An international comparison of technical education funding systems

What can England learn from successful countries?

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Contents

Foreword

The Education Policy Institute is an independent, impartial and evidence-based research institute which aims to promote high quality education outcomes for all, through analysis that both informs and influences the policy debate in England and internationally.

This publication seeks to inform the debate about one of the areas of English educational performance which has attracted the most comment and concern in recent years – the quality of our system of technical education in the upper secondary (16-19) phase. This report builds upon a recent EPI review of funding trends in English 16-19 education, by considering what lessons England may be able to learn from other European countries with apparently high performing systems of upper secondary technical education. The countries selected as comparators have been chosen because they have high literacy and numeracy levels for the cohort, and/or appear to have strong labour market returns from such education.

International comparisons are frequently complicated by data availability and comparability issues, along with differences in education and social structures. But this report seeks to focus on issues such as the mix of classroom and workplace learning, differences in funding, and curriculum and qualification variability.

The authors have identified some key issues and challenges for policymakers. If these are addressed in a timely manner, then there will be less need for the high levels of policy change and volatility which we have also experienced in 16-19 education in England in recent decades.

As ever, we welcome comment and questions about our analysis and conclusions, which will help inform our future work programme.

Rt. Hon. David Laws, Executive Chairman, Education Policy Institute

Executive summary

The recent history of technical education in England has been dominated by change and instability. Since the publication of Alison Wolf's Review of Vocational Education in 2011, steps have been taken to improve provision: public funding has been removed from thousands of lower quality qualifications, the first National Colleges have been opened, large employers now pay an apprenticeship levy, and funding requirements have been introduced to encourage students to continue to study towards English and maths qualifications post-16 if they have not previously achieved a grade 9-4 (considered a 'good pass' under the new GCSE grading system introduced from 2017) in these subjects.

We are now in the middle of a second wave of changes. In September 2020, the government will begin the roll out T levels, and it is currently consulting on higher technical qualifications, designed to provide progression pathways from T levels. In addition, the government is reviewing a selection of post-16 qualifications, to ensure that all qualifications meet requirements of quality, necessity, progression, and purpose.

The government is aiming to establish a clear technical upper secondary pathway, with clear progression routes and labour market currency. In this context, this report reviews successful upper secondary (16-19 in England) technical education and funding systems, and compares them with England, to understand what lessons we can learn, how England could achieve a world-standard technical education, and the likely barriers to doing so. The countries chosen are Denmark, Norway, Germany, Austria and the Netherlands. These countries have been selected because of high literacy and numeracy levels of young people and/or labour market returns from upper secondary education.

Findings

UK has historically funded upper secondary technical education at lower rates than academic education (23 per cent less per student in 2016), which is not the case in most other countries, despite the 16-19 funding formula putting a greater weight on high-cost technical subjects. Upper secondary technical education funding per student is also lower than the OECD average: in 2016, the UK spent $9,440 per student on average, vs an OECD average of $10,900. This is surprising considering the high proportion of technical students in the UK in classroom-based study, which tends to be more expensive for the public sector than work-based learning (mainly apprenticeships).

In all countries included in this study, subsidies are provided to employers to compensate for the time that an apprentice is training outside the job or to compensate for disadvantaged intakes that drive costs up. In England, **subsidies are now concentrated on small and medium companies**. Financial support to students, which is another driver of technical education costs, is also more generous in the countries considered than in England. **Support funding from government to students has fallen** by 71 per cent per student in real terms between 2010/11 and 2018/19.

While over a half of students in England follow the technical pathway in upper secondary, **only 16 per cent of these do so in apprenticeship training**. This compares to 27 per cent across all EU countries, and between 28 per cent and virtually all technical students in the countries considered in this study.

English technical upper secondary education is also of short duration by international standards; it is assumed to take two years to complete (at least one for some apprenticeships), while in high performing countries it generally takes around three-four years, depending on the programme characteristics.

Only 15 per cent of English students are in the highest-cost groups of subjects including engineering, manufacturing, and construction, compared with an average of 34 per cent across OECD countries. In addition, the **curriculum in England is relatively narrow**. In the other countries in our study, many technical students will continue to study their local language, a foreign language, maths and other general subjects to equip them with a sound knowledge base. This is not the case in England. Breadth of curriculum, however, varies within countries too, with longer, classroom-based and higher-level programmes more likely to include a wider range of general subjects.

Conclusions

16-19 technical education in England is less well funded than in high-performing countries. Contributory factors include a low proportion of students in high-cost engineering courses, shorter qualifications and a narrower curriculum than in other countries, and less generous financial support for students and employers of apprentices.

The introduction of T levels and other proposed reforms will bring England closer to technical provision in high performing countries: funding will be rebalanced towards more technical subjects and funding levels will increase compared to the status quo with a corresponding increase in teaching hours; students starting from lower levels will receive an addition funded year to prepare them for the T level study programme; industry placements will improve students' readiness for entry to the labour market; and the requirement to pass English and maths at GCSE level will no doubt see more young people studying these subjects.

However, important gaps will remain: most students will study T levels over just two years; only those not achieving the level expected at 16 will continue to study English and maths and the curriculum will remain narrower than in other countries; industry placements will remain less substantial than elsewhere. Moreover, these improvements largely only apply to those taking T levels, and it is still unclear how dominant these qualifications will become.

T levels are a significant step in the direction of high performing countries, but there is further to go before English upper secondary technical provision resembles theirs. Tackling these issues is likely to require substantial levels of additional government funding.

Recommendations

Evidence from countries with successful technical education systems suggests the government should consider the following recommendations:

- **Funding for technical pathways**: We welcome the government's proposed rebalancing of funding toward more technical subjects. However, the proposed increases still leave funding levels lower than in the past and lower than in high performing countries. The government should provide the 16-19 phase with a more enduring financial settlement to sustain quality provision in the long term.
- **Increase the number of starts for younger apprentices**: The number of young people undertaking an apprenticeship is falling and is small by comparison to other successful systems. The government should consider the options to increase apprenticeship uptake among young people, including further redistribution of levy funding towards younger apprentices, or other incentives for employers to hire younger learners.
- **Review the adequacy of student support**: Leading comparator nations generally provide more generous student support in upper secondary education than in England, where bursary funding fell by 71 per cent in real terms between 2010/11 and 2018/19. Given the drawbacks for those not completing an upper secondary qualification, government should review the adequacy of student support, particularly whether recent changes have left disadvantaged students worse off.
- **Review curriculum breadth and programme length**: We welcome the increased teaching hours involved in T levels, and the substantial industry placement included. However, England 16-19 curriculum remains an outlier for its narrow breadth, both for academic and technical pathways. The government should commission an independent review to consider whether the breadth of upper secondary study, for all students, is properly providing the basic and technical skills that young people need for the labour market and for progression to further study. Where this leads to increased provision, this must be matched by appropriate funding rates.

