are several conceivable reasons for the earlier completion of studies: The employment opportunities alongside studies had deteriorated and the chances of trips and foreign semesters had been dropped. Unlike the Bachelor students, the graduation rate of the Master's students declined in the second academic year. However, the reason for the decline is not so much the Covid-19 pandemic; the reduction in graduation frequency can rather be explained by the downward trend over the last few years.

270 Development in costs per student by fields of studies category, 2010–2020

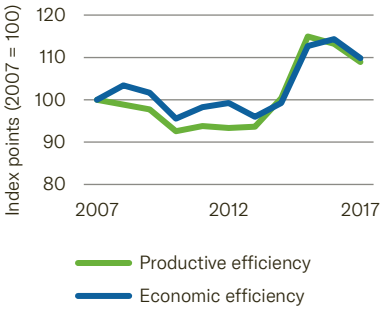
Basic training costs for apprenticeship per student in basic training (adjusted for inflation)

Data: FSO; calculations: SCCRE



271 Development of efficiency, 2007–2017

Data: *Wolter et al. (2020)*

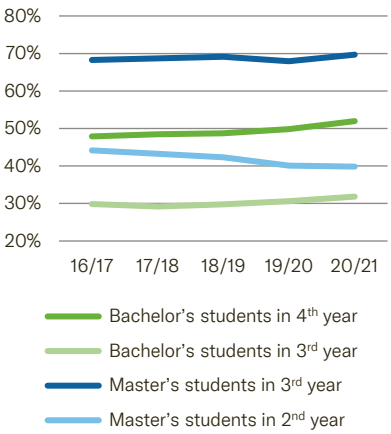


The **productive efficiency** is based on the number of teaching staff and the number of students (inputs) as well as the number of degrees (outputs).

The **economic efficiency** is based on the number of students and the costs for teaching (inputs) as well as on the number of degrees and the third-party funding (outputs).

272 Share of students who completed their studies in the corresponding year

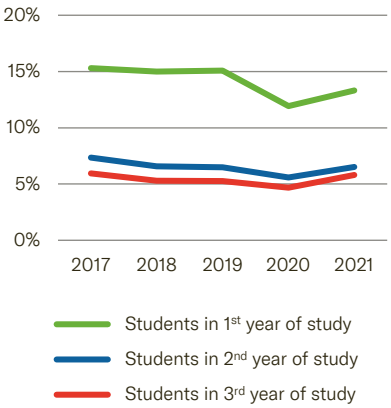
Data: FSO (LABB); calculations: SCCRE



Legend
In the academic year 2020/21, 52% of the fourth-year Bachelor's students completed their Bachelor's degree, while in 2018/19 it was only 49%.

273 Proportion of students who switched the fields of study, 2017–2021

Data: FSO (LABB); calculations: SCCRE



The length of studies depends very strongly on how frequently students change their subject field during the course of study. This question must therefore be considered from the aspect of efficiency, because changes in the field of study which could have been avoided by proper preparation or information before the studies are inefficient both systemically and individually. Evaluations of the development of the last few years show that among Bachelor's students in the first academic year the proportion of persons who changed their field of studies fell significantly in the first year of the pandemic in comparison with the previous years (→ figure 273). One possible explanation for this could be that fewer students failed the examinations, as also observed in the final examinations at upper secondary level (*→ chapter Baccalaureate schools, page 155; → chapter Vocational education and training, page 125*). If this explanation is correct, the question arises of whether the students who under normal circumstances would have been forced to repeat the academic year, to change the field of study or to discontinue studies, will fail in later examinations. This would then lead to a higher frequency of changes in fields of studies in later semesters in subsequent years. In the academic year 2021/22, a slight increase in the change in fields of study could be observed compared with the first year of the pandemic, but the change rate is still below the level of previous years.

Equity

Equal opportunities in university education are considered below based on the criteria of access and participation in education as well as educational success. Disparities between men and women as well as differences in social origin are observed. The aspects of the migration background and the (physical) disabilities will be addressed in the *chapter Tertiary-level education, page 193*.

Gender-based differences

Measured in terms of the total number of students at universities, gender distribution is very balanced. In the 2021/22 academic year, the proportion of female students was 52%. However, the selection of studies is still very gender-specific. Women are particularly under-represented in the exact and engineering sciences, while men are under-represented in

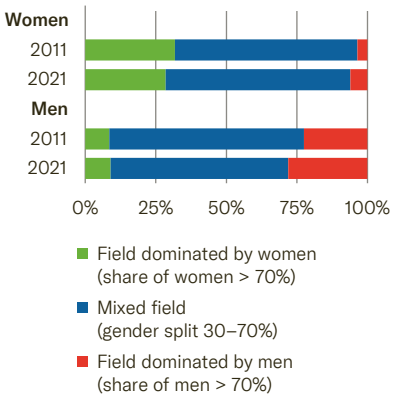
languages, literature and social sciences, as well as in veterinary medicine and pharmacy. Altogether, around every third to fourth female student and every third to fourth male student chooses a subject in which their own gender is heavily overrepresented or has a share of above 70% (→ figure 274). Only just 6% of women and 9% of men decide on a gender-atypical field of study in which the proportion of their own gender is less than 30%. The gender-specific study preferences have remained very stable over time. Over the last ten years, the proportion of women in male-dominated fields of study has tended to increase and that in female-dominated fields of study has somewhat declined. However, the proportion of men in the male-dominated fields of study has simultaneously increased. Altogether, the horizontal segregation has thus not substantially weakened.

While slightly more women than men complete a Bachelor's or Master's degree, the gender ratio is reversed at the subsequent levels. The low chances of transition and success for women after a Master's degree lead to the fact that their participation decreases as their academic career progresses (leaky pipeline): from 47% among the Doctorates to 42% among the research associates (with Doctorate) to 41% among assistant and associate professors and finally to 23% among full and extraordinary (f./eo.) professors (→ figure 275).

274 Gender segregation by student intake, 2011 and 2021

Share of students in subject areas dominated by women, mixed and dominated by men

Data: FSO; calculations: SCCRE

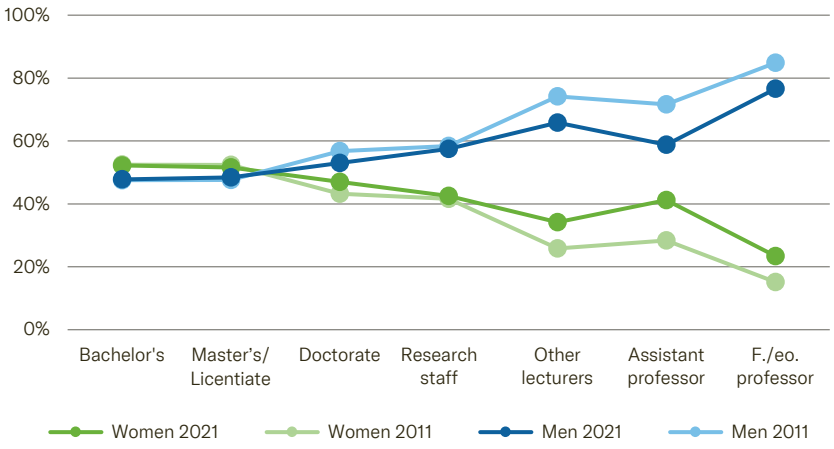


Horizontal segregation
means the uneven gender distribution in the choice of subjects.

Vertical segregation
means the uneven gender distribution at the individual career levels.

275 Leaky pipeline: gender ratios pursuing an academic career, 2011 and 2021

Data: FSO (SHIS, SHIS-PERS), swissuniversities; calculations: SCCRE



The category "full/extraordinary professor" comprises full, extraordinary and associate professors. Only persons with a degree of employment of at least 50% are included in the 2011 data in this category. In addition, the associate professors were entered in the category of "assistant professor" with a temporary appointment in 2011. The category "research associate" only comprises persons with a Doctorate.

The figures reflect the gender ratios in the years 2011 and 2021 and do not represent the results of a specific cohort, which means that the actual chances of transition and success are less unequally distributed than suggested in the figure.

276 Share of women in new appointments, 2014–2021

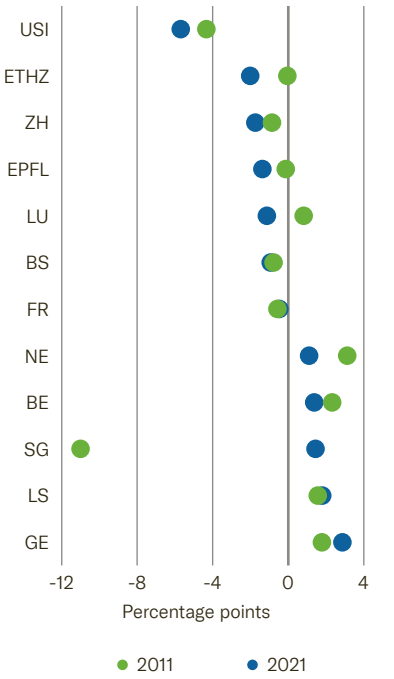
Data: FSO (SHIS- PERS); calculations: SCCRE

A **new appointment** is defined as when someone holds a professorship (including assistant/associate professorship) for the first time.

277 Deviation of share of female professors from the average, 2011 and 2021

Deviation of share of women from the average of all universities, for the same fields of studies, in percentage points

Data: FSO (SHIS-PERS); calculations: SCCRE



Separate evaluations according to fields of studies category indicate that the strength of the leaky pipeline as well as the location of the largest brain drain vary according to fields of studies category. Altogether the proportion of women decreased, considered over the entire academic career path – in other words, between Bachelors' degrees and the extraordinary and full professorships – most strongly in the areas of exact and natural sciences as well as in medicine and pharmacy at around two-thirds. It is noticeable that the proportion of women sharply decreases, in particular at the transition to the last level (full/extraordinary professorships). In the female-dominated fields of study (humanities and social sciences, law), it also decreases significantly between the Master's and Doctoral levels.

For many years, the goal of increasing the share of women with professorships has been pursued with the help of federal programmes as well as funding instruments specifically set up for women. As comparisons with 2011 show, this has been at least partially successful (→ figure 275). Analyses of the data of staff at institutions of higher education confirm the expectation that the proportion of women among professors has increased in particular in those fields of study and at those universities where it was comparatively large in new appointments and where the number of new appointments was comparatively high. In addition, it appears that the proportion of women could be increased, in particular in those institutes where it was particularly low at the start of the 2010s. In the 2010s, the share of women in new appointments was around 30% on average. In 2019 to 2021, however, it increased again significantly (→ figure 276).

The proportion of professorships held by women varies between the individual universities, with the same composition of fields of study, by around 9 percentage points (→ figure 277). The differences suggest that a small proportion of women is not simply attributable to the low supply of well-educated female academics, but is also influenced by the personnel policy of the institutions. As comparisons with 2011 show, however, the differences between the institutions of higher education have declined over the last ten years. The University of St. Gallen in particular, which recorded a share of women which was considerably below average at that time, managed to significantly increase the number of female professors. Currently, the University of Italian-speaking Switzerland (taking into account the fields of studies category offered) has the lowest number of women by far. The questions of whether the discrepancy has to do with the personnel policy of the university or whether comparatively few outstanding female candidates are available in the Italian-speaking region cannot be answered.

In general however, studies for Switzerland suggest that the difficulty in reconciling family commitments (which are typically based on a traditional family model) with professional requirements (high level of dedication and productivity, flexibility in terms of time and geographical mobility) constitutes an important explanation for the withdrawal of women from academic careers *(Bataille et al., 2017)*. In addition, the existing research, competitive and surveying discourses might also encourage men as prototypes of the "ideal researcher" and reject female biographies and lifestyles as inappropriate *(Borra, 2019)*. Among women, who are in a strong minority, certain (lacking) network structures could also negatively impact promotion *(Schön et al., 2018)*. On the other hand, there is no significant difference in the funding rate for the career development instruments of the SNSF between the sexes *(Severin et al., 2019; Widmer et al., 2019)*.

Surveys among postdocs indicate that it is at least as important for women as men to pursue their career *(Widmer et al., 2019)*. However, significant gender differences are indicated with regard to career goals: Men more often aspire to a professorship than women, while the latter rather aim for another senior research position. One possible explanation for this might be that it is more important for women to be able to work part-time later *(ibid.)*. However, the strong competition that accompanies a promotion to a professorship could also discourage women from taking up appropriate positions *(Bosquet et al., 2019)*.

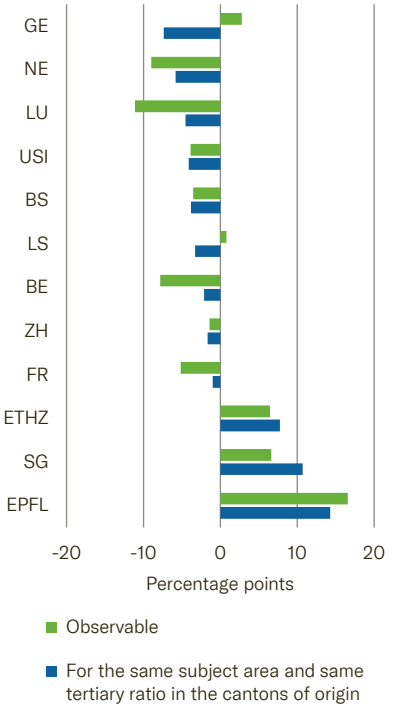
Social background

Children whose parents have graduated from a higher education institution more frequently transition to a university than children whose parents do not have a higher education qualification *(→ chapter Tertiary-level education, page 193)*. This can be explained almost completely by the socially different educational pathways at upper secondary level. In addition, earlier studies show that the social origin also influences the type of university and the specific university *(Denzler & Wolter, 2010)*. If one compares the share of students between the individual universities who have (at least) one parent with a university degree, substantial differences can also be observed (→ figure 278). The share differs by 28 percentage points between the institution of higher education with the lowest and highest share. This discrepancy can be partially explained by the fact that the selection of the field of study depends on the social origin. For example, the degree courses of medicine and the technical sciences are chosen particularly frequently by the children of academics. In addition, the fields of study at the universities are represented differently. The level of education in the population of the university canton (as well as it catchment regions) also influences the composition of the student body, as a large number of students choose the university which is closest to where they live *(Denzler & Wolter, 2010)*. However, even regardless of these two factors, differences of over 20 percentage points can be observed. ETH Lausanne proves to be by far the most socially selective institution of higher education, followed by the Universities of St. Gallen and the ETH Zurich. How the substantial differences can be explained is not known in detail. In the case of the two ETHs and the University of St. Gallen, which attract students from large parts of Switzerland, the greater distance to the institutions of higher education, which for students is bound up with additional costs, as well as the reputation of a particularly sophisticated and elite institution of higher education will, however, likely favour the socially selective choice.

278 Differences in social selectivity between universities, 2020

Deviation from average in share of students with at least one parent with a university degree; only Bachelor's students, excluding foreign educated students

Data: FSO (SSEE); calculations: SCCRE



Differences in academic success

Social inequalities are not only observed at access to university education but also in the probability of academic success (→ figure 279). Students with a migration background are less likely to obtain a Bachelor's degree at university than students without a migration background. With the same characteristics – in other words, the same gender, age, education qualification of parents, admission qualification, time of entrance to study, field

of study and same university at entrance to study – only the migrants of the first generation (Swiss-educated foreign nationals) indicate a significantly lower probability of success. The success rate also varies according to the parents' educational level. The graduation rate tends to be higher among students whose parents have a tertiary educational qualification than among those whose parents do not have any post-compulsory educational qualification. The differences prove to be statistically insignificant in the sample examined (SSEE 2013), but other studies for German-speaking Switzerland based on register data indicate significant differences by educational background *(Diem, 2021)*. Students who claim to struggle with financial difficulties and those who complain about poor health are also less successful in their studies.

279 University Bachelor's degree up to six years following enrolment by students' characteristics

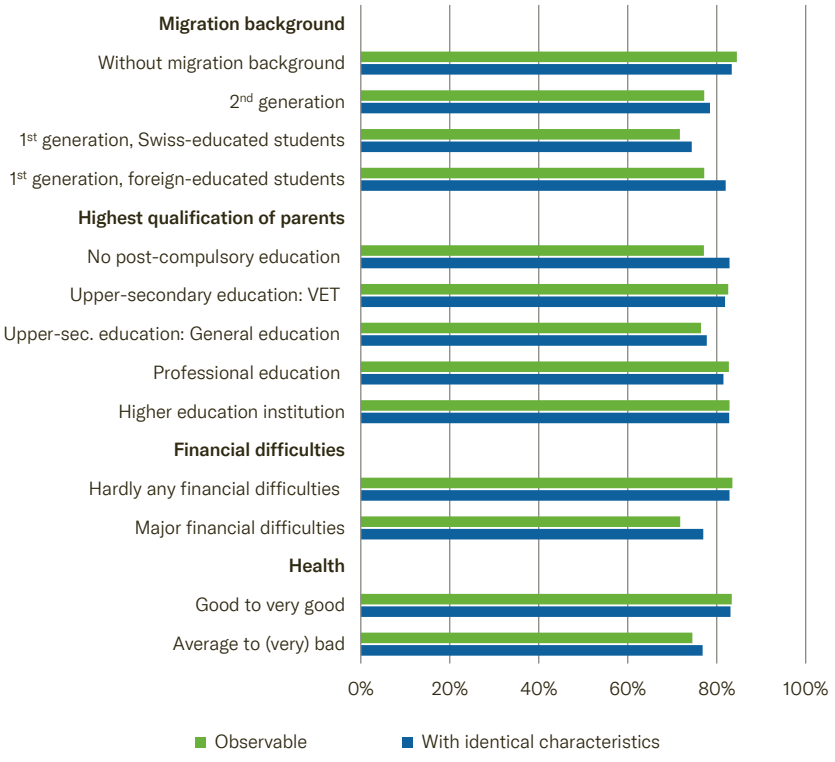
Probability of success of students who were admitted to studies in 2011 or 2012

Data: FSO (SSEE 2013, LABB); calculations: SCCRE

The **green bars** reflect the effectively observable probability of attaining a Bachelor's degree up to six years after admission to studies.

The **blue bars** represent the probability of success with the same characteristics (gender, age, migration background, highest educational qualification of parents, financial difficulties, state of health, admission qualification, gap years before admission to studies, field of studies and tier-one university at admission to studies).

Only persons with valid information on all variables have been taken into account.



COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION
AND TRAINING

UNIVERSITIES OF APPLIED SCIENCES

Context

The **facts and figures in this chapter** relate to universities of applied sciences without taking account of the integrated universities of teacher education (UTE). The latter are dealt with in the *chapter Universities of teacher education, page 285*. Continued education and training is addressed in the chapter *Continuing education and training, page 331*.

The number of enrolled students is of paramount importance to the individual universities of applied sciences (UAS), as they need to make appropriate adjustments to their course offering – not only the infrastructure and individual lectures but also the staffing. In addition, the funding provided to universities is highly dependent on student numbers *(→ chapter Tertiary-level education, page 193, → Efficiency/costs, Seite 276)*.

The number of students depends on many different factors. One key factor is the number of people with a federal vocational, specialised or academic baccalaureate – and this number in turn depends on demographics and on the structure of the feeder schools. Another key factor are the transition rates to universities of applied sciences, which are influenced by the economic situation, or rather by competition in the job market *(Bächli & Tsankova, 2020)*. Other factors include the number of students entering with other Swiss or foreign admission qualifications – the latter are referred to as international students or foreign-educated foreign nationals – as well as the duration of the (Bachelor's) course and the transition rates from the Bachelor's to the Master's programme. Overall, the development of the various factors has led to a constant increase in student numbers since the universities of applied sciences were founded. In 2021 – that is, 25 years after the Universities of Applied Sciences Act (UASA)[1] entered into force – student numbers totalled 78,000 without counting those who were completing continuing education and training (CET). Initially, the number of students enrolled at a university of applied sciences was just under 5,000.

Demographics and intake of universities of applied sciences

The decade from 2011 to 2021 saw a marked increase in the number of federal vocational baccalaureates (vBac) completed (+14%, → figure 280), particularly in the early 2010s. There was also a significant rise in student numbers at Bachelor's level despite only slightly increased transition rates of people with a federal vocational baccalaureate to courses of study at a university of applied sciences (UAS). Conversely, the number of academic baccalaureates (Bac) rose only slightly in the observed period, and the transition rate to universities of applied sciences also remained largely stable. By contrast, the considerable expansion of upper-secondary specialised schools *(→ chapter Upper-secondary education, page 111)* and the associated increase in the number of specialised baccalaureates (sBac) have clearly favoured this growth in student numbers. In the second half of the 2010s, there was also an increase in enrolments of students with a foreign qualification (international students), which contributed to the rise in student numbers. Overall, the various factors led to an almost 30% increase in the number of Bachelor's students between 2011 and 2021 alone. This growth in the student population at Bachelor's level and the expansion of Master's degree programmes have led to a sharp rise in the number of students at Master's level (+104%) – although the transition rate to Master's level has remained relatively stable. When both levels – Bachelor's and

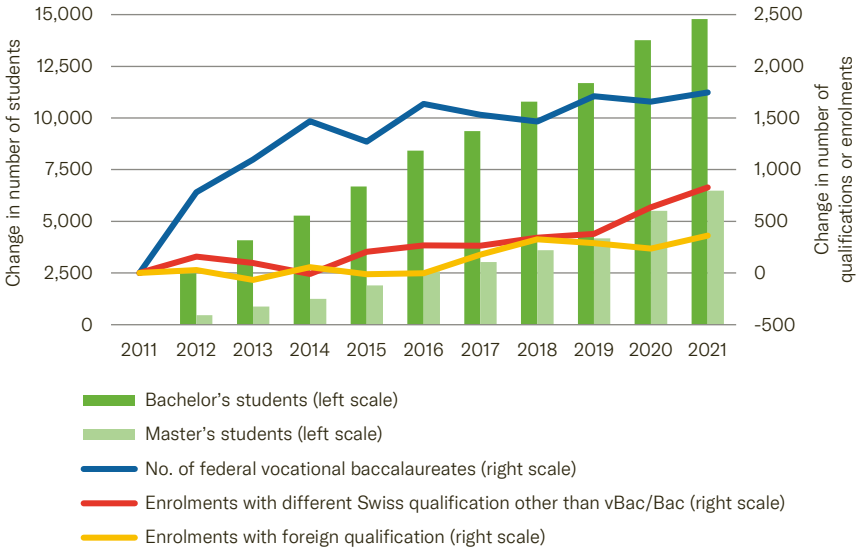
1 *Bundesgesetz über die Fachhochschulen* of 6 October 1995.

Master's – are considered, the number of students at universities of applied sciences rose by more than a third within the aforementioned period.

280 Change in student numbers and in the number of federal vocational baccalaureates and enrolments, 2011–2021

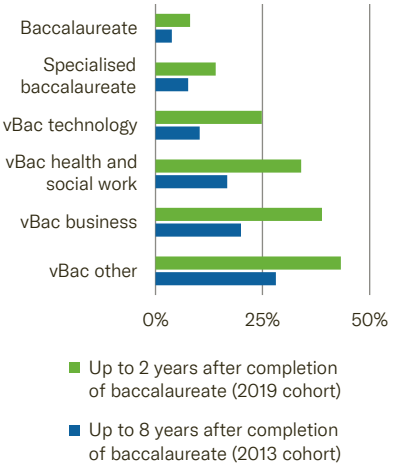
Changes with respect to 2011

Data: FSO (SHIS, LABB); calculations: SCCRE



281 Proportion of people who have not (yet) started tertiary-level education by type of baccalaureate

Data: FSO (LABB); calculations: SCCRE



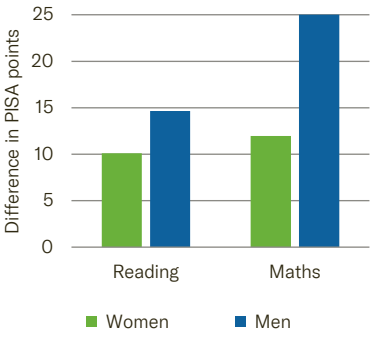
The federal vocational baccalaureate is by far the most numerous admission qualification for the universities of applied sciences *(→ Institutions, Seite 259)*. As the increase in this type of baccalaureate has flattened off since the mid-2010s, however, the universities of applied sciences may not be able to expect the same growth in student numbers in future if they continue to focus on this part of the population. That being said, the relatively moderate transition rates to tertiary-level education or training open up hitherto untapped potential for growth among holders of federal vocational baccalaureates (→ figure 281). Of people with a federal vocational baccalaureate, 10% to 30% undertake no further education or training at tertiary level, depending on educational orientation, whereas this figure is just 4% for people with an academic and 8% for people with a specialised baccalaureate.

Assuming that the differences in competencies between individuals at the end of compulsory education are still present on entry to universities of applied sciences *(→ chapter Baccalaureate schools, page 155)*, it can be shown that federal vocational baccalaureate pupils who undertook no education or training at the tertiary level have a lower competency level, on average, than those who began a programme at a university of applied sciences (→ figure 282). A higher transition rate to universities of applied sciences would result in the entry of more people with comparatively lower competency levels.

282 Selection to universities of applied sciences: difference in PISA points

Between federal vocational baccalaureate pupils who entered a UAS and those who did not enter tertiary-level education

Data: SEATS; calculations: SCCRE



Legend
Federal vocational baccalaureate pupils who began a course of study at a UAS had scored 10 points better at reading in the PISA test than those who did not begin education or training at tertiary level.

Forecasts for student numbers

As described above, the development of student numbers at universities of applied sciences depends on numerous factors. Accordingly, the drawing-up of long-term development forecasts is associated with a great many uncertainties – and this is reflected in the fact that the "low" and "high" scenarios published by the Federal Statistical Office (FSO) differ significantly from the reference scenario also published by the FSO. For the universities of applied sciences, the greatest uncertainties relate to the number of students with a foreign admission qualification who begin a Bachelor's or Master's course, as well as the transition rate of people who enter a UAS with a federal vocational baccalaureate.

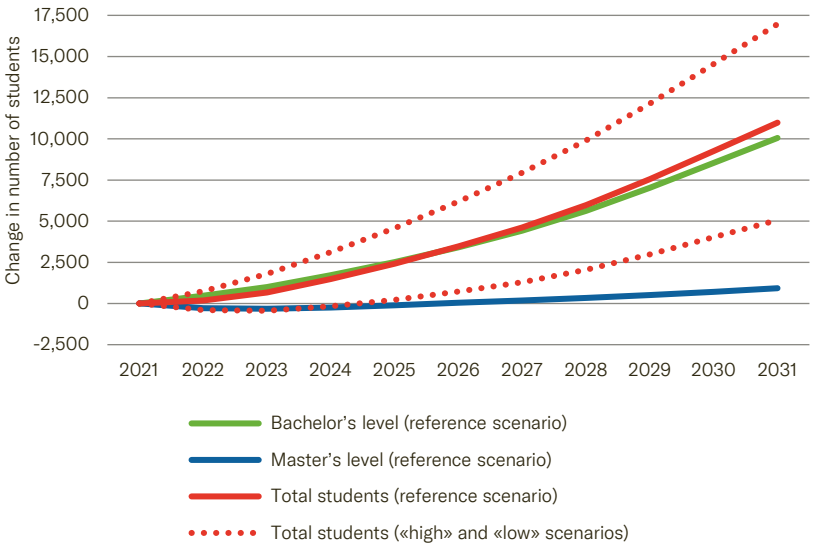
The reference scenario for the development of student numbers up to 2031 is based on the assumption that there will be an increase in not only the number of federal vocational baccalaureates but also in the transition rate for people with a federal vocational baccalaureate who begin studying at a university of applied sciences *(FSO, 2022m)*. Moreover, it is expected that more people with foreign qualifications – as well as more people with Swiss qualifications but who lack baccalaureates – will begin studying at these institutions. It is also assumed that the number of students entering Master's level will rise due to the increasing number of UAS qualifications at Bachelor's level, as well as the increase in students enrolling with other Swiss qualifications and foreign qualifications. Based on these assumptions, a total increase in student numbers by around 14%, or 11,000 students, is expected between 2021 and 2031 (→ figure 283), with growth at Master's level likely to be less than at Bachelor's level (7% versus 15%). Depending on the forecast scenario, however, growth could be as little as 6% ("low" scenario)

In 2021, **student numbers** were about 65,000 students at Bachelor's level and 13,000 students at Master's level (total: 78,000 students).

283 Predicted development of student numbers, 2021–2031

Change compared with 2021

Data: FSO



or as much as 22% ("high" scenario). This illustrates the degree of uncertainty surrounding future development: in absolute terms, the "high" and "low" scenarios differ by around 12,000 students in 2031, which is the equivalent of 15% of the student numbers in 2021. In the "high" scenario, it would therefore be necessary to expand the infrastructure significantly relative to the present day, whereas today's capacities would probably be sufficient in the "low" scenario. The "high" scenario would also require the creation of some 1250 new full-time positions (+22%) in order to maintain consistent student-teacher ratios. If such an expansion of the teaching staff were not possible, the student-teacher ratio would increase from 13.6 to 16.6 students per full-time equivalent (FTE) in the academic staff.

Institutions

The UAS landscape

According to the Federal Act on Funding and Coordination of the Higher Education Sector (HEdA)[2], the current UAS landscape includes one private (Kalaidos) and nine public-sector universities of applied sciences as well as two private UAS institutes[3] (as at July 2022). The individual universities of applied sciences consist of several subunits at different geographical locations, with each campus usually having its own management and administration.

The various universities of applied sciences differ considerably in terms of size (→ figure 284). Just 2.0% and 2.5% of students respectively are enrolled at the two smallest such institutions – Kalaidos and Fachhochschule Graubünden (FHGR). The largest university of applied sciences is that of Western Switzerland (HES-SO), which was founded as a joint UAS for all of the western Swiss cantons. In terms of size, it is followed by Zürcher Fachhochschule (ZFH), which is the largest university of applied sciences in German-speaking Switzerland. The size disparity between these two institutions is mainly down to the fact that the areas of health and social work are smaller at ZFH. This is because the corresponding courses are also offered at colleges of higher education in German-speaking Switzerland.

Zürcher Hochschule für Angewandte Wissenschaften (ZHAW), Zürcher Hochschule der Künste (ZHdK) and Hochschule für Wirtschaft Zürich (HWZ) have been accredited separately as universities of applied sciences or UAS institutes. Together, however, they are still the constituent parts of Zürcher Fachhochschule (ZFH) in accordance with the cantonal law on universities of applied sciences.
In 2019, the former Fachhochschule Ostschweiz (FHO) was split up into Fachhochschule Graubünden (FHGR, formerly Hochschule für Technik und Wirtschaft Chur [HTW Chur]) and Ostschweizer Fachhochschule (OST).
Until the mid-2010s, there was also a second private university of applied sciences (Les Roches-Gruyère), which ceased operating in 2018.

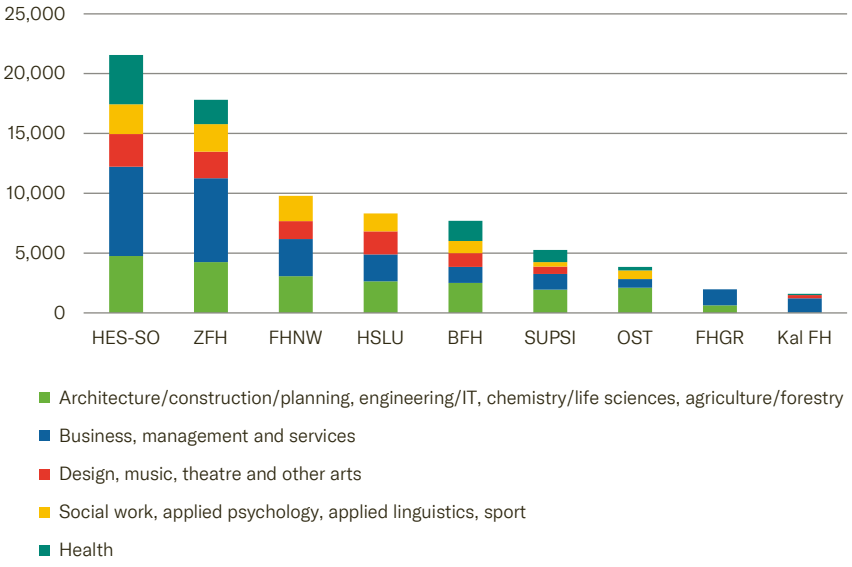
2 *Bundesgesetz über die Förderung der Hochschulen und die Koordination im schweizerischen Hochschulbereich (HFKG)* of 30 September 2011.

3 Hochschule für Wirtschaft Zürich (HWZ) and the Swiss Business School (SBS).

HES-SO	Haute école spécialisée de Suisse occidentale
ZFH	Zürcher Fachhochschule
FHNW	Fachhochschule Nordwestschweiz
HSLU	Hochschule Luzern
BFH	Berner Fachhochschule
SUPSI	Scuola universitaria professionale della Svizzera italiana
OST	Ostschweizer Fachhochschule
FHGR	Fachhochschule Graubünden
Kal FH	Kalaidos Fachhochschule

284 Number of students by university of applied sciences, 2021/22

Data: FSO

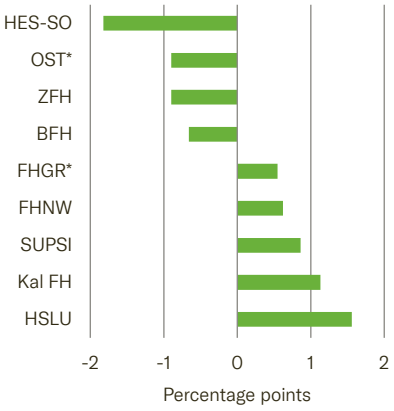


The two largest fields of study – business, management and services (33%) and engineering and IT (18%) – and the field of architecture, construction and planning (6%) are offered by all public universities of applied sciences, whereas all other fields of study can only be studied at specific universities. For example, the fields of agriculture and forestry, sport[4] and applied linguistics are only available to study at one or two universities of applied sciences. Although the fields of study on offer differ markedly from one university to another, the last ten years (2011–2021) have seen barely any change in the overall relative proportions of students in the individual fields. The greatest changes were seen in the fields of health, applied psychology (+2 percentage points in both cases) and social work (–2 percentage points).

Slight shifts can be observed in the market shares of the individual universities of applied sciences (→ figure 285). Increases were recorded in the market shares of Hochschule Luzern (HSLU), Fachhochschule Graubünden (FHGR), Fachhochschule Nordwestschweiz (FHNW), Kalaidos Fachhochschule and the Scuola universitaria professionale della Svizzera italiana (SUPSI). These increases were largely due to changes in the market shares in the STEM subjects (architecture, construction and planning, engineering and IT, chemistry and life sciences, agriculture and forestry) and in the field of business, management and services. When it comes to the other universities of applied sciences, the decreases in student shares are partly due to the relative decline of the fields of design and the arts.

285 Change in market shares, 2011–2021

Data: FSO (SHIS); calculations: SCCRE



*In the case of OST and FHGR, the changes were calculated with respect to their predecessor institutions (OST: FHO without HTW Chur; FHGR: HTW Chur).

4 Sport is only offered as a UAS degree programme at Eidgenössische Hochschule für Sport (Magglingen), which is a strategic partner institution of Berner Fachhochschule (BFH).

Admissions and departures of students

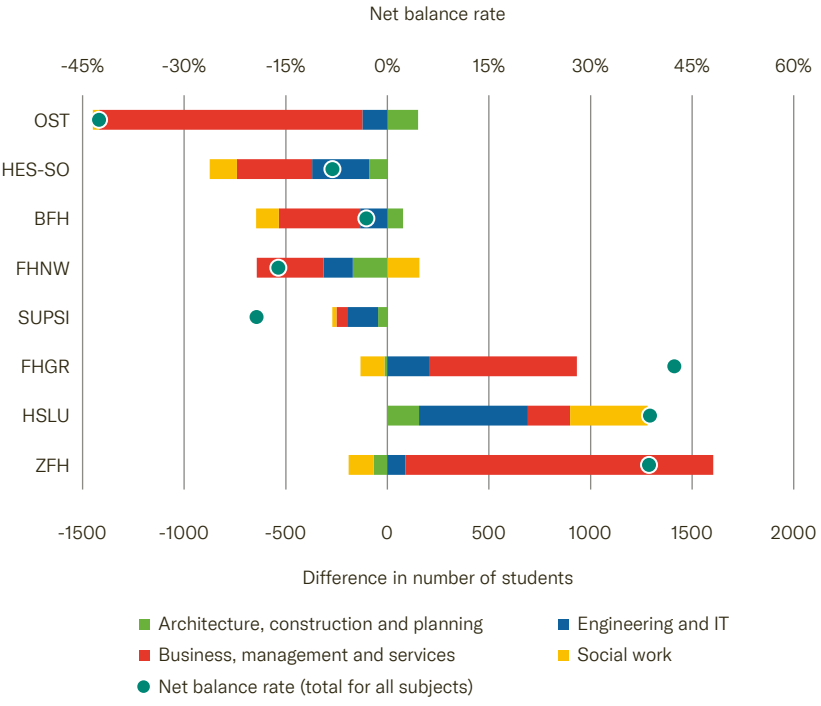
The slight shifts in the market shares of the individual universities of applied sciences may obscure the fact that they compete between one another for students. This is clear when one considers the admission of students from outside the supporting region (incoming) to the individual universities of applied sciences or the departures of students from the supporting region (outgoing). These flows can also provide clues regarding expected or perceived differences in the quality of education and the attractiveness of a university in general. Even when student numbers are by and large consistent, the admissions and departures of students are also an important factor when it comes to the funding for the individual universities of applied sciences *(→ Efficiency/costs, Seite 276)*.

The four largest fields of study are offered at all universities of applied sciences (with the exception of social work at FHGR) and together account for almost three quarters of students. In this context, the figures show that three universities of applied sciences – Fachhochschule Graubünden, Hochschule Luzern and Zürcher Fachhochschule – have a positive balance (→ figure 286). In other words, at these universities of applied sciences, the number of students from outside the supporting region (incoming) exceeds the number of students who study at a university of applied sciences outside the supporting region (outgoing).

286 Difference between admissions and departures of students by university of applied sciences, 2021

Only Students resident in Switzerland prior to starting the course

Data: FSO (SHIS); calculations: SCCRE



The **net balance rate** indicates, as a total for all fields of study, the difference between the number of students from outside the supporting region (incoming) and the number of students who study outside the supporting region (outgoing) relative to the number of students from the supporting region.

The calculations do not include private subunits or subunits financed by foundations (e.g. Fernfachhochschule Schweiz, which is part of SUPSI). In the cantons that are sponsors of two universities of applied sciences (Bern and Schwyz), the students were allocated to the two respective universities according to their distribution.

Ostschweizer Fachhochschule loses the highest number of students, and the negative balances at the university of applied sciences of French-speaking (HES-SO) and Italian-speaking Switzerland (SUPSI) can be partly explained by the fact that French and Italian are uncommon outside of the supporting region. Conversely, German is also spoken in some supporting cantons of HES-SO.

The picture presented by the positive and negative balances is largely confirmed if all fields of study are included in the comparison and if the differences between admissions and departures are considered in relation to the number of students from the region of origin. In general, offering a comprehensive range of subjects has a positive effect on the net balance, which explains the relatively low negative balance rate of Berner Fachhochschule when all subjects are taken into consideration. The net balance rate also depends on the size of the supporting region.

Of the two universities of applied sciences of French- and Italian-speaking Switzerland, SUPSI loses a considerably larger share of students to other universities of applied sciences than HES-SO despite the comprehensive range of subjects it offers. Overall, one in five Italian speakers who begins their studies at a university of applied sciences leaves their region to attend a university of applied science in German-speaking Switzerland; one in eight people from Italian-speaking Switzerland begins their studies at HES-SO *(FSO, 2020i)*. On the other hand, only 4% of French-speaking students enrol at a university of applied sciences in German-speaking Switzerland and only 0.2% enrol at SUPSI. In recent years, there has also been a sharp increase in the proportion of Italian-speaking students who begin their studies at a university of applied sciences in German-speaking Switzerland, whereas transitions to HES-SO have decreased slightly *(ibid.)*. However, even for the universities of applied sciences in German-speaking Switzerland, the trend is for a growing number of students to study outside of their own supporting region (at another university in German-speaking Switzerland), which points to more intensive competition between universities.

Practice-integrated STEM degree

As part of a pilot scheme (2015–2025) aimed at alleviating the shortage of skilled workers in STEM, the universities of applied sciences can offer practice-integrated degree programmes in STEM subjects that enable people with an academic baccalaureate or a federal vocational baccalaureate in an unrelated field of study to enter a course of study at a UAS directly. To make up for the lack of work experience, these Bachelor's degrees last four years. An evaluation of the pilot scheme *(econcept, 2019)* produced a positive overall assessment. To evaluate whether these practice-integrated degree programmes are also helping to reduce the shortage of skilled workers, an impact analysis will be carried out in 2023 and will serve as the basis for deciding whether to adopt the study model on a permanent basis.

Admission to universities of applied sciences

The Federal Act on Funding and Coordination of the Higher Education Sector sets out three channels for starting a Bachelor's course at a university of applied sciences (Art. 25 para. 1). The first – considered the main path – is by means of a federal vocational baccalaureate, supplemented by a programme of vocational and professional education and training in a vocation related to the field of study. The second route entails completing an academic baccalaureate combined with at least one year of work experience, while the third route is a specialised baccalaureate in an occupational field related to the field of study. In addition, however, other admission routes are also possible (Art. 25 para. 2 or UAS Admission Ordinance[5]; *swissuniversities, 2015*): for example, people with a federal vocational or specialised baccalaureate unrelated to the field of study are admitted if they can show at least one year of work experience in a relevant occupation.

5 *Verordnung des Hochschulrates über die Zulassung zu den Fachhochschulen und den Fachhochschulinstituten (Zulassungsverordnung FH)* of 20 May 2021.

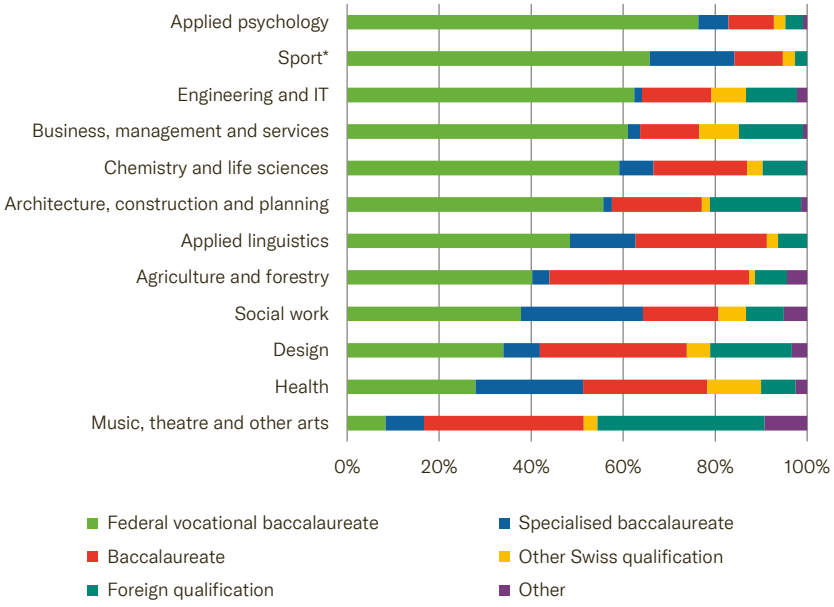
Another option is to complete professional education. The universities of applied sciences also have the option of setting additional entrance exams[6] and do so in many fields (applied psychology, design, health, social work, music, theatre and other arts, applied linguistics, sport); in some cases, a numerus clausus is also adopted.

Formal admission criteria help the universities of applied sciences to develop a distinct profile. These criteria differ from those of conventional universities in that they are accessible to people with a federal vocational or specialised baccalaureate in conjunction with at least a year of work experience. As a fundamental admission requirement, the baccalaureate is a key means of differentiating universities of applied sciences from professional education, and particularly from colleges of higher education.

Although the federal vocational baccalaureate still represents the main access route to universities of applied sciences, accounting for 50% of all admission qualifications (or 60% of all Swiss admission qualifications), the enrolled students have a very wide range of admission qualifications (→ figure 287). Nevertheless, the degree of diversity in terms of access routes varies considerably from one field of study to another.

287 Enrolments to Bachelor's courses by admission qualification, 2021

Data: FSO (SHIS); calculations: SCCRE



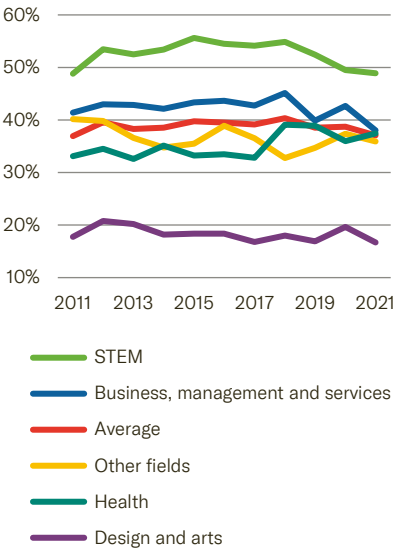
*The values are based on a sample size of < 50 students.

6 In the fields of art and applied linguistics, these tests replace the requirement to prove at least one year of work experience.

288 Proportion of students who have previously dropped out of a course of study at a university

As a percentage of all students with an academic baccalaureate who have begun a Bachelor's course at a university of applied sciences by field of study

Data: FSO (LABB); calculations: SCCRE



On average, two out of five students with an academic baccalaureate have already begun and dropped out of a course of study at a (conventional) university before enrolling at a university of applied sciences (→ figure 288). There has been no significant change in this proportion in the last ten years, although the percentage values differ considerably between different fields of study. The proportions are particularly high in STEM subjects and very low in the fields of design and the arts. The number of students who previously dropped out of a course of study at a university is particularly high in fields of study that are also offered at universities. These students frequently continue their studies in the same subject at a university of applied sciences.

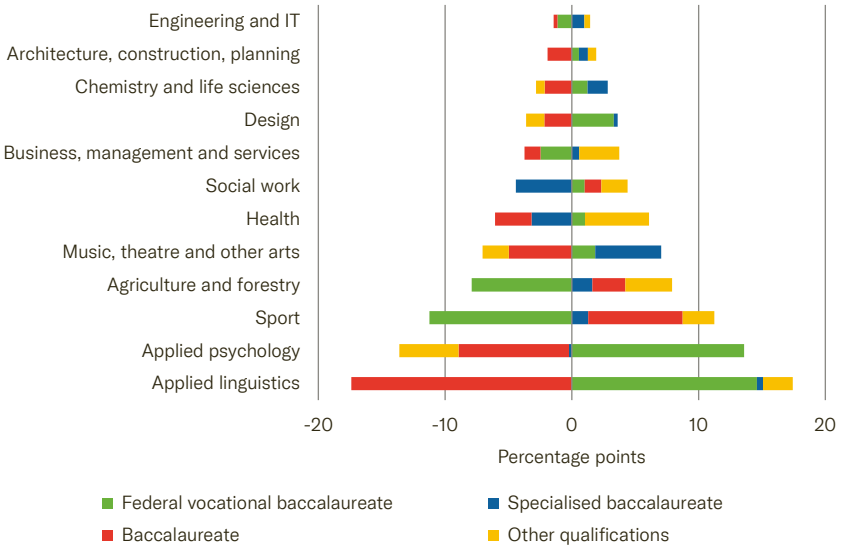
Although the make-up of admission qualifications changed in the five years between 2015/16 and 2020/21, there is nothing to suggest that the profiles of the different university types have therefore become less sharply defined. The proportion of academic baccalaureates fell in many fields of study, whereas the picture was more mixed with regard to federal vocational and specialised baccalaureates (→ figure 289). However, there has been a particular drop in the proportions of students with a federal vocational or specialised baccalaureate in fields of study where these admission qualifications are firmly established or widespread (federal vocational baccalaureate: engineering and IT, business, management and services; specialised baccalaureate: health, social work). On the other hand, there has been an increase in professional education qualifications (including the preparatory course to transition from professional education to a UAS). These are included in the "other qualifications" category.

289 Change in admission qualifications on entry to Bachelor's courses between 2015/2016 and 2020/2021

Change based on the averages for 2015 and 2016 versus 2020 and 2021; only students resident in Switzerland prior to starting the course

Data: FSO (SHIS); calculations: SCCRE

The "other qualifications" category includes the subcategories "other Swiss qualification", "foreign qualification" and "other", of which the first subcategory is the largest by far.



Performance mandate and profile development

Like universities and universities of teacher education, the universities of applied sciences are subject to a four-fold performance mandate. Their core tasks include education (basic education and training), research and development (including knowledge and technology transfer), services, and continuing education and training *(swissuniversities, 2021b)*. The principal mandates of universities of applied sciences are, firstly, to provide scientifically sound Bachelor's level education of experts who can quickly make a productive contribution in the labour market and, secondly, to engage in applied research and development. This is also reflected in the proportions of their staff's working time (→ figure 290).

The pronounced practical and labour-market orientation of universities of applied sciences is one of the key differences from the teaching delivered at conventional universities. Among other things, this is ensured by the practical orientation and experience of the teaching staff and via practical projects and work experience during the course of study *(Baer-Baldauf, 2020)*. Compared with professional education, on the other hand, the teaching at universities of applied sciences is more strongly based on science and research. Likewise, in the area of research, the concept of application orientation serves as a key differentiator from conventional universities, whereas – on the professional education side – colleges of higher education have no explicit research mandate.

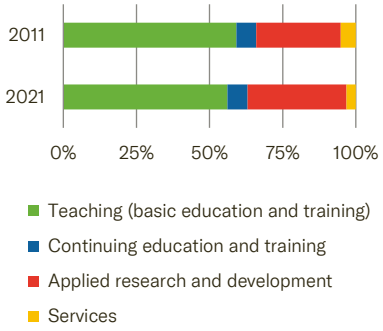
Strengthening the profiles of the courses offered at the tertiary level is a declared objective of the Confederation and the cantons *(EAER & EDK, 2019*; objective 4 of the joint declaration on education policy). The aim is to reinforce the characteristics of each profile and to continue seeking a sharper distinction between the individual university types with a view to making them complementary to one another in teaching and research. The findings of an explorative analysis *(SSC, 2020)* suggest that this is working, for there is little sign of convergence between universities of applied sciences and (conventional) universities.

In the first few years following the establishment of the universities of applied sciences, the field of applied research and development was still poorly developed in most subject areas, and it took time to raise its profile. In the last ten years – between 2011 and 2021 – the proportion of research activities, measured in full-time equivalents of staff, rose by an average of 5 percentage points (→ figure 291). There was particularly significant growth in the fields of chemistry and life sciences, design, and social work, where the increases were between 8 and 9 percentage points. By contrast, zero growth was recorded in the field of architecture, construction and planning – whose high proportion of research (35%) was already at a comparable level in 2011. Overall, the differences in research intensity between the different fields of study have barely diminished over time. The proportion of research continues to be by far the highest in fields that were already more research-intensive when the universities of applied sciences were founded – in the natural sciences and technical fields of study. With regard to the impact of applied research and development in STEM, analyses suggest that research activities have a positive impact on regional innovation and the regional labour market, at least in regions with large labour markets *(Pfister et al., 2021; Schlegel et al., 2022)*. This is in line with

290 Breakdown of human resources by activity type, 2011 and 2021

Measured in FTEs; without the area of administration and central services

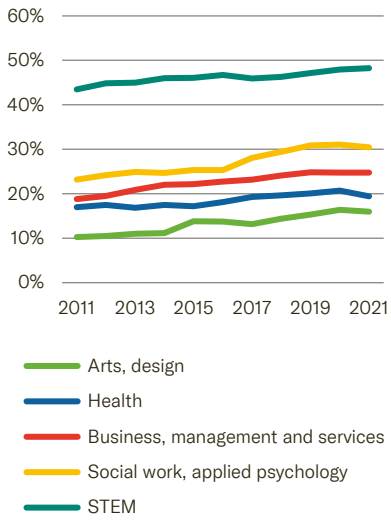
Data: FSO



291 Change in proportion of applied research and development, 2011–2021

By field of study, measured in FTEs of staff; without the area of administration and central services

Data: FSO; calculations: SCCRE



the political objectives that were set out when the universities of applied sciences were founded.

Extra-occupational degree programmes and part-time studies

In comparison with universities and universities of teacher education, the strong practical orientation of degree programmes at universities of applied sciences means that these programmes more frequently attract people who were in employment prior to starting their studies and want to remain so during the course. Accordingly, the universities of applied sciences have always offered extra-occupational – or rather part-time – degree programmes, which enable students to pursue employment or other commitments alongside their studies. Offering a wide range of extra-occupational degree programmes is a characteristic feature of universities of applied sciences *(→ chapter Tertiary-level education, page 193)*.

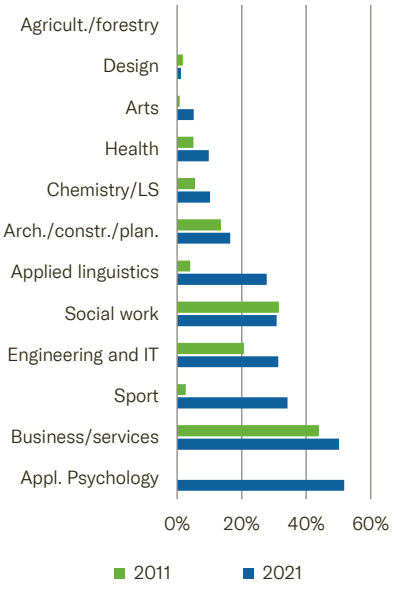
On average, almost one in three people enrolled at a university of applied sciences is studying part-time, but the proportion of part-time students varies widely between fields of study (→ figure 292). The highest proportions are found in the fields of business, management and services as well as applied psychology. Since 2011, the proportion of part-time degree programmes has increased by a total of 6 to 7 percentage points, underlining the level of demand for this form of studies.

However, employment is only the primary motivation for just under two thirds of students on a part-time programme. For the other third, employment is not the main reason for choosing to study part-time *(FSO, 2020f)*. The focus on employment is most common in the field of business, management and services, with most other fields of study showing a more balanced relationship between professional focus and a focus on other activities.

292 Proportion of part-time students by field of study, 2011 and 2021

On entry to the Bachelor's course; part-time students including extra-occupational students

Data: FSO (SHIS); calculations: SCCRE



LS Life Sciences

Education at Master's and doctoral level

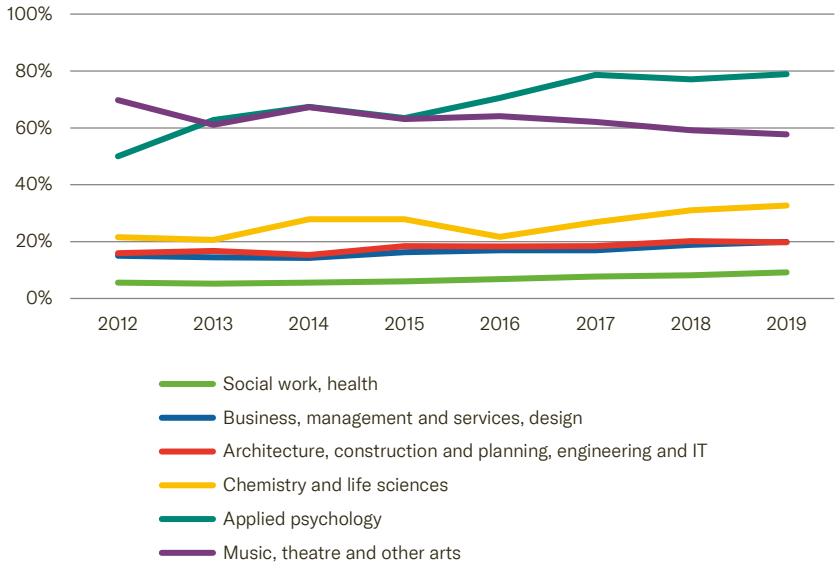
At universities of applied sciences, the Bachelor's degree is considered the standard qualification for gaining professional-level skills, with the exception of music, where the Master's degree is considered the standard qualification. However, the option of completing a Master's degree is available in all fields of study. On average, the proportion of students who transition to Master's level in the two years following their Bachelor's degree is 21% (2019 Bachelor's graduation cohort) – although the demand for education at Master's level varies strongly depending on the field of study. By far the highest transition rates are recorded in the fields of arts and sport as well as in applied psychology (→ figure 293). In the case of the arts, the high rate of transitions to Master's level can primarily be attributed to the field of music. In applied psychology and sport, the high rate of Master's transitions can be explained by the fact that a Master's degree is required for the title of "psychologist" and for the ability to teach at lower-secondary level. There is very low demand for Master's degree programmes in the fields of social work and health, where barely a tenth of all Bachelor's graduates begin a Master's programme.

In recent years (between the 2012 and 2019 graduation cohorts), the frequency of transitions to a Master's course has increased by an average of 3 percentage points. The increase in the transition rate can be observed in all fields except in the arts and in applied linguistics.

293 Proportion of transfers to a Master's course

In the two years after graduating with a Bachelor's degree from a UAS, 2012–2019; including transitions to a UAS/UTE Master's programme; only selected fields of study

Data: FSO (LABB); calculations: SCCRE



Although only conventional universities are entitled to confer the highest academic degree, the doctorate,[7] it is possible for universities of applied sciences to provide doctoral courses in collaboration with a university. This allows universities of applied sciences to impart a specific UAS profile to the education of their scientific graduates by helping to design the education and by ensuring practical and application-oriented research. At the same time, the involvement of universities guarantees access to scientific research at the universities as well as high scientific standards.

To promote these forms of collaboration, the Swiss Conference of Higher Education Institutions (SHK) provided and is providing project-related contributions in the years 2017–2021 and 2021–2024 to support doctoral programmes based on collaboration between a university of applied sciences on the one hand and a conventional university on the other. This collaboration can be with either a Swiss or a foreign university (for fields where Swiss universities are not well established). The project funding was specifically intended to support the supervision of doctoral students at universities of applied sciences by funding projects in which representatives

7 *Verordnung des Hochschulrates über die Koordination der Lehre an den Schweizer Hochschulen* ("University Council ordinance on the coordination of teaching at Swiss universities") of 29 November 2019.

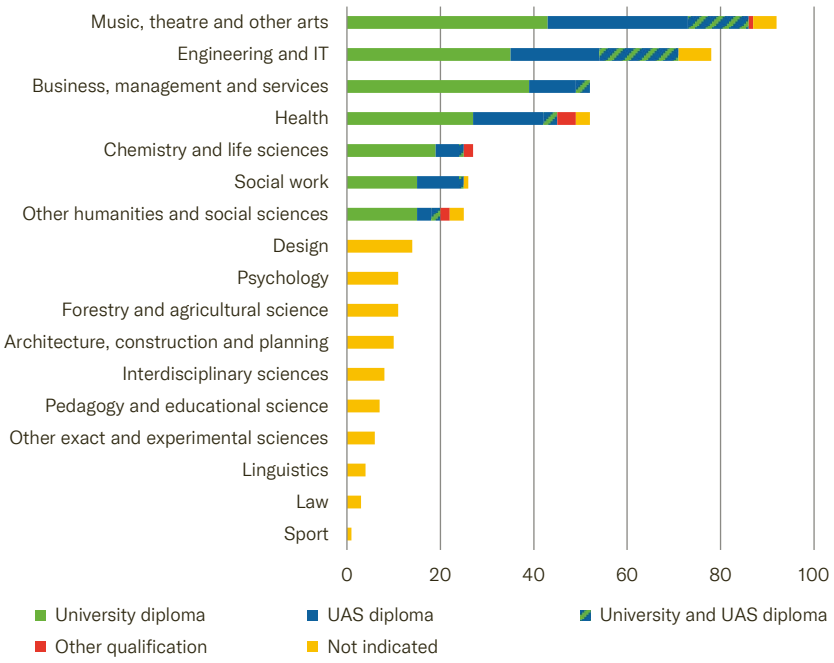
at both universities of applied sciences and universities were involved in supervision.

In 2019, the number of doctoral students who had begun a doctorate in the years 2016 to 2018 and were participating in a collaboration programme of this kind, were employed at a university of applied sciences as part of a UAS project, or had an official supervisor who worked at the university of applied sciences came to a total of around 430 individuals *(swissuniversities, 2020a)*, 83% of whom were employed at a university of applied sciences. In terms of the academic staff of the universities of applied sciences, approximately 2% were therefore on a doctoral course. Only slightly over half of all doctoral students took part in a programme involving a Swiss university, with the remainder entering into a partnership with a foreign university *(swissuniversities, 2020a)*.

The number of students in doctoral education varies widely between the different fields of study (→ figure 294). The highest number of doctoral students can be found in music, theatre and other arts, followed by engineering/IT, business, management and services, and health. Overall, these four fields of study account for some two thirds of all people who are doing a doctorate. Interestingly, over half of those employed at a university of applied sciences had a diploma (Master's degree, Lizenziat) from a conventional university and only just under a third held a Master's degree from a university of applied sciences.

294 Number of doctoral students by field of study and admission qualification, 2019

Data: *swissuniversities (2020a)*



Diploma 2nd cycle higher-education qualification

The **data on doctoral students** includes all individuals who were enrolled on a doctorate in 2019 and had begun the doctoral programme in the years 2016–2018. It includes all Swiss universities of applied sciences but not universities of teacher education that are integrated into a university of applied sciences. The numbers include a) doctoral students who are doing their doctorate as part of a UAS collaborative programme with a university in Switzerland or abroad that is entitled to confer doctorates (regardless of their employment situation), b) doctoral students one of whose official supervisors works at the UAS and c) doctoral students who are employed at a UAS as part of a UAS project but are not supervised by UAS staff.

Effectiveness

The primary aim of teaching at universities of applied sciences is to train students for occupations that require the application of either scientific knowledge and methods or artistic and design skills (see HEdA). The Qualification Framework for the Swiss Higher Education Area (nqf.ch-HS) sets out the minimum competencies that students should have at the end of their studies *(swissuniversities, 2021b)*. As yet, there are no national or international tests that could be used to review the stated competencies in a standardised manner for Switzerland, although indicators of labour market integration are used to obtain clues as to the effectiveness of UAS education. These indicators may not represent the competencies directly, but they can provide information as to whether there is demand in the labour market for the competencies acquired at the university. Analyses of the return on education are presented in the *chapter Cumulative effects, page* 355.

The effectiveness of education is also measured using the indicator "graduation rate" – or rather "drop-out rate" – although this can also only be interpreted as a limited measure of competencies: on the one hand, the graduation rate can be controlled by the universities regardless of the competencies achieved, while on the other hand it also depends on factors that are beyond the influence of the universities. As further indirect indicators of the effectiveness of the education, a consideration is also made of the competencies of the lecturers and the evaluation of the education by the students.

The **Qualification Framework** for the Swiss Higher Education Area summarises the target skills to be achieved by the students at the end of the respective study cycles in the following five categories: "knowledge and understanding", "application of knowledge and understanding", "judgement", "communication skills" and "self-directed learning".

Competencies of lecturers

The level of competencies at the end of the course of study is heavily influenced by the skills and competencies that the students already possess at the time of enrolment. Regardless of this, however, the quality of the education essentially depends on the competencies and/or qualifications of the lecturers at the universities of applied sciences. In general, a double competency profile is desirable for academic staff at universities of applied sciences. In other words, the aim is for these individuals to have not only academic competencies but also vocational skills. This is intended to foster the successful and rapid labour market integration of UAS graduates.

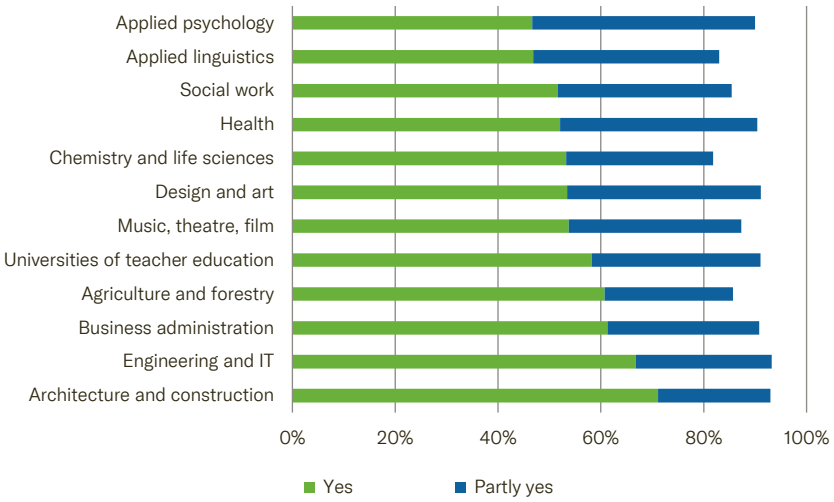
A survey of lecturers at universities of applied sciences and universities of teacher education in relation to their qualification profiles *(Böckelmann et al., 2019)* found that, on average, almost 60% firmly believe they have a double competency profile, although the proportions vary strongly depending on the field of study (→ figure 295). If one includes the respondents who answered the question about a double competency profile with "partly yes", this proportion increases to an average of 90% – with smaller differences between the fields of study. Assuming that the respondents' answers correspond to their actual qualifications, a double competency profile is present in a large proportion of lecturers. One can, however, assume that self-assessment leads to a slight upward bias in the results. Specifically, because of their educational biography, almost 30% of UAS lecturers enter the profession with no relevant scientific competencies *(ibid.)*, and it is questionable whether or rather to what extent they have

In order to promote a **double competency profile** in young academics at universities of applied sciences, the Swiss Conference of Higher Education Institutions (SHK) supports pilot programmes for the development and implementation of new models for the promotion of young academics via project-specific contributions *(swissuniversities, 2021a)*. This funding is intended to help ensure that universities of applied sciences have a sufficient number of adequately qualified members of staff and can further strengthen their profile at the interface between science and practice.

acquired the missing competencies for carrying out science-based work and research projects as part of their work. Nevertheless, according to their responses, 90% of lecturers have practical experience in a potential future occupational field for the students.

295 Proportion of lecturers who claim to have a double competency profile by field of study, 2018

Data: *Böckelmann et al. (2019)*



The gap between these figures and 100% is made up of the answers “no”, “partly no” and “don’t know”, with the “don’t know” category accounting for almost 5% points of the answers.

The probability that lecturers will claim to have a double competency profile is not connected with the length of their practical experience or with the number of years of service at the university of applied sciences *(Böckelmann et al., 2019)*. However, people with a Master’s degree from a university or a doctorate tend to claim to have a double competency profile more often than lecturers with a Bachelor’s degree or a UAS Master’s degree.

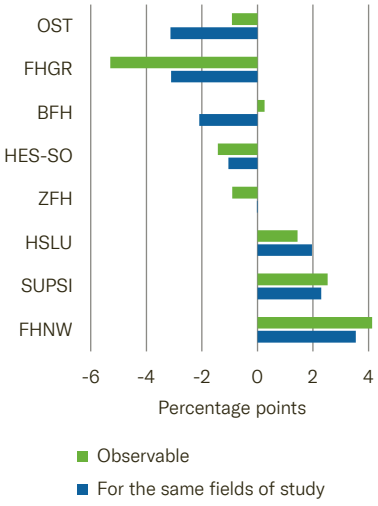
Evaluation of the course of study

Graduates' evaluation of the course of study can also provide clues as to the quality of the education. The question of whether they would choose the same field of study at the same university again is answered in the affirmative by a good 70% of respondents. The percentage of "yes" answers varies strongly depending on the field of study, accounting for 53% of answers in relation to applied linguistics and 89% in relation to agriculture and forestry. Moreover, differences also exist between the universities of applied sciences irrespective of the field of study (→ figure 296): the proportion of students who would choose the same course of study again is at its lowest at Ostschweizer Fachhochschule and Fachhochschule Graubünden, while the highest values are found at Fachhochschule Nordwestschweiz . If the fields of study are the same, there is a difference of 7 percentage points between these institutions. Assuming that the survey results reflect the quality of education, it would appear from the differences between the universities of applied sciences that these institutions have a significant ability to influence the quality of education by adopting suitable course structures or through the curricula, recruitment of lecturers, or higher education didactics.

296 Evaluation of course of study by university of applied sciences, 2021

Proportion of graduates who would choose the same field of study at the same university again: difference with respect to the average for all public universities of applied sciences

Data: FSO (EHA); calculations: SCCRE



Successful completion of studies

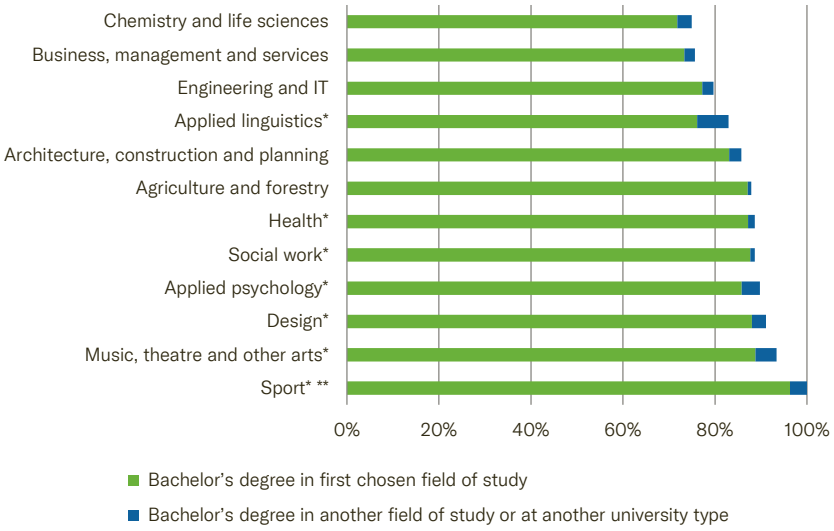
Assuming that the successful completion of studies reflects the acquisition of the target competencies (and therefore of the quality of the education), the graduation rate can provide an indication of the effectiveness of the education at universities of applied sciences. However, the rate also depends on the selection strategy and/or the quality standards that a university applies. A low graduation rate may therefore also point to high quality standards in a programme, while a high rate, by the same token, may be an indicator of more modest requirements. The graduation rate can therefore only serve as a reliable indicator of the effectiveness of a degree programme as long as it is certain that universities do not impose lower qualification requirements than are expected by the labour market. It should also be borne in mind that the graduation rate is determined not only by the requirements of the universities and the quality of education they provide, but also by the make-up of the student population. Universities of applied sciences can influence this composition through selection for and during the course of study. This is because, unlike universities, which are not allowed to select their Bachelor's students except in the fields of medicine and sport sciences, universities of applied sciences are free to vet prospective students through corresponding entry procedures – and make use of this option in various fields of study.

On average, four out of five students earn a Bachelor's degree within eight years of entering a course of study, with the graduation rate varying between 75% and 100% depending on the field of study (→ figure 297). As one would expect, graduation rates are higher in fields of study where provision is made for entrance exams.

297 Graduation rate up to eight years after starting Bachelor's course by field of study

For the 2013 intake of students who were living in Switzerland prior to starting the course

Data: FSO

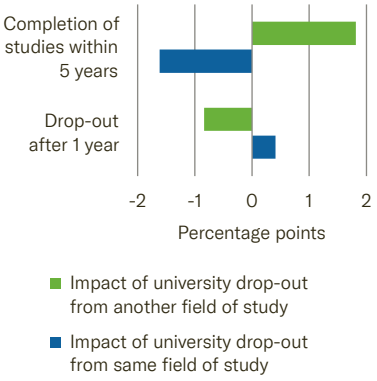


* Field of study with evaluation of suitability
** The values in sport are based on student numbers of < 50 students.

298 Influence of drop-outs from universities on the graduation rate of other UAS students

Effect of a drop-out from a university in a class of 20 at a university of applied sciences; baseline results

Data: *Goller et al. (2022)*



Legend
A person who, before entering the university of applied sciences, dropped out of a course of study at a university and studied a different field there than they did at the university of applied sciences increases the probability of successful graduation of the other UAS students by 1.8 percentage points.

An individual's academic success is also influenced by the quality of their fellow students. In general, fellow students with a high level of cognitive abilities have a positive impact on the graduation rate, although students at the bottom end of the performance scale can also experience negative effects due to the presence of highly capable peers *(Feld & Zölitz, 2017; Humlum & Thorsager, 2021; Thiemann, 2021)*. According to a recent study, the graduation rate at universities of applied sciences is also influenced by people who have dropped out of a course at a university before entering the university of applied sciences *(Goller et al., 2022)* – and the direction of this effect depends on whether they studied the same subject at the university. Students who studied a different subject have a positive impact on the graduation rate of fellow students, whereas students who studied the same subject reduce the graduation rate or, rather, contribute to a higher probability of dropping out (→ figure 298). The explanation for these different relationships may well be that students who studied the same subject at the university have a significant head start in terms of subject knowledge.

Influence of the COVID-19 pandemic on study progression

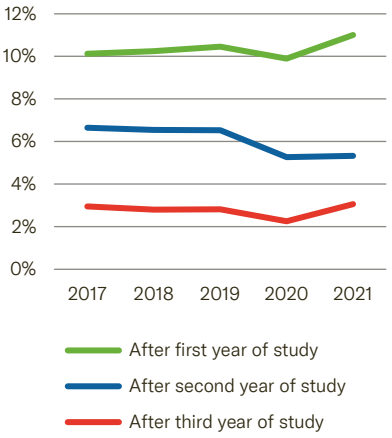
As part of the measures to contain the COVID-19 pandemic, universities were closed in March 2020 and face-to-face teaching was replaced with online tuition *(→ chapter Tertiary-level education, page 193)*. These changes had an impact on the students, the lecturers, and the institutions themselves. As well as affecting teaching and the holding of examinations, the measures also meant that, in many cases, infrastructure had to be provided for the new formats. In the absence of comparable tests, it is not known what impact this distance learning had on the students' acquisition of skills. However, data relating to enrolment and graduation gives some indication of the extent to which the COVID-19 pandemic has led to increased drop-outs from or interruptions of studies in the short term. Analyses show that fewer people actually left the university system without a qualification in the academic year 2020/21 than did in previous years (→ figure 299). A decrease in exit rates was particularly observed for students in the second or third year of their studies, whereas there were no significant changes among first-year students. The academic year 2021/22 presents more of a mixed picture. While it was again relatively rare for second-year students to drop out of their course of study, an increased drop-out rate is seen among students in their first year.

No systematic changes can be observed in relation to study intensity, but analyses of the data relating to transitions to a Master's course indicate that the rate of direct transitions increased in the years 2020 and 2021. It remains to be seen whether this increase will be reflected in an increase in the overall transition rate or whether it will be offset by a reduction in late transitions in subsequent years.

299 Drop-out/interruption rate by stage of degree, 2017–2021

UAS students entering a Bachelor's course for the first time

Data: FSO (LABB); calculations: SCCRE



Legend

In 2020 and 2021, 5% of Bachelor's students dropped out of their course of study after the second academic year (blue line). In previous years, the drop-out rate was significantly higher at 7%.

Labour market success

Successful labour market integration is a key criterion for evaluating the education delivered at universities of applied sciences, for these institutions are mandated to provide education that is relevant to the world of work. Therefore, successful and rapid labour market entry provides an indication of whether the course of study has provided students with skills that are relevant to the labour market. However, the graduates' employability depends not only on their higher education but also on the competencies they brought with them at the time of enrolment, on selection by the university of applied sciences during the course of studies, on work experience, and on the regional labour market situation at the time of graduation.

In **comparison with previous years**, the employment rate was slightly higher and the proportion of people in qualification-appropriate employment was slightly lower in 2021. This change was primarily due to the revision of the questionnaire and the associated redefinition of the employment rate *(→ chapter Tertiary-level education, page 193)*. In addition, the COVID-19 pandemic may also have had a positive impact on the number of people in employment.

Analyses of graduate surveys suggest that graduates of universities of applied sciences integrate into the labour market relatively well overall. The 2021 Graduate Survey revealed that, one year after completing their studies, an average of 93% of graduates are in employment and 3% are unemployed according to the International Labour Organization (ILO) definition *(→ chapter Universities, page 225)*. Five years after graduation, the proportion of unemployed individuals was still 4% and the ILO unemployment rate was less than 2% (for the 2016 graduation cohort), which is considerably lower than the Swiss average. Four out of five people (80%) who were in employment one year after completing their studies at a university of applied sciences were in an occupation that required a university degree or that was at least appropriate to the specialist skills acquired during the course of study. The reason why this figure is not higher may be that certain positions are equally suitable for graduates of professional education (particularly from the colleges of higher education) or holders of CET certificates (e.g. MAS).

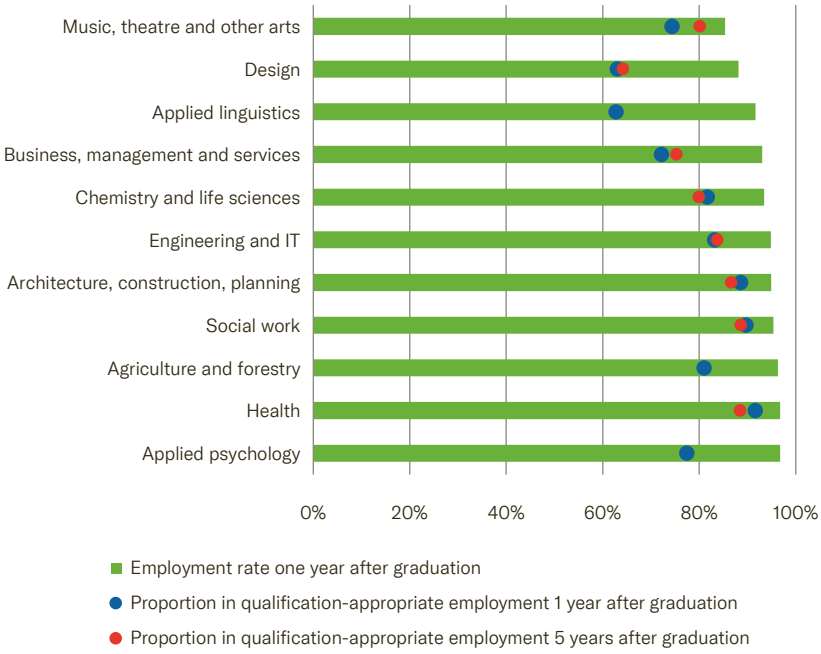
When it comes to entering the labour market, there are clear differences between the fields of study both in terms of labour market participation and in the quality of employment (→ figure 300). The highest employment rates and proportions of people in qualification-appropriate employment are found in the areas of health, social work, and architecture, construction and planning. The employment rate is at its lowest in the arts and design despite admission restrictions that seek to absorb some of the expected difficulties in labour market integration through rigorous selection. A significantly below-average proportion of people in qualification-appropriate employment is also seen in fields that one would assume were in high demand due to the shortage of skilled workers – particularly the field of business, management and services. For those who completed their studies in 2016, the proportion in qualification-appropriate employment increased by an average of 2 percentage points (from 79% to 81%) in the time between the first and fifth year after the completion of studies.[8] Accordingly, however, the rate of people not in adequate employment remains substantial even five years after the completion of studies and cannot therefore simply be an entry phenomenon.

8 In figure 300, the increase in qualification appropriateness is only partly visible, because different cohorts are depicted. The figures for one year after graduation are based on the 2020 graduation cohort, whereas those for five years after the completion of studies relate to the 2016 cohort.

300 Labour market situation one year and five years after completion of studies, 2021

Graduates at Bachelor's level, provided they did not begin a Master's course, and at Master's level; data points with sample sizes of < 50 are not shown.

Data: FSO (EHA); calculations: SCCRE



An employed person is described as being in **qualification-appropriate employment** if the job that person is doing a) requires a university degree or b) displays a clear match with the professional skills acquired during the studies (scores of 4 and 5 on a scale from 1 "not at all appropriate" to 5 "highly appropriate").

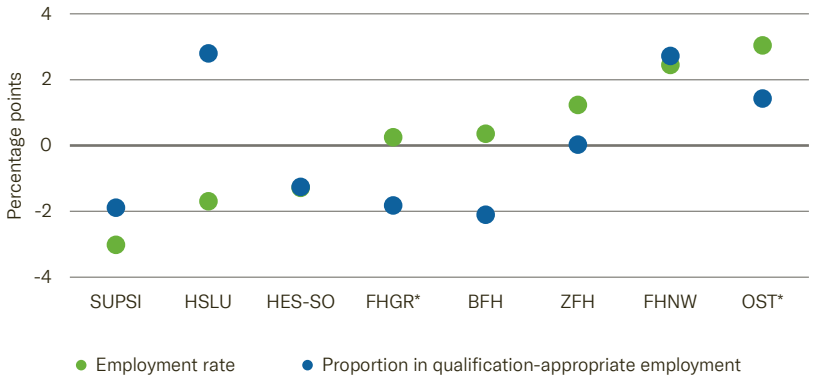
The question of the extent to which universities of applied sciences can influence the successful integration of their graduates into the labour market, e.g. through suitable design of degree programmes, through teaching, or through selection policies, is not an easy one to answer. However, the fact that it certainly is possible to influence this integration is clear from the observation that the labour market opportunities of graduates one year after completing their studies vary between the different universities of applied sciences (→ figure 301) – irrespective of the fields of study offered (and, in the case of the employment rate, irrespective of the regional unemployment rate). For example, the employment rate of graduates of Berner Fachhochschule is approximately 3 percentage points higher than that of graduates of the Scuola universitaria professionale della Svizzera italiana, while there is barely any difference in the proportion of people in qualification-appropriate employment (among those in employment). Meanwhile, despite a comparable employment rate to that of the Haute école spécialisée de Suisse occidentale, the proportion of graduates of Hochschule Luzern in qualification-appropriate employment is 4 percentage points higher. Differences between the universities of applied sciences can be partly attributed to unobservable differences in local labour markets, but one can rule out varying unemployment rates from one major region to another and the different range of fields on offer as possible explanations.

301 Differences in graduates' labour market success by UAS

Deviations in employment rate and proportion of appropriately employed people with respect to the average; 2018 and 2020 graduates at Bachelor's level, provided they did not begin a Master's course, as well as at Master's level one year after completion of studies

Data: FSO (EHA), SECO (amstat); calculations: SCCRE

The points show, for each university of applied sciences, how much the employment rate of their graduates and the proportion of people in qualification-appropriate work differ from the average of all universities of applied sciences when the fields of study are the same (and, in the case of the employment rate, when the unemployment rate for the major region is the same).



*The figures for FHGR and OST also include the former subunits (FHGR: HTW Chur; OST: FHO without HTW Chur).

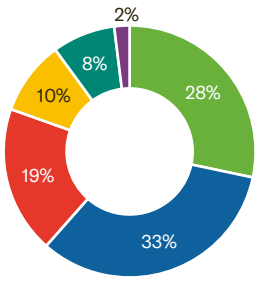
Efficiency/costs

Assessing the efficiency of universities of applied sciences – that is, the relationship between the use of resources (input) and the achievement of targets (output) – relies on comparable data relating to the costs (inputs) and a suitable measure of output (i.e. effectiveness). Whereas comparable data is available for the individual universities of applied sciences on the cost side, it is difficult to comprehensively reflect the output using suitable data (as described in the section on effectiveness). In addition to the remarks on efficiency, the focus is therefore also on the costs of the universities of applied sciences and their income. International comparisons are drawn in the *chapter Tertiary-level education, page 193*.