Introduction

The recent history of technical education in England, especially at upper secondary level, has been one of permanent change.

In 2011, Alison Wolf's Review of Vocational Education called for a simplification of the 14-19 vocational education system, and warned that many available qualifications had no or low labour market value and did not allow progression to higher levels of education and training.[1] Since then, the government has removed thousands of qualifications from league tables and public funding, introduced the first National Colleges to address pressing skills shortages in England, and introduced the requirements for students without a GCSE A*-C (now 9-4) grade in English and maths to continue to study towards it.[2] The government also pledged to reach 3 million apprenticeship starts between 2015 and 2020, a target that is now very unlikely to be met despite the introduction of an apprenticeship levy that employers with a pay bill over £3m have to pay.[3,4] The focus on academisation also gave birth to technical-oriented providers such as University Technical Colleges (UTCs), with 60 opening since 2012, although 10 have now closed or are planning to close as a result of low enrolment.[5] Funding for 16-19 education has been reduced since 2010, leaving many more providers in deficit. There has also been a reduction of learning hours received by students of nine per cent and of teaching wages in further education by eight per cent.[6] The spending round announced by the chancellor in September 2019 will just reverse a quarter of the fall in funding per student.[7]

England is now in the middle of a second wave of reforms, which will change the technical education sector further. These include:

- **T levels**. The new level 3 technical qualifications will be introduced from September 2020, when the 'digital production, design and development', the 'design, surveying and planning', and the 'education' T levels will be introduced. Annual additional funding will total £500m once all T levels are introduced.[8,9]
- **Review of post-16 level 3 and below qualifications**. The government wants to avoid overlaps between A levels, T levels, and other qualifications. It will require all qualifications that exist alongside A levels and T levels, including applied generals and tech levels, to meet its criteria of quality, necessity, purpose and progression. Otherwise, they may no longer be publicly funded.[10]
- **Higher technical qualifications**. The government has shown concern that progression from upper secondary to higher technical qualifications is often challenging. [11] The government hopes to create a system of robust higher technical qualifications with greater labour market currency, which offers T level and other technical students the opportunity to progress to higher levels of education and training.
- **Institutes of Technology (IoTs)**. The first IoTs opened in September 2019. They specialise in delivering higher technical education at level 4 and 5. The first 12 IoTs are backed with a total of £170m funding.[12]

The government is therefore attempting to bring clarity into the technical education system, structuring provision around 15 technical routes. At upper secondary (16-19) level, 11 of these routes will be delivered through T levels or apprenticeships, which will be classroom-based qualifications with industry placements, and four will be apprenticeships. Both qualifications should allow students to either progress to higher levels of education (higher technical qualifications and higher/degree apprenticeships) or directly into the labour market.

More recently, in September as part of the 2019 spending round, the government announced a one-year settlement that will see an additional £400m for 16-19 education for 2020-21.[13] The funding commitment includes:

- An increase to the basic funding rate for all students with funding worth £190 million, equivalent to an additional 2 per cent.
- £120 million to increase the uplift available for courses with higher equipment and other running costs, such as engineering.
- A further £25 million for the delivery of T levels.
- £35 million for targeted interventions to support students taking level 3 qualifications to resit GCSE English and maths.
- £20 million to support teacher recruitment and retention in the sector.

In addition, the government committed a further £120m for a second wave of eight Institutes of Technology.[14]

In its attempt to build a gold standard technical education system, the government should consider the experiences of some of the world's highest performing countries. This report compares upper secondary technical education in England against a number of top-performing nations. We look at funding systems in selected countries and link these to how upper secondary technical education is structured and to student outcomes.

The report is organised as follows:

In **chapter one**, we establish the criteria for selecting countries for comparison.

In **chapter two**, we review funding levels in these countries, comparing funding rates for academic and technical upper secondary, and the contributions of government, households and the private sector.

In **chapter three**, we analyse a range of elements relative to the design of programmes, including enrolment rates, the length of programmes, the prevalence of work-based learning, the distribution of students among different subject groups and the breadth of curriculum.

Finally, we discuss what our analysis means for 16-19 technical education in England and issue recommendations for policy reform.

Methodology

This report does not only compare funding of upper secondary technical education in different countries but gets under the skin of these figures to understand cost drivers. This means that our analysis considers a range of elements that help explain differences in levels of funding. As a result, we use data from a variety of sources, as detailed in this section.

Chapter 1

In order to select the countries for this international comparison, we have used two sets of criteria: learning outcomes and labour market outcomes.

- **Learning outcomes**: we have selected countries with high reading/literacy and maths/numeracy scores in PISA and PIAAC. Both datasets are held by the OECD. Among other things, PISA assesses reading and maths skills at age 15, while PIAAC assesses literacy and numeracy skills for the whole working-age population. For PISA we have used published data, while for PIAAC we have analysed raw data selecting 19-year olds only, which is the expected completion age of upper secondary education (16-19) in England. Due to small sample sizes, we have not been able to restrict the analysis to students who followed technical tracks.
- **Labour market outcomes**: we use two measures of labour market outcomes. First, the employment rates of those who completed upper secondary technical education, one to three years after completing their qualification up to the age of 34, provided by Eurostat. Second, we consider the proportion of 15-29-year olds who are upper secondary-educated and are not in education, employment or training (NEETs). The source of this data is the OECD.

Chapter 2

This chapter looks at funding for upper secondary technical education in different countries, with data coming from a variety of sources. Before presenting the data used in this section, it is crucial to clarify several concepts using the definitions in the UOE (UNESCO-UIS, OECD, and EUROSTAT) handbook of international education statistics: [15]

- **Upper secondary education**: this is the education stage designed to prepare young people for tertiary education (often university-based) or to join the labour market. In England it is expected to start at age 16 and finish no later than age 19. Other countries both start and finish upper secondary at different ages. It is often the stage where students choose between academic and technical pathways. While in England we generally refer to this education stage as 16-19 education, in this report it spans all age groups to include all people doing relevant qualifications. For example, it will include adults taking their first full level 3 qualification.
- **Technical education**: it is designed to equip students with knowledge and skills geared to specific occupations and industries. It will often have work-based components, and it can be classroom-based or an apprenticeship. The UOE manual uses 'technical education' as an umbrella term for vocational education and training and occupation-oriented qualifications, regardless of whether they are classroom-based qualifications or apprenticeships. This is

consistent with the approach taken in the report of the independent panel on technical education, chaired by David Sainsbury Sainsbury, in 2016:

> "In recent years, government and others have started to refer less frequently to 'vocational education' and increasingly to 'technical and professional education' or simply 'technical education'. This report follows this convention and uses 'technical education' throughout. It would be easy to suggest that the move away from 'vocational education' is nothing more than a change in terminology; simply a rebranding exercise. But we believe it must be much more than that. In the past in this country the vocational option has often been defined not by what it is, but by what it is not: the academic option. Despite its dictionary definition, the word 'vocational' in policy terms has often been treated as a catch-all term for everything other than GCSEs, A levels and degrees. We need to make a decisive break from this flawed approach, and we believe that shifting the emphasis to discussing technical education can help".[16]

- **Academic education**: also referred to as 'general' education, it prepares students for further study, and is classroom-based. It is not intended to be occupation- or industry-specific.
- **Dual-system apprenticeships**: these qualifications require learners to spend most time learning on the job, and some time learning in the classroom. The work-based element usually needs to account for no less than 75 per cent of the total planned learning hours. In England, apprentices should spend at least 20 per cent of their training learning off the job.

Figures 2.1 to 2.3 reflect **funding figures** from the OECD. This data covers spending on formal education, whether it comes from public sources, households or the private sector. This includes all training-related costs, whether this takes place in the classroom or at work in the context of an apprenticeship. This means that spending on apprenticeship training is included. However, work-based training which does not include any classroom-based provision is excluded. While the data presented includes publicly funded maintenance grants for students, it does not include apprentice wages.

To illustrate how spending on apprenticeship training appears in our data, the UOE manual gives the following example:

> "For example, if the estimated total cost of a[n] … apprenticeship programme to the employer is EUR 10 billion, of which EUR 6 billion is the estimated cost of training and EUR 4 billion is the cost of apprentices' salaries, social security contributions, and other compensation, only EUR 6 billion are included in [the data]."[17]

Data on employer subsidies and financial support available to students has been gathered through a literature review (see endnotes and bibliography for a detailed list of sources).

Chapter 3

This chapter gets under the skin of funding data and discusses cost drivers. It does so by reviewing a range of elements and using the following data:

- **Percentage of students in technical tracks:** we use Eurostat data for comparator countries and Department for Education data for England. We use Department for Education (DfE) data for England as Eurostat includes all students in upper secondary, regardless of age. In the case of England, this will include many older learners doing, for example, level 3 qualifications. While in countries like Germany or Denmark the proportion of older learners may be substantial, they will be doing the same or similar programmes as younger students. This is not the case in England, where there may be substantial differences between the qualifications pursued by 16-19-year olds and those taken by older students.

- **Percentage of technical students in apprenticeship training**: we use Eurostat and DfE data for the reason stated above. The percentages in brackets in figure 3.2 show the number of apprentices as a proportion of all technical students, rather than as a proportion of all upper secondary students.
- **Cost variation across subjects**: in this case data has been obtained through literature review and website research (see endnotes and bibliography for more detailed information).
- **Distribution of students between subjects**: this shows how students distribute between four subject groups: 'engineering, manufacturing, construction', 'health, welfare', 'business, administration, law', and 'services'. Categories do not add up to 100 per cent as the OECD, where the data comes from, only provides enrolment numbers in a selection of subject groups.

We are confident that the methodology used in this research allows for comparison between England and high-performing countries, and that the evidence reviewed provides important lessons for government and policymakers to learn from. The table below summarises where future work in this area could benefit from further insight.

Indicator	**Data included in this report**	**How analysis could be expanded**
Learning outcomes	Reading/maths score for 15-year olds and literacy/numeracy scores for 19-year olds	Break down scores for 19-year olds by pathway (technical)
Funding per technical upper secondary student	Spending on training, including apprenticeships but excluding apprentice wages	Data could be fine-tuned by splitting funding figures by type of provision (classroom-based vs apprenticeship), and how much of it goes to providers and how much to other recipients
Employer subsidies and student support	Levels of legal entitlement for employers and students	Average sum obtained by recipients of subsidies and maintenance support, and in the case of students, proportion receiving support
Cost by subjects	Data from literature review for Norway, and available data from England's 16-19 funding formula. Data for Norway reflects running costs and England's, funding rates	Running costs of specific subjects, per year, for all countries studied
Distribution of student by subject groups	Distribution of student between a selection of subject groups	Same data for all subject groups

Chapter 1. Identifying high-performing countries

It is widely accepted that a successful technical education system should provide solid basic skills for its learners and also a labour market-relevant qualification offer to smooth transition from school into the world of work.[18,19] We have therefore based the selection of countries for this report on two types of outcomes: learning and labour market-related. Presenting and analysing outcomes for technical and academic students separately is often not possible due to data limitations. Instead, where possible, this section provides outcomes for those leaving education with an upper secondary qualification who, in most cases, did so through technical pathways. Where data for England is not available, UK data will be provided as a proxy.

The analysis of the outcomes below resulted in the choice of Germany, Netherlands, Austria, Denmark and Norway as the best fit for this international comparison of upper secondary technical education funding. These countries stand out in a number, if not all, of the following areas:

- High literacy and numeracy performance at different ages,
- Positive performance progression between age 15 and age 19,
- High levels of employability of upper secondary technical education leavers, and
- Low numbers of upper secondary leavers not in education, employment, or training (NEETs).

Learning outcomes

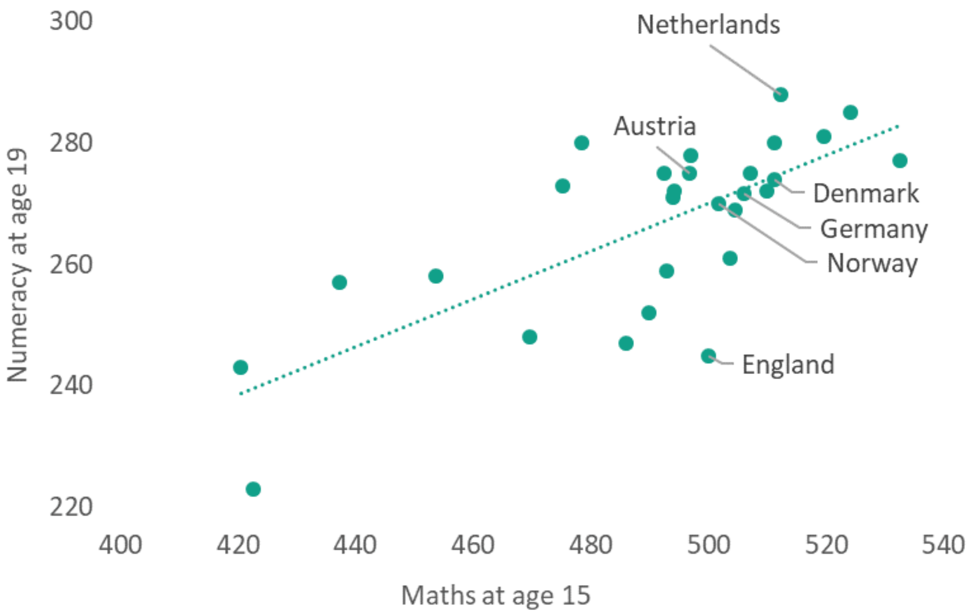
For learning outcomes, we consider students' proficiency in two basic skills: the reading/literacy and maths/numeracy performance of students at age 15 and 19, using PISA data for students at age 15 and PIAAC data for 19-year olds. Both held by the OECD, PISA stands for Programme for International Students Assessment, and assesses a range of abilities of 15-year olds, notably in reading and maths.[20] PIAAC is the Programme for the International Assessment of Adult Competencies, and its main output is the survey of adult skills. This survey assesses the abilities of adults in several areas, including literacy and numeracy. [21]

We have used published PISA figures and analysed raw PIAAC data, selecting 19-year olds only in the case of PIAAC, which is the higher expected age of completion of upper secondary in England. Selecting only 19-year olds did not come without limitations, notably that (a) age breakdown was not available for some countries, including Germany or Austria, and (b) sample sizes are small, and we have not been able to limit our analysis to students in technical pathways as a result.