302 Composition of funding sources, 2021

In the area of basic education and training

Data: FSO; calculations: SCCRE



- Confederation: basic contribution
- Canton: FHV contributions within supporting region
- Canton: FHV contributions outside supporting region
- Remaining funding from school authorities
- Tuition fees
- Third-party funds and other income

Funding sources of universities of applied sciences

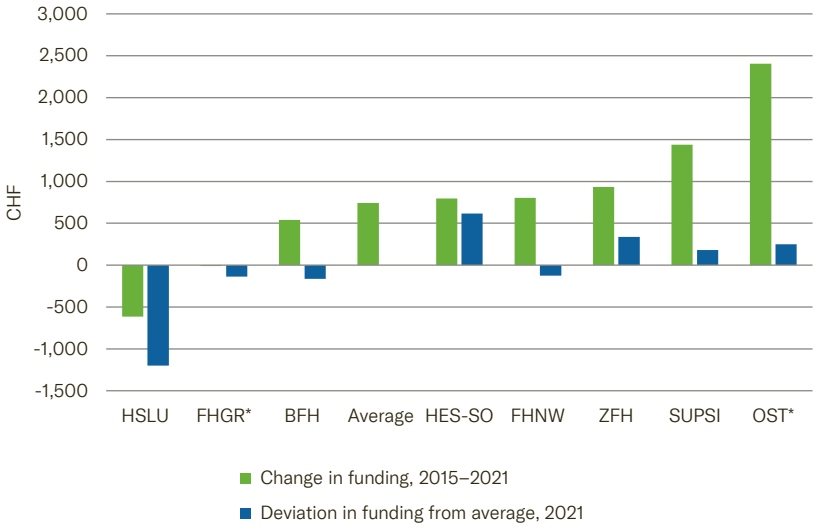
At public universities of applied sciences, roughly 60% of funding for basic education and training comes from the cantons (→ figure 302). Cantonal contributions cover over half of costs. Of these contributions, around two thirds come from the supporting cantons themselves and one third from cantons outside the supporting region, which transfer the funding for their students at universities of applied sciences outside the canton to the respective UAS canton within the framework of the Universities of Applied Sciences Agreement[9].

9 *Interkantonale Fachhochschulvereinbarung (FHV)* of 12 Juni 2003.

The basic contributions from the Confederation cover just under 30% of expenditure. Since the introduction of the Federal Act on Funding and Coordination of the Higher Education Sector (HEdA), these contributions are no longer paid as flat rates per student. Rather, the amount of the contribution payments also depends on the output or, rather, the performance of the individual fields of study compared with that of other universities of applied sciences *(→ chapter Tertiary-level education, page 193)*. In addition, the contributions are no longer based on the current student numbers, but on those of the two previous years. With respect to the previous flat rates per student, federal funding increased by an average of CHF 700 per full-time student in the period between 2015 and 2021 (→ figure 303) – an increase of approximately 7%. However, the individual universities of applied sciences benefitted from this increase to very different degrees. The new calculation basis also means that universities of applied sciences, which grew strongly in the two previous years, receive comparatively fewer contributions per student.

303 Change in federal funding per student by university of applied sciences, 2015–2021

Data: SERI (financial reporting); calculation: SCCRE



*In the case of FHGR and OST, the change was calculated with respect to their predecessor institutions (FHGR: HTW Chur; OST: FHO without HTW Chur).

Change in funding, 2015–2021
Difference between the average funding per student (in FTEs of the respective year) that the various universities of applied sciences received in 2021 (as part of the federal funding pursuant to HEdA) and that which they would have received in 2015 (based on student flat rates) had the composition of fields of study been the same as in 2021.
Contributions that the universities of applied sciences received in 2015 for applied research and development are not included in the calculations.

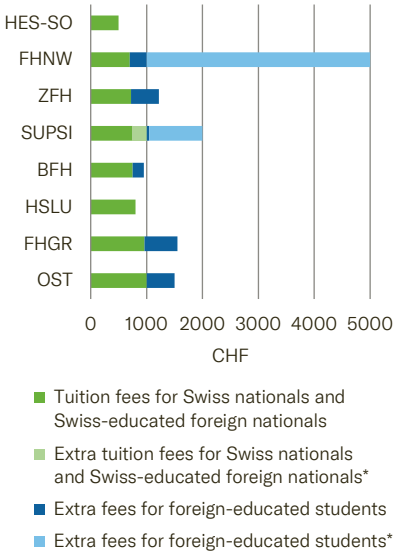
Deviation in funding from average, 2021
Deviation of average federal funding per student (in FTEs of the respective year) from the average of all universities of applied sciences given the same composition of fields of study, by UAS.

Students' tuition fees cover 8% of the costs of their education. These fees are between CHF 500 and 1,000 per semester (→ figure 304), with most universities of applied sciences charging slightly higher fees to foreign students. In general, the fees are standard for all fields of study within the individual universities of applied sciences. Exceptions include the Scuola universitaria professionale della Svizzera italiana and Fachhochschule Nordwestschweiz (for international students). As the education costs vary significantly by field of study, there is also considerable variation in the share of costs that students cover for their education. For example, a

304 Tuition fees per semester, 2022

Only public universities

Data: swissuniversities



*Additional subject-specific tuition fees

business studies student at Fachhochschule Bern contributes 11% of their annual costs for basic education (no research), whereas a student in music, theatre and other arts at the same UAS pays only 3%.

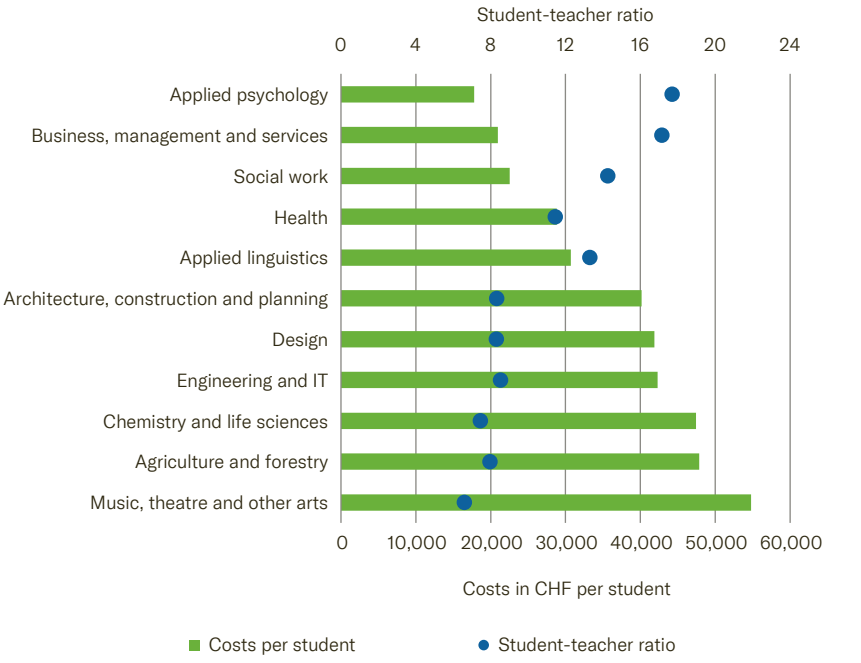
The question of whether students should pay a greater proportion of education costs or whether tuition fees should instead be further reduced in the name of equality of access is a constant topic of discussion and cannot be answered empirically in the absence of studies relating to Switzerland. Findings from studies carried out abroad show that even moderate tuition fees can reduce the likelihood that children from low parental education backgrounds will go on to higher education *(Kroth, 2015)*. On the other hand, tuition fees can also lead to faster and more frequent completion of studies *(Bietenbeck et al., 2021)*.

Costs by field of study

Whereas tuition fees generally do not differ from one field of study to another, the teaching costs per student differ considerably depending on the field of study: for example, annual expenditure is around CHF 18,000 in applied psychology but runs to CHF 55,000 at the other end of the scale in the field of music, theatre and other arts (→ figure 305). These differences can largely be explained by differences in student-teacher ratios.

305 Student-teacher ratio and costs per student by field of study, 2020

Data: FSO; calculations: SCCRE



Costs per student
Annual full costs for teaching (basic education and training) per student FTE

Student-teacher ratio
Number of student FTEs (according to financial reporting) per FTE in the academic teaching staff (basic education and training)

Basic education and training includes the Bachelor's and Master's levels. The calculation of student FTEs is based on the number of ECTS points for which students have registered, where 60 ECTS points per year correspond to a full-time course of study.

Certain subjects, such as the laboratory-intensive life sciences, require a higher intensity of teaching, and subjects such as music or theatre even call for individual tuition in some situations. In other subjects, smaller classes or higher teaching intensities are the primary drivers of costs and must therefore be scrutinised for reasons of efficiency unless there is evidence of improved academic performance. Although there is proof that larger classes in higher education are associated with poorer grades *(Kara et al., 2021)*, it should be noted that the teaching intensity at universities of applied sciences is already relatively high compared with that at conventional universities.

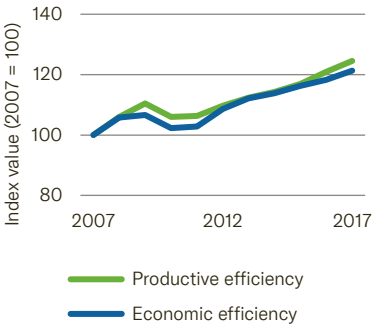
If the costs for applied research and development are considered in addition to teaching costs, the annual expenditure per student ranges from CHF 26,000 (applied psychology) to CHF 85,000 (chemistry and life sciences).

Assessment of efficiency

Given the difficulty associated with suitably measuring the output (effectiveness) of higher education, it is also difficult to adequately measure the efficiency. An assessment is therefore only possible based on assumptions and with certain limitations. With a view to assessing the efficiency of universities of applied sciences, various models with different outputs and varying inputs were therefore calculated as part of an expert report on efficiency in the Swiss education system *(Wolter et al., 2020)*. The results show that the ranking of universities of applied sciences with regard to efficiency varies depending on the type of calculation used. However, the statements on the development of the overall efficiency of a UAS system over time remain the same regardless of the model. Assuming there was no change in the competencies of UAS graduates over time, it is clear that there was a positive change in efficiency in the period between 2007 and 2017 (→ figure 306). On average, the efficiency of universities of applied has increased by around 20%, meaning that they invested 20% less inputs in the education of the same number of graduates. This increase in efficiency is primarily due to the improved ratio between graduates on the one hand and students on the other *(Wolter et al., 2020)*. In this regard, the quantitative expansion of universities of applied sciences may have led to a boost in efficiency, as the inputs didn't increase to the same extent as the outputs (graduates).

306 Development of efficiency, 2007–2017

Data: *Wolter et al. (2020)*



The **productive efficiency** is based on the number of teaching staff and the number of students (inputs) as well as the number of degrees (outputs).

The **economic efficiency** is based on the number of students and the costs for teaching (inputs) as well as on the number of degrees (outputs).

Equity

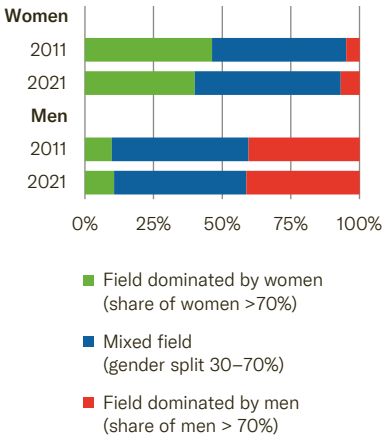
This section considers equal opportunities at universities of applied sciences based on the criteria of access and participation in education as well as the graduation rate. In the process, it looks at disparities between women and men as well as differences in social origin. The aspects of migration background and (physical) disabilities are addressed in the *chapter Tertiary-level education, page 193*.

Gender differences

307 Gender segregation by student intake, 2011 and 2021

Proportion of students in female-dominated, mixed and male-dominated subject areas

Data: FSO; calculations: SCCRE



Based on the total number of students, the gender distribution at universities of applied sciences is very well-balanced, with women accounting for 49% of students (academic year 2021/22). However, there are pronounced gender differences when it comes to subject selection, and these differences lead to significant horizontal segregation. Men are overrepresented especially in engineering and IT and in the field of architecture, construction and planning, while women are significantly overrepresented in the fields of health, applied linguistics, applied psychology and social work. Overall, some two fifths of students attend a degree programme that is dominated by a proportion of their own gender of over 70% (→ figure 307). Only 7% of women or 11% of men select a gender-atypical subject (with under 30% of students from their own gender). Compared with the situation in 2011, however, horizontal segregation has tended to decrease: today, there are fewer women in subjects dominated by women and slightly more in male-dominated subjects. Among men, however, the situation has barely changed.

At Master's level, the genders are also nearly balanced, with women accounting for 49% of students. However, this figure obscures the fact that the transition rate from Bachelor's to Master's level is lower among women than men in many fields of study, particularly in the fields of chemistry and life sciences, business, management and services, social work, health and the arts. The reason why the proportion of women is not lower at Master's level is primarily that women are overrepresented in fields where the Master's transition rate is disproportionately high (applied psychology as well as music, theatre and other arts). In addition, women show a higher transition rate than men in applied psychology.

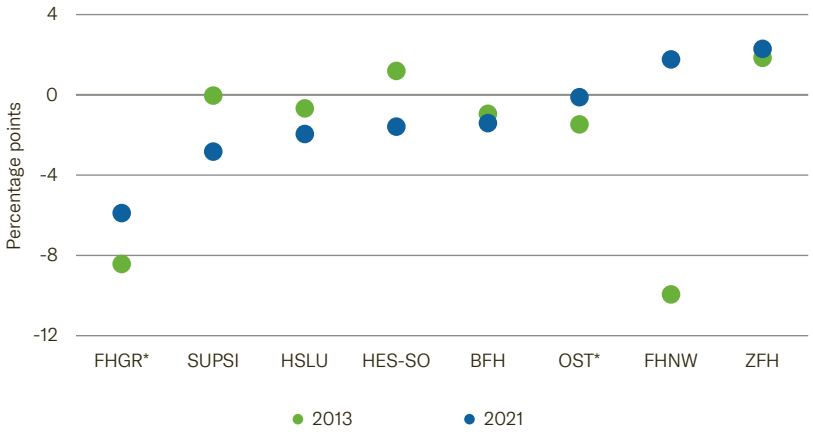
Gender imbalances also affect the academic staff, becoming more pronounced along the career path. Women make up 42% of assistants and scientific collaborators, 40% of "other lecturers" (without managerial responsibility), and 28% of lecturers with managerial responsibility (in the year 2021). In many fields of study, the proportion of women at the highest hierarchical level is barely half that recorded among students, with key exceptions being the two fields with the highest proportion of women – namely health and applied linguistics. Here, women make up a clear majority even within the group of lecturers with managerial responsibility. The differences are also relatively small in the field of sport.

The proportion of women in professorships and among the other management staff also varies between the different universities of applied sciences, regardless of the composition of fields of study (→ figure 308). The lowest proportion of women is found at Fachhochschule Graubünden. Otherwise, the differences are relatively small, with deviations of ±3 percentage points from the average. Since 2013, the proportion of women in fields with a below-average proportion of women has increased by 4 percentage points on average. Fachhochschule Nordwestschweiz has achieved the clearest increase in the proportion of women, which was significantly below average at that time. Overall, the findings suggest that women's participation can be substantially impacted by the human resources policy of the institutions and cannot simply be attributed to a shortage of well-educated female academics.

308 Differences in the proportion of women in professorships and among management staff by UAS, 2013 and 2021

Deviation of proportion of women from annual average for all universities of applied sciences (2013: 18%, 2021: 21%), for the same subject areas, in percentage points

Data: FSO (SHIS-PERS); calculations: SCCRE



*In the case of FHGR and OST, the data points for the year 2013 are based on the respective predecessor institutions (i.e. the subunits of the former FH Ostschweiz).

The chart does not include fields of study where the proportion of women is greater than 50% (applied linguistics, health and social work) and only takes account of people whose degree of employment is at least 10%. Where people hold multiple positions within a university of applied sciences, only the field of study (or the respective function) with the highest degree of employment is taken into account.

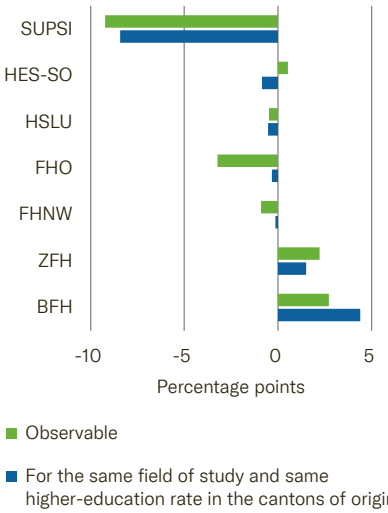
Social background

Overall, the transition rate to a university of applied sciences is slightly higher for school leavers whose parents have a professional education qualification or graduated from a higher education institution than for children whose parents did not complete higher education or training *(→ chapter Tertiary-level education, page 193)*. Variations in access by educational background can largely be explained by differences in education paths that already exist at the end of compulsory education. Moreover, previous studies show that social origin influences not only the decision to study at all but also the choice of university type and university *(Denzler & Wolter, 2010)*. If one considers the degree to which the proportion of students from an academic family at each individual UAS differs from the UAS average, it is clear that there are also substantial differences in this regard (→ figure 309). There are 12 percentage points between the universities of applied sciences with the lowest and highest proportions of students with at least one parent who has a university degree. However, this considerable discrepancy primarily stems from the fact that the Scuola universitaria professionale della Svizzera italiana (SUPSI) shows significantly lower social selectivity than other universities of applied sciences. This cannot be attributed to the composition of fields of study (which vary by social origin) or the level of education in the population of the supporting region (or that of the catchment canton); rather, it appears to exist regardless of these factors. The origin of this finding is – at least partly – that SUPSI loses an above-average number of students from its own canton to other universities of applied sciences. The parents of these students are twice as likely to have a university degree than those of students who remain in the canton.

309 Differences in social selectivity between universities of applied sciences, 2020

Deviation from average proportion of students with at least one parent with a university degree; only Bachelor's students who were living in Switzerland prior to starting the course

Data: FSO (SSEE 2020); calculations: SCCRE



Legend
At FHO, the proportion of students whose parents have a university degree is 3 percentage points below the average for all universities of applied sciences. Once one controls for the composition of fields of study and the rate of tertiary education of the population in its students' cantons of origin, however, FHO no longer differs from the average for all universities of applied sciences.

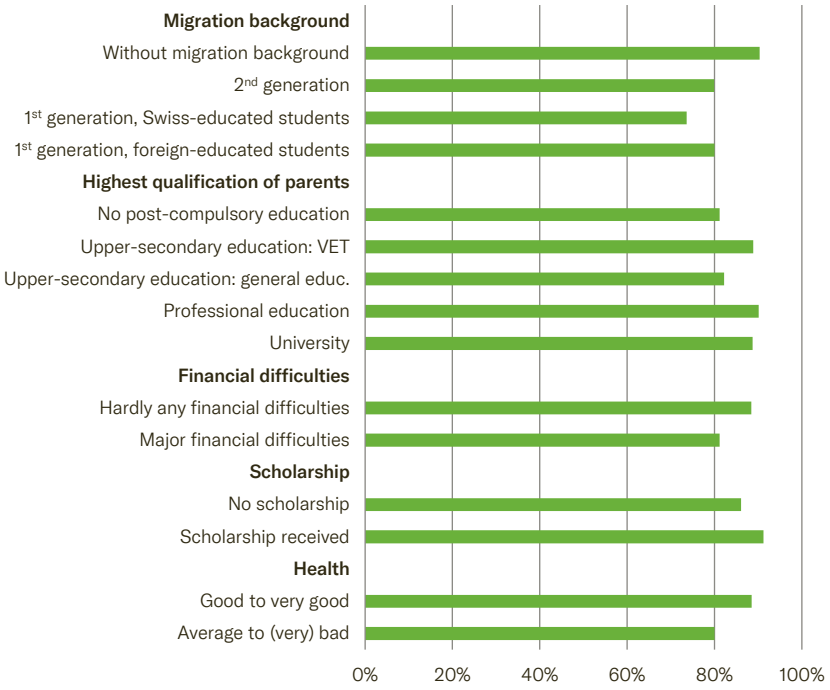
Differences in academic success

Social inequalities can be observed not only in the access to the universities of applied sciences, but also in the probability of successfully completing the course of study (→ figure 310). People with a migration background who have begun a course of study at a university of applied sciences are less likely to earn a Bachelor's degree than those without such a background. In the case of second-generation migrants, the lower chances of success can be explained by the parental level of education, by the state of health and by more frequently cited financial difficulties. However, first-generation migrants also have a lower probability of earning a Bachelor's degree even once other characteristics are controlled. There are also differences with respect to the educational level of the students' parents. Students whose parents have no post-compulsory education are less likely to successfully complete their course of study than those whose parents have graduated from a course of vocational or professional education and training or tertiary-level education. However, this difference is no longer statistically significant once the migration background is taken into account. This means that the lower graduation rate is partly explained by the fact that students whose parents have no post-compulsory education are more likely to have a migration background, which has a disadvantageous effect on graduation rate. Furthermore, it is clear that students with financial difficulties are also less likely to complete the course of study successfully. People who received a scholarship earn a Bachelor's degree more often than those without a scholarship. In this context, however, it remains unclear whether the scholarships play a causal role in greater (or faster) academic success or whether people who applied for a scholarship are characterised by specific features that favour their studies (such as high goal orientation or self-efficacy). A poorer state of health is also associated with a lower graduation rate, although there is also a lack of clarity regarding the direction of – or rather the reasons for – this relationship.

310 Bachelor's degree ratio up to six years after enrolment, by student characteristics

Predicted probability of success in same field of study and at same university on enrolment, 2012

Data: FSO (SSEE 2013, LABB); calculations: SCCRE



The bars reflect the probability of earning a Bachelor's degree up to six years after enrolment – in the same field of study and at the same university. The findings appear to be comparable if one additionally controls for the characteristics of gender, age, admission qualification and type of education (full-time versus part-time).

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION
AND TRAINING

UNIVERSITIES OF TEACHER EDUCATION

Context

The universities of teacher education (UTEs) today actually represent a third type of higher education institution, even though the legal framework of higher education only provides for two categories (Art. 2 paragraph 2 HEdA[1]). Institutionally, the universities of teacher education as well as the universities of applied sciences are structured as practice-oriented higher education institutions with cantonal sponsorship; some are integrated into universities of applied sciences. As professional universities in the education sector, *(swissuniversities, 2017)* their central social function is the training and further education of teaching staff and other professionals in the education sector. Due to their enormous significance for the entire education sector, the universities of teacher education will be dealt with separately in the Education Report. However, the institutional perspective of the Education Report – education is described according to education levels and types – means that teaching training is only dealt with in this chapter if it takes place at the universities of teacher education.

The qualification function of the universities of teacher education is key for the cantons from a qualitative and quantitative perspective, because as a school authority, they are dependent on the fact that the universities of teacher education tailor the training of pedagogical staff for the schools at compulsory level, and also partly at upper secondary level, to the requirements of the cantonal education system, as well as ensure the quantitative need for teaching staff. However, this task is also dependent on a series of contextual factors largely beyond the control of universities of teacher education. Social trends, the attraction of the teaching profession, but also the other education options influence the choice of studies of the potential students at universities of teacher education *(→ Self-selection in the universities of teacher education, Seite 298)*. In addition, the self-selection into the universities of teacher education is influenced by politically determined admission regulations and training requirements, not least by the duration of studies *(Denzler & Wolter, 2009; Lautenbach, 2019)*.

From the perspective of education policy, the focus is on securing the demand for teaching staff for the entire education system. On the one hand, the demand side must be taken into account, in other words, the primarily demographically determined demand for teaching staff in the school system. On the other hand, the focus is on the offers, which means that the interest of the potential student in teacher training must be taken into account. With regard to the latter, it is therefore interesting how sufficiently capable candidates can be recruited to study at a university of teacher education and be prepared for the teaching profession.

Teacher education at Universities

Teaching staff are not trained only at UTEs: In Canton Geneva, teachers of all levels are trained at the Institut universitaire de formation des enseignants (IUFE) of the University of Geneva; in Canton Fribourg, teaching staff are also trained at the university for the lower and upper secondary levels. The University of Zurich and ETH Zurich also offer training for baccalaureate school teachers. Finally, universities of applied sciences have degree programmes for specialist subject teachers in specialised areas such as music, art and sport. Altogether, however, these institutions combine less than 5% of all students in the field of teacher training *(→ Institution, page 293)*.

Offers

The offer is primarily shaped by the number of trained teaching staff. Here, the entire process must be taken into account, from the start of studies until the start of a job. The strong growth of the universities of teacher education deserves mention here. Since 2010, admissions to the UTEs have

1 Federal Act on Funding and Coordination of the Swiss Higher Education Sector (Higher Education Act, HEdA) of 30 September 2011

increased by over 30%. In the meantime, at least 4000 students – which corresponds to around 10% of all baccalaureate students – decide on a course of studies at a university of teacher education. 87% of an entrance cohort complete their studies successfully and obtain a teaching diploma at compulsory education level. 91% of graduates then take up a professional activity and are employed as a teacher one year after graduation, five years later it is only 80%.

The cantons are active in a threefold capacity with regard to the UTEs: First as a school authority of the university of teacher education, then as a future employer of the graduates of these institutions and third with regard to the training contents as the authority responsible for defining both the curricula and the timetabling guidelines for the future place of work of the students. This would in turn suggest that the universities of teacher education must be much more strongly aligned towards the needs and expectations of the cantons than the other institutions of higher education.

Professional mobility

The professional mobility of teaching staff is dominated by change, while maintaining the same function: Teaching staff change schools or the level of instruction, but still perform a teaching activity. Some teaching staff change their function and are subsequently active in the school administration. Cases where teachers actually leave the teaching profession is much less frequent, and a distinction must be made here between temporary and definitive exits. However, many teaching staff who definitively give up their teaching activity remain in the education system in another function, such as teacher training, in education administration or in other education-related sectors *(Herzog et al., 2007)*. The professional mobility of teaching staff has so far been researched in Switzerland predominantly from an individual, occupational biographical perspective; there is hardly any quantitative work which examines the fluctuation on the macro level of the entire educational system *(Sandmeier et al., 2018)*.

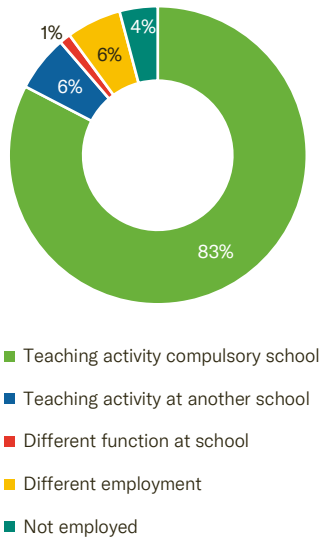
Initial longitudinal analyses of the statistics of teaching staff by the FSO give ample evidence of a high retention rate in the teaching profession. If one considers the career of all teaching staff at compulsory school level under 55 years of age over five years, after one year a retention rate of 92% can be observed and after five years a rate of 83% (→ figure 311). This quota includes job changes within and between cantons). Only just 6% have taken on a new job outside of the school system. Many exits are only of a temporary nature; around half of the teaching staff who leave the profession return to it again within five years. The exit rate is somewhat higher with young people (under 35 years) than with older teaching staff. On the other hand, the re-entry quota is higher with young people. In the case of women who have given up their teaching activity due to motherhood, the return quota is the highest at almost 60% *(FSO, 2022j)*.

Among the over 55s, only slightly more than a third remain in the teaching profession within five years, as the age-related retirements increase *(FSO, 2022j)*. Altogether, each year roughly 3% of all teaching staff leave education due to retirement. However, the proportion of age-related retirements should considerably decrease in the next ten years for demographic reasons, according to forecasts by the FSO *(FSO, 2022j)*. If one compares

311 Fluctuation in the teaching profession, 2020

Situation of teaching staff (cohort 2015/16) after five years (all teaching staff under 55 years of age, compulsory school level (including private schools)).

Data: *FSO (SSP); (FSO, 2022j)*



the age structure of the teaching staff in 2020 with the situation ten years ago, it can be seen that the pressure of an increased need for recruitment due to ageing has relaxed in most cantons (→ figure 312). With the exception of a few cantons, retirements should thus not further exacerbate the strained situation on the labour market for teaching staff over the coming years.

312 Change in the age structure of the teaching staff

Proportion of teaching staff in the pre-school and primary levels in the uppermost age segment (50 years and older), 2011/12 and 2021/22

Data: FSO; calculations: SCCRE

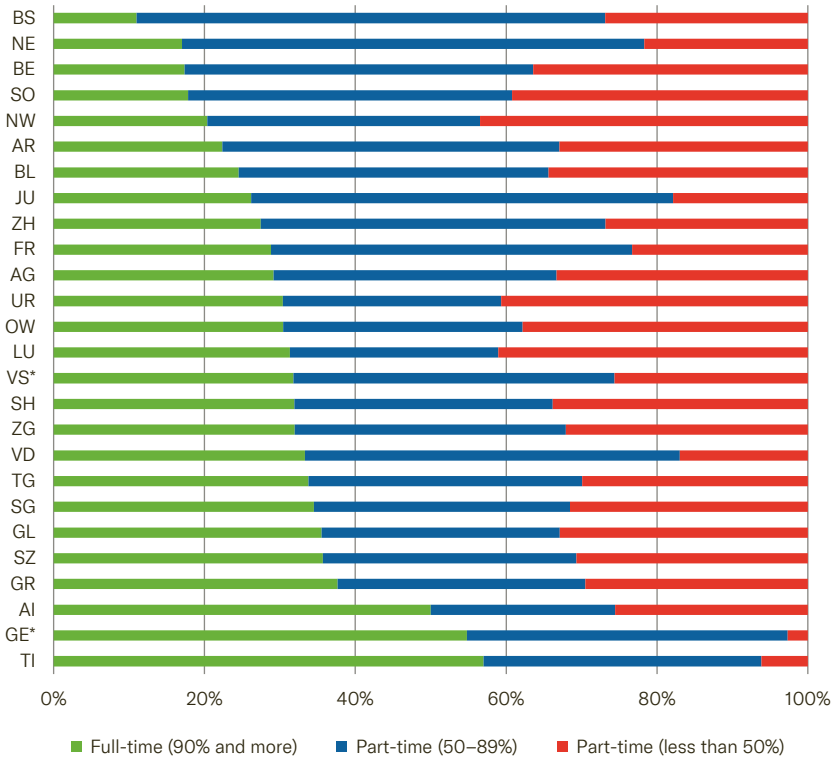
Legend
Points below the diagonals represent cantons in which the proportion of older teaching staff has declined: Teaching staff have thus become younger over the last few years. Conversely, the proportion of older teaching staff has increased somewhat in cantons Basel-City and Nidwalden.

Full-time/part-time employment

The supply of teachers is decisively determined by the level of employment of active teaching staff. The teaching profession is characterised by the fact that part-time employment is particularly widespread; in comparison with other professions, the proportion of women is also high. The profession is chosen, among other reasons, because part-time work favours the work-life balance *(Denzler & Wolter, 2009; Hof & Strupler Leiser, 2014; Leemann et al., 2021)*. This means that with an average level of employment of 65% currently, a third of the available resources is not being used. As those teaching staff who are temporarily or permanently not active at all in the teaching profession are not included in this figure, the need for trained teachers for each full-time job is thus considerably higher (→ figure 313).

313 Level of employment of teaching staff (primary level, 3rd–8th grade) by canton, 2020/21

Data: FSO (SSP); calculations: SCCRE



*GE and VS: Primary level, 1st–8th grade

The average level of employment of active teaching staff, in other words, the intensity of activity, has not changed dramatically over the last few years at compulsory school level although the situation on the teaching job market is certainly tense, due to the large, unmet demand for teaching staff. On average, less than 30% of teaching staff in Switzerland work full-time. Small teaching workloads of less than 50% are still common. In the vast majority of cantons, every fourth teacher works less than 50%.

The heterogeneity between the cantons is high and very stable over time, which means that an alignment process cannot be observed. Apart from cultural reasons, structural and institutional reasons are the most likely explanations for the major cantonal differences, such as the regional school organisation[2] or the conditions of employment and the practice of allocation of workload in the schools. The latter can be seen from the fact that some cantons have a very high proportion of small workloads, while others hardly assign any workloads of less than 50%. The large cantonal differences with the average employment levels also make it clear that the low levels of employment cannot simply be explained by the high percentage of women in the teaching staff, as only the employment levels but not the proportion of women are considerably different between the cantons.

2 The range of classes in subjects such as music and instrumental lessons or sports lessons, for example, varies from canton to canton. This has an impact on the number of subject teachers and the average workload. The same categories of teachers are not counted as regular teaching staff everywhere.

However, regarding the employment level of career starters, it must be taken into account that the calculated workloads are not only the result of decisions by these persons. According to the graduate surveys, the proportion of people entering the labour market who preferred a higher employment level is greater than that of people who wanted a lower workload. This means that at least at the beginning of a career the potential would exist to employ teaching staff with higher teaching workloads. If this situation could be improved with organisational measures, more work resources would be available for the teaching staff entering the profession.

Possible salaries in the teaching profession

Remuneration is not the only decisive factor when it comes to the decision of young people to opt for teacher training, but it has a significant effect on how long teaching staff remain in the profession.

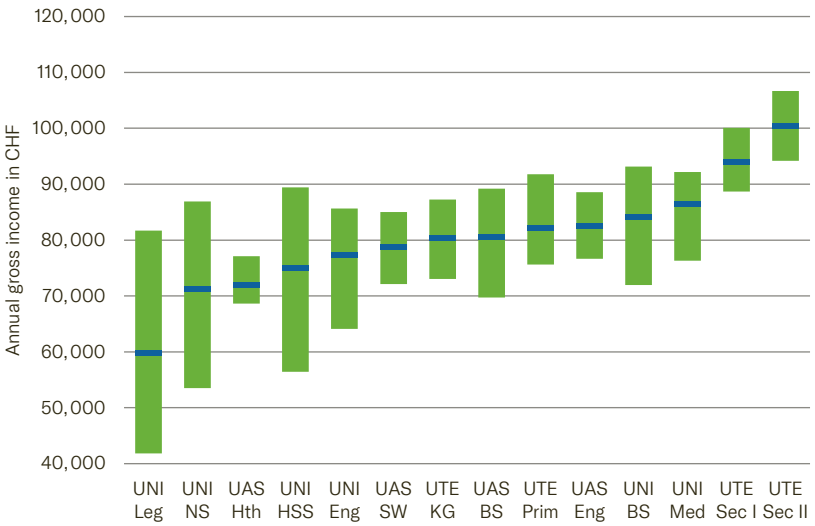
When setting salaries, a canton must take into account, on the one hand, the comparison with professionals with a comparable education and comparable work requirements in the public sector. On the other hand, it would be important to consider the wages for teaching staff in neighbouring cantons. In addition to the starting salary, wage development and the average salaries over the working career should also be taken into account here.

The data from the university graduate survey only enables the salary development to be observed over a period of five years after graduation. If we compare the starting salaries as well as the salaries after the first five years of employment of prospective teachers with those of graduates from other fields of study in all types of universities in Switzerland (→ figure 314), the income prospects are good for all levels in the teaching profession. One year after completing their studies, teaching staff at lower and upper-secondary level are among the best paid compared with other wage earners with a degree from a university. Secondary school teachers achieve higher median salaries at the start of their careers than, for example, holders of a university degree in subjects such as medicine or economics. With a median wage of at least 80,000 Francs primary and kindergarten teachers rank in the upper midfield, above graduates of an academic university with a degree in engineering, natural sciences or humanities and social sciences, bearing in mind that on the teachers' side, wages for a three-year bachelor's degree are compared with wages for master's degrees at university level.

314 Employment income of graduates, one year after completion of studies, 2021

Annual gross incomes estimated using quantile regressions (standardised to 100%), controlling for age

Data: FSO (EHA); calculations: SCCRE



The green bars represent the central 50% of the distribution (2nd and 3rd quartile); the median lies in between (blue)

Leg	Legal studies
NS	Natural sciences
Hth	Healthcare
HSS	Humanities and social sciences
Eng	Engineering
SW	Social work
BS	Business and services
KG	Pre-school
Prim	Primary level
Med	Medicine
Sec	Secondary level

UIT: only graduates of the 2nd cycle (licentiate, diploma, Master's)

UAS: only graduates of the 1st cycle (Bachelor's degree, diploma), who have not started a Master's degree at the time of the survey

UTE, primary level: only graduates of the 1st cycle (Bachelor's, diploma), who have not yet started their Master's studies at the time of the survey and are teaching at the primary level

UTE, lower-secondary level: only graduates with Master's or final exam, who are teaching at the lower secondary level

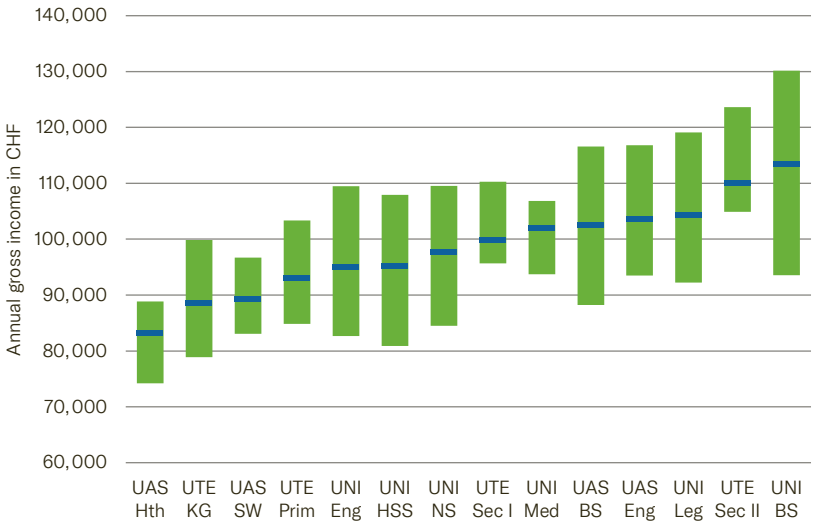
UTE, upper secondary level: graduates who teach in an academic or vocational baccalaureate school

Five years after completion of their studies, academic and vocational baccalaureate teachers remain in the lead. With at least 110,000 Francs median salary, they achieve similar salaries as economists (with a university degree) who are at the top of the scale. The median salary of teachers at the lower secondary level five years after completing their studies is at least CHF 100,000, which is on a par with doctors and lawyers. With a median income of around 90,000 Francs, the primary and kindergarten teaching staff are in the lower midfield, together with graduates of an academic university degree in the natural sciences, the humanities and social sciences (→ figure 315).

315 Employment income of graduates, five years after completion of studies, 2021

Annual gross income estimated using quantile regressions (standardised to 100%), controlling for age

Data: FSO (EHA); calculations: SCCRE



The green bars represent the central 50% of the distribution (2nd and 3rd quartile); the median lies in between (blue)

Leg	Legal studies
NS	Natural sciences
Hth	Healthcare
HSS	Humanities and social sciences
Eng	Engineering)
SW	Social work
BS	Business and services
KG	Kindergarten
Prim	Primary level
Med	Medicine
Sec	Secondary level

In this comparison, it should be highlighted that primary teaching staff with a three-year Bachelor's degree at a university of teacher education can keep up with the incomes of Master's graduates from different disciplines at academic universities even five years after graduation, which has a positive effect on the return on education of the entire career in favour of the teachers.

The variance shown in the teachers' salaries represents primarily the differences between the cantons in a national comparison. However, these are considerably lower than the wage variance of graduates of a degree in humanities and social sciences, the natural sciences or economics at a university. This means that the risk of achieving an income that is well below average after graduating is considerably higher in certain university degree programmes than after graduating at a university of teacher education *(→ margin text, page 293)*.

Demand for teaching staff

On the demand side, the key parameters are, on the one hand, the number of pupils, and on the other hand institutional specifications such as the number of lectures prescribed by the curricula, the size of classes and the supervision quotient *(→ chapter Compulsory education, page 27)*. The demographic development is an external contextual factor over which the school system has no influence, which influences the demand for teaching staff most strongly.

Unlike the demographics, the institutional factors are very much subject to political and official control. These factors, together with the wage specifications, influence the demand and thus have an impact on the costs. If one factor is changed, this has an impact on the others. For example, if attempts are made to relieve workload in schools by hiring more staff, this leads to an increase in the supervision factor. This in turn results in a higher demand with corresponding financing needs.

The demand for teaching staff is thus determined by the interaction of the demographic development and the institutional specifications. In its forecast scenarios for the teaching staff in compulsory education, the FSO takes into account both the demographic development in the number of pupils as well as in the teaching staff and their mobility. The FSO thus estimates that although the number of teaching staff will rise by around 6% by 2031, in view of the increasing number of pupils, the number of teaching staff to be recruited each year, however, will tend to decline due to the decrease in retirements *(FSO, 2022k)*.

Because the number of graduations at universities of teacher education will continue to rise according to student forecasts (for the study programme primary level a growth of around 20% is predicted by 2031), the offer of newly trained teaching staff in the coming years should converge somewhat more with the demand; however, the demand gap will continue to exist *(FSO, 2022k)*.