We have considered whether countries performed well in both reading/literacy and maths/numeracy at age 15 and 19, and whether it appears that students make progress during upper secondary.[a] Figure 1.1 shows the performance of students in all participating countries in maths/numeracy. English 15-year olds show an average performance, but they fare substantially worse at age 19. This suggests that very little progress is made by English students in upper secondary.[22] As the chart shows, countries performing near or above average at both stages include Norway, the Netherlands, Germany, Denmark and Austria. Other countries with particularly high performance at both ages are Japan, Korea, and Estonia. The Netherlands stands out for having much higher performance at 19 than countries with similar performance at 15.

[a] How PIACC scores compare with countries with similar PISA scores.

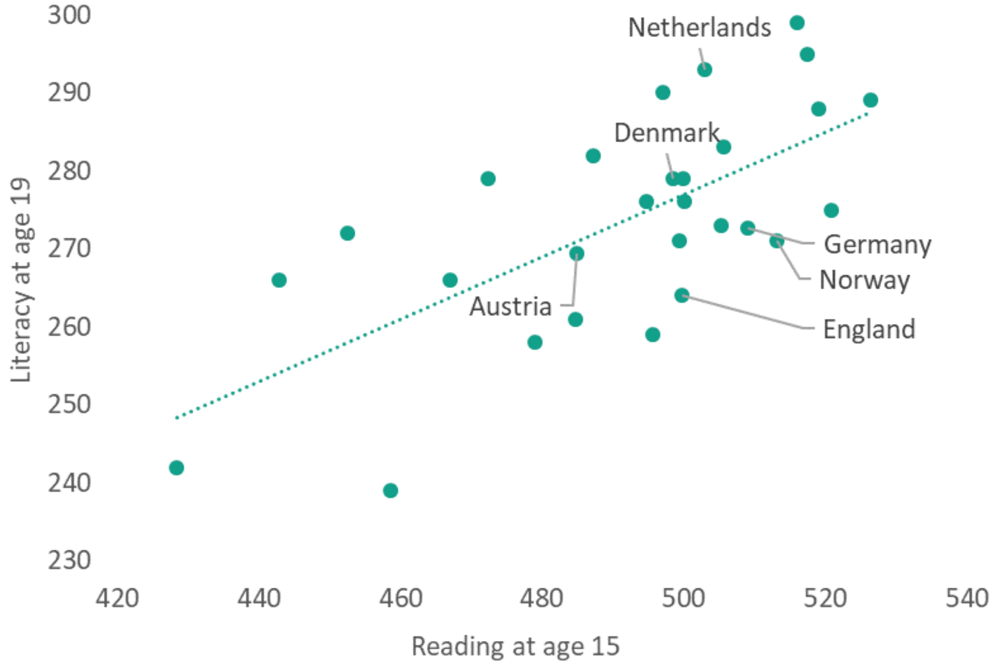
Figure 1.1 Maths/numeracy performance at age 15 and 19 [b]



Source: OECD (PISA 2015, and PIAAC 2015 or most recent year)

As figure 1.2 shows, there is less of an association between performance at 15 and performance at 19 in reading/literacy. However, the top performers remain largely unchanged, with the Netherlands showing particularly strong performance at both ages, as do Japan, Korea and Estonia. German and Norwegian students do well at age 15, but less so at age 19 (yet still showing a performance above or close to average). Once again England appears to show poor performance at age 19 when compared to countries with similar performance at 15.

Figure 1.2 Reading/literacy performance at age 15 and 19[b]



Source: OECD (PISA 2015, and PIAAC 2015 or most recent year)

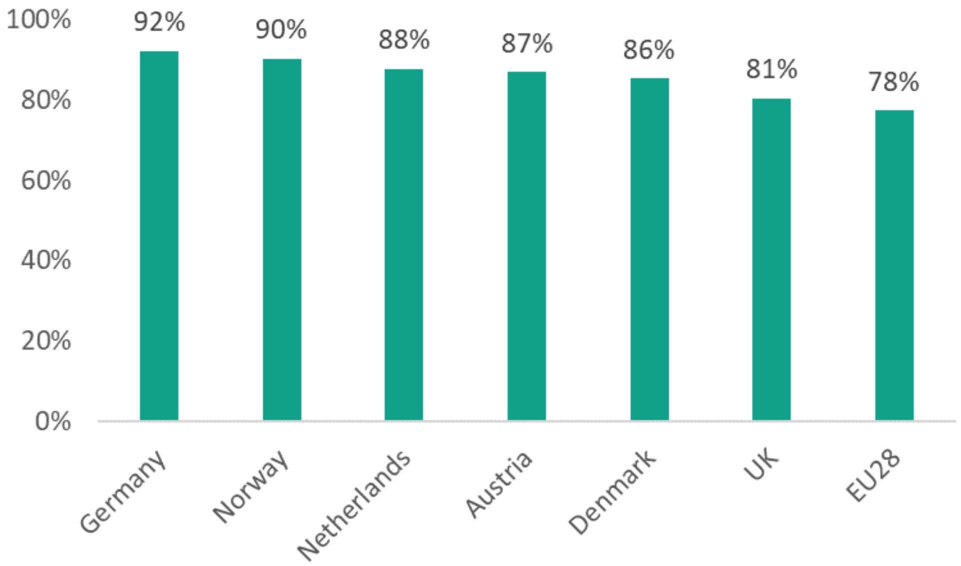
[b] PIAAC performance in Austria/ Germany corresponds to the whole working-age population.

Labour market outcomes

The non-educational outcomes considered here are the proportion of upper secondary technical education graduates employed, and those not in education, employment or training (NEET).

In 2018, 78 per cent of education leavers aged 15-34 and whose highest attainment was upper secondary technical education in the EU28 were employed for one to three years after completion (figure 1.3). In all our selected countries, this group has employment rates above the EU28 average. The rate is highest in Germany, where 92 per cent are employed, followed by Norway (90 per cent), the Netherlands (88 per cent), Austria (87 per cent) and Denmark (86 per cent). A little further behind we find the UK (81 per cent).