Risk aversion with teaching staff
Salary differences between members of different fields of study and professional groups can also be explained partially by self-selection in various activities based on individual characteristics and preferences such as risk aversion or attitudes towards certain remuneration models. According to the latest studies, teaching staff as well as students in teacher training programmes are characterised by a significantly higher risk aversion, namely with regard to their professional career. This characteristic plays a decisive role in the self-selection in professions with a level of job security and fixed remuneration models *(Ayaita & Stürmer, 2020; Bowen et al., 2015)*. The higher risk aversion is apparent not only in comparison with the average population, but also in comparison with persons from the area of healthcare and social work, as well as in comparison with other employees in the public sector *(Ayaita & Stürmer, 2020)*. The different levels of readiness for risk of teaching staff is also used as an explanation for widespread resistance to reform or the use of new technologies *(Bowen et al., 2015; Dohmen & Falk, 2011; Howard, 2013; Terhart, 2013)*.

Institutions

Teachers at compulsory school level are trained in Switzerland practically exclusively at universities of teacher education. One exception is Canton Geneva, which trains its teaching staff for all levels at the university. The universities of teacher education usually offer study programmes for training as teaching staff at primary level, lower secondary level, sometimes also at higher secondary level as well as for specialised professions in the area of special needs education. Education is completed with an academic degree at Bachelor's or Master's level. The actual professional qualification is evidenced by a teaching diploma for the respective school level, which is recognised by the Swiss Conference of Cantonal Ministers of Education (EDK)[3]. With this recognition procedure, the EDK guarantees standardised minimum requirements for the training institution, for the admission conditions for study, for the training and for the qualifications of the

3 Regulations on the recognition of teaching qualifications for teaching at primary level, lower secondary level and Baccalaureate schools of 28 March 2019

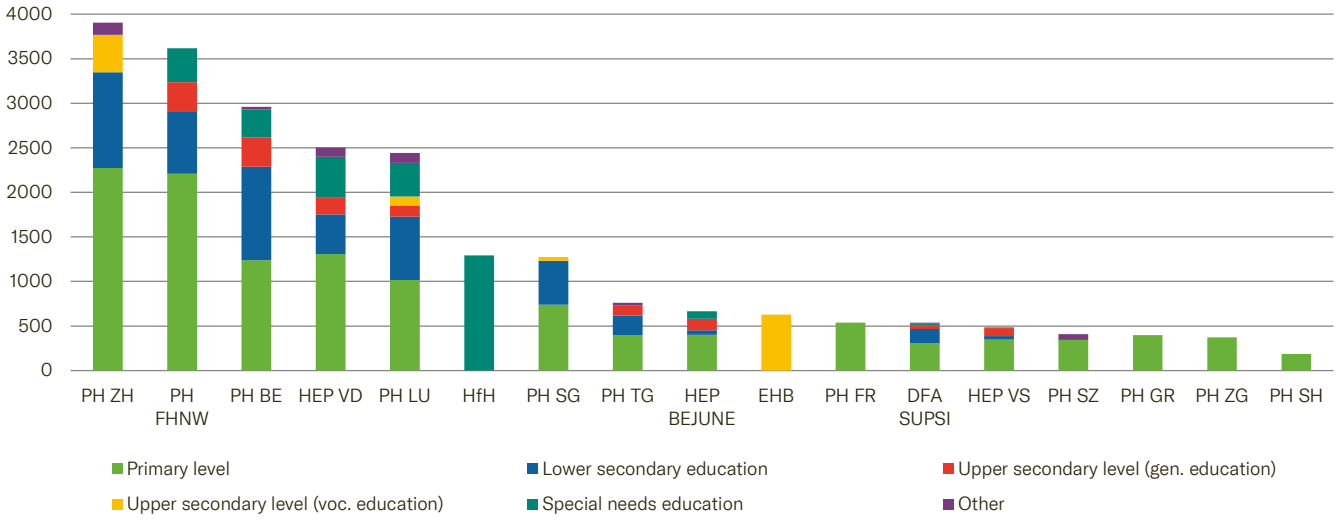
lecturers. It thus ensures nationwide freedom of movement for access to the profession as well as international recognition of the training. The completely revised recognition rules have been in effect since 1/1/2020.

The 15 universities which offer programmes of study for teaching at compulsory school level are accredited today as "universities of teacher education" according to the Higher Education Act (HEdA). In addition, there are also two specialised higher education institutions: the University of Curative Education (ICUCE) and the Swiss Federal University for Vocational Education and Training (SFUVET), which are both recognised as "universities of teacher education". Together, they train the vast majority of teachers in Switzerland (→ figure 316).

316 Students at universities of teacher education, 2021/22

Only students in diploma, Bachelor's or Master's study programmes, without further education, of all universities of teacher education in Switzerland accredited according to HEdO (including corresponding departments at the universities of applied sciences as well as the ICUCE and the SFUVET)

Data: FSO (SHIS); calculations: SCCRE

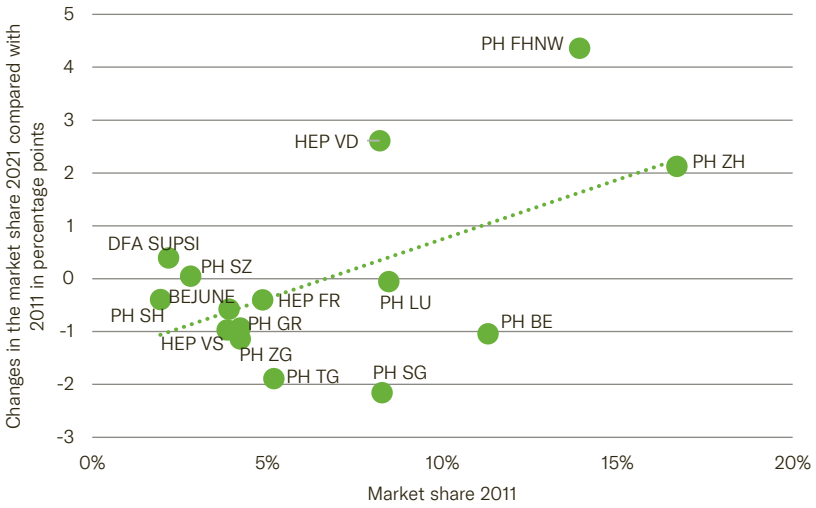


Apart from the institutional diversity, figure 316 also shows the heterogeneity of the sizes of the various universities. The five largest universities of teacher education with more than 2000 students each train two-thirds of all future teaching staff, while the remaining eleven universities with sometimes less than 500 students train the other third. In the last few years, the market shares of the individual universities of teacher education changed, but this development did not take any specific direction. Accordingly, both large and small universities lost or gained market shares (→ figure 317). Neither a trend towards an equalisation of student numbers nor a trend towards a greater concentration of students at the largest universities of teacher education can thus be observed.

317 Development of the market shares of the universities of teacher education, 2011–2021

Market shares measured as a share of the Swiss total of students in the primary level area

Data: FSO; calculations: SCCRE



One possible explanation of this constant heterogeneous situation is in the cantonal sponsorship of practically all universities of teacher education. For most of the small cantons, it is not necessarily worthwhile to run a university of teacher education that is as large as possible – especially as this involves high infrastructure costs – if this meant that they would train increasing numbers of teaching staff who would afterwards be employed in a different canton. Most cantons run small universities of teacher education, with the hope of being better able to cover their own requirements for teaching staff and not having to poach staff from a different canton. Small or peripheral cantons in particular count on the fact that it is simpler to obtain teaching staff if they can train them in their own canton. Otherwise the students would first have to leave their canton, and after they have completed their studies need to be coaxed to return home again *(Oggenfuss & Wolter, 2019)*. Whether this strategy is successful cannot be verified empirically at present.

Inter-cantonal mobility of students

In principle, cantons promote the free movement of students in the choice of their universities. The competition for students generally entails performance- and quality-enhancing incentives for the universities. To cover the costs, the cantons where the students are residents make contributions to the costs of education to the sponsors of universities. The inter-cantonal financial burden sharing in the area of the universities of teacher education is performed through the Inter-Cantonal Agreement on Universities of Applied Sciences (IAC-UAS)[4]. Small cantons are thus faced with the choice of financing the education of the members of their canton themselves

4 Inter-Cantonal Agreement on Universities of Applied Sciences (IAC-UAS) of 12 June 2003

with their own university or dispensing with it altogether. If the second solution is chosen, the cantons must pay the sponsors UAS agreement contributions (IAC-UAS) for the training in non-cantonal universities.

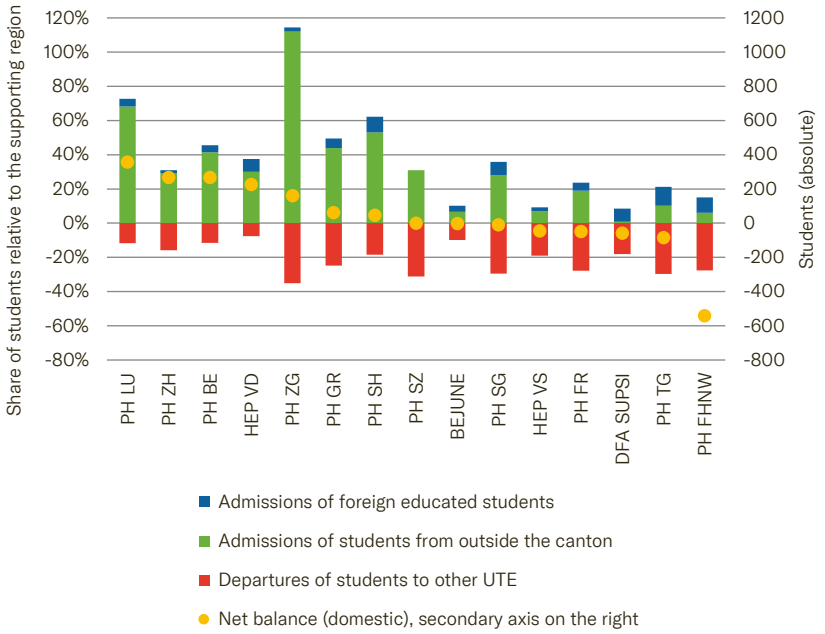
On average throughout Switzerland, only about 20% of students resident in a specific canton or in a region with a university of teacher education are educated outside of their region of origin. However, as not all cantons run universities of teacher education, 30% of future teaching staff do not study at a university of teacher education of their supporting canton or their supporting region. The share of international students, in comparison with the other university types, is relatively low at around 5% and this percentage varies strongly from one university to another (→ figure 318). Some universities are successful in reducing their negative migration balance somewhat with foreign students. Financially, however, acquiring students from abroad does little to contribute towards offsetting costs, because these students are not subject to UAS agreement contributions. Foreign students only pay somewhat higher tuition fees.

Possible explanations for the different quotas in the mobility of students at the individual universities must be sought in the individual study decisions and self-selection mechanisms of the students. These are likely to be influenced not least by institutional and cultural factors or by the reputation of a university. However, this university data does not allow an empirical verification of these hypotheses.

318 Origin of the UTE students, 2021

Share of the UTE students (primary level) who come from outside the supporting region and the students who study at a UTE outside the supporting region, relative to the total of the UTE students of the supporting region, net balance: only students in Switzerland

Data: FSO (SHIS); calculations: SCCRE



Legend
Measured by the number of UTE students from Canton Zug, more than 100% of students at the UTE Zug come from another canton or abroad. At the same time, a good 35% of the UTE students from Canton Zug attend a UTE outside Canton Zug for their education.

Admissions of students from outside the canton
Proportion of students from outside the supporting canton (resident in Switzerland) relative to the number of students from the supporting canton

Admissions of foreign-educated applicants
Proportion of foreign-educated applicants relative to the number of students from the supporting canton

Departures of students to other cantons
Proportion of the students studying outside the supporting canton, relative to the number of students from the supporting canton.

Net balance (domestic)
Proportion of students from outside the supporting canton (resident in Switzerland) minus the number of students who study outside the supporting canton.

Admission to the universities of teacher education

The admission practice of the universities does not only influence the selection by the universities themselves, but also the self-selection of the students and thus the future composition of the teaching staff. Nationwide requirements exist for admission, which, however, allow the individual universities of teacher education a relatively wide scope.

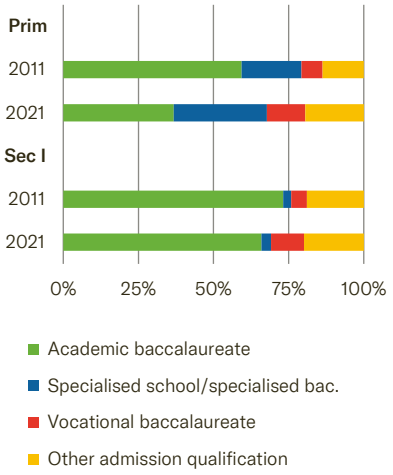
According to the revised EDK recognition rule, admission to training for teaching at compulsory school level requires an academic baccalaureate or a University Aptitude Test qualification (Passerelle). Holders of a recognised specialised baccalaureate in education are admitted for the primary level degree programme. In addition, the rule provides for specific procedures with examination and equivalent verification for the admission of professionals and for persons who are changing careers. The EDK thus follows the admission requirements for the universities of teacher education (see Art. 24 of HEdA) already defined in the HEdA. The consequence of these institutional specifications is that the students at universities of teacher education can provide a more heterogeneous profile with regard to their prior education at higher secondary levels than students in university degree programmes. Thus ten years ago, for example, at least 40% of the students who entered the study programmes for pre-school and primary level did not have an academic baccalaureate (→ figure 319). This proportion has increased strongly since then and is over 60% today. The relationship between students holding an academic baccalaureate and those with other qualifications has thus been reversed. In the lower secondary level study programme, the situation has changed significantly less over time.

The increase in intake of students without an academic baccalaureate in the primary level study programme has been particularly affected by efforts to enhance admission of vocational school leavers *(→ chapter Upper-secondary specialised school, page 179)*. The vocational school certificate was originally the prevalent entrance qualification to pre-school level teaching training (kindergarten). According to the HEdA, an academic baccalaureate, a specialised baccalaureate or an equivalent qualification are now required for the study programmes at a university of teacher education. Since the revised EDK recognition rules came into force on 1 January 2020, there is no longer separate training for the pre-school level (kindergarten), for which in the past, a certificate of secondary education was sufficient. Today, the pre-school level is subsumed under the primary level; the corresponding study programmes thus also include the lower level. This means that since 2020 all young people who want to enter a university of teaching education via the specialised school first have to obtain the specialised baccalaureate in education.

Entrance via a specialised baccalaureate is chosen by a large proportion of women *(Leemann et al., 2021)*. Men, on the other hand, who do have an academic baccalaureate and who wish to obtain an education in teaching have more frequently acquired a vocational baccalaureate (→ figure 320). After the vocational education and training programme and the vocational baccalaureate, however, they have to pass the university aptitude test for enrolment in a Swiss academic university (Passerelle) or attain a qualification equivalent to the aptitude test or the specialised baccalaureate by sitting an internal entrance examination set by the university in question *(→ margin text, page 298)*. Graduates of the basic professional training

319 Entrants by admission qualification, 2011 and 2021

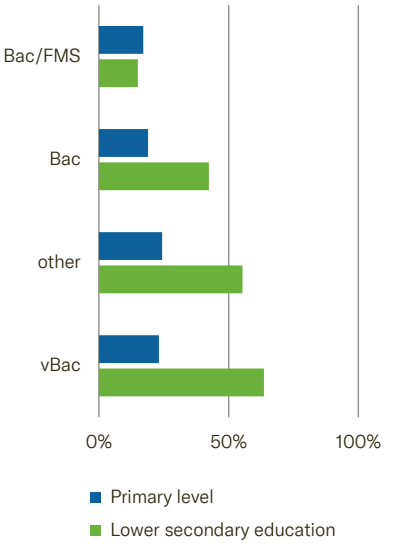
Data: FSO (SHIS); calculations: SCCRE



320 Proportion of men by admission qualification, 2021

Proportion of men by UTE entrants by admission qualification and study programme

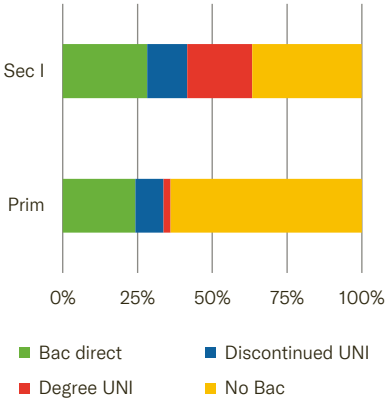
Data: FSO



321 Entry into UTE after discontinued university studies, 2021

Entry to a university of teacher education with academic baccalaureate (Bac) and prior education at an academic university (UNI), 2021

Data: FSO (LABB); calculations: SCCRE



Examination-free admission to study programme primary level at the UTE Bern

The Grand Council of Canton Bern has resolved, as a result of the revision of the Act on German-speaking universities of teacher education of 8 March 2022, that holders of a vocational baccalaureate can be admitted without an examination to the study programme for primary level at the university of teacher education in Bern. In particular, this rule is justified by the need for new recruitment options for teaching staff. However, the new admission rule is in contradiction to the HEdA and to the revised recognition rule of the EDK.
The training is thus not associated with the nationwide EDK recognition.

thus form a possible recruitment pool which could enable more men to be recruited for the teaching profession *(Leemann et al., 2021)*.

A considerable proportion of first-year students only arrive at a university of teacher education after discontinuing studies at an academic university. Longitudinal analyses of higher education institution data can be used to show that the study programmes for the primary level and lower secondary level contain around 10% to 13% of the students with an academic baccalaureate who changed to a university of teacher education after discontinuing their studies at an academic university (→ figure 321).

Flexible forms of study

In order to attract more people for education in the teaching profession, the universities of teacher education offer more flexible forms of study. These include the option of part-time study, in other words, reduced presence. Self-study, individual guidance and online courses enable students to complete their education in addition to family commitment and work. In addition, professionals from the age of 30 are enabled to change careers and join the teaching profession. In this case, the ability to study is clarified as part of a documented, individual procedure "on file". The training is usually accompanied by some degree of teaching practice within the framework of a part-time position at the target level from the second year of studies (see Art. 8, Paragraph 4 of Recognition Rule). In the whole of Switzerland, just under 10% of all students in 2021 in the primary level study programme started their training as career changers or in a part-time variant.

Self-selection in the universities of teacher education

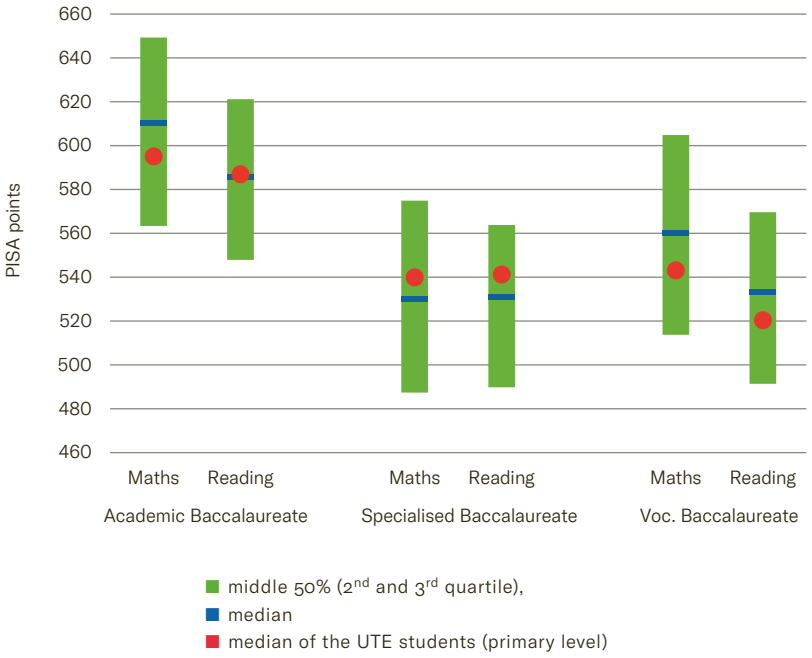
The various training programmes at upper secondary level either demand explicitly different academic achievements or are selected by young people with different abilities *(→ chapter Upper-secondary education, page 111)*. As the distribution of performance in the various types of training in the upper secondary level heavily overlap, it is not clear from the outset whether students at a university of teacher education differ with regard to their technical competences, depending on their admission qualification. Unfortunately, competence data on students at the time of completion of the upper secondary level is not available. Only the (PISA) competencies measured at upper secondary level can be used as proxy variables. Appropriate analyses are possible via the longitudinal data of the PISA cohorts 2012 (SEATS data), which show the following: Students at a university of teacher education who have an academic baccalaureate are recruited on average from the second quartile of the PISA performance in mathematics, in reading they correspond to the median, relative to all young people who hold an academic baccalaureate. Young people with a specialised baccalaureate are recruited on average from the third quartile of those who took a specialised baccalaureate. Students at a university of teacher education who have entered the university via an academic baccalaureate thus on average have a below average PISA performance compared with the performance of all baccalaureate school pupils at the end of the compulsory school period – at least in mathematics. They are thus still, on average, superior to their

colleagues with a specialised baccalaureate who scored above average in PISA for their school type (specialised baccalaureate school). According to this data, however, the vocational baccalaureate students at the universities of teacher education are negatively selected, with regard to the distribution of performance within the school type vocational baccalaureate. The difference between specialised and vocational baccalaureate, however, is considerably lower among the prospective primary teachers than that between specialised and academic baccalaureate and only significant in reading. (→ figure 322). The difference in cognitive ability of the prospective teachers is relevant with regard to system effectiveness, as numerous studies show that the cognitive abilities of teachers are strongly related to students' achievement growth. *(Enzi, 2017; Hanushek et al., 2019)*.

322 PISA performance of the UTE students by baccalaureate qualification

PISA points (2012) and current training by university type, 2021

Data: SEATS; calculations: SCCRE



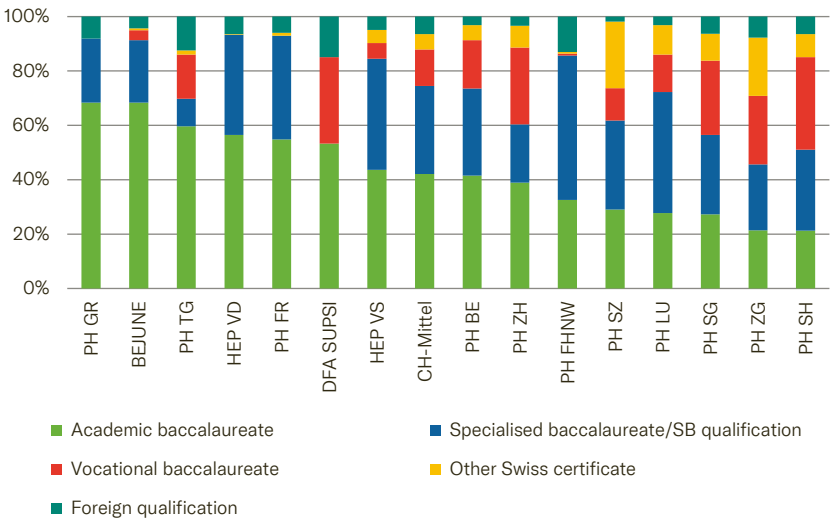
Legend
The mean test performance (median) of all graduates with an academic baccalaureate in PISA (mathematics) is 610 points (blue bar). The median performance of graduates with a general baccalaureate who enter a UTE is 595 points (red dot).

The diversity of students who qualify potentially for admission to a university of teacher education according to the EDK recognition rule means that the composition of the student population with regard to their previous schooling at the individual university is widely varied. It thus reflects various cantonal and regional practices (→ figure 323). Access to teacher education has different regional traditions. This has not least to do with the fact that the proportion of students who attend the various general education programmes at the upper secondary level are different from one canton to another. In cantons with an expanded range of specialised baccalaureate schools – such as in Northwestern Switzerland – this access plays a correspondingly more significant role; in addition, there are still cantons that do not offer any technical education at upper-secondary schools.

323 UTE entrants by admission qualification and UTE, 2021

UTE entrants in the primary level study programme (Bachelor's degree programme, without further education)

Data: FSO (SHIS); calculations: SCCRE



Effectiveness

The effectiveness of the universities of teacher education is measured by how well the universities have provided the prospective teachers with the skills and competences relevant for practising the profession which enable them to optimally support their pupils' learning and to improve their competences. An effectiveness determined in this manner would have to be based on a causal chain, which would first have to establish a causal link between the higher education and the teachers' skills and secondly, a similar one between teachers' and pupils' skills. For this purpose, it would have to be possible to take into account the personal, cognitive and motivational requirements of the students at the start of their studies as well as the corresponding requirements of the children and young people they teach. Research is far from being able to causally identify such relationships. Enormously complex panel data must be available for this purpose which needs to be collected over a long period of time. Collecting this data would also require a variety of potential influencing factors to be taken into account. It is correspondingly difficult to assess the effectivity of the education at universities of teacher education in Switzerland.

Up to now, it has mainly been the second correlation which has been better investigated: There are answers to the questions of which characteristics and skills of teaching staff positively influence the acquisition of competencies by the learners *(Bacher-Hicks et al., 2019; Baumert et al., 2010; Brühwiler et al., 2017; Kane & Staiger, 2008; Rockoff, 2004; Rockoff et al., 2010)*. The research of the causal contribution of training to prospective teachers' professional skills is more difficult in the absence of corresponding data. Not least because no consensus exists regarding which are the relevant output variables of teacher training, in other words, which are the job-relevant skills to be taught and how should these be measured. Up to now, there have been different conceptualisations for ascertaining the complexity of acquiring professional skills in teacher training *(Blömeke et al., 2008; Helsper, 2016; Kauper et al., 2018; Rothland et al., 2018; Voss et al., 2015)*. Considered empirically, research so far has been mostly based on self-reported assessments with regard to the output values, which can be distorted.

Descriptors of the training process, aspects of the effectiveness of training as well as factors, from which it is assumed that they have an impact on efficiency, will be presented and discussed below on the basis of Swiss data.

Study success rates

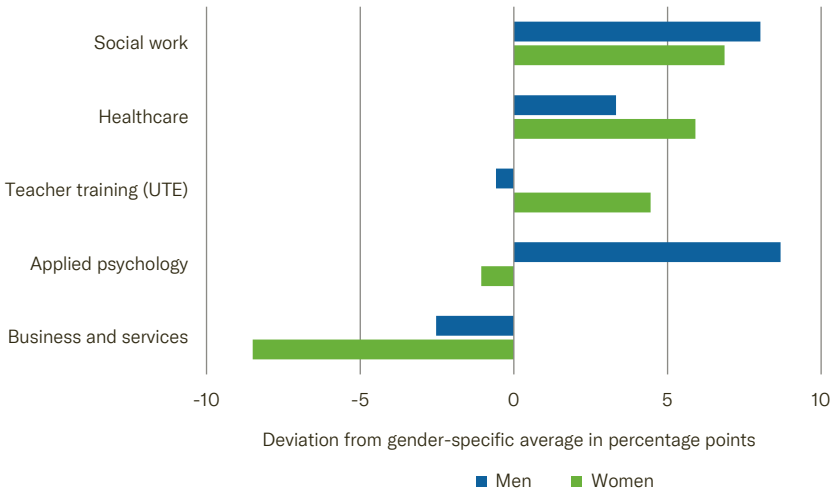
For the Bachelor degree programmes of the universities of teacher education, the Federal Statistical Office (FSO) reports a study success rate of 88% on average, based on the 2006–2009 cohorts. In comparison with the average study programmes at the universities of applied sciences, this is six percentage points higher. The quota is thus similar to that of the study programmes of Healthcare and Social Work at the universities of applied sciences (→ figure 324).

An evaluation by gender, however, reveals a striking gender-specific difference: In the universities of teacher education, the success rate of men is 10 percentage points lower than that of women. The question is why men are less successful at the universities of teacher education than women. Is this due to poorer study requirements of men, to less motivation or do men generally have a higher tendency to drop out of studies?

324 Study success by subject area and gender

Study success (graduation in the same subject), 2018 of the cohorts 2006–2009; deviation from the gender-specific average of the universities of applied sciences in percentage points

Data: FSO



Legend
The success rate of female students in the subject area Healthcare is around 6 percentage points higher than the average success rate of the female students at the universities of applied sciences. With the female students at the universities of teacher education, it is roughly 4 percentage points above the average. With the men, the success rate at the UTEs and with the business students is lower than the average for all students at universities of applied sciences.

Teaching activity during studies

It is generally considered to be conducive to starting a career if students actually have relevant practical experience during their studies. Students at universities of teacher education are in this case usually employed as teaching staff at schools, either in long-term part-time positions or as substitutes. The question is, however, how well students are qualified for such assignments, in particular when they take place right at the start of studies. Regular secondary employment on a larger scale also harbours the danger that the working students become overloaded and cannot meet the requirements set in their education. A professional employment

independent of studies might particularly conflict with the practical vocational training if it suggests to freshmen students that they already possess the required teaching skills and thus undermines the demand for science-based professionalisation *(Bäuerlein et al., 2018; Cramer, 2013; Hascher, 2011)*.

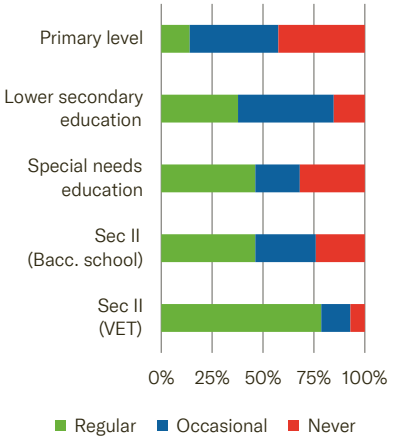
Teaching activities independent of studies of students vary depending on the field of study. In the analysis, only graduates below the age of 30 are taken into account; thus career changers who sometimes exercise a paid teaching position as part of their training are not taken into account. In the study programmes for the upper secondary level or even in special needs education, in other words, in fields of study which are usually completed as part-time studies, it is 50% and more of students who teach on a regular basis. With the students in the primary level study programme, it is 14% on average for Switzerland as a whole; at some universities of teacher education however, it is up to 30%. In the lower secondary level study programme, almost half of the students regularly perform a teaching activity (→ figure 325).

Finally, the analysis of the graduate survey shows that prospective teachers who regularly teach during their studies assess their training differently than other students. This finding indicates that a teaching activity during training which is independent of studies and thus unsupported can be relevant for assessing the training and its effectiveness. Accordingly, teaching activities independent of studies would also have to be given greater consideration by the universities of teacher education *(Bäuerlein et al., 2018)*.

325 Paid teaching activity during studies

Paid employment related to studies during the studies; survey of university graduates 2017–2021; only persons who were below 30 years old at the start of the survey.

Data: FSO (EHA); calculations: SCCRE



Competence acquisition

In order to enable representative analyses, the research on competence acquisition and professionalisation during teacher training would have to be based on extensive data with test results in individual areas of competence, which should be designed and standardised as uniformly as possible. Programmes in Germany, such as the COACTIV study *(Kunter et al., 2013)* or the more recent project Effective Competence Diagnosis in Teacher Education *(Lohse-Bossenz et al., 2021; Rutsch et al., 2018)*, do this on a large scale and use longitudinal study designs to identify professionally relevant competences of teaching staff and to describe the interaction of teaching methodology and science.

There are no similar studies in Switzerland. Regarding the question of the efficiency of teaching training, the findings of research here are restricted to sub-aspects of competence acquisition, namely to the area of practical vocational training *(Baumgartner, 2018; Winkler & Grüning, 2018)* or teaching methodology. However, the skills examined in these studies are surveyed in different ways. Qualitative and quantitative surveys are deployed, as well as experts' observations and pupil surveys, as well as actual tests; the results of the individual studies are difficult to compare with each other.

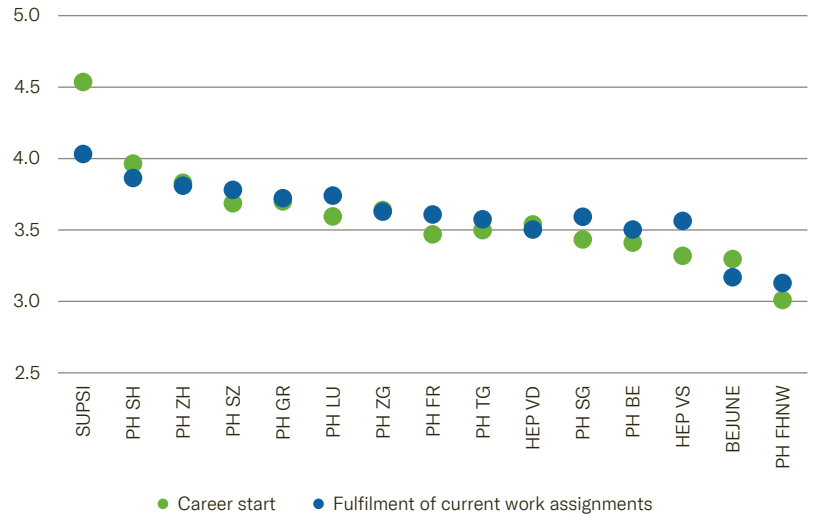
An alternative would also be the graduate survey in Switzerland, which on the basis of representative data from career starters provides indications to their subjective assessment of the effectiveness of their training. For the universities of teacher education, for example, the question of how these

persons assess their training with regard to career entry and the fulfilment of current professional tasks is relevant. The values shown in figure 326 are based on regressions with the data from graduates of the study programme at primary level, who are teaching in the compulsory school level one year after graduation. What is striking is the high level of heterogeneity between the universities, which results from outliers at the extreme ends of distribution. Only the four universities placed at the bottom deviate significantly from the average, as well as the university placed right at the top (→ figure 326).

326 Assessment of the training by the graduates

Assessment of training with regard to a) career entry and b) the fulfilment of the current work assignments; scale 1–5; only graduates of a study programme at primary level at universities of teacher education who are employed at compulsory school level one year after graduation

Data: FSO (EHA, 2017, 2019 and 2021); calculations: SCCRE



Entry to the teaching profession and retention

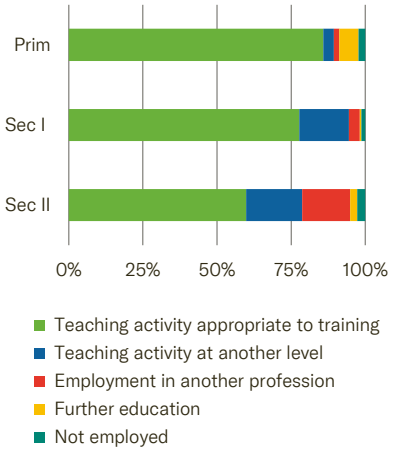
From the perspective of the education system, the career entry and retention of trained teaching staff represents an effectiveness criterion. If a considerable proportion of graduates from the universities of teacher education were to decide against teaching in the school area or to give up a teaching position soon after they had started, this would indicate either a low attraction for the profession or an inadequate preparation for the profession or both together. However, only the second would be decisive for assessing the performance of the universities of teacher education.

Personal attitudes and self-efficacy convictions are key for career entry *(Hecht & Weber, 2020; Keller-Schneider, 2020a, 2020b)*. If teachers see themselves as competent and if they attribute this acquisition of competence to the training, then these would be indications of a level of efficiency of the education at a university. The significance of self-efficacy is empirically demonstrated by the fact that career starters who estimated the training one year after graduation as supportive with regard to the fulfilment of their professional assignments are more likely to be still active in the teaching profession five years later.

The vast majority of UTE graduates from the universities of teacher education take up a teaching post within a year of completing their studies, but with considerable differences according to education level. 83% of teachers with a training for the primary level take up teaching activities which are appropriate to their level, while this is only around 77% for trained teaching staff at lower secondary level and for academic and vocational baccalaureate school teachers is only about 60% (→ figure 327). Regarding the secondary level teaching staff, more than one-third take up a further course of studies or training after graduating from a university of teacher education. In the case of baccalaureate school teachers, the high proportion of those who teach on another level probably indicates difficulties in finding a job.

327 Employment situation of graduates by teaching level

Data: FSO (EHA), initial surveys 2021; calculations: SCCRE; graduates one year after graduating



Prim primary level, including pre-school level
Sec I lower secondary level
Sec II upper secondary level

Efficiency/costs

Statements about the efficiency of resources used in UTEs demand both comparable data on the various inputs (real and monetary) as well as suitable output measurements. Because, as already mentioned in the previous section, there is no generally applicable measure of output for the area of teacher education, it is likewise not possible to make statements about the efficiency of education. The following remarks are therefore limited to a cost comparison (monetary input).

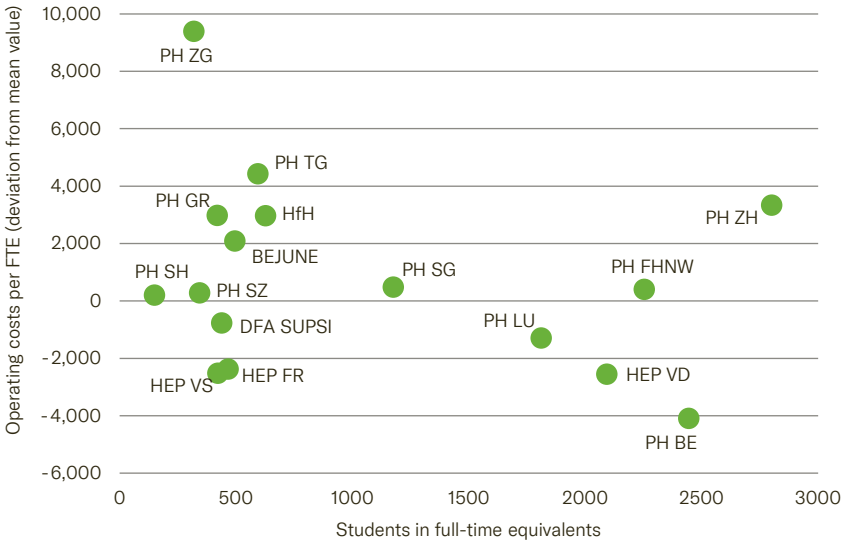
Training costs per person

If the costs of study of the individual universities of teacher education are compared for each student – measured in full-time equivalents (FTE) – for the programme of study of the primary level, a very large heterogeneity of costs can be established, which, however, cannot be explained by the size of the university (→ figure 328). There are various explanations for these differences, such as heterogeneous supervision relationships, differences in the training models, a wide range of heterogeneity in the range of studies, diverging wage costs, unequal staffing structures as well as in general the diversity of the organisational structure of the universities. However, an exact analysis of the determinants of the rather large costs differences is not available.

328 Costs of education per student and number of students by university, 2021

Staff costs for basic training in the primary level study programme for each student (in FTE) and number of students (in FTE) in the primary level study programme (basic training)

Data: FSO; calculations: SCCRE

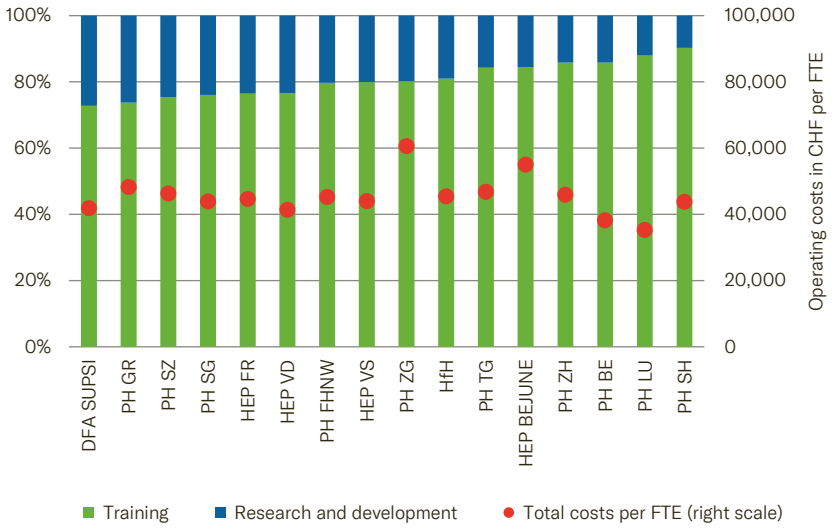


If one considers not only the expenditure for teaching but the overall costs of the university of teacher education for each student (in FTE), no correlations between the cost ratio of training and research and the overall costs per FTE can be established. Thus universities with very similar overall costs per FTE (such as SUPSI, HEP VS and UAS SH) show very different cost ratios between training and research and vice versa. In other words, research-intensive universities of teacher education – with regard to the overall costs per student – are not expensive, but also not less expensive than less research-intensive universities of teacher education (→ figure 329).

329 Distribution between training and research costs per FTE by university, 2021

Relationship between costs for training and for research and development per FTE; overall costs (operating costs) per FTE

Source: FSO; calculations: SCCRE



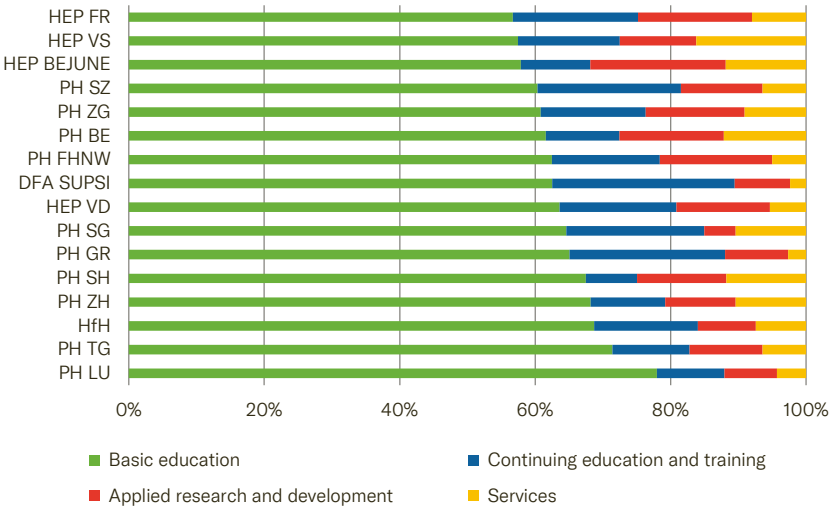
Cost structure of the universities of teacher education

If the staff costs are further differentiated according to the four areas of performance (basic training, further education, applied research and development as well as services), no correlation with the size of the university can be observed either. The differences in the cost structure between the universities of teacher education can be explained accordingly not by the size of a university, as there are small (Schaffhausen) as well as large (Zurich) universities of teacher education with a proportionately large allocation of resources in the area of training. In the third-party funded area (further education, research and development, services), the various universities also have different profiles.

It must, however, be taken into consideration, that even small increases in staff, for example, in the area of research and development, can have a strong impact on the overall ratio at small universities due to the pro rata consideration (→ figure 330).

330 Staff costs by performance type and university, 2021

Source: FSO; calculations: SCCRE



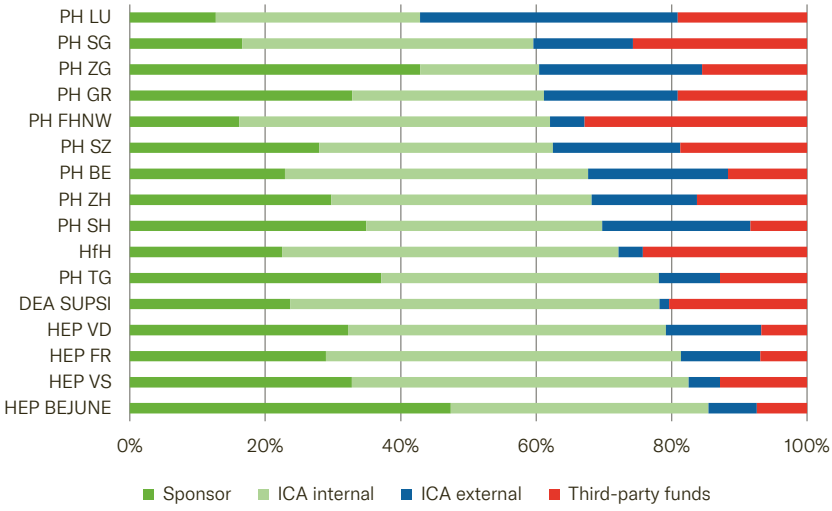
Financial sources of the universities of teacher education

The universities of teacher education are primarily financed by fixed contributions from their sponsors (cantons). In addition, there are contributions from other cantons as part of the inter-cantonal agreement on universities of applied sciences (ICA-UAS), as well as tuition fees, third-party funds and other income. The combination of the various financial sources is different according to the area of performance. However, the earnings structure of the entire university of teacher education over all areas of performance will be considered below (→ figure 331).

The increase in students from outside the canton has an impact on the financial resources of the host universities. On average, the universities of teacher education receive 14% of their operating costs in the form of inter-cantonal compensation payments (→ figure 331). Basic financing by the sponsors is on average around 70%. The less that a university of teacher education is able to acquire students from outside their canton and thus UAS agreement contributions as well as third-party funding, the greater the proportion of financing which the sponsoring canton needs to provide. With regard to the third-party funding, this depends on whether it covers the expenditure which would have also been incurred without it, or whether the third-party funding initiates activities which without it, would not have taken place. If the latter is the case, the share of sponsorship of the costs decreases on a percentage basis, but not on an absolute basis, while in the first case, both would decrease. The size of the sponsor contributions varies – dependent on these factors – very widely between the universities of teacher education; it ranges from less than 50% in the case of the UTE Lucerne up to 80% in the case of the UTE BEJUNE.

331 Operating revenues by financial source in percentage of the operating costs, 2021

Source: FSO; calculations: SCCRE



Basic financing by the sponsors: without infrastructure costs

ICA internal: ICA contributions for students within the sponsoring region (imputed)

ICA external: ICA contributions for students outside the sponsoring region

Third-party funds: research funds, tuition fees, other revenuesw

Equity

Equality of opportunity at the UTEs is discussed in this chapter in addition to the analysis of the university system as a whole *(→ chapter Tertiary-level education, page 193)* – mainly from the perspective of access to training. Disparities between different social groups, genders and Swiss and foreign students are highlighted.

Social background

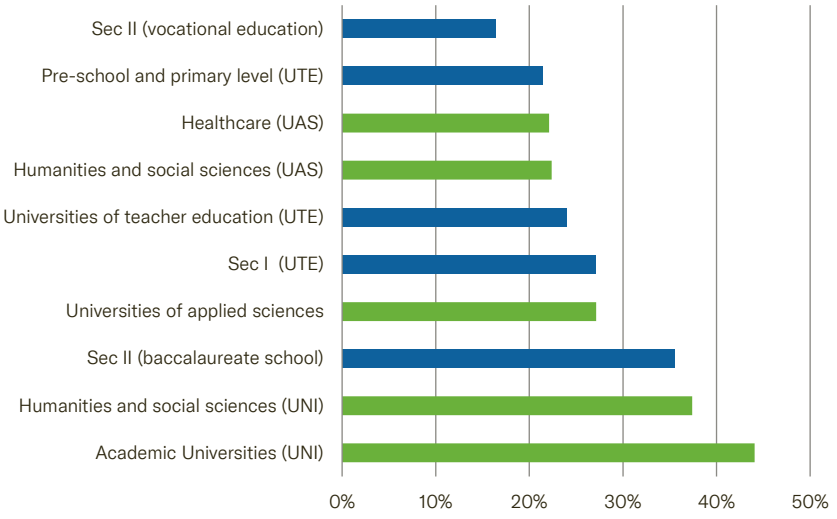
The social disparity tending to be prevalent in the Swiss higher education system between the university and the non-university sectors *(Denzler, 2011; Diem, 2021)* can also be seen in the various study programmes at the universities of teacher education. However, the latter make a contribution to improving equal opportunities in access to higher education with an admission practice that is, in comparison with the academic universities, considerably more open, as well as with alternative access for persons without a university admission qualification. Thus the proportion of graduates in the programme of study of primary level at universities of teacher education whose father has a degree from a university is around half that of university graduates. The proportion then increases in the study programmes for the secondary level and is highest in that for prospective academic and vocational baccalaureate school teaching staff (→ figure 332); it is lowest for teaching staff of the vocational training part of the upper secondary level. This pattern reflects not least the different parts of the admission qualifications which are required in the individual study programmes. The lower the proportion of academic baccalaureates, the less frequently

the students come from families in which at least one of the parents is a university graduate. However, the figures also show that the teaching staff do not form a homogeneous group with regard to social background, but rather a reflection of the social background of the pupils which they teach. For the compulsory school level, the teaching staff correspond with regard to their social background, for example, rather to the social average of the population than the average of holders of a degree at university level. An interesting observation is that the prospective academic and vocational baccalaureate school teachers come considerably less frequently from academic families than the average of the other graduates from academic universities, who were their fellow students during the specialised studies.

332 Social background of the university graduates by study programme, 2021

This shows the proportion of graduates whose father holds a degree from a university (UNI, UAS, UTE).

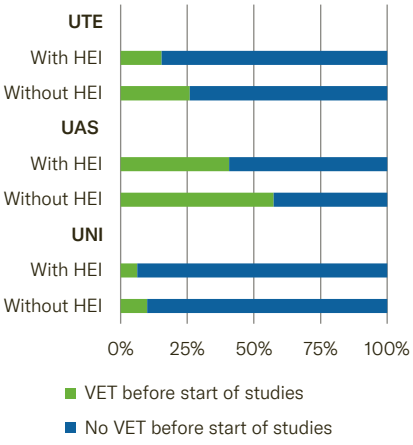
Source: FSO (EHA); initial surveys 2017, 2019 and 2021; calculations: SCCRE



333 Students by previous education and social background

Students with and without basic vocational education and training (VET) before commencing studies; father with degree from a higher education institution (with HEI) and without degree from a higher education institution (without HEI)

Data: FSO (EHA), initial surveys 2017, 2019 and 2021



Access to higher education via the VET programme to the university, which is actually a feature of the universities of applied sciences, also causes a reduction in social disparity. At the universities of teacher education, almost a quarter of the students from non-academic families have completed basic vocational education and training before commencing studies. At the academic universities, this is less than 10% (→ figure 333).

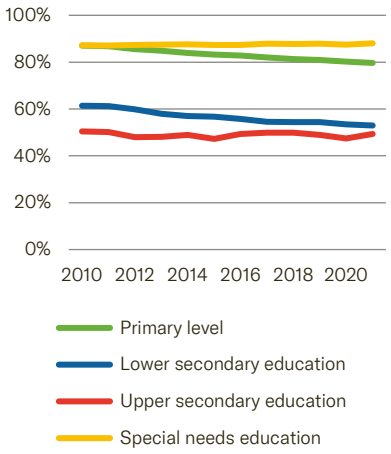
Gender

The study programmes of the universities of teacher education are traditionally characterised by a high proportion of women, which decreases from education level to education level for which training is provided. The highest quota of women is over 87% in the study programme special needs education, while the fewest women are in the study programme for the upper secondary level (→ figure 334). However, it can be established that the proportion of women in the study programmes of primary and lower secondary level has decreased by around 7 percentage points over the last decade. The reasons for the growing proportion of men are not completely clear, even though it has been observed that the universities of teacher education themselves have taken various measures to make themselves more attractive for men.

Fears that too few men in the teaching profession, in particular for the male pupils, would bring disadvantages, could be refuted with reference to various studies, which suggested that neither boys nor girls are at an advantage if they are taught by a teacher of the same gender (SKBF, 2018). A large-scale quasi-experimental study with Finnish data now shows that a more balanced gender ratio in the schools is associated with better academic performance, a better transition to post-compulsory education and a higher employment rate at the age of 25 for both male and female pupils. The authors surmise that the observed effects are, on the one hand, conveyed by a higher complementarity in the team and on the other hand by certain non-observed skills in the male teachers *(Schaede & Mankki, 2022)*.

334 Development of female proportion of UTE entrants by course, 2010–2021

Data: FSO (SHIS); calculations: SCCRE



Migration status

The proportion of teaching staff with a migration background is generally regarded as a yardstick for the successful integration of foreigners in the Swiss education system. In addition, teaching staff with a migration background are seen as having a special potential in dealing with the cultural heterogeneity in the educational institutions with regard to cultural diversity in schools *(Syring et al., 2019)*.

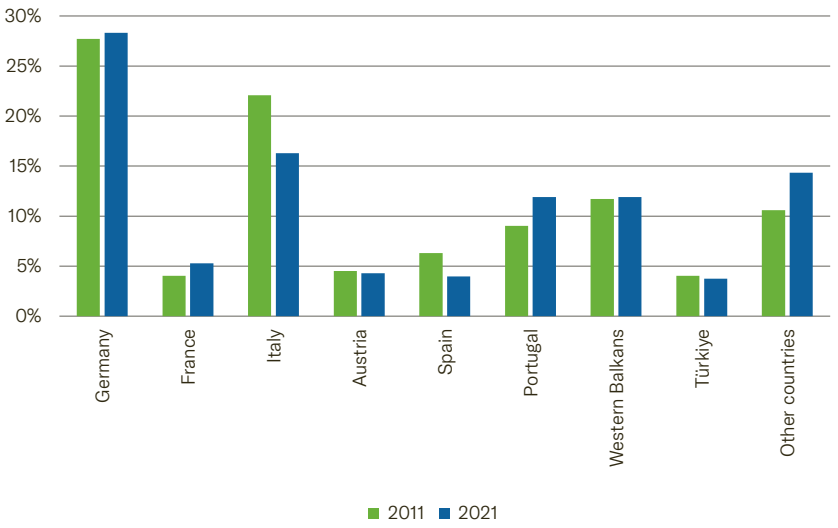
However, the proportion of foreign students at universities of teacher education is very low. Altogether, only around 5% of students at universities of teacher education who have acquired their university qualification entrance in Switzerland have foreign nationality (known as Swiss-educated applicants). However, it is important to consider that when taking into consideration the nationality, the proportion of students with a migration background is underestimated due to naturalisation before their studies *(→ chapter Baccalaureate schools, page 155)*. In addition to the 5% mentioned, there are another approximately 5% of foreigners who come to Switzerland for education (known as foreign-educated applicants).

However, starting out from quite low proportions, the share of foreigners who were living in Switzerland before commencing their studies and have acquired their university entrance qualification here has increased (→ figure 335).

335 Origin of foreign students, 2011 and 2021

Proportion of foreign students by nationality; only Swiss-educated applicants have been taken into account, in other words, persons of foreign origin who had their residence in Switzerland at the time that they obtained university admission.

Data: FSO (SHIS); calculations: SCCRE



With regard to equal opportunities, further clarification is needed on whether foreign nationals are also confronted with other barriers, in addition to the admission conditions, which could lead, for example, to them discontinuing their studies more frequently than Swiss nationals *(Besa & Vietgen, 2017)*. Based on the available data and the current research, no signs of such disadvantages can be identified.

The fact that the universities of teacher education are less attractive than the academic universities for foreign-educated applicants who first come to Switzerland to study can be explained as follows: On the one hand, the academic universities enjoy a wider international reputation, with which it is easier for them to attract foreign students *(→ chapter Tertiary-level education, page 193)*. On the other hand, the degrees (with exceptions) are better recognised on the international labour market than those from universities of teacher education.

COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION
AND TRAINING

PROFESSIONAL EDUCATION

Context and Overview

336 Length of professional experience by training type

Exam cohort 2018

Data: FSO

Professional education (PE) is provided at tertiary level B, alongside training and education at cantonal universities, Federal Institutes of Technology (ETH and EPFL), universities of applied sciences and universities of teacher education, giving professionals with a federal VET diploma the ability to access tertiary-level education without a (vocational) baccalaureate. It also provides a source of experienced professional and managerial personnel for business. The aim of professional education and training is to "enable the transfer and acquisition of competencies needed to carry out the complex tasks and decision-making associated with a given profession" (Article 26 para. 1 VPETA[1]). Compared with other educational programmes, PE is more closely aligned with the requirements of the labour market. Students on professional education programmes often have many years of professional experience behind them (→ figure 336) and more frequently pursue their studies alongside a job, which can be an advantage, especially when it comes to developing social skills *(Bolli & Renold, 2017)*.

Federal examinations (Federal Diploma of Higher Education FDHE and Advanced Federal Diploma of Higher Education aFDHE) assess candidates' professional skills and equip them to perform at a level requiring more than the successful completion of vocational education to federal VET diploma level. The Advanced Federal Diploma of Higher Education have higher requirements than the Federal Diploma of Higher Education within a particular sector. They qualify graduates as managers or experts in a specific field. In the case of the FDHE and aFDHE, the professional organisations specify the skills to be attained in the exam regulations and assess them at centrally-administered exams. Graduates receive a Federal Diploma of Higher Education (FDHE) or an Advanced Federal Diploma of Higher Education (aFDHE). There are no regulations governing the preparation for these exams.

Broad, generalist colleges of higher education (CollHE) provide students with practice-oriented skills for taking on professional and management responsibility. In terms of qualifications from CollHE, professional organisations work alongside education providers to develop the core syllabus for each course of study. Providers obtain federal recognition for their courses on the basis of the core syllabus, administer the final qualification process and issue the diploma.

1 Federal Act on Vocational and Professional Education and Training (Vocational and Professional Education and Training Act, VPETA) of 13 December 2002.

337 Overview of professional education in Switzerland

Data : CSRE

	Admission requirements	Duration	Provider	Qualification	NQF VPQ
Federal examinations	**Federal Diploma of Higher Education (FDHE)** Upper-secondary qualification and a certain number of years' work experience in the relevant field	unspecified since attendance on preparatory courses (part-time) is voluntary	voluntary attendance on preparatory courses provided by education institutions and professional organisations, as well as public and private schools	Federal Diploma of Higher Education (FDHE), e.g. Specialist in Business Administration and Applied Technical Management, FDHE; HR Specialist, FDHE; Chartered Specialist in Accounting and Financial Management, FDHE	5–6
	Advanced Federal Diploma of Higher Education (aFDHE, also mastership examination) Federal professional examination and a specific number of years' work experience in the relevant field			Advanced Federal Diploma of Higher Education (aFDHE), e.g. Swiss Certified Accountant, aFDHE; Licensed Electrical Installation and Safety Expert, aFDHE; Master Farmer, aFDHE	6–8
	College of higher education (CollHE) Upper-secondary qualification and work experience in some cases	4–8 semesters[2] (full-time or part-time)	Private and public schools	Advanced Federal Diploma of Higher Education (aFDHE), e.g. Registered Nurse, aFDHE; aFDHE in Business Administration; Social Worker, aFDHE	6

NQF VPQ National Qualifications Framework for Vocational and Professional Qualifications

Development of qualifications

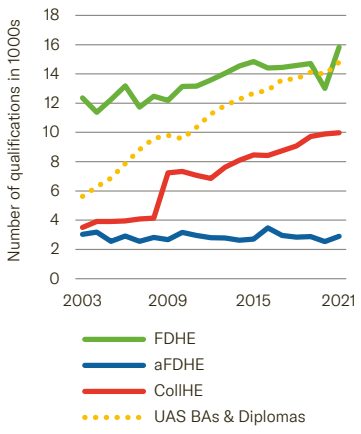
Professional education is of great quantitative significance to the tertiary education sector. Approximately 25,000 professional education qualifications are awarded each year; in 2020 this corresponded to 43% of all first qualifications at tertiary level[2]. Over the last year, development of federal examinations remained constant, while the number of CollHE diplomas increased (→ figure 338). However, the number of qualifications from UASs increased strongly over the same period, with the relative share of professional education across all tertiary qualifications decreasing consistently since the introduction of UASs. This competition from UASs is also named by providers in the professional education sector and individual stakeholders as the greatest challenge facing the further development of PE *(Neukomm et al., 2020)*.

The FSO anticipates that, in terms of students, past development is set to continue in the next decade. It predicts that HEIs will experience an increase in student numbers of approximately 12% between 2019 and 2029, while for CollHE[3], the increase will be just under 5%. CollHE will largely see more students in subjects such as social welfare, nursing and healthcare, as well as IT and communication technologies; meanwhile a decline is anticipated in subjects such as finance, banking and insurance *(FSO, 2021k)*.

338 Developmentofqualifications by education type, 2002–2021

College of higher education diploma without post-diploma; in 2009, a large number of qualifications previously unregulated by the Confederation were converted into CollHE qualifications; the decline in 2020 is driven by the pandemic *(→ Effects of the Covid-19 pandemic, page 318)*

Data: FSO



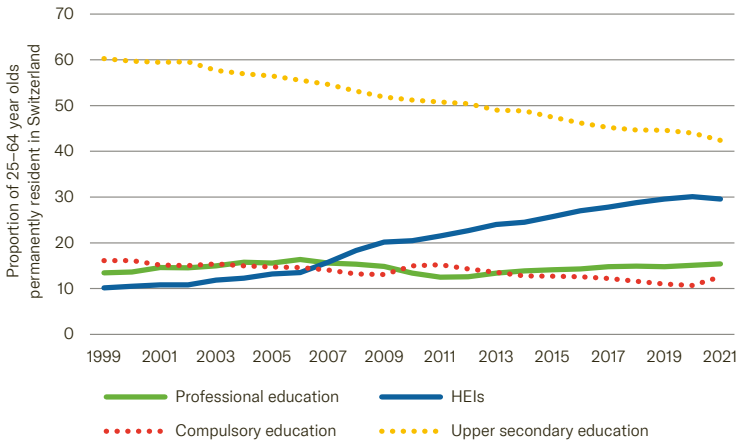
2 Bachelor's level and licentiate, diplomas from universities, UASs and UTEs.

3 Due to a lack of data, scenarios for federal examinations are currently unavailable.

Since the establishment of UASs, the proportion of people in gainful employment aged between 25 and 64 has also increased, while the proportion with a professional education qualification has remained relatively constant. This development indicates that only the HEIs, in particular UASs, have benefited from the growing trend towards tertiary education (→ figure 339). This is not least connected to the expansion of new baccalaureates (vocational baccalaureate schools, specialised baccalaureate), which has given significantly more people access to higher education. The constant proportion of holders of professional education qualifications in gainful employment indicates that the trend towards a greater number of HEI qualifications has not come at the cost of professional education and instead complements it *(Aepli et al., 2021)*.

339 Development of the highest completed education of 25–64 year olds permanently resident in Switzerland

Data: FSO



Effects of the Covid-19 pandemic

Professional education was also heavily impacted by the COVID-19 pandemic. In 2020, a number of federal examinations had to be rescheduled which, for the FDHE, led to a tangible decline in qualifications (→ figure 338). However, the year after, this pandemic-related decline was no longer evident.

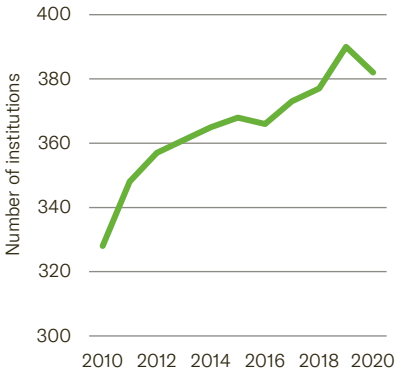
Similarly, at colleges of higher education, the rapid transition to remote teaching was associated with great expense. Learning support and exams were disrupted, with teachers claiming that students learned less through remote teaching. At the same time, teachers also saw remote teaching as a way of improving digital competencies *(Aeschlimann et al., 2020)*.

Institutions

Unlike HEIs, in professional education, it is not the individual institution that receives accreditation. Rather, in the case of the federal exams, only the qualifications themselves are recognised by the Confederation through the exam regulations. In the case of colleges of higher education, courses of study are recognised through the course's core syllabus. Therefore, there are CollHE courses and preparatory courses for federal examinations available at a variety of education providers, both private and public. These providers usually offer more than preparatory courses or CollHE courses. Almost half, for instance, are primarily active in vocational education and training *(Frey et al., 2021)*. This also explains the high number of education and training providers in comparison to universities. In the last decade, the number of active providers of professional education increased by 16% (→ figure 340), although there was no substantial increase in student numbers.

340 Development of the number of education and training providers

Data: FSO



Institutional developments

After the new Federal Vocational and Professional Education and Training Act (VPETA), which came into effect in 2004 and includes professional education, the strategic project "Strengthening higher vocational education" (launched in 2013) came to an end. It covered several key areas. In the case of federal examinations, public support for education seekers was introduced by means of subject funding in early 2018. However this direct federal funding for graduates of preparatory courses for federal examinations mostly replaced cantonal funding for preparatory course providers *(→ Efficiency/costs, page 326)*. Alongside changes to funding, professional education qualifications were further classified, together with VET programmes, in the National Qualifications Framework (NQF) for Vocational and Professional Qualifications (→ figure 337). This classification helps ensure differentiation between VET qualifications. At the same time, they also reflect the positioning of professional education qualifications at tertiary level and their equivalence with HEI qualifications. The NQF for Vocational and Professional Qualifications was based on the European Union's European Qualifications Framework, thereby also improving international comparability. In contrast to the ISCED classification, the NQF for Vocational and Professional Qualifications also differentiates among and between the federal examinations.

Furthermore, in 2015, the SERI introduced new English titles for vocational and professional qualifications to ensure optimum labour mobility for holders of those qualifications, even overseas. Finally, accessibility between professional education and UASs was examined. Although admissions to programmes at UASs are the responsibility of each individual institution, the Swiss Conference of Rectors of Higher Education Institutions (swissuniversities) has developed recommendations (best practice) in this area, whereby graduates of CollHE can be admitted onto programmes at UASs without needing to pass an exam, while holders of a Federal examination may be admitted after passing an entrance exam. If the course at the UAS is in a different field of study to the professional education qualification, an additional admissions requirement of at least

one years' professional experience in an occupation related to the field of study is also recommended.

Alongside the aforementioned developments, there were also reforms specifically relating to colleges of higher education. In the 2015/2016 academic year, the new Intercantonal Agreement on Funding Contributions for Study Programmes at Professional Education Institutions (ICA-PEI) came into effect, followed in 2017 by a complete revision of the Minimum Requirements for the Recognition of Study Programmes and Continuing Education and Training at Professional Education Institutions (MiR-PEI) *(→ Efficiency/costs, page 326)*. With the ICA-PEI, funding for courses at PEIs was also put in place, easing the financial burden on students, regardless of their canton of residence. The MiR-PEI was revised to align more closely with the needs of the labour market and quality development. Action points in terms of the positioning of CollHE were reviewed on the basis of political initiatives. According to the study *(Neukomm et al., 2020)* commissioned by the SERI, action is still needed at CollHE, especially in terms of recognition, connectivity and profile. The present "Positioning colleges of higher education" project clarifies provider structure *(Frey et al., 2021)*, distinctions within professional education and in comparison to UASs, as well as funding and the distribution of responsibilities between the Confederation and cantons. Measures for promoting national recognition and international mobility were also discussed.

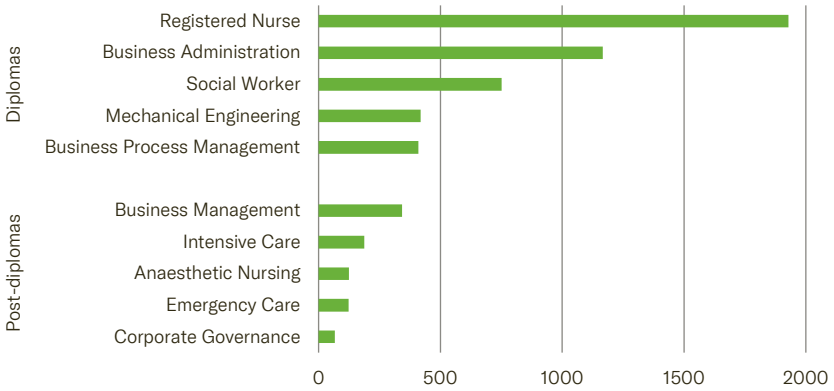
Colleges of higher education

Courses of study at colleges of higher education are based on core syllabus for 55 professions *(Frey et al., 2021)*. These are developed and adopted by professional organisations in collaboration with providers of education and training. They are authorised by the SERI. The core syllabus must be reviewed and approved every 7 years. CollHE also offer post-diploma courses, which are also recognised by the Confederation. Quantitatively, qualifications from CollHE focus on a few courses of study. The five most commonly attended (→ figure 341) make up almost half of all qualifications; for post-diploma courses, this amounts to just over 57%.

341 The five most common qualifications at PEIs, 2019

Diplomas and post-diplomas

Data: FSO



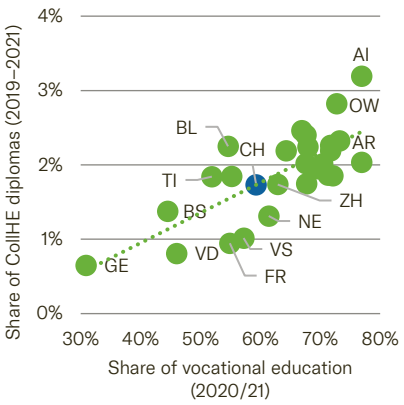
Figures 341, 343 and 344 show 2019 numbers, as in 2020, the number of qualifications was impacted intermittently by the COVID-19 pandemic and was therefore distorted; this was compensated for in 2021.

In geographical terms, most qualifications at CollHE are in German-speaking Switzerland. This is largely due to the greater prevalence of VET programmes in this part of the country. Cantons with the highest proportion of VET programmes also have the highest proportions of qualifications from CollHE per resident aged 25–30 years (→ figure 342). Unlike federal exams *(SCCRE, 2018)*, the presence of a cantonal offering doesn't seem to play a decisive role, as the example of Appenzell shows: Although there are no providers of professional education in either of the two Appenzell cantons (Ausserrhoden and Innerrhoden), the proportion of people with CollHE qualifications in that area is the highest in Switzerland.

342 Cantonal share of CollHE diplomas

Number of diplomas (average 2019–2021) per resident/aged between 25–29 years, versus cantonal share of VET programmes

Data: FSO; calculations: SCCRE



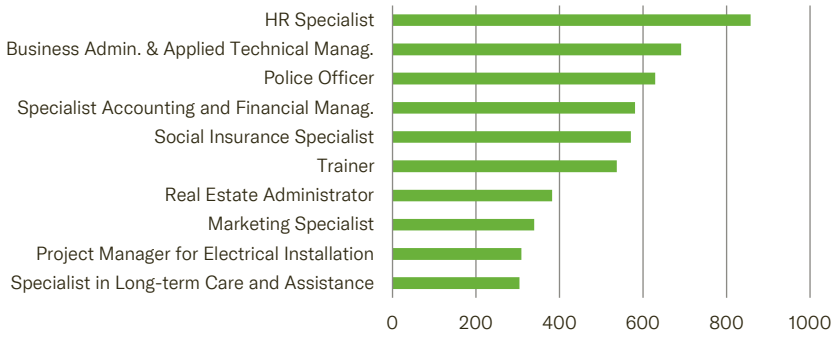
Federal examinations

In contrast to CollHE, whose courses are recognised by the Confederation, federal recognition of the federal examinations extends only to the qualification. The initiative of creating a new Federal examination always comes from a professional organisation. These organisations set the content, i.e. the skills to be assessed in the exam, while the Confederation is responsible for oversight of the exams and approving the exam regulations. The relevant professional associations set the exams annually or biannually. In 2022, the SERI professional directory listed approximately 260 different Federal Diploma of Higher Education and 160 different Advanced Federal Diploma of Higher Education. There are no regulations governing the preparations for these exams; the candidates are free to choose themselves how they prepare. However, the overwhelming majority attend a relevant preparatory course. In the 2018 exam cohort, 94% of candidates studied for a FDHE and 95% of candidates worked towards an aFDHE *(FSO, 2020b)*.

As with colleges of higher education, the number of Federal examination qualifications is heavily concentrated in a few areas (figure 343 and figure 344). Approximately half of all candidates are working towards a Federal Diploma of Higher Education in "Business, Administration and Law". A further 20% are working towards a diploma in "Engineering, Manufacturing and Construction".

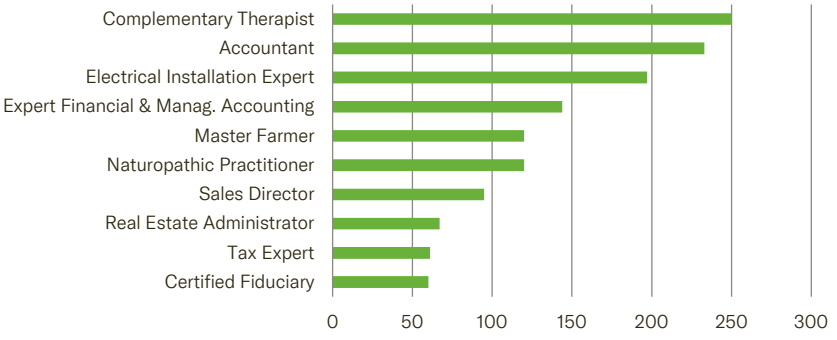
343 Federal Diploma of Higher Education: The top 10 qualifications, 2019

Data: FSO



344 Advanced Federal Diploma of Higher Education: The top 10 qualifications, 2019

Data: FSO



The proportion of qualifications in several established federal examinations has remained relatively constant over the years. Overall, however, much momentum can be seen, particularly with the termination of old exams and the creation of new ones. For example, in 2016, exams in Complementary Therapies were held for the first time, with 619 qualifications in the first year. A year later there were still 130 qualifications; in 2018 there were just 80.

Effectiveness

Exam success

81% of students sitting an exam in professional education in 2018 were successful. At colleges of higher education, which organised and marked the exams themselves, 94% candidates passed. In Federal Diploma of Higher Education examinations, 76% of candidates were successful. In the case of Advanced Federal Diploma of Higher Education examinations, the percentage was 73% *(FSO, 2020b)*. Success rates also vary by subject. For example, success rates for students in teacher education and social sciences, as well as services, were above average. However, these rates only indicate differences in terms of likely exam success; it is unknown whether similar differences exist for the proportions of students registered or unregistered for the exams.

Labour market integration

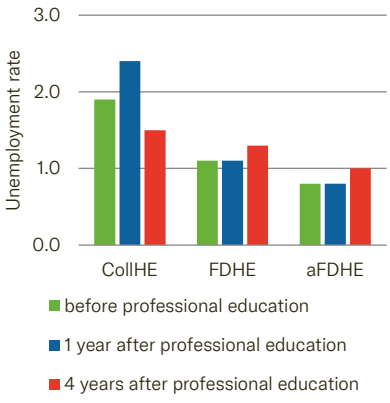
With regards to labour market integration, success rates for professional education graduates are above average. The unemployment rate (as defined by the International Labour Organisation, ILO) one to four years after graduation is approximately 2% (CollHE) and slightly over 1% (FDHE and aFDHE, figure 345). Even during the pandemic-induced economic crisis of 2020, the unemployment rate among newly graduated professional education students was low at 1.4% *(FSO, 2022c)*. In comparison, people aged 25–39 years old have, on average, an unemployment rate of approximately 5%. However, the low unemployment rate immediately after professional education isn't solely on account of that training, since the rate of unemployment for professional education graduates is already disproportionately low even before commencing studies. On the one hand, this arises from the requirement for previous practical experience and, on the other, the fact that many professional education courses are cofinanced by the employer, whereby employability is, to a certain extent, a requirement even before training begins. Furthermore, training agreements are often made between the employer and employee and compensation payments are scheduled in the event that the employee leaves the employer before a certain time period has elapsed.

The employment rate for people with a professional education qualification is high immediately after training but also when taking into account all holders of such a qualification. Approximately 95% of graduates are in employment *(Aepli et al., 2021)*. A similarly high employment rate is seen in those who have completed higher education (university, UAS or UTE) after a VET programme. However, in those who have attended a school with general education programmes prior to tertiary-level education, the employment rate is significantly lower at approximately 90%. Interestingly, this is also the case for those who have completed professional education after attending a school with general education programmes *(Aepli et al., 2021)*.

345 Unemployment rates for the 2016 exam cohort

Before the start of professional education and 1 year and 4 years after graduation

Data: FSO



Professional education versus universities

Which educational path do employees prefer in applications? In order to answer this question, fictitious application files for various different jobs are being assessed by employers in a new study *(Rageth & Sritharan, 2022)*, where the education of the applicant was varied randomly. This shows that for entry level positions, vocational training tends to be preferred over baccalaureate schools (without further training). For more challenging positions (Sales Manager or Head of IT) persons with advanced Federal Professional Examinations tend to be preferred over those with a university degree (Bachelor) or a university of applied sciences degree (Master) and are more likely to be invited for an interview, but only for the position of Sales Manager. The effect – in other words, the higher probability of being invited to an interview – is more pronounced among employers who have good knowledge of tertiary level B (professional education and training).

Professional education courses – in keeping with the aims of this training type – are often linked to a change in the graduate's professional status too. The proportion of employees with management responsibilities increases in students at a CollHE from 14% prior to training to 33% one year after. In those who have passed a FDHE examination, it increases from 29% to 44%, and in those with an aFDHE examination, from 48% to as high as 62%. The latter often takes the step into self-employment too, a step linked to vocational courses with a certificate of master craftsmanship. Before training, approximately 7% are self-employed; one year after training it is already 13% and after four years, approximately 18% *(FSO, 2022h)*.

Effects on wages

Just as the effects of training on employment can only cautiously be interpreted as causal, wage increases cannot always be attributed to it either. The effects on wages are also difficult to confirm because the heterogeneity of the qualifications – in addition to the fact that the number of qualifications is sometimes very small – meaning that general statements are difficult to make. Comparing the wage increase for professional education graduates with that of VET graduates, the difference amounts to approximately 7% after completion of professional education. In the years following, it increases to approximately 10–18% *(Sander & Kriesi, 2019)*.

The descriptive analysis of wage data also indicates that professional education is already reflected in wages immediately after graduation. The median salary one year after the completion of training is approximately 20% higher than before training[4] (→ figure 346). A portion of this wage increase can be explained by a change in profession, as well as an orientation towards roles with a management function, whereby promotion could again be a consequence of training. However, even without a promotion, professional education qualifications often lead to a shift into a higher wage bracket, especially in the public sector and in healthcare and social care *(Ecoplan, 2013)*.

The absolute level of income for the various training types (CollHE, FDHE and aFDHE) cannot be compared directly, as unlike the pre- and post-training comparison, we are not dealing with the same group of people or age ranges. For example, at 28 years old, graduates from CollHE are significantly younger than those with a FDHE (33 years old) and an aFDHE (36 years old) *(FSO, 2020b)*. However, even comparing the same age category for all training types, differences between each group may influence income, for example with regards to sector or region.

4 "Before training" is defined as six months prior to the first course or six months prior to the start of preparations for the final exam.

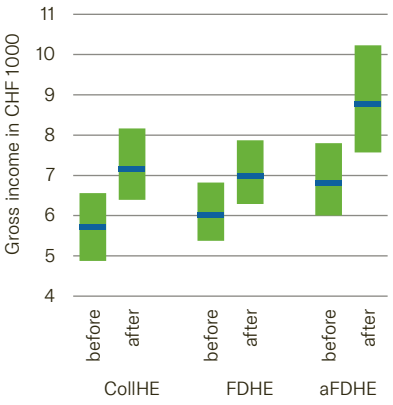
If medium- and long-term wage developments are also taken into account, people with professional education have a considerably higher income than people without tertiary education. However, they earn slightly less than HEI graduates (→ figure 347). Since the length of training is usually shorter than in the latter, the return on education, i.e. the life-time wage advantage gained through one year of training, is just as high for professional education graduates.

On the other hand, whether someone has completed professional education or general education prior to tertiary education has no bearing on their wages. Immediately after completing tertiary-level education, those who had previously completed vocational education report significantly higher income than those with a general education. This can be explained by the lack of labour market experience of people coming from general education. The wage benefits for people with a vocational qualification prior to tertiary education disappear relatively quickly, however, and five years after graduating from a tertiary level course, there is no observable difference *(Oswald-Egg & Renold, 2021)*.

346 Standardised gross income for 30–34 year olds

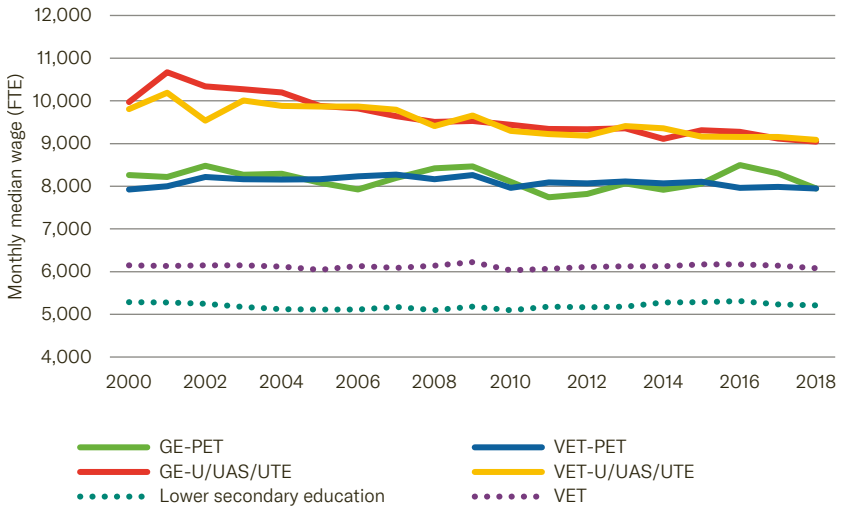
Before and 1 year after training. This data comes from the exam cohort 2018; The green boxes correspond to the 25% and 75% quartiles. The blue line corresponds to the median.

Data: FSO



347 Median wage development after the highest qualification

Data: *Aepli et al. (2021)*



Highest qualification

Lower sec: Lower secondary education (no upper-secondary level qualification)

VET: Vocational education and training

GE-PE: Completion of professional education after general education

VET-PE: Completion of professional education after vocational education

GE-U/UAS/UTE: Degree from a higher education institution after general education

VET-UIT/UAS/UTE: Degree from a higher education institution after vocational education

FTE: Full-time equivalent

When comparing the average income for various types and levels of education, it should be noted that income dispersion also varies. The higher average income of people with university degrees can be explained by the much higher incomes of the top 20% of the income distribution. Excluding the top 20% of both training types, people with professional education would have a similar income on average to university graduates *(Aepli et al., 2021; Sander, 2020)*. Differences are also apparent in relation to the sector and activity performed. The returns on professional education are greater in sectors where such training leads to an increase in the share of analytic, interactive and, interestingly, manual, non-routine activities *(Sander & Kriesi, 2019)*.

However, as shown in a non-representative survey of users of an apprenticeship platform, some potential students appear to be unaware of the wage outlook for professional education qualifications *(Bolli et al., 2020)*. In this survey, there was a tendency to underestimate the income for all training types, however professional education qualifications were underestimated the most. The income for UAS qualifications was underestimated the least.