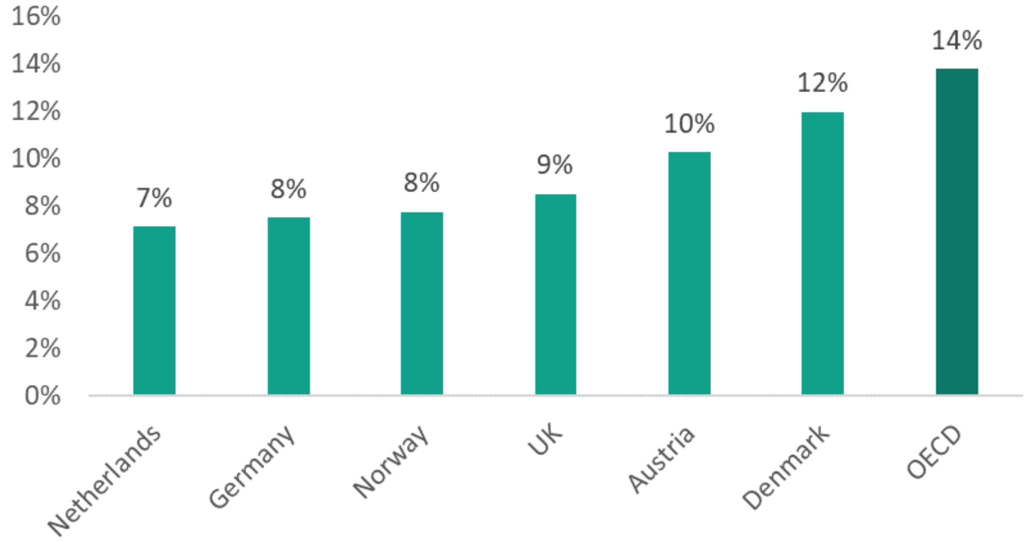
Figure 1.3 Employment rates of 15-34 upper secondary technical education completers who are not in education or training, 1-3 years after completion, 2018



Source: Eurostat

The number of young people who are NEETs in these countries shows a similar picture. In the Netherlands, Germany, Norway, UK, and Austria 10 per cent or less of 15-29-year olds who completed an upper secondary or post-secondary-not tertiary education are out of education, training or employment. This is the case of 12 per cent in Denmark (figure 1.4).

Figure 1.4 Percentage of 15-29-year olds whose highest attainment is an upper secondary or a post-secondary qualification and who are not in education, employment or training (NEETs), 2017



Source: OECD

Conclusions

We conclude from the analysis in this section that the Netherlands, Denmark, Germany, Austria, and Norway are all high performers against some, or all of the indicators presented above:

- The Netherlands: students at age 15 have high levels of literacy and numeracy skills, and students at age 19 have much higher levels of literacy and numeracy than students in countries with similar scores at age 15. Furthermore, technical upper secondary completers enjoy high levels of employment rates and low NEET rates.
- Denmark: literacy and numeracy levels are high at both age 15 and 19. Employment levels are higher than the OECD average.
- Norway: students have high levels of literacy and numeracy skills at age 15, yet they do not stand out at as top performers at age 19. Employment rates are, however, well above average.
- Germany: literacy and numeracy scores at age 15 are positive, though scores for literacy of those aged 16 or older are lower than might be expected. However, employment rates are very high.
- Austria: students to do not stand out for their literacy and numeracy scores, though the numeracy scores of those aged 16 and older are higher than might be expected of countries with similar scores at age 15. Upper secondary graduates enjoy high employment rates.

Compared to these countries, literacy and numeracy levels among 15-year olds in England are average, while 19-year olds do substantially worse than might be expected of countries with similar performance at age 15. NEET rates, however, are very low, although employment rates of those who leave with an upper secondary qualification within one to three years of completion are the lowest among the selected countries.

Chapter 2. Funding systems

Spending levels across countries

In this chapter we investigate how high-performing upper secondary technical education systems are funded. Unfortunately spending data for Denmark are not available, but we decided to include this country regardless due to its well-respected technical education system and the outcomes of our analysis in chapter 1.

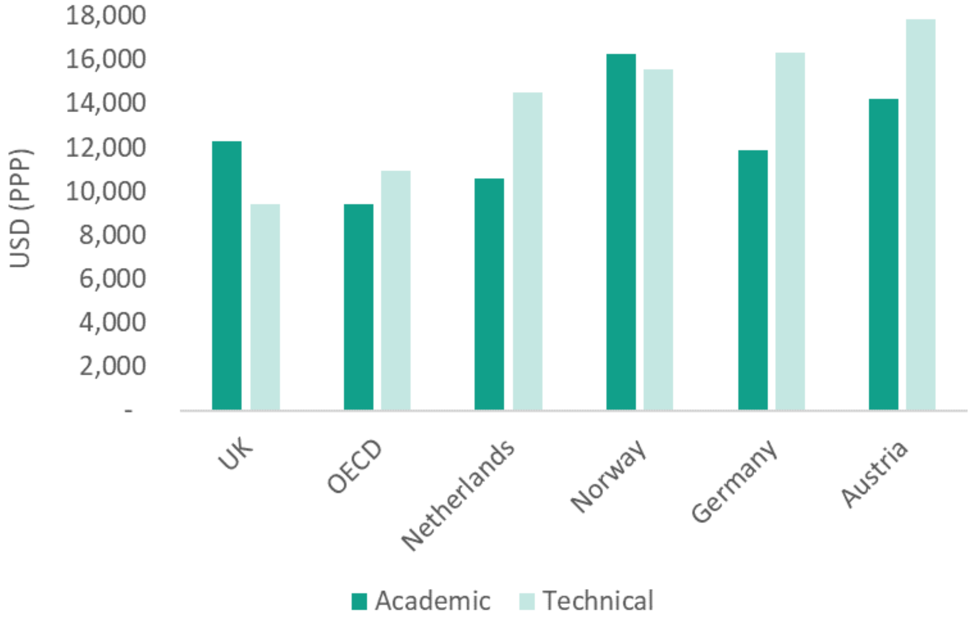
As set out in the methodology section, funding figures cover spending on formal technical education, whether it comes from public sources, households, or the private sector. This includes all training-related costs, whether this happens in the classroom or at work in the context of an apprenticeship. It excludes funding for work-based training with no classroom-based component. In other words, some classroom-based provision is required for inclusion in the data presented. While spending on apprenticeship training is included, apprentice wages are not. However, publicly funded maintenance grants to students and apprentices are included.

Although they only present a partial picture, the OECD data on education expenditure provides a good indication of funding levels across the selected countries. Figure 2.1 shows how much countries are spending on each upper secondary technical education student per year, in equivalent US Dollars using purchasing power parity.[c] All selected countries spend more per capita than the OECD average ($10,900). The Netherlands spends around $3,600 more per student than the OECD average (+33 per cent), Norway $4,600 more (+43 per cent), Germany $5,400 more (+49 per cent), and Austria $6,900 more (+63 per cent more). As a reference, the UK spends $9,440 per technical student in upper secondary, just under $1,500 less than the OECD average (-14 per cent). There may be several reasons for countries to spend more or less on one particular education stage or pathway, and that does not necessarily reflect quality of provision. This is something that will be discussed later.

Funding rates in England appear to be lower in technical study than in academic study, despite the 16-19 funding formula accounting for cost weightings meaning that some technical courses, which are more expensive to deliver, have a premium of between 20 and 30 per cent. For some specialist and land-based courses, the premium is 75 per cent. The final amount received by providers will, however, depend on the number of annual planned hours of technical qualifications and retention rates, among other things. [23]

[c] This technique standardises prices across countries considering costs of living.

Figure 2.1 Funding per upper secondary academic and technical student, 2016

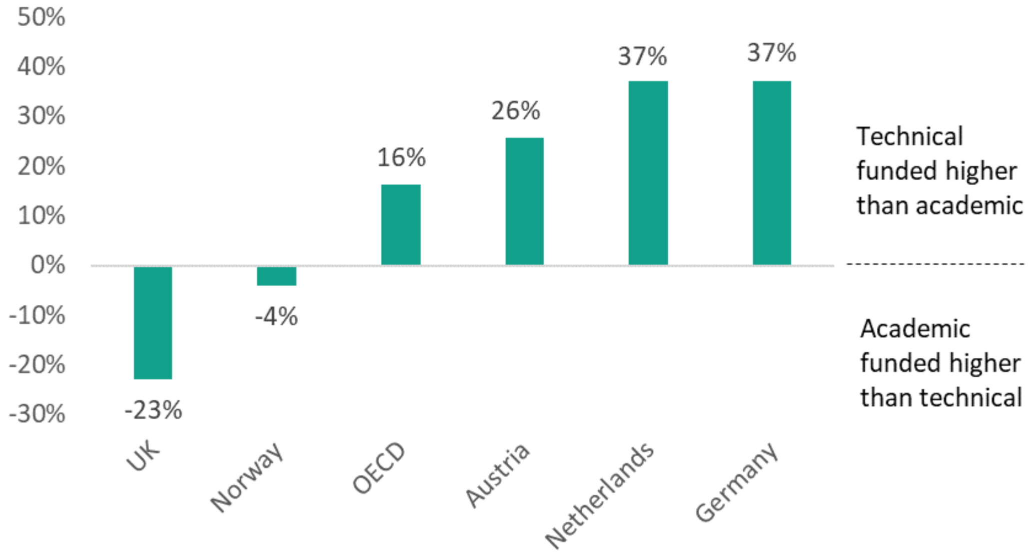


Source: OECD

While OECD data is the best source for comparing funding levels across countries, it does not come without its limitations. Crucially, the most recent spending figures date from 2016. An EPI report published in early 2019 found that 16-19 education funding has been falling over recent years; by 16 per cent per student in real terms since 2010/11, [24] although current government spending plans for 2020-21 should reverse a quarter of this fall.[25] The size of the falls may not therefore be fully reflected in the figures presented.

OECD countries spend on average 16 per cent or $1,520 more per technical student than per academic student. However, this is not true for the UK, where technical students get 23 per cent less funding than academic students, and Norway, where technical students get 4 per cent less. However, funding per technical student in Austria is 26 per cent higher than for academic students, and 37 per cent higher in both the Netherlands and Germany (figure 2.2).

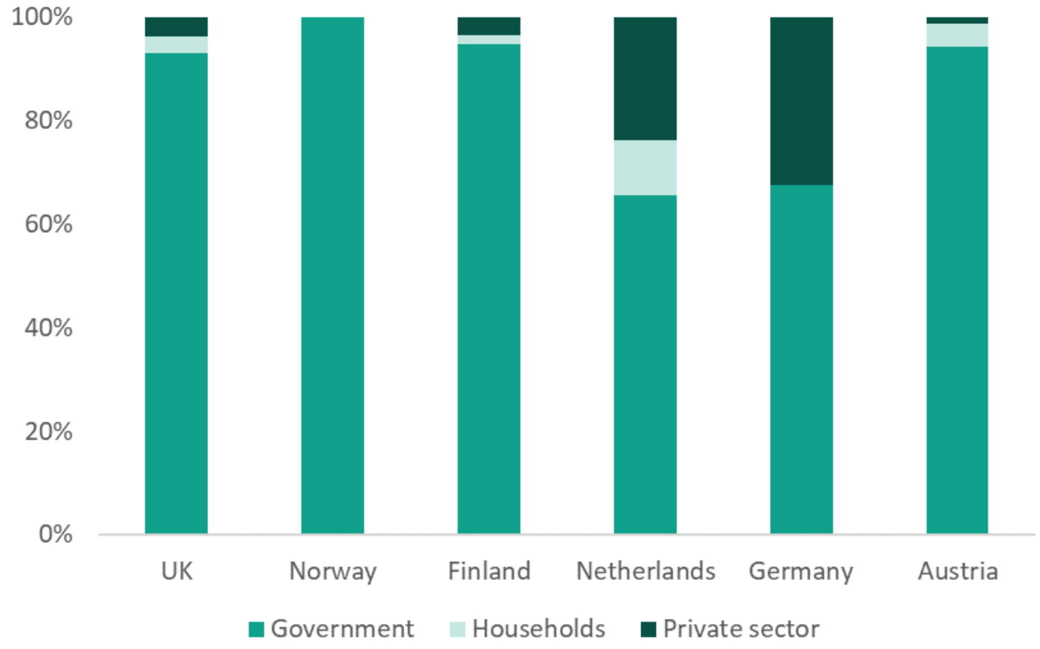
Figure 2.2 Funding gap between academic and technical upper secondary education, 2016



Source: OECD

Some of the countries that fund technical education more generously also have substantial contributions from employers, including costs of providing on-the-job training and paying for off-the-job training. Figure 2.3 shows that is especially true for Germany and the Netherlands, where the private sector accounts for 33 per cent and 24 per cent of the total spending respectively. In countries like Norway, private sector contributions are small despite high rates of apprenticeship take-up due to high levels of public subsidy. In the Netherlands, high levels of household contributions mainly reflect that students in long programmes need to pay tuition fees from age 18.

Figure 2.3 Percentage of total technical education spending coming from government, households, and the private sector, 2016



Source: OECD

Above we mentioned that OECD data includes all spending on upper secondary education, regardless of the age of learners. Given the proportion of older learners that the English spending figures are likely to include, the government, and the Institute for Apprenticeships and Technical Education in particular, should collect and present comparable data reflecting spending levels on 16-19 year-olds in both classroom-based technical education and apprenticeship training. Any analysis involving international comparisons would greatly benefit if this was achieved.