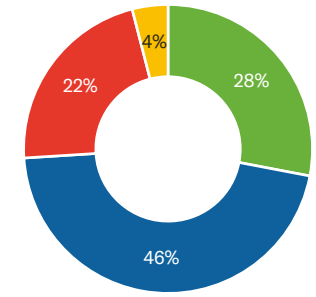
Efficiency/costs

The efficiency of professional education is more difficult to assess than other forms of training. Aside from the lack of data, the highly heterogeneous nature of professional education is also a factor. There are many different qualifications, numerous providers of education and training and, in some fields, only a small number of graduates with similar or comparable training. However, from a public sector perspective, compared to HEIs, professional education is at least cost-efficient. In 2019, the Confederation and cantons spent CHF 503 million on professional education, corresponding to 1.26% of total public training spending. If these public costs are distributed to the number of students, according to the FSO, training spending per person amounts to just over CHF 13,000 per year. This corresponds to approximately one third of the public cost of students in HEIs.

The public costs represent only one part of the total costs, as the students, often supported by their employer or family, cover a considerable proportion of the costs themselves. However, even considering these costs, professional education courses are comparatively cost-efficient. Considering the positive outcomes, such as labour market integration, professional education is thus more efficient than other tertiary qualifications from a societal perspective.

348 Income of education and training providers, 2018

Data: *Frey et al. (2021)*



Funding of colleges of higher education

The Intercantonal Agreement on Funding Contributions for Study Programmes at Professional Education Institutions has been in place since the 2015/16 academic year. It ensures that all interested parties have equal access to education. In the case of students from outside the canton, the canton in which the school is located receives compensation in accordance with the agreement. These contributions make up approximately 22% of the schools' total revenue, while the canton of the school covers almost half of the costs (→ figure 348).

A further 28% is financed through course fees. These course fees vary significantly by course and institution, with the high average cost being the result of several very expensive courses. For example, a course in "Hospitality Management" costs CHF 34,000 over the whole year, while course fees in "Healthcare and Social Care" come to just CHF 4700 *(FSO, 2020b)*. Some of these differences arise from the fact that the public sector contributes 50% of the average cost of a course, but up to 90% in the case of increased public interest. The median semester fee is CHF 2400 *(Frey et al., 2021)*. Approximately half of these course fees are covered by the students

themselves; just under half is financed by the employer *(FSO, 2020b)*. It is notable that total course fees are higher when there is just a small number of providers for a specific profession (→ figure 349).

The competitive environment among providers differs not just by profession but by region, although not to the same extent. The highest number of providers per profession is in Espace Mittelland and Zurich, and the lowest in Tessin (→ figure 350). At the same time, proximity to place of residence is one of the most important criteria when it comes to choosing a provider *(FSO, 2020b)*, which may discourage those in outlying regions, with few or no providers, from pursuing studies. Meanwhile, those who have completed studies are mostly happy with their living situation *(FSO, 2020b)*.

Funding of federal examinations

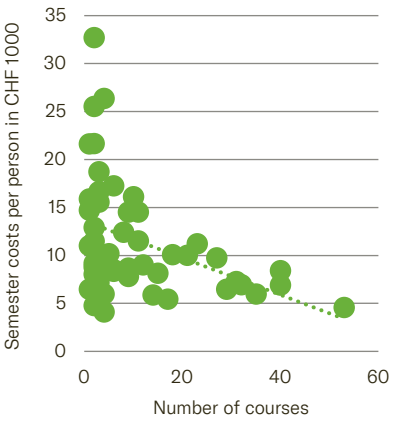
In 2020, Federal Diploma of Higher Education and their preparation courses cost an average of CHF 15,000, while Advanced Federal Diploma of Higher Education were more expensive on average, at CHF 19,700. In 2018, subject-oriented funding for preparation courses was introduced by the Confederation, and students can now apply for federal funding amounting to 50% of attributable tuition fees (max. CHF 9,500 for a FDHE and CHF 10,500 for an aFDHE). Since its introduction, contributions have risen continuously. This is also tied to the removal of cantonal funding, which had been available prior to this point (→ figure 351).

A point of interest in terms of education policy is whether or not subject-oriented funding will ultimately ease the burden on students or whether employer contributions will decrease due to federal funding, subsequently being replaced by subject-oriented funding. A final assessment of this question is not currently possible and requires further observation. Considering the share of funding in this initial phase, we see that both the student's own and the employer's shares have fallen since the introduction of federal contributions (→ figure 352). However, employer contributions have decreased somewhat more sharply than self-funded contributions. At the same time, it is not yet possible to say whether the prospect of federal subsidies encouraged individuals into training, who generally could expect less support from their employer, or whether federal subsidies in fact replaced employer support.

349 Average costs and number of courses

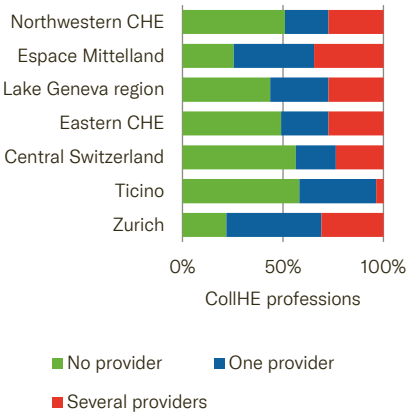
Per profession

Data: *Frey et al. (2021)*



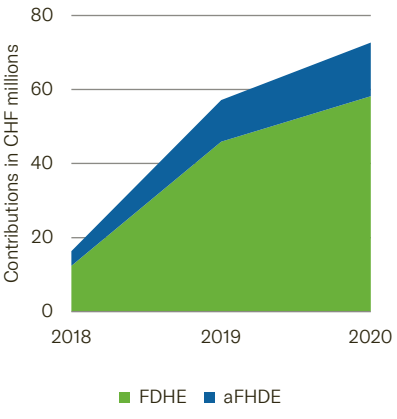
350 Market competition by region

Data: *Frey et al. (2021)*



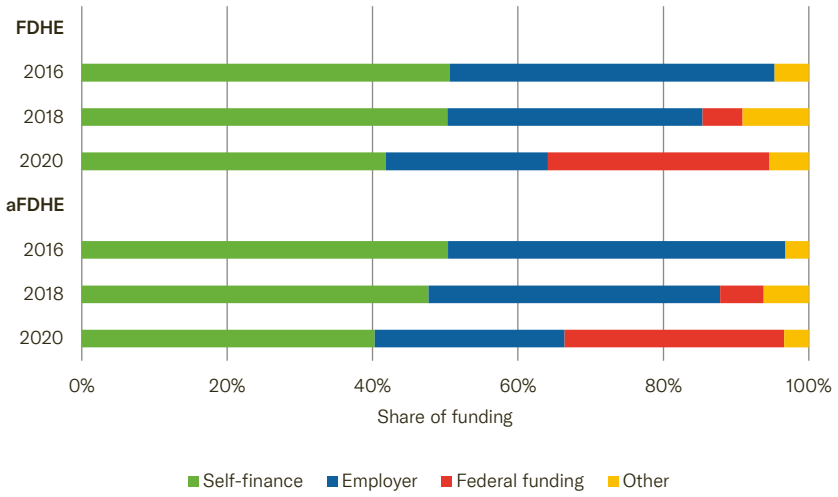
351 Federal funding by exam type and year

Data: *FSO (2021g)*



352 Sources of funding before and after the introduction of federal funding

Data: *FSO (2020b)*



Social background and gender distribution

University admissions are more socially selective than UASs or UTEs due to socio-demographic selection at baccalaureate schools *(→ chapter Tertiary-level education, page 193)*. Professional education qualifications are socially selective in a similar way to UAS admissions, as students are often admitted from VET programmes *(FSO, 2020b; Nägele et al., 2018)*: When taking into consideration the highest level of education for the parents of all students in professional education, a similar picture emerges to students at UASs *(FSO, 2020b)*.

In terms of gender distribution, individual professional education courses reflect the gender distribution in VET programmes. Fewer professional education qualifications are obtained by women because the proportion of women on VET programmes is also lower. However, the proportion of women among those who obtain a professional education qualification after vocational training has virtually doubled in the last twenty years from around 17% to one-third.

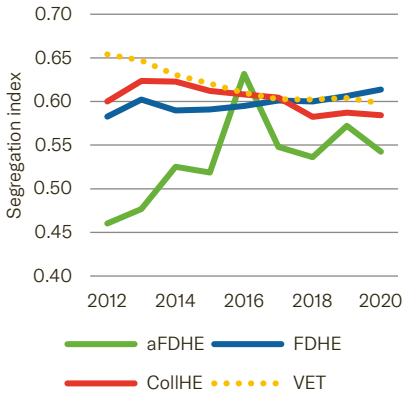
In each individual course of study, gender distribution is often highly concentrated. Thus, on the one hand, approximately 90% of exam candidates in "Information and Communications Technology" and "Engineering, Manufacturing and Construction" are men. On the other, the proportion of women in healthcare and social care is more than three quarters *(FSO, 2020b)*. However, when gender distribution between the various education types is compared using the segregation index *(→ chapter Vocational education and training, page 125)*, professional education is not more segregated than vocational education (→ figure 353). It is therefore

difficult to prove specific preferential treatment or discrimination towards one gender when it comes to accessing professional education. As far as Advanced Federal Diploma of Higher Education are concerned, the distribution of qualifications by gender varies considerably in some cases. This is mostly the case with new qualifications, especially healthcare. These qualifications temporarily lead to a sharp increase in numbers and compensatory moves in the following years.

353 Gender segregation index

By training type and year

Data: FSO (LABB); calculations: SCCRE



COMPULSORY EDUCATION

UPPER-SECONDARY EDUCATION

TERTIARY-LEVEL EDUCATION

CONTINUING EDUCATION AND TRAINING

CONTINUING EDUCATION AND TRAINING

Context

In view of technological and social change as well as the internationalisation of labour markets, continuing education and training (CET) has become of crucial importance for highly developed knowledge societies. Structural shifts and labour market dynamics result in rapidly changing adjustments to qualification requirements, and at the same time cause skills to become obsolete quickly *(Lentini & Gimenez, 2019)*. Moreover, demographic shifts and rapidly ageing societies mean that the average age of the working-age population is constantly rising, which in turn means that new knowledge and skills are less and less likely to reach the labour market and companies quickly via young workers. Finally, technological change is making it increasingly difficult for people with no qualifications above compulsory schooling to prevail in the labour market long term, which in turn increases their need to catch up by completing formal education programmes as adults. This also applies to immigrants with little formal education who enter the country at an age at which formal education has normally been completed. To help such immigrants integrate into the labour market permanently, it is necessary to first address any deficits in their formal compulsory education.

CET pursues a range of goals. First, it serves to maintain work-related knowledge and skills, which constantly become obsolete due to the changes mentioned above. This is possible on the job itself, or through educational programmes in institutional settings. Second, CET makes it possible for individuals to learn new skills with which to advance their career in a field they already know well. Third, people learn new skills also with the aim of creating opportunities for themselves in other fields – for example when structural shifts threaten their accustomed line of work or make another field more lucrative and attractive. Fourth, CET is often also an urgent and necessary measure, driven by individual needs or labour market shifts; for example, as a way of regaining a foothold in working life after having lost a job or following a period of unemployment. Fifth, CET helps to close gaps in basic skills among adults. Sixthly and finally, people tend to continue their development and general education for personal reasons. Non-vocational, general CET, as well as adult education, covers practically all areas of life, from politics to leisure, as well as in fields relating to culture and sport. The function and target group of this type of CET are consequently varied.

The term “continuing education and training (CET)”

The term “continuing education and training” – understood as part of lifelong learning – refers to non-formal educational activities. This refers to organised learning taking place outside the formal education system, i.e. in places other than those that award formal qualifications. Non-formal education includes courses, conferences, seminars, private lessons and on-the-job training *(FSO, 2017b)*. Strictly speaking, preparatory courses for the examinations of the Federal diploma of higher education part of professional education (PE) are not part of formal education. Participation in such courses is voluntary, unlike the examination, which is a compulsory part of the formal qualification. Therefore, training itself is considered non-formal education and falls under CET *(→ chapter Professional*

education, page 315). Similarly, CET at universities and institutes of technology (UNI) falls under non-formal education, even if such programmes have their own certificates, such as the Master of Advanced Studies (MAS). These CET qualifications do not count as formal educational qualifications. Finally, non-formal learning (such as individual study of professional literature), i.e. that takes place outside of a structured setting and is not part of an explicit programme, also falls under CET.

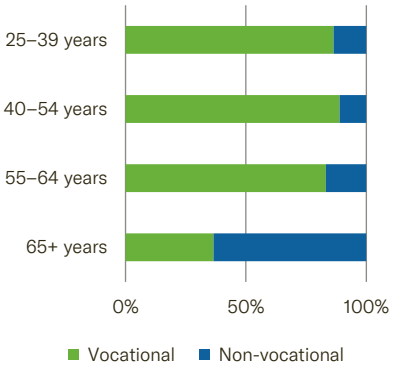
Most non-formal education activities take place for professional reasons (→ figure 354). Among the working-age population, only around 13% of CET activities in 2021 were not related to work. However, non-vocational CET is gaining in importance for those who retire, even if such activities among the older population are low.

This chapter focuses mostly on non-formal education for the employed. This is due, on the one hand, to the importance CET has for the labour market, both from a personal and societal perspective. On the other hand, methods reasons play a key role as well: Reviewing the effectiveness, efficiency and equity in CET as part of education monitoring makes it necessary to categorise CET activities as consistently as possible in accordance with clear educational policy objectives.

354 Vocational vs. non-vocational CET

Reason for attending CET programmes, 2021

FSO (SLFS); calculations: SCCRE



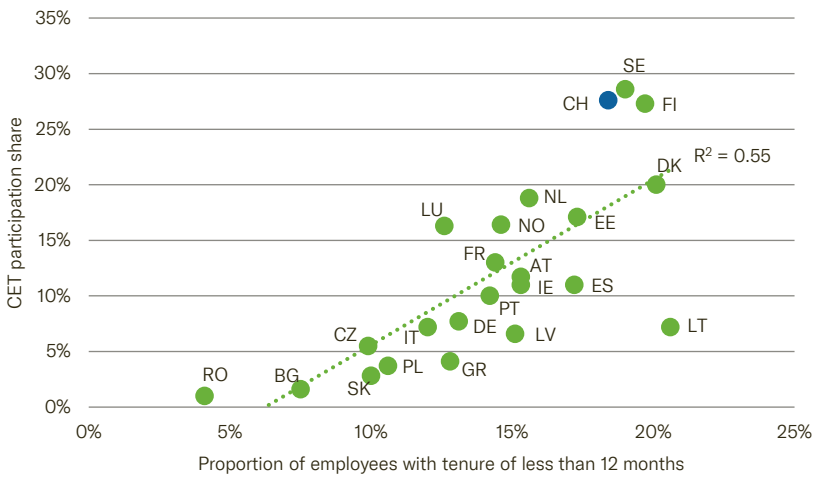
Dynamic labour market

The Swiss labour market is known to be very dynamic. This is not only a consequence of rapid job creation, but also due to relatively high turnover rates within current workforce segments. Accordingly, many workers change their jobs every year. This dynamic could be the reason for the strong demand for CET programmes. Such a correlation can be empirically shown based on international data (→ figure 355). Countries whose labour markets have high employee turnover rates (i.e. those with a high

355 Proportion of new positions taken up and CET participation

Proportion of employees with less than one year of tenure as a percentage of total employees; participation share in CET (last 4 weeks), age 25–64, 2021

Data: Eurostat; calculations: SCCRE



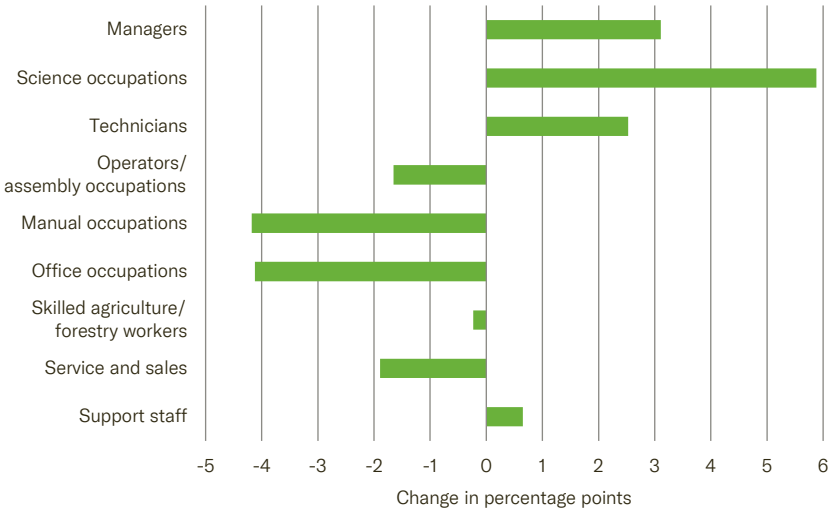
proportion of employees who started a new job less than a year ago) have higher CET shares. The direction of causality, however, remains unclear: Do high turnover rates drive demand for training or are they the consequence of high training intensity? The latter would imply that training is what makes it possible for someone to change his or her job in the first place. Regardless of the causal direction, empirical data suggests the following: The more dynamic a labour market is, the greater the need among all workers to ensure their employability. High turnover rates, however, do not force only the gainfully employed themselves to remain employable through CET. Companies also need to provide incentives in the form of CET opportunities to retain their existing staff. In the absence of such efforts, companies will have to replace the skills and expertise lost through churn by training new employees.

The high proportion of new jobs filled annually in Switzerland compared to other countries is not only due to people changing jobs but also due the effects of structural shifts driven by technological change. This is expressed in the quantity of new jobs created each year as well as in the new skills that are in demand. While automation first eliminated routine manual tasks in industrial production *(Machin, 2001)* and replaced them with tasks requiring higher cognitive skills, digitalisation has been spurring a similar process in the service professions for several years: Routine cognitive activities are being replaced by non-routine ones that usually call for other skills, which can be acquired increasingly only through tertiary education.

356 Change in employment shares over the last 20 years by occupational group

Change in shares of employees by occupational group between 2000 and 2020

Data: FSO (SLFS); calculations: SCCRE



This trend can be seen in Switzerland through quantitative shifts in the occupational categories (ISCO classification). An increasing number of workers are employed in the science professions and as managers. At the same time, fewer and fewer people are needed for jobs that do not require a tertiary education. This applies, for example, to crafts, office work, plant and machinery operation, and assembly (→ figure 356).

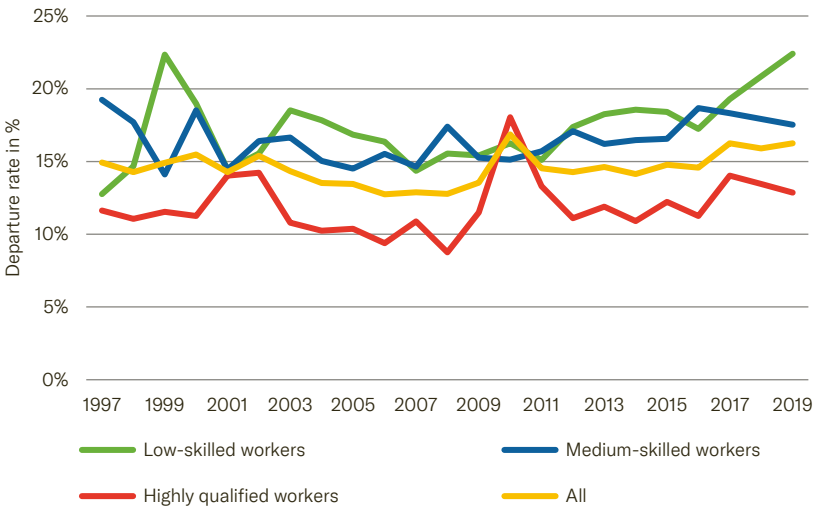
Globalisation and technological change have led to a strong polarisation in the labour market, especially in the English-speaking countries: While the number of jobs with medium qualifications has declined, the number of jobs for weakly qualified and thus poorly paid people has increased. On the other hand, jobs on the other end of the qualification spectrum have been created as well. In Switzerland, the decline in medium qualifications can be observed, but not an increase in the number of jobs with low qualification requirements *(Breemersch et al., 2019; Müller & Salvi, 2021)*.

Unlike other countries, Switzerland has been better able to prevent the gainfully employed with medium qualifications from slipping into jobs with low requirements. This is probably due to the economy's structure, which has successfully prevented major disruptive shocks since the late 1990s *(Müller & Salvi, 2021)*. Continuous technological change – unlike rapid and abrupt change – is better and easier to manage by offering targeted CET programmes and recruiting well-trained workers (→ figure 357). In addition, for a considerable proportion of people with medium qualifications, a proficient level of education also entails the opportunity to qualify for more challenging jobs by completing a specific CET programme – for example also in the area of PET *(→ chapter Professional education, page 315)*.

357 Departure rates in relation to employment

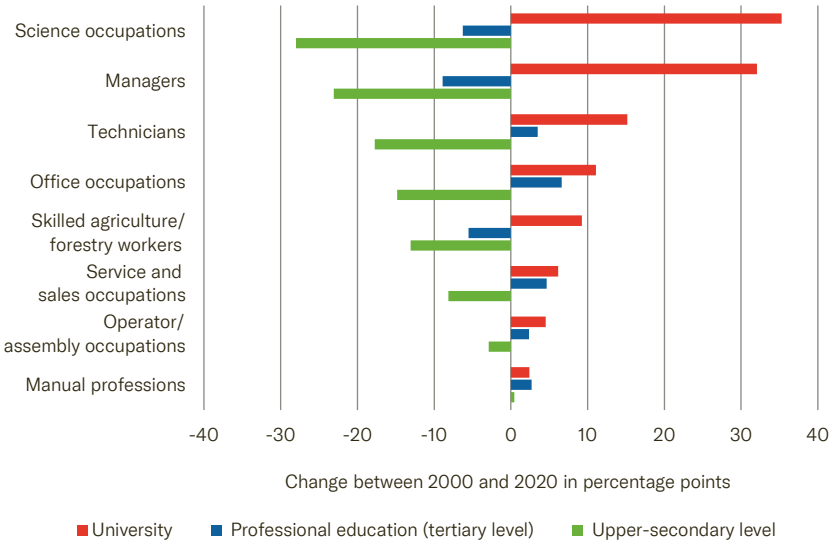
Voluntary and involuntary departures from a job, relative to employment

Data: FSO (SLFS); calculations: *Müller & Salvi (2021)*



358 Change in employee composition by occupation category and education level, 2000 – 2020

Data: FSO (SLFS); calculations: SCCRE

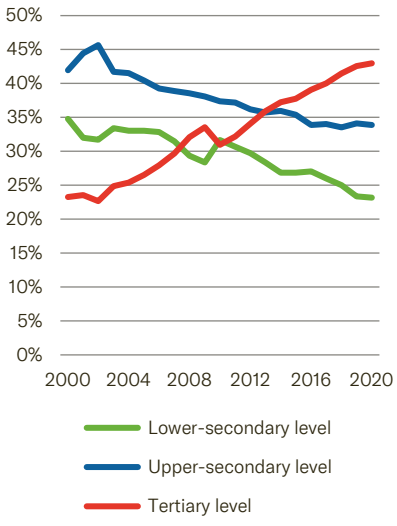


The structural change, which is expressed by a sharp increase in demand for those with tertiary qualifications (→ figure 358), can hardly be absorbed solely by natural turnover or further training. Such shifts in the structure of qualifications are possible only if, above all, people who are still in formal education invest even more heavily in such programmes, i.e. by enrolling in longer and more challenging education and training courses. This is reflected not only in the general and steadily rising rate at which tertiary qualifications are awarded in Switzerland *(→ chapter Tertiary-level education, page 193.)*, but also specifically in the increasing number of people with a university degree, which is particularly evident among the foreign population (→ figure 359).

359 Change in the qualification structure of foreign population

Foreign population, age 25 – 64, 2000 to 2020, by highest education qualification

Data: FSO (SLFS); calculations: SCCRE



Digital skills

Technological progress requires virtually all employees to acquire new skills. This applies in particular to those in communication and information technologies (ICT). According to a 2021 survey on internet use by the Federal Statistical Office (FSO), however, digital skills are distributed very differently based on educational achievements and age. While in the middle age segment (30–59 years) more than 60% of those with tertiary education believe they have advanced digital skills, the figure for people without post-compulsory education is only 14%. There are also significant differences in the use of digital technologies: 70–80% of respondents with tertiary education state that they use word processing and spreadsheet programmes, while among those without post-compulsory education the share is 10–20% (→ figure 360).

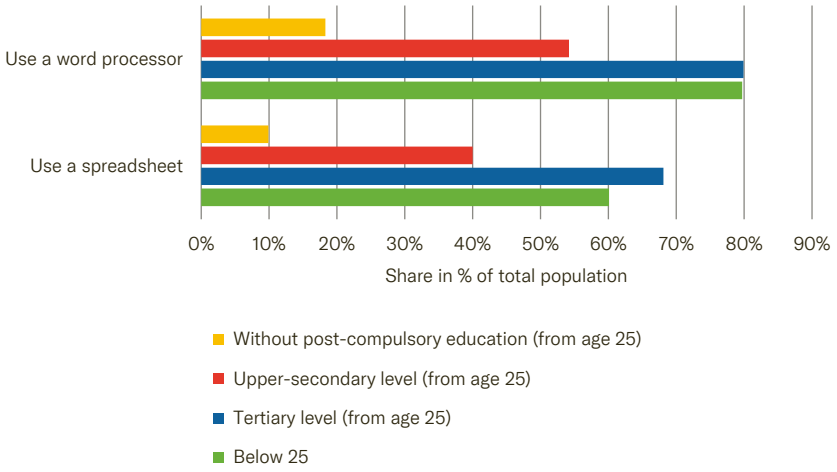
The significance of these findings for CET nevertheless remains unclear, due to a lack of information about whether these skills are actually used

with the same frequency and intensity by everyone regardless of educational background and age. If such skills are used only rarely, they are usually not worth acquiring, as they would quickly become obsolete and forgotten due to their infrequent use. At the same time, it also remains unclear whether the acquisition of such skills would raise the chances for older or less qualified individuals of getting a new job or being assigned new tasks in their current job where such skills are called for.

360 Use of digital technologies by education level, 2021

Educational levels are shown for individuals from age 25; no distinction is made by educational level for those below age 25. Among this generation, the use of digital everyday technologies on average is about as widespread as among people above age 25 who have a tertiary education.

Data: FSO (OMN 2021); calculations: SCCRE



Devaluation and preservation of skills

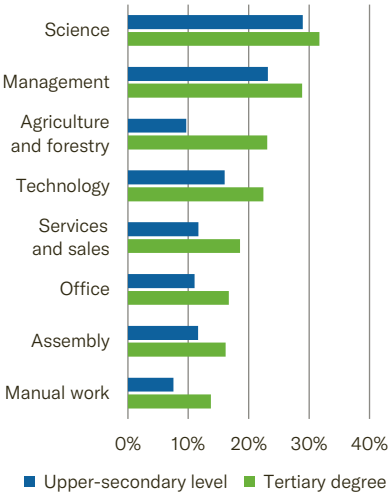
Skills tend to decrease with a person's age. Various analyses with data on adult skills show that such a decline already sets in at middle age, although the rate of decline varies depending on the level of education, labour market status – not to mention the striking differences among age cohorts and countries. The fastest decline in skills occurs among those with low cognitive abilities and among the employed. Employees with higher qualifications show a lower rate of decline *(Barrett & Riddell, 2016; Martin, 2018; OECD, 2016; Paccagnella, 2016)*.

The fact that better qualified workers find it easier to maintain their skills may seem surprising since parts of a broader skill set are more likely to become obsolete. Such workers are thus under more pressure to use CTE as a way of maintaining their skills. On the other hand, they mostly benefit from having better chances of working in a demanding job that offers opportunities to acquire new skills. Findings in Switzerland also indicate that the more demanding an occupational category is in terms of cognitive skills, the more likely it is that the gainfully employed will participate in CET programmes. The following also applies within an occupational group: The better educated people are, the more likely they are to complete a CET programme (→ figure 361).

361 CET by occupational group and educational qualification, 2021

Participation in vocational CET courses, employed population, age 25–64, weighted percentage values

Data: FSO (SLFS); calculations: SCCRE

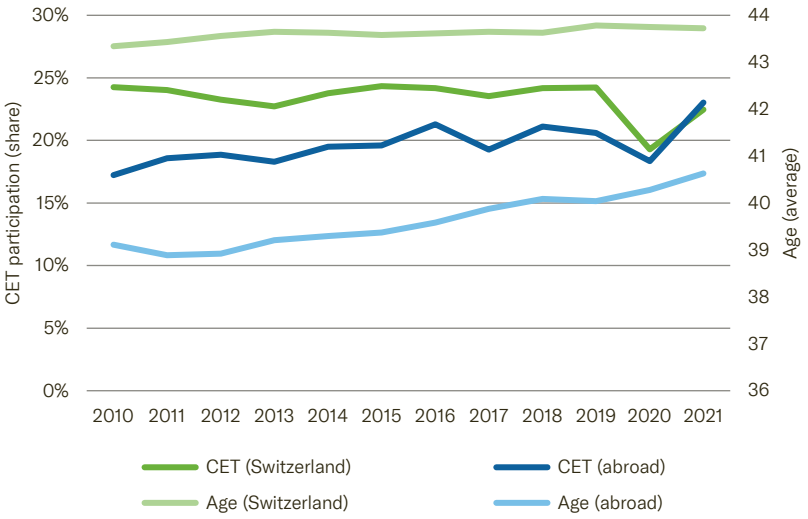


When considering that the average age of the gainfully employed in Switzerland continues to rise due to demographic shifts and that consequently there are more and more people in the labour market who acquired their formal education a long time ago, it is reasonable to expect that average participation in CET will continue its upward trend. However, this is not the case, at least as far as the local population is concerned. On the other hand, an upward trend in CET participation can be observed among working population segments that immigrated to Switzerland from abroad and whose average age is below that of the native Swiss population. Their average age has nevertheless increased more rapidly than that of the Swiss population over the last decade (→ figure 362).

362 CET participation and average age by nationality, 2010 to 2021

Gainfully employed individuals aged 25–64; CET during the last 4 weeks; weighted percentage values; only those with at min. post-compulsory education; the sharp decline in CET participation in 2020 is due to the measures to combat the COVID-19 pandemic *(→ COVID-19 pandemic, page 339)*.

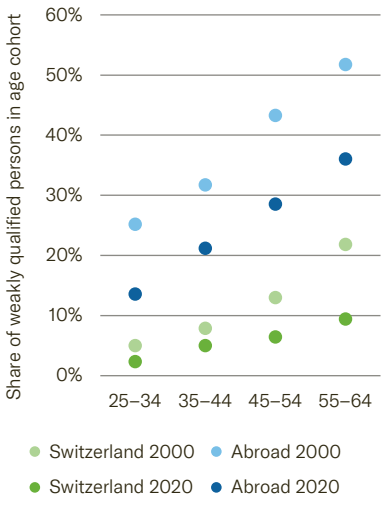
Data: FSO (SLFS); calculations: SCCRE



363 Weakly qualified individuals by nationality, 2000 and 2020

Share of weakly qualified individuals in the total of all weakly qualified workers per age group, taking into account different cohort size

Data: FSO (SLFS); calculations: SCCRE



Individuals with weak qualifications

Among the employable population, those with weaker qualifications and no post-compulsory education constitute a special group that potentially has a strong need for CET. However, the size of this group has been decreasing steadily in recent years. Between 2000 and 2020, the number of Swiss without post-compulsory education practically halved across all age groups, and in 2020 it made up only 2% of those aged 25–34. Among foreign workers with weak qualifications, the decline comes to about one third, albeit starting from a higher level. The youngest cohort shown here still accounts just under 14% without post-compulsory education (→ figure 363).

This trend illustrates the success of the education policy, which aims for a completion rate of 95% at upper-secondary level *(→ chapter Upper-secondary education, page 111)*. Swiss nationals up to the middle age groups

have currently reached this goal – unlike residents with a foreign nationality. The new migration policy *(Cattaneo & Wolter, 2015)*, which makes selection more contingent on qualifications, is also reflected in a general decline in the number of low-skilled individuals. Nevertheless, between 20% and 30% of foreigners aged 35 have not completed their upper-secondary education.

In terms of CET policy, this means that the problem for those with weak qualifications is of decreasing importance – especially as far as the Swiss-born are concerned; however, it will not solve itself, even in the medium term. Ten years from now, the proportion of Swiss with weak skills is expected to drop below 5%. Among those of foreign nationality, practically every fifth person will still be in the weak skills category in ten years from now. Measures to address this problem must begin with the formal education of those migrants who have completed at least part of their schooling here *(→ chapter Upper-secondary education, page 111)*, as well as with specific CET programmes for those who immigrated to Switzerland as adults. This would mean promoting basic skills as well as closing gaps in formal education, and, above all, creating more opportunities to acquire formal educational qualifications (such as PET programmes for adults).

COVID-19 pandemic

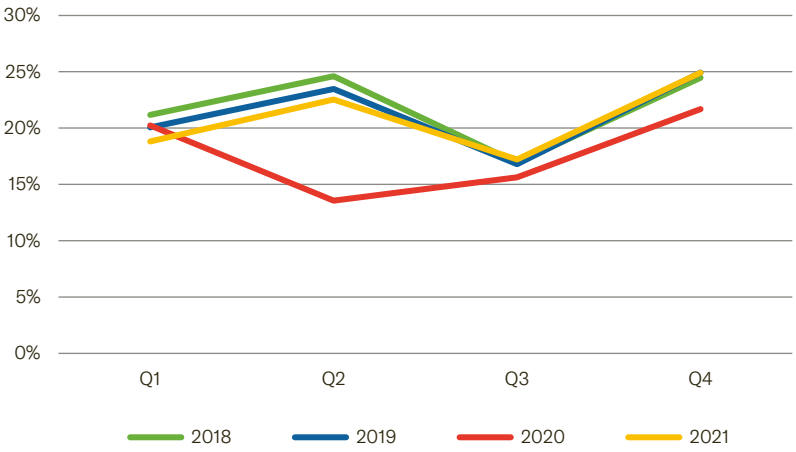
The Federal Council's measures to combat the COVID-19 pandemic in the spring of 2020 caused enrolment in CET programmes to plummet in 2020 *(FSO, 2021c)*. For the providers of CET programmes, the ban on in-person events, in effect from the first lockdown in March until June 2020, led to a sharp decline in the number of events held. The median participation share in CET courses in the second quarter of 2020 fell by over 40% against the previous year. The second half of 2020 saw some recovery due to the general easing of restrictions, but the recovery did not compensate the loss. This probably also relates to the fact that the pandemic caused some institutions to close again from November 2020 until April 2021, whereby providers of CET programmes were again forced to discontinue in-person events.

Overall, the participation share in CET in 2020 thus remained far below the level of previous years, and significant losses were also recorded in 2021 due to restrictions in the first quarter (→ figure 364).

364 CET during the COVID-19 pandemic

Participation in CET by quarter, 2018–2021, employed population, age 25–64; participation during the last 4 weeks

Data: FSO (SLFS); calculations: SCCRE



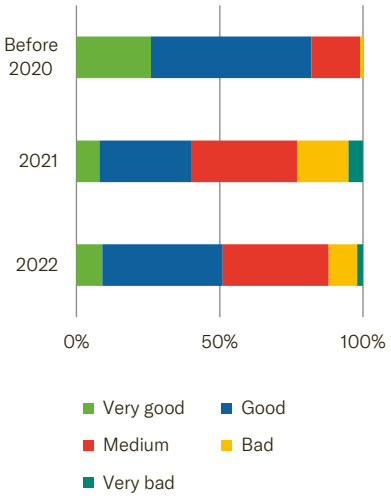
The new Eurostat regulations of 2021 also led to changes in SLFS analyses. The year 2021 can thus be compared with previous years only to a limited extent. From 2018 to 2020, CET included only courses; as of 2021, it also includes seminars, conventions and private lessons.

A survey by the Swiss Association of Further Education (SVEB) of such providers found an average decline in the volume of offers of around 38% for 2020. About a third of the providers were able to run less than half of their programmes. In the wake of the ban on in-person instruction, the vast majority of institutions adjusted their offers to the new situation by means of digital technologies *(Gollob et al., 2022)*, but this was not enough to compensate for the decline in demand. In spring 2021, the providers' economic situation on average was seen as significantly worse than before the pandemic (→ figure 365), a view derived mainly from the smaller providers. Because of the decline in the volume of programmes and courses on offer, many providers had cancelled contracts with freelancers, thus avoiding for the most part having to lay off permanent employees *(Gollob et al., 2022)*. In addition, developing and designing CET programmes, especially for online events, has become much more demanding for planners *(Haberzeth & Dernbach-Stolz, 2022)*.

365 Evaluation of the economic situation, 2021

Evaluation of the economic situation by the providers, before March 2020, at the time of the survey in April 2021 and as an outlook to 2022

Source: (SVEB 2021)



Institutions

The Continuing Education and Training Act (CETA) has been instrumental in defining the principles of CET and determining the general requirements for financial assistance from the federal government since 2017. The federal government supports all areas of CET activities through a series of special laws *(→ Financing, page 347)*. The CETA ensures that subsidies are available for certain CET services by organisations and for cantonal programmes so that learners can acquire and maintain basic skills in reading, writing, local language, everyday mathematics and the use of information and communication technologies.

CET market

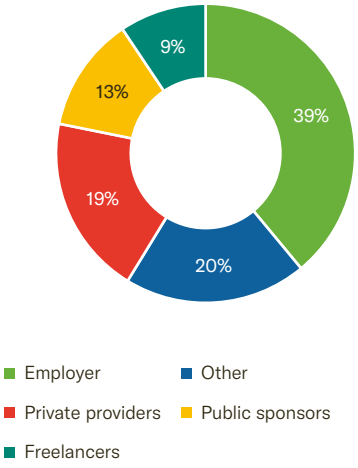
The Swiss CET market is strongly characterised by private sponsors, which include civil-law, for-profit and not-for-profit institutions. Besides private providers, companies are the most frequent sponsors of CET programmes. For them, CET, which is usually managed internally for the benefit of the workforce, is not the main goal of their economic activities. Accordingly, their programmes are not publicly accessible. Besides private sponsors, the federal government and the cantons also sponsor institutions that offer CET programmes. These include vocational schools, PET colleges, universities of applied sciences, universities of teacher education, as well as universities and institutes of technology *(Schläfli & Sgier, 2014)*.

Overall, the private sponsors of for-profit and not-for-profit CET institutions tend to dominate, whereby employers make up at least a quarter of the offers. The remaining CET offers (almost 50%) are sponsored by private CET institutions. This also includes non-profit, charitable providers such as associations, trade associations, social partners and religious institutions (→ figure 366).

In the case of public sponsors, universities and institutes of technology are of primary importance, and their mandate also includes CET, besides training and research. In 2021, CET courses at universities and institutes of technology, universities of applied sciences, and universities of teacher education had roughly 14,000 participants in total. At universities of applied sciences, CET course participants made up roughly 11% of all BA students in 2021 (→ figure 367). In terms of programme intensity, however, CET participants at universities and institutions of technology play a much smaller role. The number of CET courses completed at universities of applied sciences and universities of teacher education in 2021 declined because of restrictions relating to the pandemic.

366 Sponsorship of CET providers, 2021

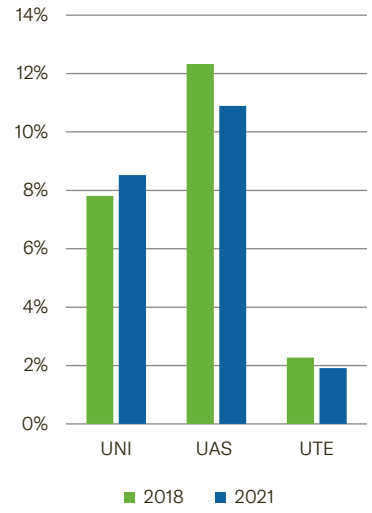
Data: FSO (MET, 2021)



367 CET at universities and institutes of technology

Proportion of CET participants in relation to all BA students, 2018 and 2021

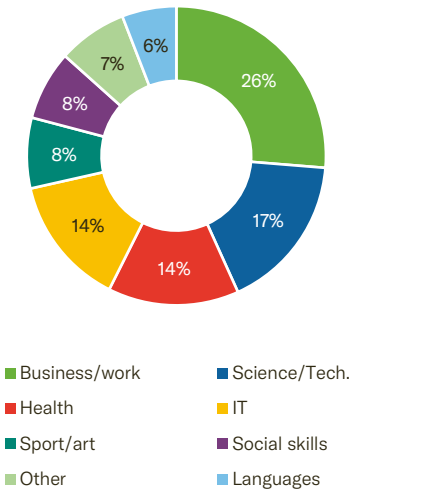
Data: FSO (SHIS); calculations: SCCRE



368 CET topics

Activities attended by the permanent resident population age 25–64

Data: FSO (MET 2021)



In CET courses, content relating to labour market topics tends to dominate, whereby the fields of business, employment, science and technology, as well as IT make up over half of the courses (→ figure 368).