Employer subsidies and student support [d]

While funding going to providers is the main driver of costs in upper secondary technical education, there are two elements that will, inevitably, have an impact on the size of public spending on this stage of education: the support received by students, notably in classroom-based provision, and the subsidies for employers who hire apprentices. Funding to providers is not easy to untangle from funding for employers and students, as companies may use part of their subsidies to pay for training outside the workplace, and subsidies to students may be channelled through providers.

Levels of student support vary significantly between countries, with some making very limited support available to learners, and others taking more universal approaches to student finance.

In England, student support has been affected by recent falls in funding. In 2010/11 students received over £630m worth of financial support, but by 2018/19 this had decreased by 71 per cent in real terms, to just £184m. [26] Today, England offers a targeted support scheme to students aged 16-19, with only the most disadvantaged students being eligible for student finance, generally up to £1,200 per academic year.[27] Additionally, apprentices that have been in care can receive a one-off £1,000 bursary.[28]

In other countries, support is available for students from the age of 18, usually because other benefits apply for under-18s or their families. And, as we shall see in the following chapter, in most cases students continue up to and beyond the age of 18.

In Denmark, parents of children aged 15-17 can obtain up to £114 per month.[29] Meanwhile, classroom-based students aged 18 or older are eligible for grants between £177 and £240 a month, depending on parental income. However, as most students choose a work-based pathway, the apprentice wage is the means by which most students have to sustain themselves through upper secondary education.[30]

In the Netherlands, classroom-based learners over the age of 18 are eligible for a loan of £436 a month, which can be completed with a supplementary grant of £359 a month. [31] [32] Parents of children aged 12-17 can obtain £284 per quarter.[33]

In Germany, grants and loans are available to students in the classroom-based pathway: they are eligible for loans up to £6,453 and grants between £218 and £764 a month depending on individual circumstances.[34] [35] In Norway, support for technical students comes as a combination of grants and loans. There is support available to students to relocate, for subsistence and expenses and for purchasing equipment required in their studies, among other support. Loans, however, are also available. Depending on individual circumstances, upper secondary technical students are eligible for a maximum annual support of £10,000 (2019/20). Up to 40 per cent of this support is given as a grant, depending on the student's situation, with the rest being provided as a loan.[36] In most cases, the level of financial support to upper secondary students is higher than in England.

The level **of subsidies from government to employers** also varies greatly from country to country. In England, employers with a pay bill of £3m or more pay 0.5 per cent of any amount in excess of that

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[d] Prices in this section are shown in pounds and in cash terms (i.e. only in current prices if they are for academic year 2019/20). We have used the exchange rate on the 31st of December of the relevant year, or current rate for 2019/20 figures.

into a digital account for apprenticeship training. [37] This levy, which was introduced in April 2017, is expected to raise between £2.6bn and £3bn per year between 2017/18 and 2021/22. [38] Levy-paying employers get a 10 per cent top-up from the government for apprenticeship training. Employers with a pay bill of less than £3m do not pay the apprenticeship levy. Instead they only need to contribute 5 per cent of the training costs, while government subsidises the remaining 95 per cent. [39] Additional funding is available if a student does not have the required minimum level of English and maths.[40] Employers also obtain an additional £1,000 if they hire an apprentice aged 16-18.[41]

In both Germany and Norway, employers get a subsidy if they hire disadvantaged learners. [42] Norwegian companies receive, at least, a basic grant of circa £13,000 per apprentice, spread over the duration of the apprenticeship. Employers can obtain a supplement on top of this amount depending on the characteristics of the training programme (i.e. if apprentices spend more time learning than producing value for the company, then the company can obtain additional funding from government up to around £1,000). They can also obtain additional funding for apprenticeship places in protected trades. [43,44,45,46]

In Austria, the decline in apprenticeship numbers prompted the government to increase public subsidies to employers to incentivise them to offer apprenticeships. Every company that trains an apprentice is entitled to basic support, which they receive in different amounts for each year of the apprenticeship. There are additional grants for employers when apprentices pass their examination with outstanding results. Other benefits for employers include health insurance contributions for apprentices in the first two years of training, and accident insurance is waived for the whole of the apprenticeship. Only in the last year do companies need to contribute to the apprentice unemployment insurance. Companies also receive flat rate grants if they employ apprentices who are young women in male-dominated occupations, disadvantaged apprentices, participants in inclusive schemes and older learners that meet certain requirements. All this comes from the federal government, but providers and municipalities provide funding too. [47]

In the Netherlands, training companies receive grants for offering apprenticeships, up to £2,420 per student.[48] [49]

Danish employers also pay an apprenticeship levy, which in 2018 was £326 per full-time employee, whether they employ apprentices themselves or not. In return, employers get apprentice wages reimbursed for the time that apprentices spend in colleges and receive contributions toward apprentices' travel expenses if they work abroad.[50,51]

In conclusion, public subsidies may compensate employers for the cost of training apprentices, for labour costs of apprentices, for periods when apprentices are not producing value for the company, and for disadvantaged intakes. Additionally, they can reward employers in protected trades. The cost to the public purse will depend on how the government strikes a balance between the universality of subsidies and the degree of employer contributions.

Table 2.1 Summary table: student support and employer subsidies across countries

Country	Student support	Employer subsidies
Denmark	Parents receive up to £114 a month per child aged 15-17. Classroom-based students aged 18 or older are eligible for grants between £177 and £240 a month.	Employers pay a levy of £326 (2018) per full-time employee. In return, apprentice wages are reimbursed when they are not in the company, among other costs.
Norway	Students can obtain support to relocate, for subsistence, to purchase equipment, etc. Maximum annual support is £10,000, of which 40 per cent can be obtained as a grant.	Employers receive a minimum grant of circa £13,000 per apprentice for the whole duration of the apprenticeship, with a top up depending on the characteristics of the programme. There is also funding for employers recruiting disadvantaged apprentices, and those offering placements in protected trades.
Germany	Loans up to £6,453 a year and grants between £218 and £764 per month are available to students.	Companies are eligible for a grant if they hire disadvantaged young people.
Austria	No student support provided	Employer obtain a basic amount which is split over the duration of the apprenticeship. There are additional grants if apprentices pass their examinations with outstanding results. Some labour costs are waived. Employers obtain grants if they hire young women in male-dominated trades, disadvantaged apprentices, etc.
The Netherlands	Parents can obtain £284 per quarter per child aged 12-17. Classroom-based learners aged 18 or older are eligible for a loan of £426 a month. Supplementary grants up to £359 a month also available.	Grants up to £2,420 per student are available for employers offering apprenticeships.
England	£1,200 per academic year for the most disadvantaged students. £1,000 one-off bursary for disadvantaged apprentices.	Employers with a pay bill over £3m pay 0.5 per cent of any amount in excess of that into an apprenticeship levy. Levy-paying employers get 10 per cent government top-up for any spending on training, while government subsidises 95 per cent of training costs of SMEs. Additional funding for English and maths training and employers hiring disadvantaged apprentices.