Effectiveness

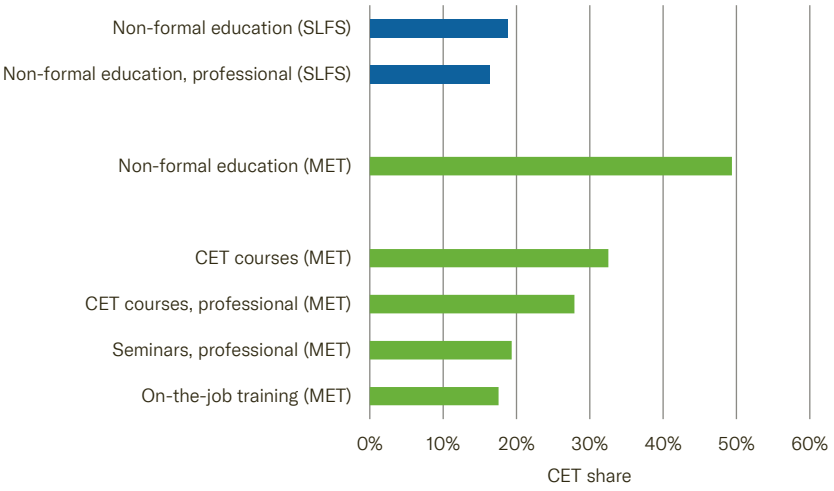
Any statement about CET effectiveness would have to address the extent to which an offer reached its goal. This would require not only a previously defined set of goals, but suitable measures for gauging the output, i.e. the degree to which the goal was reached (e.g. that certain skills were in fact acquired). Both requirements are hard to meet in CET, especially in view of the diversity of the activities, whose goals vary as much as the participants themselves. In addition, CET activities cover a range of content, scope and intensity. Unlike formal education, non-formal education has hardly any explicit educational policy guidelines with learning objectives that could serve such a purpose. Policy goals are therefore formulated mostly in very general terms, usually by focusing on ways of promoting CET (such as in the Federal Council's legislative plan) with a view to better utilising the potential in the domestic labour force or offsetting the negative effects of structural changes *(Federal Council, 2020)*.

The lack of uniform curricular specifications also makes it mostly impossible to determine the extent to which the objectives were reached. In some cases, participant surveys are used, which often involves a personal assessment of the success of the course or how well certain skills were taught. Such surveys also analyse outcomes, such as how well certain content can be applied in everyday working life vis-à-vis prior expectations on the course. However, such information is available only for individual CET activities and is not standardised at the place of origin. In other words, it does not provide a comprehensive view of the outputs and outcomes of CET activities in Switzerland. Accordingly, there are efforts underway to measure the effectiveness – especially in vocational CET – by means of objective data on labour market integration and success. The focus here is on questions concerning a person's employment status after completing a CET programme, how much he or she earns, and about issues concerning his or her career at this point. From a broader perspective, however, it is impossible to make conclusive statements about CET effectiveness because even standard before-and-after comparisons fail to capture the causal effects of CET because of the way participants are selected.

Statistical observations usually operationalise the output of the CET system in the form of quotas, whereby a ratio is established between participants in non-formal activities and the total population over a defined reference period (→ figure 369). However, such a ratio is not very meaningful because it does not include the type of educational activity (courses, seminars, conferences or others) or the duration. These uncertainties are particularly problematic when course participation shares are compared across different populations or countries.

369 Participation in CET, 2021

Data: FSO (MET, 2021; SLFS 2021); calculations: SCCRE



Different concepts and surveys for recording participation in continuing education. Reference period SLFS (blue bars): last 4 weeks; MET (green bars),last 12 months.

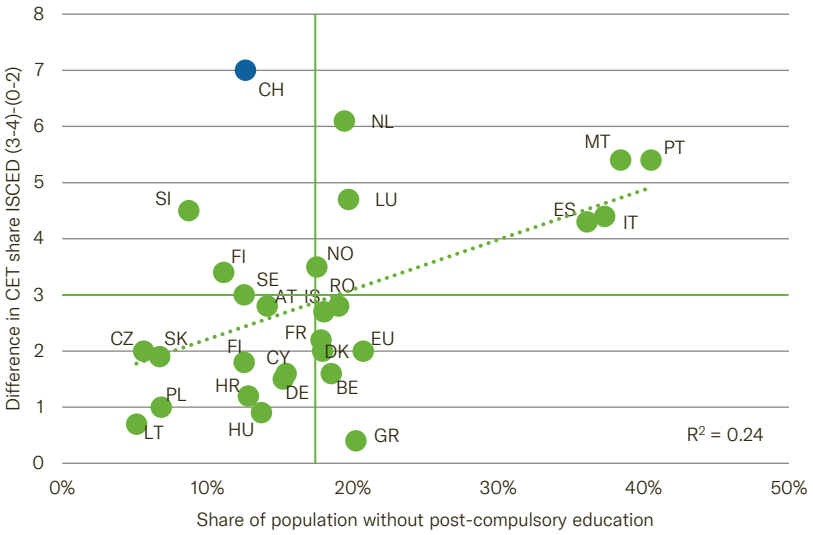
From a societal perspective, there is strong consensus on education policy, as well as an interest in having people without post-compulsory education improve their labour market skills through CET. Policy makers are thus willing to increase public funding for educational measures for these groups. This consensus, which is shared internationally, is an expression of the federal government's aim, as laid out in the CETA, as well as in cantonal legislative efforts and programmes. The effectiveness of these efforts is often gauged by the success in encouraging individuals with weak qualifications to participate in CET programmes. An international comparison of CET shares of persons with weak qualifications identifies two things (→ figure 370): Firstly, the larger the proportion of the population without post-compulsory education, the larger the gap between the CET share of those without post-compulsory education and those with an upper-secondary education[1]. This may be related to the fact that labour market integration is weak (low participation share) in countries whose proportion of people without post-compulsory education is high, as well as because the economy is geared more closely to those with weak qualifications. This has a negative effect on the willingness of investors to fund CET programmes, both in the case of employers and (prospective) employees. Secondly, it can be seen statistically that Switzerland is an outlier compared to EU countries, in the sense that the gap in CET shares is particularly large given the relatively small proportion of people without post-compulsory education. Even if this is more the result of an above-average CET share for those with an upper-secondary education than of a below-average share for those without a post-compulsory education, it still shows that the latter group benefits less from the overall strong CET activities in Switzerland compared to those with a higher education.

1 Excluding Switzerland, the coefficient of determination (R^2) increases to 0.37

370 Proportion of weakly qualified individuals and their participation in CET, 2021

The CET participation share of people with weak qualifications is represented as the difference between the participation share of those with an ISCED level 0–2 qualification (without post-compulsory education) and those with an ISCED level 3–4 qualification (post-compulsory education) in percentage points; the two axes (red) represent the mean value.

Data: Eurostat; calculations: SCCRE



Legend
The disparity between people with weak qualifications and those with post-compulsory education in Poland is 1 percentage point, with a weak-qualification share of 7% of the population. The participation share of people with weak qualifications is thus 1 percentage point lower than that of people with post-compulsory education. In Portugal, where 40% of the population has weak qualifications, the difference in participation shares is over 5 percentage points.

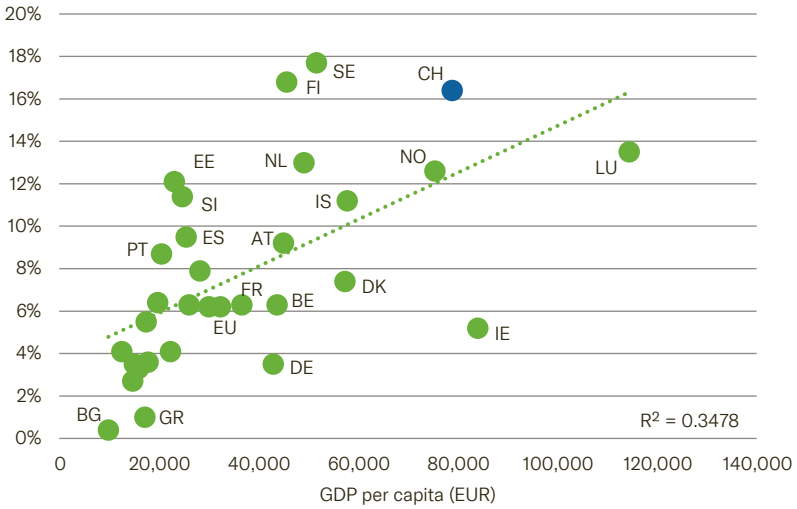
Switzerland's overall high CTE share can also be explained by the country's strong economic performance (→ figure 371). However, it must be noted that a strong correlation between a country's economic performance and the population's CET patterns says nothing about causality. On the one hand, strong CET participation may be an effect of an economy that generates considerable added value and thus would have a stronger need for CET for reasons relating to labour market integration. On the other hand, strong CET participation can be a cause of strong economic performance, because having cutting-edge skills serves as a driver for the intense rate at which such an economy adds value.

CTE patterns of the population can be depicted more precisely by also taking the number of hours of CTE into account, besides the participation share. In occupational fields where the gainfully employed participate in CET more frequently, CET programmes, on average, are shorter (→ figure 372).

371 GDP per capita and participation in CET, 2021

GDP per capita in euro; CTE participation share (reference period: last 4 weeks)

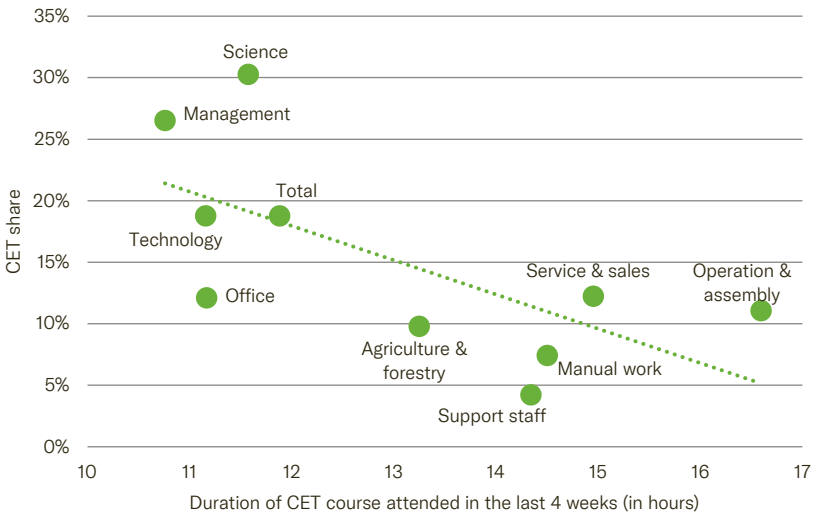
Source: Eurostat; calculations: SCCRE



372 Participation and duration of vocational CET by occupational group, 2021

Participation shares and total CET programmes attended during the last 4 weeks (in number of hours), employees age 25–64

Data: FSO (SAKE); calculations: SCCRE



Effect of CET on labour markets

Methods for addressing the endogenicity of CET participation in research on the effects of CET

A range of methods exist for addressing non-random participation in CET: Fixed-effects panel data makes it possible to include unobserved variables in the analyses *(e.g. Ehlert, 2017)*. Another possibility is matching techniques or balancing regression analyses that use covariates to create a balanced control group (Goux & Maurin, 2000; Muehler et al., 2007; Novella et al., 2018; Ruhose et al., 2019). Finally, there are quasi-experiments with trial comparison groups *(Görlitz, 2011; Leuven & Oosterbeek, 2008)* or explicit field experiments with a random allocation of test subjects, for example by means of vouchers *(Görlitz & Tamm, 2016; Schwerdt et al., 2012)*.

The empirical evidence for the effect of CET on wages and employment has so far been based solely on studies conducted abroad, solely with a focus on causality. However, without considering the fact that, as a rule, more motivated and capable people choose CET programmes or are selected for such by their employers, the effects of CET are systematically overestimated.

Some studies that use various approaches and rely on empirical evidence for the causal effects of non-formal education indicate wage effects between 3% and 12% in comparison to non-participants in CET *(Muehler et al., 2007; Novella et al., 2018; Ruhose et al., 2019)*. The observed effects vary widely, depending on gender, age, education type, and industry *(Blanden et al., 2012; Ehlert, 2017)*. However, there are also experimental studies that identify no causal effects *(Görlitz, 2011; Görlitz & Tamm, 2016; Goux & Maurin, 2000; Leuven & Oosterbeek, 2008)* but still take into account the selectivity of companies' training practices and the mobility of workers.

Schultheiss and Backes-Gellner (2021) use data from Switzerland to establish the effects of CET on labour markets. Depending on the field of employment and the type of applied skills, these effects apply to wages and employment. For Switzerland, initial analyses with a research method already used in a study with German data *(Ruhose et al., 2019)* indicate that there are causal effects between CET courses on wages and the likelihood that a jobholder will remain employed (→ figure 373).

373 Labour market effects of CET

Data: FSO (MET), ZAS (AHV), SECO (ALV); calculations: Denzler et al. (2022).

Legend

Compared to the control group, those who attended a vocational CET course in 2015 earned significantly higher wages in subsequent years (plus 5% at average); their unemployment risk fell by an average of 2.5%.

Efficiency/costs

The difficulties in assessing CET effectiveness also make it impossible to gauge CET efficiency. Therefore, the following section covers only the cost picture. Considering only costs by themselves does not allow for conclusions about the benefits or CET efficiency. Consequently, high costs are not an indication of strong benefits and low costs are not a sign of high efficiency.

CET costs

Participants in CET courses incur both direct (participation fees, course fees, documents, expenses, etc.) and indirect costs. The latter includes mainly opportunity costs in the form of forgone income and free time. Forgone income is often the highest cost item, especially for those whose employers do not support CET, and thus constitutes the main disincentive to attending a CET event.

However, participants generally pay only a small part of the costs of vocational CET. Only about 22% of the gainfully employed pay for the costs of their continuing education courses themselves, either in full or in part, with employers making the largest contribution (→ figure 374).

The FSO's Microcensus Education and Continuing Education 2021 survey found that working individuals who cover the costs of vocational CET courses themselves pay on average at least CHF 1,800 per course and year. However, the amounts vary strongly: Half of all courses cost less than CHF 654 (mean). For the top decile, the amounts range from CHF 2,000 to CHF 16,000.

Financing

Cantons usually fund CET either on the basis of their CET or VET laws. There are no nationwide statistics on such commitments on funding, and it is thus not possible to provide an overview. The Federal Continuing Education and Training Act aims to better coordinate measures between the federal government and the cantons. In addition, the federal government can contribute to cantons by funding measures and programmes so that adults can acquire and maintain basic skills. These contributions are the federal government's only direct subsidies for CET, which is made available based on the provisions of the CETA.

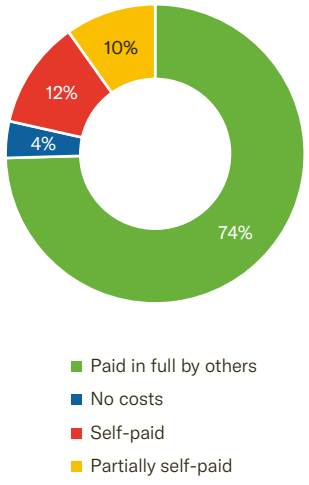
In 2018, CHF 3.9 million were paid on the basis of the CETA (→ figure 375), which is less than 1% of the CHF 474 million that the federal government and social insurers spent on CET. Roughly 20% of the funds are distributed on the basis of the Vocational and Professional Education and Training Act (VPETA), whereby most of the amount subsidises preparatory courses for PET examinations *(→ chapter Professional education, page 315)*.

More than half of the federal government's funds for CET are used for measures under unemployment insurance to help job-seekers find work and for measures under disability insurance to assist others with retraining and integration. Distribution of the remaining approx. 20% is based on various federal laws that regulate CET in specific areas.

374 Cost breakdown of CET, 2021

Financing of vocational CET courses; employees age 25–64

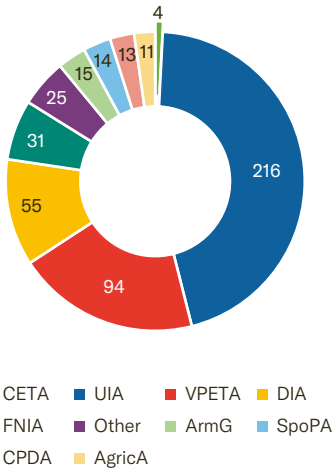
Data: FSO (MET 2021)



375 ET expenditures by the federal government and social insurers, 2018

In CHF million, rounded

Source: SERI; calculations: SCCRE



AgricA	Agriculture Act
ArmA	Armed Forces Act
CETA	Continuing Education and Training Act
CPDA	Civil Protection and Civil Defence Act
DIA	Disability Insurance Act
FNIA	Foreign Nationals and Integration Act
SpoPA	Sports Promotion Act
UIG	Unemployment Insurance Act
VPTEA	Vocational and Professional Education and Training Act

The federal government and the cantons cooperate to promote basic skills by subsidising up to 50% of the total costs of cantonal programmes for helping learners acquire basic skills in mathematics, reading, writing, local language, and information technologies (ICT). These funds cover the cost of courses as well as accompanying measures (coordination, administration, awareness building, counselling, etc.).

The federal government also subsidises short courses to promote basic skills through companies and trade associations as part of the "Simply better!.. at the workplace" promotional programme. The funding priority was launched under the policy on skilled labour, for which the Vocational Training Act and the Continuing Education Act provides the legal basis *(econcept, 2020)*. The focus is on older employees with weak, basic skills. In the courses, employees can acquire basic skills relevant to the workplace and learn how to better deal with workplace challenges. In general, the aim is for workers to maintain their ability to prevail in the labour market *(econcept, 2020)*.

Finally, CET organisations receive financial assistance under the Continuing Education and Training Act [2]. For example, in the 2017–2020 funding period, service agreements worth approx. CHF 10 million were signed with CET organisations, whereby approximately half of the amount went to the Swiss Association for Continuing Education (SVEB), the umbrella organisation.

Subsidies for assisting workers with weak skills

The public sector finances a range of CTE programmes to help learners acquire basic skills. Most cantons have launched such programmes in recent years. Based on the Continuing Education Act, the federal government supports such cantonal offers by covering up to 50% of the costs, whereby amounts are earmarked for each canton in relation to its population size. These funds cover the cost of courses as well as of accompanying measures, coordination, administration, awareness building, counselling, etc. For the 2017–2020 funding period, CHF 13.5 million were paid to cantons under CETA provisions, while the figure in 2020 was just under CHF 5 million.

2 Art. 12 Continuing Education and Training Act (CETA): Grants to CET organisations; 1. The State Secretariat for Education, Research and Innovation (SERI) can grant financial assistance to CET organisations and enter into service agreements with them for information and coordination tasks, quality assurance and development, and for developing CET within the scope of the authorised credits.

CET over the course of employment

All CET surveys indicate that participation shares decrease as the age of participants rises (→ figure 376). When distinguishing by educational level, only a slight increase among those with tertiary education becomes apparent on entry in the labour market, otherwise the CET activities of employees aged 25 and above decline. The reasons for more CET activities among those with a tertiary degree are mainly because university graduates, unlike those with vocational qualification, start to acquire job-specific skills only after they enter the labour market.

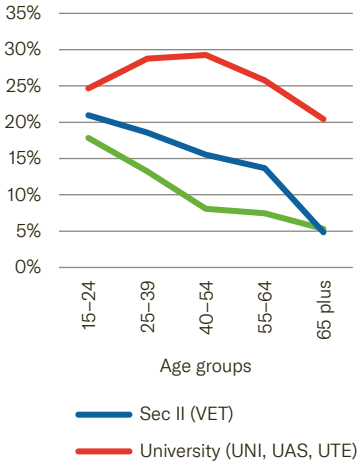
Wage-trend analyses also show that labour productivity in Switzerland tends to decline from the age of 45 and that further investments in human capital would be needed to offset the decline. However, this is not reflected in average CET patterns, which decrease continuously with rising age.

This finding can be explained by the fact that employees' CET costs tend to rise with age. Opportunity costs, especially, will increase, e.g. in the form of wages forgone while attending the course. Furthermore, the return from CET for employees and employers will also decline because the period during which the costs of such programmes can be recouped shortens with increasing age. The phenomenon of CET participation declining with age thus does not necessarily indicate a form of discrimination against older workers but is more likely to be related to profitability considerations *(→ Devaluation and preservation of skills, page 337)*.

376 CET in the course of employment, 2020

CET, last 4 weeks, only gainfully employed persons age 25–64

Data: FSO (SAKE); calculations: SCCRE



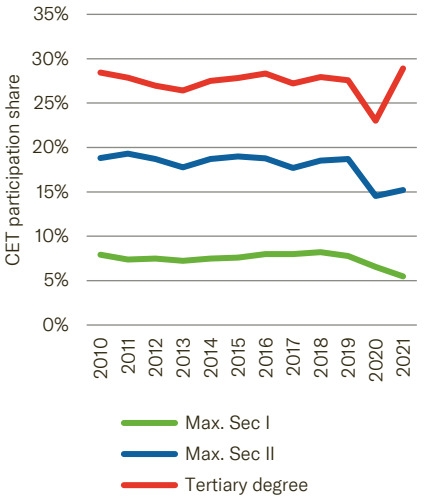
Equity

Persistent differences in CET shares based on the highest level of formal education indicate a potential equity problem (→ figure 377). However, whether this in fact constitutes an equity problem, i.e. whether those with lower formal education are less effective in exploiting their potential for acquiring further skills, cannot be answered conclusively. The reasons for the differences in participation shares are also hard to determine. It is unclear, for example, how much the difference in CET participation is due to those with a weak educational background facing higher access barriers to CET than those with a strong educational background. Furthermore, whether different educational preferences give rise to these differences has also not yet been determined. The fact that skills acquired during formal education lose their value over time suggests that those with higher levels of education will need to invest more in CET to maintain their current skills as required by the job than people with a lower formal education level, a fact that must also be considered.

377 Participation in CET after graduation

Gainfully employed individuals aged 25–64; vocational CET during the last 4 weeks

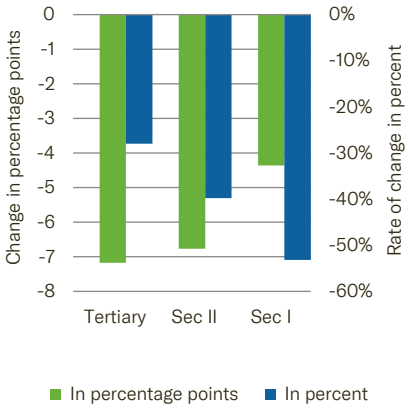
Data: FSO (SAKE); calculations: SCCRE



378 Collapse of the CET share in Q2 of 2020 by education level

Change in participation share between Q1 and Q2, 2020, in percentage points (left scale) and in percent (right scale); gainfully employed population, age 25–64

Data: FSO (SLFS), anforderungsprofile.ch; calculations: SCCRE



Regardless of these questions, two observations can be made. First, CET does not compensate for differences between formal education. In fact, the opposite applies: There are indications that such differences will remain the same or even increase. Second, the government's CET strategies with focus on groups with low levels of formal education do not seem to have succeeded in narrowing these differences over time.

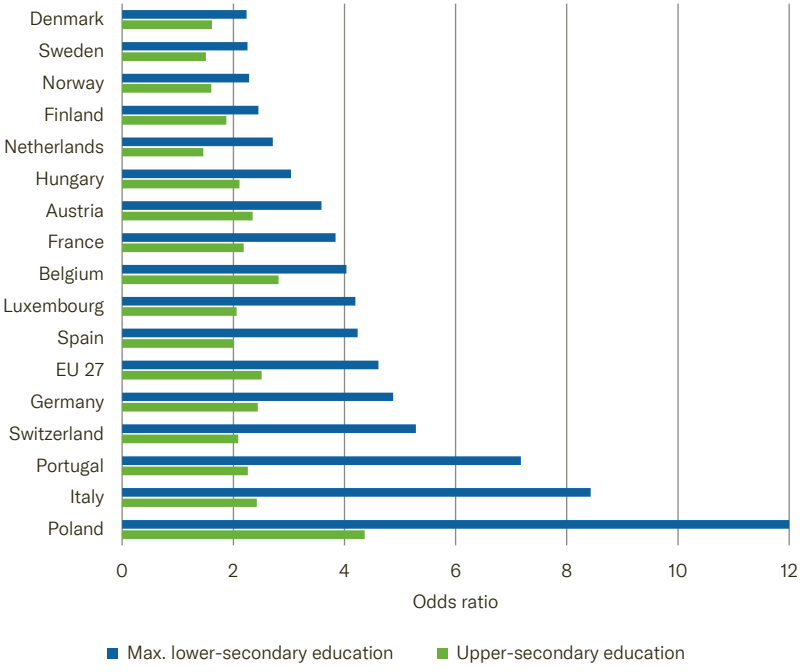
The ban on in-person instruction due COVID-19 restrictions led to a larger absolute decline (in percentage points) in the CET participation share among those with tertiary education than among those with weaker qualifications. For the latter group, though, the relative decline was even more pronounced (→ figure 378).

In terms of educational disparity among groups with various levels of formal education, Switzerland is only average compared to other countries (→ figure 379). In Switzerland, those with tertiary education have an advantage over those with weaker qualifications in terms of access to CET: The probability of such a person completing a CET programme is 5.3 times higher. In recent years, Switzerland has not improved the relative opportunities for those with weak qualifications to participate in CET measures. While some countries (such as Germany or Spain) have narrowed this gap in recent years, the gap in Switzerland has remained constantly high.

379 International comparison of educational disparity, 2021

Advantage in CET participation of individuals with tertiary education compared to persons with no post-compulsory education (blue bars) and those with upper-secondary education (green bars)

Data: Eurostat; calculations: SCCRE

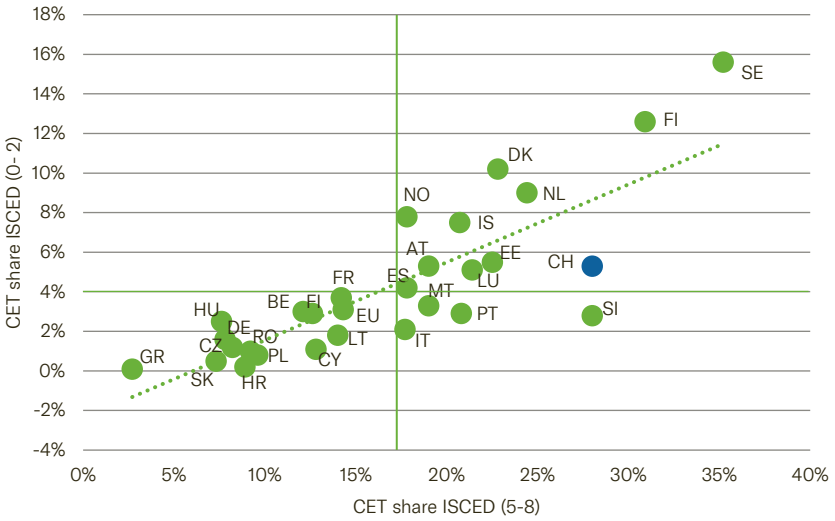


A comparison of absolute shares of various education groups indicates that Switzerland's shares of individuals with weak qualifications are in mid-range in a European comparison. In terms of Switzerland's average CET participation share, participation by the weakly qualified is below average, while that of the highly qualified is above average, which explains the large disparity. By contrast, Germany has a smaller disparity among the educational groups, yet their members participate in CET significantly less often overall (→ figure 380).

380 International comparison of participation shares, 2021

The figure shows the participation shares of the weakly qualified (Y-axis) and of those with tertiary education (X-axis); individuals aged 25–64; the green axes are the respective averages.

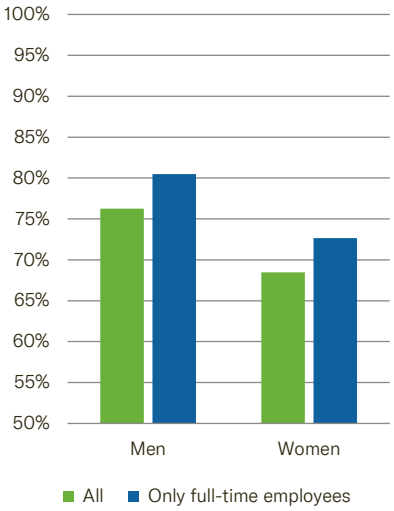
Data: Eurostat; calculations: SCCRE



381 Employer support by gender, 2021

Participation in at least one CET activity, fully paid by the employer; resident population, 25–64- years old

Data: Eurostat; calculations: SCCRE



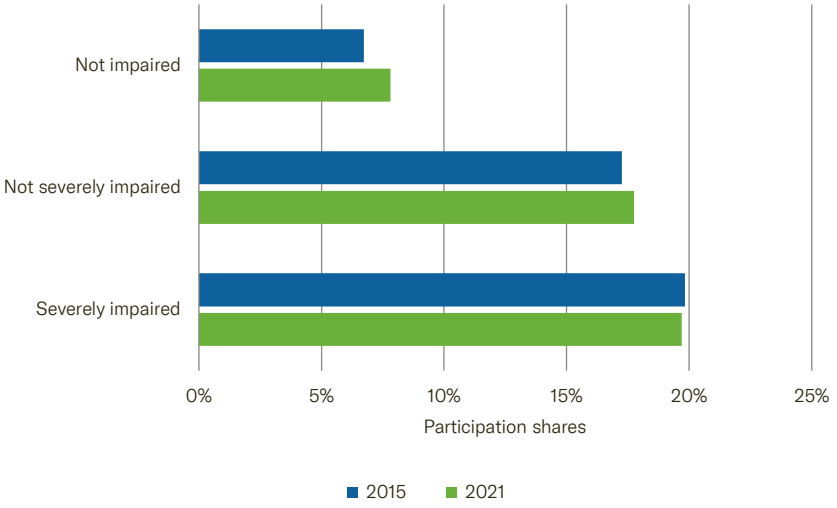
Significant gender differences are apparent in the support that employers provide for CET, whereby men are more likely than women to benefit from employer funding. The fact that women work part-time more frequently than men does not explain this difference because the gap is the same for women and for men who work full-time (→ figure 381).

Under the Federal Act on the Elimination of Discrimination against Persons with Disabilities[3], those with disabilities should have equal access to CET offers. However, obtaining relevant statistics on this issue remains a challenge. The Swiss Labour Force Survey (SLFS) has only approximate figures on the degree to which impaired health affects a person's ability to participate in CET. They nevertheless indicate that people with health impairments are less likely to participate in CET activities (→ figure 382). There is no information about the reasons for the gaps in participation shares.

382 Disability and CET, 2015 – 2021

Participation in CET based on degree of impairment; population age 25 – 64

Data: SLFS; calculations: SCCRE



3 Federal Act on the Elimination of Discrimination against Persons with Disabilities (Disability Discrimination Act), of 13 December 2002

CUMULATIVE EFFECTS

Introduction

The term "cumulative" in the chapter title has a range of meanings pertaining to education. Firstly, it covers all investments in education and skill acquisition throughout an educational career. Secondly, it refers to knowledge acquired not only during formal education but also outside of school and time spent in formal education. Thirdly, besides connoting cumulative skill acquisition, the term also refers to the overall returns to education at the individual and societal levels. Finally and fourthly, returns to education refers to both the monetary and the non-monetary effects derived from education. The chapter thus follows on from earlier education reports and is based primarily on new research findings. Citations of studies already mentioned in previous education reports are largely omitted. As a new, special topic and in addition to themes such as cognitive and non-cognitive skill acquisition and the monetary and non-monetary benefits of education, the report also examines homogamous aspects relating to education whereby people tend to form partnerships based on the similarities in their educational background.

Acquisition of non-cognitive and cognitive skills

Children begin acquiring cognitive and non-cognitive skills already at the time of birth, years before any formal schooling begins, and such acquisition is shaped in particular by the home[1] and the immediate social environment *(Shure, 2021)*. While the family environment, which plays a decisive role in a child's ability to develop cognitive and non-cognitive skills, is difficult to change, it can at least be positively influenced by interventions and complementary activities. Early childhood programmes, i.e. measures for early childhood education and care[2], can help to lessen family-related differences in performance among children, enabling them to benefit similarly when they start school *(Jeong et al., 2021; Joo et al., 2020; Murano et al., 2020)*. A recent programme in Switzerland, for example, is an adapted version of the *"Parents as Teachers"* intervention that originated in the US in the 1980s. Evaluations of the pilot programme in German-speaking Switzerland show that, compared to a control group, children of families in the programme were better able to adjust their behaviour, and their developmental level and language skills had improved significantly by the age of three *(Schaub et al., 2019)*. But interventions at a later stage that aim to improve cognitive and non-cognitive skills can also be successful. The randomised intervention Promoting Alternative Thinking Strategies (PATHS) among eight-year-old school children in the city of Zurich aimed at helping them develop patience, self-control, social problem-solving,

What is referred to as non-cognitive skills[3] includes personality traits as well as social skills. However, in the absence of a universally valid definition, uniform concepts are applied neither theoretically nor empirically. Mostly, non-cognitive skills include those that cannot be attributed to intelligence or that fall under academic studies. With respect to education, it is mainly changeable, non-cognitive skills that are of interest because they can be acquired in addition to those taught at schools, and to a lesser degree character traits that either cannot be changed or that lie outside of educators' scope of influence. The literature is rife with countless descriptions of personality and character traits. In many empirical studies, the five-factor model (known as the Big Five according to *Goldberg, 1971*) has prevailed, which describes personality based on five main dimensions: Extraversion, agreeableness, conscientiousness, openness to new experiences, and neuroticism. However, new terms are constantly being added, such as the tendency to compete *(Niederle & Vesterlund, 2007)* or what is referred to as *grit (Duckworth & Yeager, 2015)*, especially if they adequately explain educational success and decisions in parallel with established concepts of cognitive and non-cognitive abilities.

1 A Danish study *(Lundborg et al., 2021)* probably for the first time causally indicated that especially the mother's level of education is decisive for the children's future academic performance, while the father's level of education has practically no influence on it.

2 For an overview of early childhood programmes, please refer to *Elango et al. (2016)*.

3 The terms "abilities" and "skills" are used synonymously in this chapter.

self-esteem, emotional intelligence and academic engagement. The results indicate that four years after the intervention, the children were 4.4 percentage points more likely than those in the control group to enter a baccalaureate school and 7.1 percentage points more likely to also graduate from that school. Further analysis also showed that the effect of the intervention on educational attainment was due to changes in the children's socio-emotional skills rather than to improved cognitive skills *(Sorrenti et al., 2020)*.

The development of cognitive skills often correlates strongly with that of non-cognitive skills *(Wanzer et al., 2019)*. At the same time, it is not always clear whether this correlation is due to one effect or to the simultaneous effects of several factors involving both skill types, or whether the skill types influence each other mutually. Empirical evidence indicates that both mechanisms are involved. For example, a good family setting can simultaneously result in motivation as a non-cognitive trait and develop reading skills as a cognitive trait. At the same time, weak cognitive skills can reinforce less desirable personality traits, while weak non-cognitive skills can hamper the development of academic skills at a later stage. In principle, research indicates that non-cognitive abilities generally also lead to cognitive ones, and conversely that a significant part of any achievements involving cognitive abilities are dependent upon or furthered by non-cognitive abilities *(Heckman et al., 2022)*.

During the school years , in addition to the educational institutions, teachers as well as parents, classmates also decisively influence the development of cognitive and non-cognitive skills. Such peer effects can in turn originate from cognitive and non-cognitive skills or from the behaviour of classmates *(Balestra et al., 2021, 2022)*.

Educationally homogamous partnerships

A person's education level influences not only his or her monetary and non-monetary return and the economic, cultural and social capital of the children in line with how genes are passed on across generations, it also plays a role at a previous stage in how the family is formed through the choice of the partner. What is referred to as *assortative* mating, i.e. the preference of a partner with a similar level of education, in turn has consequences for the income of the partners, and subsequently across generations for any children the couple may have. While the behaviour in choosing partners is well documented empirically, it is also partly gender-specific *(e.g. Neyt et al., 2019)* and subject to change over time. For example, data from the US, Denmark, Germany, the UK and Norway show that the number of assortative matings is declining among those with tertiary education, while individuals with lower levels of education are increasingly in partnerships that are similar in terms of education *(Eika et al., 2019)*.

For Switzerland, census data from 1970 to 2000 on the other hand indicates that while the proportion of educationally homogamous partnerships remained relatively stable, heterogamous partnerships increased in the lower educational groups, as did homogamous partnerships in the middle and higher educational groups *(Becker & Jann, 2017)*. At the same time,

Neyt et al. (2019) studied how education level influences a person's success with finding a partner on a dating app. In line with previous research, their results indicate that a gender-

related effect from the education level does influence the likelihood of finding a partner. Women attach greater importance to a potential partner's level of education than men. Contrary to previous literature, however, the authors also found that men are not deterred if a woman has a higher level of education. Finally, the authors found no indication that app users would specifically prefer a partner with a similar level of education. The study, however, is about how people get to know others by means of a dating platform and not about how they enter into marriage.

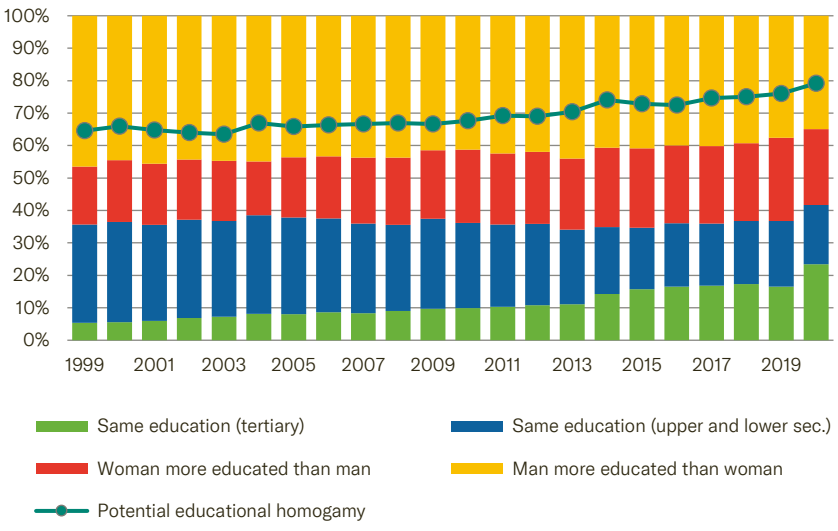
the proportion of those without a partner increased in the total population. The tendency towards homogamy was nevertheless more pronounced in the lower educational groups than in the higher ones, and especially in the middle ones. Analyses of data from the Swiss Labour Force Survey (SLFS) and the Swiss Household Panel showed that the number of those who chose a partner with the same level of education and salary had increased *(Ravazzini et al., 2017)*. Homogamous couples in which both spouses have a tertiary degree made up around 3% of all household types in 1992, and just under 13% in 2014. The proportion of couples in which the woman married a more highly educated partner fell from 28% to 20% in all household types – not least because of the growth in education among women, whereas the proportion of couples in which a woman had married someone with less education increased almost symmetrically from 7% to 12% in all household types. Using the same data, it was also found that the increase in assortative mating was more likely among those with low levels of education than those with tertiary education. Women with tertiary education were more likely to live in single households than men.

A look at recent trends (→ figure 383) indicates, in line with the rising share of tertiary degrees among the youngest cohorts, an increase in the proportion of educationally homogamous couples with a tertiary educational background and a decrease in educationally homogamous couples with another educational background. While the actual proportion of educationally homogamous couples remained stable across all educational levels, the proportion of potential educationally homogamous couples increased from about 65% in 2000 to about 80% in 2020 due to the harmonisation among the degrees. The trend among couples in which the man is more educated than the woman has been tapering off over the last twenty years, unlike the trend among couples in which the woman is more educated than the man.

383 Proportion of educationally homogamous and educationally heterogamous partnerships

Persons aged between 25 and 70 years

Data: FORS (Swiss Household Panel); calculations: SCCRE

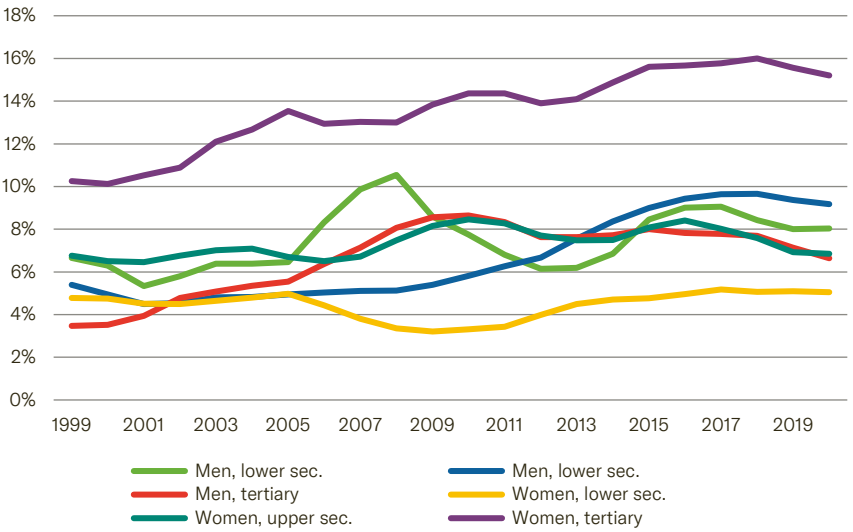


The last twenty years saw an increase in the proportion of single parents or those in single households, especially women with tertiary education (→ figure 384). However, this trend began well before the proportion of women with tertiary degrees started to increase.

384 Proportion of singles and people living alone in Switzerland, by gender and education

Persons above age 40

Data: FORS (Swiss Household Panel); calculations: SCCRE



The monetary benefit

Individuals benefit monetarily from education because by acquiring skills they can improve their chances in the labour market and pursue work with better pay. When applied to society as a whole, the collective acquisition of skills determines a country's competitiveness and thus the growth and performance of its economy. Finally, the state and society benefit from having people with better and longer education who earn higher incomes, thus generating higher tax revenues, which in turn spur public investment in education and other areas and thus reduce the burden on the welfare system.

Employment

Education influences the likelihood of a person being active in the labour market in three non-exclusive ways. Firstly, having a better education increases the likelihood of someone finding a job in the first place.[4] While this generally depends on the economic situation, the improved job prospects of those with a better education are arguably even more pronounced during economic downturns than during booms. Secondly, people might voluntarily refrain from working even if there are job vacancies. Lower levels of education can, depending on the social system and family status, increase the likelihood of a person intentionally not working, as this person would find only jobs with low pay and relatively poor working conditions. This, however, can also have a reverse effect whereby better education can result in pay levels that allow someone to substitute his or her working time with leisure time. Thirdly, skills lose their value over time, and hence the risk of unemployment can depend on how rapidly skills acquired originally lose their value. However, the question of which form or level of education is especially affected by the risk of such devaluation cannot be answered unequivocally. On the one hand, the originally acquired skill type plays a role. A study for Switzerland shows that higher occupational specialisation is associated with lower occupational mobility and longer periods of unemployment. However, the more specialised occupations are also associated with higher wages *(Rinawi & Backes-Gellner, 2021)*. This suggests that a trade-off exists between the risk of and returns to educational investments from very specific skills. On the other hand, the rate of technological change in a particular occupation plays a role in how easily the skills in question can be substituted *(Aepli et al., 2017)*.

Even though digitalisation may threaten high-skilled and low-skilled jobs, it can be assumed that people with higher levels of education are better prepared for meeting the challenges ahead *(Aghion et al., 2022; Dillender & Forsythe, 2022)*. While certain technologies may require and complement highly specialised skills *(Felten et al., 2019)*, workers with better training are also able to learn new skills more quickly and thus are more likely to adapt to the new technologies. Non-cognitive skills, too, play a role in a person's ability to adapt. Analyses of data from Germany show

4 *Aepli et al. (2021)* found significant differences among the employment rates of various educational groups. The lowest employment rates were among those without a post-compulsory education or with a baccalaureate (70–75%), the highest rates were among those with a tertiary degree (90%), and in between were the rates for those with vocational training (85%)

that workers who are more open to experiences and ego-centred, competitive and emotionally stable tend to be less vulnerable to the negative consequences in the labour market from digitalisation *(Bode et al., 2019)*.

Wages

Educational differences affect not only the likelihood of a person finding work in the first place but also the wages to be earned through gainful employment *(Deming, 2022)*. Wage discrepancies due to educational disparities can be explained by differences in productivity among individuals on account of their training and skill levels. This reflects not only in productivity in a particular activity but also in whether complex or frequently changing tasks can be managed more effectively. In a work environment where routine tasks are increasingly being replaced by non-routine ones *(→ chapter General context of the swiss education system, page 9)*, the more educated tend to be more productive due to their ability to adapt more quickly to changes in the environment *(Deming & Noray, 2020; Gersbach & Schmassmann, 2019)*. An employee's productivity is usually difficult to gauge before he or she takes up a job, which is why employers look at a candidate's level of education as an indication of their productivity *(Spence, 1973)*. This leads not only to different wage offers but is also increasingly used as an indicator to gauge whether an applicant should be considered in the first place *(Piopiunik et al. (2020); Fossati et al. (2020)* specifically for the apprenticeship market in Switzerland)

A study in Denmark about a nationwide change in the grades' scale at Danish universities indicated that the rise in university grades, brought on by the revision and unrelated to students' ability, led to higher earnings immediately after graduation in the short term. However, the effect tapered off in subsequent years, suggesting that employers quickly caught on to students' true productivity *(Toft Hansen et al., 2021)*.

On the other hand, education-related wage differences can arise if, due to the levels of technology used, more productive jobs tend to be given to more highly qualified workers. This is because high-skilled workers are not only more productive but also able to perform more complex tasks on average.

The wage differences resulting from an increasing number of years in formal education are denoted as the private returns to education.[5] Determining how additional education affects wages has remained a challenge since the first calculations in the late 1950s, because the selection of more able individuals to longer education periods and into higher-wage jobs tends to distort and overestimate the return on education.

According to human capital theory, a person will invest in education until the benefits from it have offset the additional cost he or she incurred. Since it is difficult to obtain information about the actual benefits (wages) and the actual cost and to make projections, education decisions are based on wage expectations *(Arcidiacono et al., 2012; Beffy et al., 2012; Wiswall & Zafar, 2021)*. Whether these will hold true in the future cannot be verified, but comparisons with current wages in relation to a particular field or education level indicate that under- and overestimations may occur *(Lergetporer et al., 2021)*. In a study, *Fernandes et al. (2021)* found that students of both genders at the University of Applied Sciences in Bern and the University of Fribourg overestimated the wages they could expect. A broad survey of the Swiss population confirmed the finding that both genders (men more so than women) tend to overestimate the wages of those with an academic degree, but that both men and women tend to underestimate the wages of those with a background in vocational education and training *(Cattaneo, 2022)*.

In Switzerland, wage advantages of between 7.5% and 8.5% per additional year of education are achieved on average (→ figure 385). At 8%, this means, for example, that someone with an MA degree (five years of education) from a university can expect a wage advantage of around 40% on average in each year of employment, compared to someone who entered the labour force with a baccalaureate but no further education. The estimated average return to education has been subject to cyclical fluctuations over the past two decades but remains relatively stable, and even tends to show a slight upward trend. In other words: The general rise in education level among the working population has so far not led to an oversupply of education that would have eroded the profitability of the investment for an individual *(→ chapter Tertiary-level education, page 193)*. However, the average return fails to take relatively high heterogeneity into account. When calculating the return on education at each level for those among the

5 For a literature review, see for example *(Psacharopoulos & Patrinos, 2018)*.

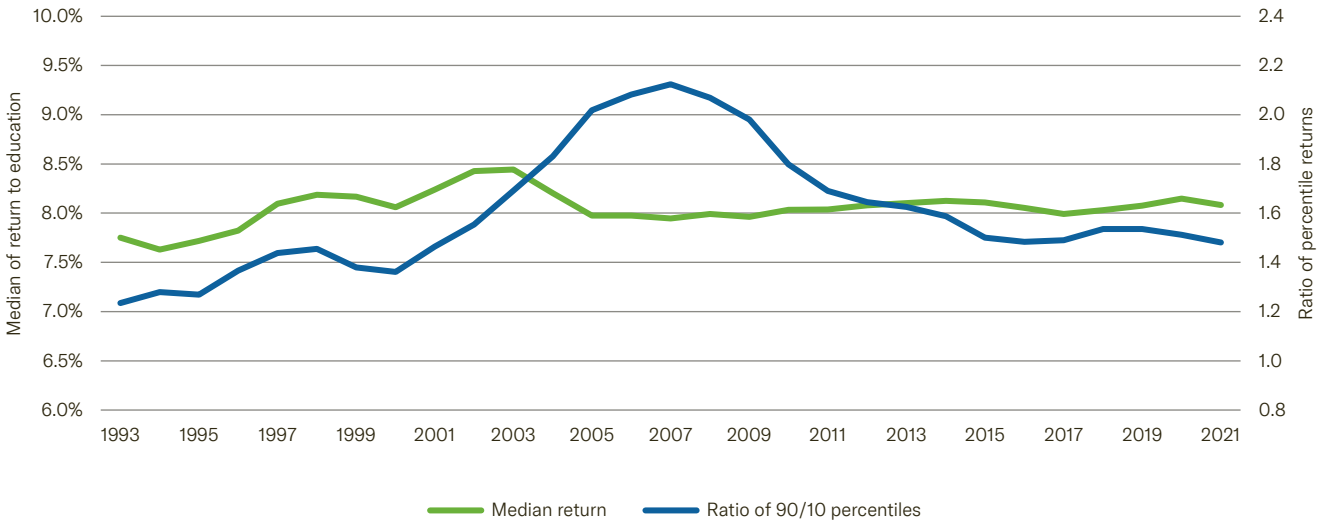
lowest earners (first wage decile) and for those among the highest earners (ninth wage decile) and then examining the relation among these returns, it becomes clear that in terms of income distribution the returns at the top of the wage scale are always significantly higher than those at the bottom. This difference in favour of those who always earn the most, regardless of education level, has increased from around 20 to around 100% since 1990, i.e. the return to education has doubled. After that, however, the advantage decreased again and levelled off at around 50%. This comparison shows two important aspects of the return on education: firstly, investing in education pays off significantly more for the more productive individuals than for the lowest earners at each education level; secondly, the return risk increases with additional education because the spread in wages widens with increasing education levels. The average return thus loses in meaning as the duration of education increases.

385 Return to an additional year of education

Return for median income and the relationship between return on education of the first and ninth deciles

The figures reflect the moving average over two years in each case.

Data: FSO (SLFS); calculations: SCCRE



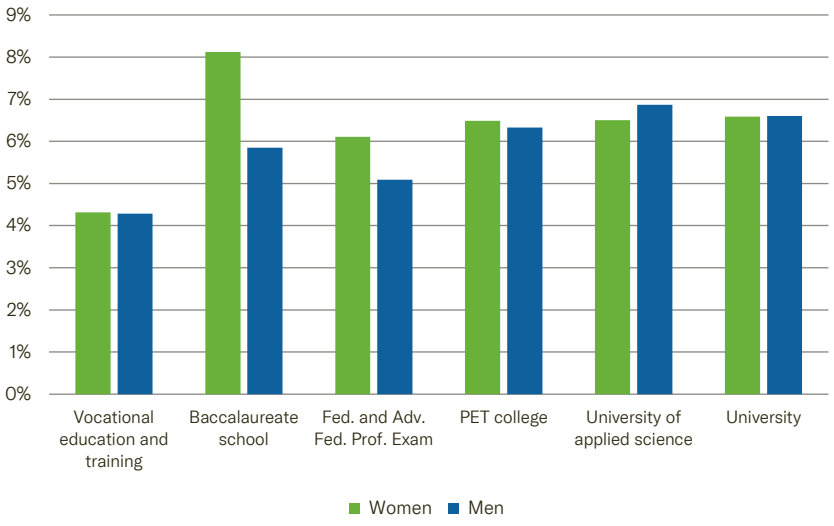
When interpreting time series based on SLFS data, it is important to bear in mind that from 1991 to 2009 data was collected in the second quarter of each year, and from 2010 onwards it was collected quarterly as a continuous survey. In 2021, the SLFS was also changed from a telephone-only survey to a multi-mode online survey using a revised questionnaire. These changes led to breaks in the time series, which may at least partially influence the results.

Today, the returns to education per year in education and by education type are on average about 15 to 20% higher for those with a secondary education and about 45 to 50% higher for those with a tertiary education than for those without post-compulsory education. While these differences are slightly higher than in the 1990s, they have remained relatively constant over the past decade *(Aepli et al., 2021)*.

When interpreting such figures, it is important to note that time spent in education also differs for those with a secondary or tertiary qualification. A calculation of the wage differences per additional year of schooling (→ figure 386) indicates that those with a tertiary degree (university or university of applied sciences) earn about 6.5 to 7.0% more than those without post-compulsory education. In contrast, those with basic vocational training (apprenticeship) earn on average only about 4.5 to 5.0% more per additional year of schooling, while the returns for those with a PET qualification are highest at about 7.0 to 7.5% per additional year of training. It should be noted that these figures represent only average values calculated on the assumption of typical training durations per training programme type. However, the individual return on education can vary greatly depending on the programme type and subject as well as on other cognitive and non-cognitive skills.

386 Returns for an additional year of education in 2021, by education type

Data: FSO (SLFS); calculations: SCCRE

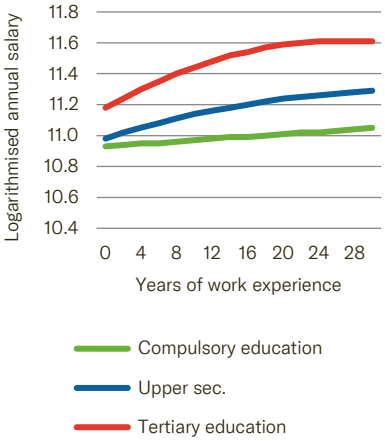


The returns to education in figure 386 are calculated for those with average incomes relative to the incomes of those without post-compulsory education. The calculation is based on assumptions about the additional training years required for each training programme type. The return for those with a baccalaureate is probably overestimated since on average half of them drop out of the programme, and the duration of their training can thus be assumed to be correspondingly higher *(SCCRE, 2018)*. The returns in figure 385 were calculated relative to the median and not to the average wage and assume linearity per additional school year. The differences within the wage distribution per education category, and especially among individuals without post-compulsory schooling, explains why the return on education in figure 386 is slightly lower than that in figure 385.

Even initial wage estimates used for calculating the returns to education *(Mincer, 1974)* showed that productivity is not only influenced by the level of formal education but also by experience, which increases during a person's working life. Turning experience into increased productivity and thus higher wages, whether through learning *on the job* or a further education programme, in turn depends on education *(Heckman et al., 2003; Lemieux, 2006)*. Higher levels of formal education at the beginning of a person's working life will enable this person to increase his or her wages

387 Returns to professional experience by highest qualification

Data: FSO (SLFS); calculations: SCCRE



Legend

The average logarithmic wage with 10 years of work experience compared to that with 11 years increases by only about 0.004 points (from 10.969 to 10.973) for those with compulsory schooling, a relative wage increase of 0.4%. The corresponding increases, on the other hand, are just under 1.3% for those with a secondary education background and about 2.1% for those with a tertiary background. Wage increases are higher at the start of a career than with increasing work experience. This well-known phenomenon is mainly due to the higher learning effects and productivity gains at the beginning of a professional career *(Heckman et al., 2003; Lemieux, 2006).*

through experience in the labour market (→ figure 387). There are manifold reasons for this: Firstly, the better a person is trained, the more likely it is that he or she can apply the acquired skills more effectively and quickly in a specific job and thus become more productive and earn a higher wage. Secondly, better trained individuals are more likely to continue learning over the years, which results in higher productivity and thus allows for wage increases *(→ chapter continuing education and training, page 331)*. Thirdly, people with higher levels of education are more likely to have access to occupations and jobs with higher productivity potential.

Growth, externalities and fiscal returns

In addition to individual monetary benefits, education also generates a monetary benefit for society as a whole, which manifests itself in higher economic growth and generally higher wage levels, not only for the individuals educating themselves, and in higher tax revenues. On the one hand, the fiscal benefit results from more highly educated people becoming more productive, earning higher wages and thus paying significantly more taxes due to tax progression. On the other hand, the fiscal return is favoured by the fact that more educated individuals receive fewer state transfer payments (social benefits, etc.). The fiscal return on education can thus be viewed as the benefits in terms of higher tax revenues and lower government transfers relative to the public expenditures on education. However, there are two reasons why the fiscal return on education is difficult to interpret without further correction. Firstly, it needs to be considered that many people would have invested in their education even if they had no or only little state support; in other words, the potential of fiscal returns is rarely fully exploited. Only once reduced government support results in lower demand for education would tax revenues start to decrease, but not the returns themselves. In this case, limits to such reductions would be introduced quickly, for equity reasons. It thus becomes clear that the individual and fiscal returns mirror each other, whereby an increase in one inevitably leads to a decrease in the other, and vice versa. Secondly, as in the case of individual returns to education, the causal relationship between education and returns must be considered: The actual fiscal returns to education would be overestimated if those with higher levels of education could have increased their income also without the higher education levels. This point is quantitatively significant, even if the overestimation cannot be measured precisely. Depending on the study, it can be assumed that returns to education are overestimated by 20 to 50% due to selection biases among those participating in education.

Besides the individual and fiscal returns, the social return on education must be considered as well. On the cost side, it essentially includes all private and public investments; on the benefit side, it includes higher wages, higher tax revenues, and possibly lower social expenditures. However, the social return can be more than just the balance between private and public costs and yields. This becomes apparent when education results in external benefits for individuals without education, or when it helps to prevent negative externalities, i.e. costs that the non-educated incur and pass on to society partially or fully. The positive externalities are mostly referred to as spillover effects, thanks to which less-educated workers earn

higher wages when they work with more educated colleagues. Such spillovers can occur either because less-educated workers become more productive when collaborating with better educated ones or because the latter pass on part of their progress in productivity to them.[6] A meta-analysis based on 32 empirical studies on spillovers effects from education onto productivity, wages and rents in 15 countries shows that the effect decreases with rising economic development *(Cui & Martins, 2021)*. On the other hand, spillovers tend to increase when the education within a workforce polarises, i.e. when there is an increase in the number of those with a very good education or with low levels of education and a decrease in between among those with average educational qualifications.

Reduced negative externalities, such as less environmental damage because of more sustainable practices, less disease due to preventive health care, and fewer political conflicts on account of more consensual conduct, can affect all levels of education. However, the potential for reducing negative externalities is particularly high when transitioning from a very low to an intermediate level of education, i.e. a qualification at the post-compulsory level. As a rule, this substantially reduces the risk to society from having to pay social benefits over longer periods of unemployment or from having to bear the cost incurred from criminal behaviour, for example. While all of these factors may generate monetary benefits for society as a whole, many of them also have a dominant non-monetary benefit, especially for individuals, and they are thus dealt with in more detail in the following section on non-monetary educational benefits.

6 Spillover effects do not always have to originate from well-educated individuals and affect others with less education. The reverse is also possible when, for example, someone with a lower level of education takes a course, thus enabling his or her better-educated colleagues to become more productive by freeing up time they would previously have had to spend on fixing mistakes and giving instructions (e.g. *Espinosa & Stanton, 2022)*. Another possibility of spillover effects from workers with less formal education onto those with better formal education can occur when the skills of both complement each other *(Backes-Gellner et al., 2017)*.

The non-monetary benefits

Education and skills in general influence many aspects of life, beyond the world of work. Better education is expected to have positive effects on health and thus on life expectancy, personal satisfaction, peaceful coexistence, political participation and various other life outcomes. The following sections refer to the most important of outcomes on which education can have a positive effect.

Health

In Switzerland, for example, the number of lung cancer cases is higher among those with low education levels. The same correlation exists between smoking and social status or education level. Similarly, those with compulsory education have a higher risk of being hospitalised for diabetes, heart failure, chronic obstructive pulmonary disease or asthma than those with a tertiary education. The risk of being hospitalised for osteoarthritis or back problems also increases significantly by about 30% for those without a tertiary qualification, presumably because they work in other occupations *(Bayer-Oglesby et al., 2020)*.

The positive effect of education on a person's health and life expectancy is seen as among the most important non-monetary outcome *(Bijwaard, 2022; Fletcher & Noghanibehambari, 2021; Fonseca et al., 2020; Savelyev et al., 2022)*. The influence can be observed directly or indirectly in different ways. Firstly, more education directly promotes health awareness, such as knowledge about the consequences of behaviour that damages health. Secondly, those with better education are more efficient in maintaining their health; for example, they often know better which preventive measures serve them best in terms of their health *(García & Heckman, 2021)*. Thirdly, education increases the opportunity cost of illness, which in turn reduces the incentives for unhealthful behaviour and increases those for healthful behaviour (such as healthy eating and exercise). Similarly, education reduces the likelihood of someone having to work in an unhealthy environment and increases the likelihood of this person pursuing health-promoting activities, also while still in education.

In addition to these direct effects, education can also influence health indirectly *(Kamhöfer et al., 2019)*, especially through higher income *(Grossman, 2015; Werbeck et al., 2021)*. Conversely, unemployment, low income, and financial problems associated with lower levels of education can cause stress with direct negative effects on a person's health and life circumstances (social exclusion, risk of divorce, etc.), thus adversely affecting his or her wellbeing.

Despite the many direct and indirect ways in which education can positively affect, or in which a lack thereof can negatively affect the health of individuals, the causal relationship between education and health remains difficult to quantify, and not every correlation necessarily is evidence of a causal effect. This is for the same reasons that other correlations between outcomes and education do not always indicate a causal relationship *(Bijwaard et al., 2019; Galama et al., 2018; Heckman et al., 2018)*. Firstly, there are selection effects *(Bolyard & Savelyev, 2021)*, i.e. those who educate themselves more are also likely to be the ones with healthful habits, even without longer education. Secondly, there are unobserved third-party variables that influence education levels and health positively, thus giving rise to only a spurious correlation between education and health. These include many non-cognitive areas *(Carter et al., 2019; Savelyev et al., 2022)*, such as locus of control, self-control, agreeableness or conscientiousness *(Atkins et al., 2020; Botha & Dahmann, 2022; Christensen et al., 2019; Wagner et al., 2019)*. And finally, there is also an empirically proven form of reverse causality, i.e., people with poorer health have less time to educate themselves for precisely this reason *(Grossman, 2015; Oskorouchi et al., 2020)*.

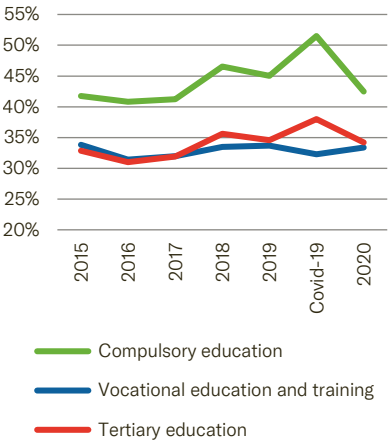
Various studies, for example *Meghir et al. (2018)* in Sweden and *Malamud et al. (2021)* in Romania, that use school reforms as a means of identifying causal effects have not found any direct causal influence of education on health. It is important to take a close look at the causal effects because correlations between education and health often suggest a strong potential return to more education, which however is not realised when educational programmes are expanded. Most studies that do not find a causal link between more education and better health tend to limit their analysis to a quantitative expansion of education, i.e. to an extended duration rather than to better quality, as by means of new educational content, for example. Recent studies have managed to address these limitations at least partially. For example, a study that examined the causal and simultaneous connection between cognitive and non-cognitive skills and addictive behaviour, found that an additional year in school reduces the likelihood of smoking by four percentage points at age 20 and by eight percentage points at age 30. At the same time, the study shows that the chance of enrolling in a university increases among those who decided not to start smoking. According to the study, an adolescent's non-cognitive skills are more likely to help him or her avoid forming unhealthful habits. However, among those with healthful habits, cognitive skills have a stronger effect on educational success than non-cognitive skills *(Hai & Heckman, 2022)*.

The following evaluations of current data from Switzerland should be viewed with the caveat that the connections between education and health are not always causal in nature. Data from the Swiss Household Panel 2010–2020 (→ figure 388) show the proportion of people with frequent depressive symptoms, broken down by educational background. On average, people with no post-compulsory education (ISCED 1/2) are significantly more likely to have depressive symptoms than those with a VET background (ISCED 3B/5B) or those with general education and a tertiary degree (ISCED 3A/5A/6).

Contrarily, data on the subjectively perceived state of health (→ figure 388) indicates that health increases with education level and is best among those with general education and a university degree. It is also interesting to note the range of concerns during the first COVID-19 wave in 2020[7], although both results (Figure 388 and Figure 389) were only short-term, transitory slumps that disappeared again once the first restrictions for the pandemic were lifted. It is therefore reasonable to assume that the effects must be linked primarily to the impact on working life.

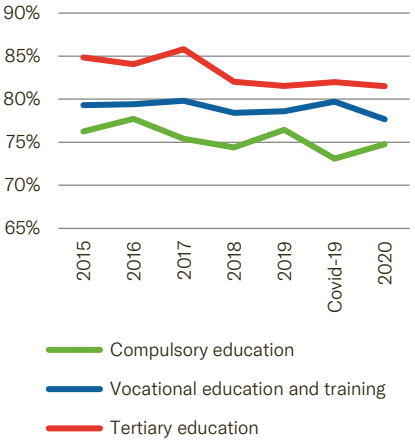
388 Proportion of people with frequent depressive symptoms, by educational background

Data: FORS (Swiss Household Panel); calculations: SCCRE



389 Proportion of people with good to very good subjective health, by educational background

Data: FORS (Swiss Household Panel); calculations: SCCRE

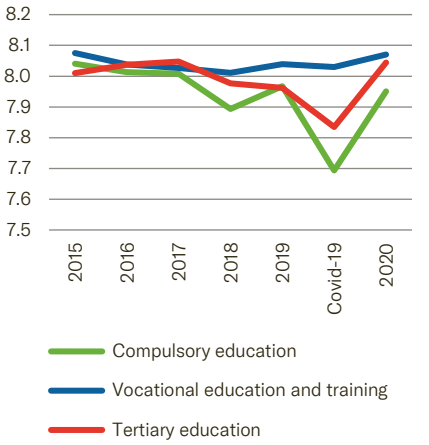


7 The Swiss Household Panel conducted a supplementary survey from mid-May to mid-June 2020 to obtain specific information about the period of the first COVID-19 wave, in addition to the results from the main survey. This data was used in 388 and 389, in addition to that from regular surveys, which usually run from September to February each year. In Figure 388 and 389, for example, the information for 2019 covers the survey period from September 2019 to February 2020 (the same as for the other years).

390 Average life satisfaction, by educational background

Data: FORS (Swiss Household Panel); calculations: SCCRE

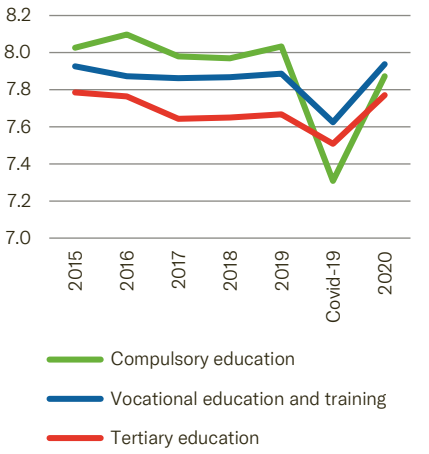
Life satisfaction is measured on a scale of 0 (not at all satisfied) to 10 (fully satisfied).



391 Average job satisfaction, by educational background

Data: FORS (Swiss Household Panel); calculations: SCCRE

Job satisfaction is measured on a scale of 0 (not at all satisfied) to 10 (fully satisfied).



Well-being and happiness

As in the case of the effects on health, there are potentially a number of direct and indirect mechanisms enabling education to influence well-being.[8] Moreover, especially health and life-satisfaction have a strong positive correlation. On the one hand, the knowledge acquired through education can be viewed as a benefit in itself, thus enhancing self-contentment. At the same time, education can improve our ability to reflect on our situation and that of others, thus increasing our chances of better managing our life in general or of dealing with strokes of fate, which in turn boosts contentment. The attainment of a certain level of education and the associated education-based identification with a certain group can also have a beneficial psychological effect and thereby increase contentment *(Kuppens et al., 2015)*. On the other hand, a higher level of education can lead to higher expectations of oneself, of others, or of life in general, expectations that are harder to meet, and where a failure to do so can negatively affect self-contentment *(Stewart-Brown et al., 2015)*.

Besides the direct influences of education on self-contentment, indirect influences must also be borne in mind. Education can generate greater contentment through the income the person earns *(Easterlin, 2021; Fitzroy & Nolan, 2018; Killingsworth, 2021; Lindqvist et al., 2020)* or through the occupation itself, as well as through the mere fact of working and being healthy *(Bakkeli, 2021; Clark et al., 2019; Steptoe, 2019)*. Here, too, the range of direct and indirect influences make it difficult to precisely identify empirically the origins of the effects. For this reason and because education can have both a positive and a negative effect on subjectively perceived satisfaction, the effects of education on self-contentment have not yet been clearly demonstrated empirically. Moreover, here, too, there is possibility of reverse causality, i.e. the possibility that those who are less satisfied will spend less time in education. In the case of the influence on health, the problem of measurement lies primarily in the countless metrics and expressions of health; in the case of satisfaction, the problem is that science remains ambiguous as to how to measure it in the first place *(Blanchflower & Oswald, 2011; Chen et al., 2019)*. The following empirical analyses for Switzerland need to be seen against the background of these limitations. In terms of average life satisfaction, almost no differences between the various education categories existed, at least until 2017 (→ figure 390). What is striking, however, is that the sharp drop in self-contentment during the COVID-19 pandemic did not affect those with a VET background (ISCED 3B/5B), unlike in the case of those in the other education categories. On the other hand, those in all education categories felt a drop in job satisfaction (→ figure 391). As with the analyses for health, it is striking that the values very quickly returned to pre-pandemic levels after the lockdown.

8 This report uses the terms self-contentment, wellbeing and happiness interchangeably, although their meanings are not necessarily identical. See also *Bucher (2018)* and *Veenhoven (2018)*.

Crime

The positive effects of education also include an education-related drop in criminal and other socially harmful behaviour *(Baier, 2019; Baron et al., 2022; Cano-Urbina & Lochner, 2019; Dragone et al., 2021; Entorf & Sieger, 2010)*. Here, too, a number of direct and indirect means of influence exist, some of which have been well documented empirically. Education can not only directly strengthen cognitive and non-cognitive characteristics and skills, such as patience, hard work, and risk aversion, but also boost well-being, which in turn can reduce the likelihood of anti-social and criminal behaviour *(Beelmann & Lösel, 2021; Jackson et al., 2020)*. A direct connection between education and crime can also be seen when young people who spend more time in school have less time and thus less opportunity to commit a crime in the first place. Several studies have confirmed this based on changes in compulsory education *(Anderson, 2013; Bell et al., 2016)*. Extending compulsory schooling or expanding upper secondary education has proven particularly effective in keeping young people in school during a phase of life in which the risk of delinquency, viewed over the person's entire lifespan, is temporarily very high. One way in which education can affect crime indirectly is through the income and career opportunities that it opens up, which significantly increase the opportunity costs of socially undesirable behaviour and, at the same time, reduce the incentives for acquiring income and recognition illegally *(Ferraz et al., 2021; Machin et al., 2011)*. 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 individuals will choose not to behave in this way. However, the effect of the opportunity cost of reducing criminal behaviour may be lowered if the person perceives the gains to be much higher than the risk of getting caught. This is used, for example, to explain the phenomenon whereby there tends to be a positive correlation in white-collar crime between education level and the probability of a crime being committed *(Baier, 2019; Lochner, 2004)*.

The possibility of reverse causality exists in crime as well. While education can influence the probability of a person committing a crime, there is also the possibility that a criminal act, especially by an adolescent, can reduce the likelihood of the offender starting and completing a longer or better education programme. For example, someone is more likely to drop out of school if those he or she associates with personally or socially at a very young age were frequently involved in crime *(Dragone et al., 2021)*. Finally, non-cognitive skills or personality traits also play an important role and can contribute to a spurious correlation between education and crime *(Heckman et al., 2017; O'Riordan & O'Connell, 2014)*. Thanks to this, interventions with a positive effect on the personality and behaviour of young people can both promote education and reduce crime *(Beelmann & Lösel, 2021)*.

Environmental knowledge and behaviour

According to a study, an additional year of education leads to 1% more emissions from buildings and to 5% more emissions from mobility. In contrast, emissions from food decrease by 1% with each additional year of education *(Bruderer Enzler & Diekmann, 2015)*. Another study analysed the effect of personalised information about a person's CO^2 footprint for the United Kingdom. The results show that while the intervention significantly raised awareness of ways in which participants could reduce their CO^2 footprint, this awareness did not lead to any change in habits that measurably affected energy consumption at home or through travel *(Büchs et al., 2018)* (about the effect of information in this context, cf. *Taube et al., 2021)*.

Education can have a potentially positive effect if it raises ecological awareness and develops behaviours that protect the environment. The most direct approach involves teaching content relating to the environment and ecology in schools, as is the case in all compulsory school curricula of the three language regions of Switzerland.

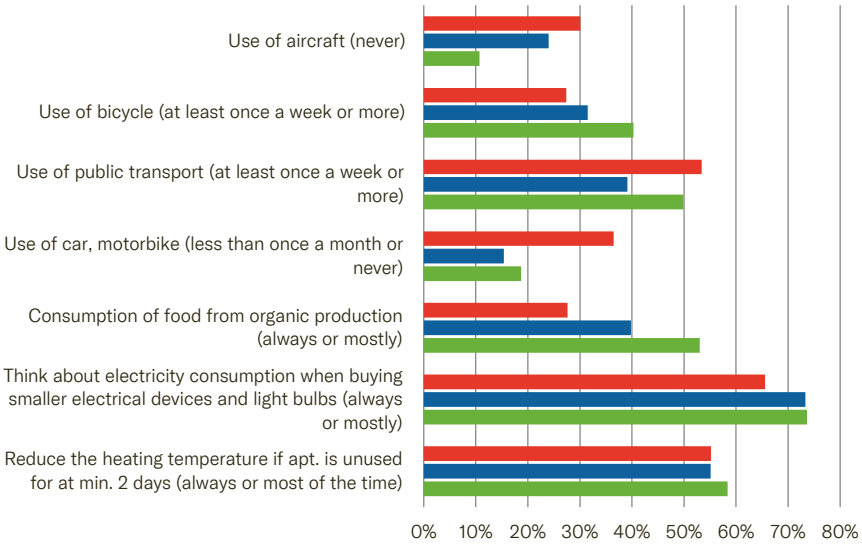
Even if formal education raises environmental awareness, there still may be gaps between such awareness and a person's actual behaviour towards the environment. For example, a study for Switzerland shows that while those with better training are more knowledgeable about and committed to environmentally-friendly behaviour, their conduct is still associated with higher greenhouse gas emissions *(Bruderer Enzler & Diekmann, 2019)*.[1]

While for other non-monetary returns, the positive effect of education on income often produces favourable knock-on effects when incomes rise, this is only partially the case for environmental behaviour, and may even lead to negative effects. Income can influence environmental behaviour positively when environmental quality is seen as a desirable good (for example, products from organic farming or high-end appliances with lower energy consumption) that individuals with higher incomes are more willing and able to afford. At the same time, the generally higher consumption associated with higher incomes (for example living space, travel and commuting) also goes hand in hand with a higher environmental impact (→ figure 392). In summary, education can bring about a direct effect, which in the best case positively carries over to environmental behaviour. On the other hand, the indirect effect of education through income can lead to positive and negative consequences in that higher income creates more options for environmentally conscious behaviour, but at the same time also tends to spur consumption, which may in turn be environmentally harmful. These outcomes result in an ambiguous overall effect of more education on environmental behaviour.

9 A study for the United Kingdom came to similar conclusions. Although more education brings about a better understanding of climate change and its causes, there is little causal evidence that this leads to more environmentally-friendly behaviour *(Powdthavee, 2020)*.

392 Environmental behaviour by educational level

Data: FSO (Omnibus survey 2019)



Political participation

The expected effect of education on individuals' knowledge and behaviour in the context of citizenship is one of the most important element for peaceful coexistence within a society and for a functioning democracy. As with environmental knowledge, an attempt is made to steer this behaviour directly via the education provided at school. This raises two fundamental questions: Can schools influence knowledge about and attitudes towards political participation in the first place? And does more knowledge in fact result in a higher level of political participation? As with other forms of non-monetary benefits of education, a distinction must be made between more education, i.e. especially longer duration of education, and the specific educational content. There is evidence that a knowledge of political science can have a lasting effect on the civic engagement of young people *(Briole et al., 2022; Campbell, 2019)*. However, various studies also indicate a positive relationship between a person's level of education and his or her political activity. Even if certain channels suggest a causality between a higher level of education and an increase in political activity, here, too, statistical correlations are not necessarily the same as causal effects. Studies that in turn use school reforms to identify causal effects show that even strong correlations between educational level and political activity do not always pass the test of a causal relationship *(Bömmel & Heineck, 2020; Lindgren et al., 2019; Persson et al., 2016)*. A study for Switzerland comes to a similar conclusion *(Stadelmann-Steffen & Sulzer, 2018)*. The study examined the influence of school-based political education on young people's interest in politics. The authors analysed three dimensions of political education (knowledge, skills, and arousing interest in politics) and found, descriptively and by considering political and demographic factors, that in classes with a strong emphasis on knowledge acquisition – for example, about political institutions, Swiss politics, and the legal aspects of

politics – student's interest in politics tends to be below the average of all classes. In contrast, interest in political topics increases when skills such as competence to judge, as well as competence to act and factual competences are given more emphasis. Differences in learning methods in this study are strongly driven by the school type. Whereas the classes in baccalaureate schools have more emphasis on arousing a general interest in political topics, vocational education focuses more on knowledge acquisition.

As with other outcomes, political participation shows that non-cognitive skills play a crucial role and can be of greater significance than academic skills *(Cohodes & Feigenbaum, 2021; Heckman et al., 2017; Holbein, 2017; Holbein et al., 2020)*. This raises the question of whether non-cognitive skills delivering a positive effect are themselves the result of additional education or are the reason why someone chose to spend more time in education. Unfortunately, many studies cannot answer this question conclusively. The answer to this question is essential, however, because in the latter case the selection effect, people with better non-cognitive skills choosing longer education, would merely lead to a spurious correlation between education and political participation.

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ANNEX

Abbreviations

aFDHE	Advanced Federal Diploma of Higher Education
AFPE	Advanced Federal Professional Examinations
AG	Aargau
AI	Appenzell Innerrhoden
AR	Appenzell Ausserrhoden
AT	Austria
Bac	(Academic) baccalaureate
BE	Bern
BE	Belgium
BFH	Berner Fachhochschule
BG	Bulgaria
BKZ	Bildungsdirektoren-Konferenz Zentralschweiz
BL	Basel-Landschaft
BS	Basel-Stadt
CAS	Certificate of Advanced Studies
CH	Switzerland
CIIP	Conférence intercantonale de l'instruction publique de la Suisse romande et du Tessin
CollHE	College of Higher Education
CW	Calendar week
CY	Cyprus
CZ	Czech Republic
D-CH	German-speaking Switzerland
DE	Germany
DK	Denmark
ECTS	European Credit Transfer and Accumulation System
EDK	Swiss Conference of Cantonal Ministers of Education
EDK-IDES	Informations- und Dokumentationszentrum der EDK
EE	Estonia
EHA	Graduate Survey
eHBB	Survey on professional education
EPFL	École polytechnique fédérale de Lausanne
ES	Spain
ESD	Education for sustainable development
ETH	Swiss Federal Institute of Technology
EU	European Union
FC	Federal Constitution
F-CH	French-speaking Switzerland
FDHE	Federal Diploma of Higher Education
FFA	Federal Finance Administration
FHGR	Fachhochschule Graubünden
FHNW	Fachhochschule Nordwestschweiz
FHV	Universities of Applied Sciences Agreement
FHO	Fachhochschule Ostschweiz
FI	Finnland
FMS	Upper-secondary specialised school
FOPH	Federal office of public health
FPE	Federal Professional Examination

FR	Fribourg
FR	France
FSIO	Federal Social Insurance Office
FSO	Federal Statistical Office
FTE	Full-time equivalents
GDP	Gross domestic product
GE	Genève
GL	Glarus
GR	Graubünden
GR	Greece
HEdA	Federal Act on the Funding and Coordination of the Higher Education Sector
HEP-BEJUNE	Haute Ecole Pédagogique Berne, Jura, Neuchâtel
HES-SO	Haute école spécialisée de Suisse occidentale
HfH	Hochschule für Heilpädagogik
HR	Croatia
HSLU	Hochschule Luzern
HTW	Hochschule für Technik und Wirtschaft
HSS	Humanities and social sciences
HU	Hungary
I-CH	Italian-speaking Switzerland
ICT	Communication and information technologies
IE	Ireland
IHEID	Institut de hautes études internationales et du développement
ILO	International Labour Organization
IS	Iceland
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
IT	Italy
IUV	Intercantonal University Agreement
JU	Jura
KG	Pre-school
LABB	Längsschnittanalysen im Bildungsbereich
LCH	Dachverband Lehrerinnen und Lehrer Schweiz
LENA	National platform for apprenticeship
LT	Lithuania
LU	Luzern
LU	Luxembourg
LV	Latvia
MAS	Master of Advanced Studies
MT	Malta
MZB	Microcensus on education and training
NC	Numerus clausus
NE	Neuchâtel
NL	Netherlands
NO	Norway
NW	Nidwalden
OdA	Labour organizations

OECD	Organization for Economic Cooperation and Development
OST	Ostschweizer Fachhochschule
OW	Obwalden
PE	Professional education
PER	Plan d'études romand
PIAAC	Programme for the International Assessment of Adult Competencies
PISA	Programme for International Student Assessment
PL	Poland
Prim	Primary school
PT	Portugal
RO	Romania
sBac	Specialised Baccalaureate
SCCRE	Swiss Coordination Centre for Research in Education
SE	Sweden
SEATS	Swiss Education Attainment and Transition Study
Sec I	Lower-secondary education
Sec II	Upper-secondary education
SECO	State Secretariat for Economic Affairs
SEMP	Swiss-European Mobility Programme
SEnOF	Service de l'enseignement obligatoire de langue française
SER	Syndicat des enseignantes et des enseignants de Suisse romande
SERI	State Secretariat for Education, Research and Innovation
SFUVET	Swiss Federal University for Vocational Education and Training
SG	St. Gallen
SH	Schaffhausen
SHIS	Swiss Higher Education Information System
SHIS-PERS	Hochschulpersonal
SHK	Swiss Conference of Higher Education Institutions
SI	Slovenia
SK	Slovakia
SLFS	Swiss Labour Force Survey
SLMS	Schulleitungsmonitor Schweiz
SNSF	Swiss National Science Foundation
SO	Solothurn
SSEE	Social and Economic Conditions of Student Life
SSP	Statistik des Schulpersonals
STEM	Science, technology, engineering and mathematics
SUPSI	Scuola universitaria professionale della Svizzera italiana
SZ	Schwyz
SZH	Schweizer Zentrum für Heil- und Sonderpädagogik
TG	Thurgau
TI	Ticino
TREE	Transitions from Education to Employment
UAS	Universities of Applied Sciences
ÜGK	Verification of the Attainment of Basic Competencies
UK	United Kingdom

UNI	(Conventional) universities
UR	Uri
USA	United States of America
UTE	University of Teacher Education
vBac	Federal Vocational Baccalaureate
VD	Vaud
VET	Vocational education and training
vetC	Federal VET Certificate
vetD	Federal VET Diploma
VS	Valais
WLAN	Wireless Local Area Network
ZFH	Zürcher Fachhochschule
ZG	Zug
ZH	Zurich

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