Conclusions

While it may have gone some way to begin rebalancing funding between academic and technical education, the UK still funds technical education at a lower rate than all other countries studied. Furthermore, the figures shown probably do not reflect the total size of falls in funding that have hit 16-19 education in England since 2010.

Private sector contributions are particularly large in countries with high levels of apprenticeship training. In many countries the cost of salaries is eased by high levels of government subsidies to employers. Countries tend to provide additional funding to companies that hire disadvantaged apprentices (Germany, Norway), or if they offer places in protected trades (Norway). Employers can also obtain subsidies to labour costs such as health insurance or employer contributions to unemployment insurances (Austria). Denmark has an employer levy system akin to the one in England.

With the introduction of the apprenticeship levy, employer contributions to training in England have increased. However, student support and subsidies to levy-paying employers seem less generous than in other countries. Support for Small and medium-sized enterprises (SMEs) is, however, remarkably generous.

Defining an adequate student support threshold is beyond the scope of this research. However, the low level of student support in England compared to its competitors and the large falls in student support since 2010/11 both suggest that government might need to review the adequacy of student support funding.

Chapter 3. Programme design

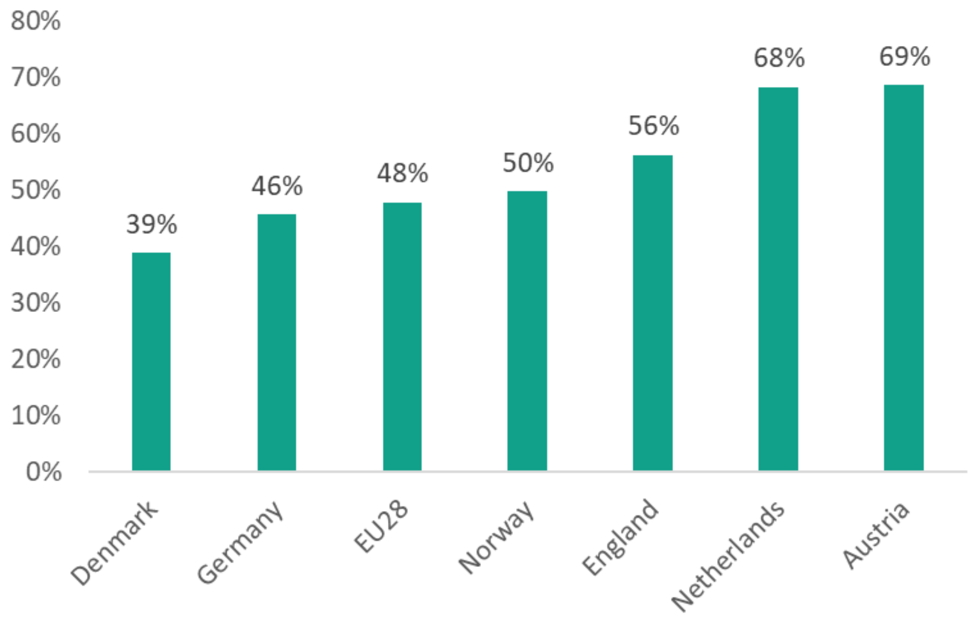
Funding and spending figures alone provide little information about the provision students receive. In this chapter we consider the programme characteristics that may explain some of the variations in the levels of spending seen in the previous chapter. There are four aspects that will be considered in this chapter:

- Number of students in technical pathways, and the balance between classroom-based and work-based study,
- Length of programme,
- Distribution of learners between subject groups, and
- Breadth of curriculum

Student numbers and pathways

The total number of students enrolled in upper secondary technical education may influence the rate at which governments and employers are prepared to fund learners, as larger numbers may restrict how much money is overall available. This is especially the case for technical education as most countries spend more on technical students than on academic students (see chapter 2).

Figure 3.1 Percentage of upper secondary students in technical tracks, 2017[e]



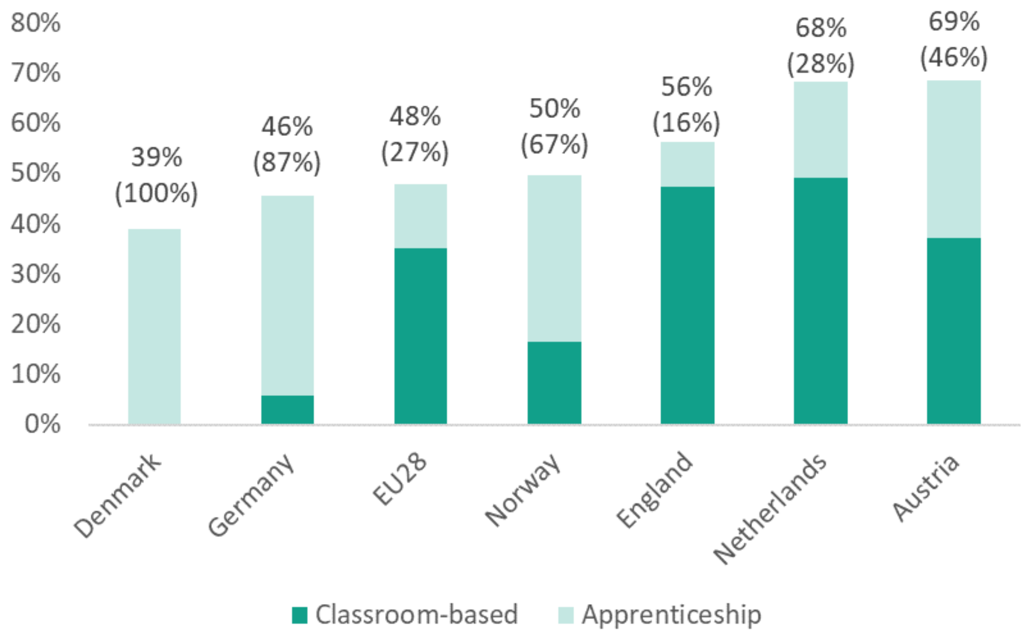
Source: Eurostat and Department for Education

[e] England is quite unique in having many older learners in upper secondary education. In other countries, this category of learners have a separate learning route available, generally under the name of 'continuing education' or similar. Even if countries like Germany or Denmark have some older students returning to education to start upper secondary qualifications, these are still mainly targeted to young people as an alternative to academic education, while in England older students may be taking upper secondary qualifications that are quite different to those taken by 16-19 year-olds. To that end, the data for England reflects DfE data for 16-19 year-olds, rather than all ages.

Figure 3.1 shows that 48 per cent of students are in vocational tracks across the whole of the EU28. Most of the countries selected have higher proportions that this average. Denmark is the only exception, where only 39 per cent of students chose a vocational pathway. The Netherlands and Austria have particularly high proportions of students in vocation tracks, with 68 and 69 per cent respectively.

These figures, however, tell us very little about the nature of the programmes. Whether programmes are classroom- or work-based has an impact on the total amount of spending. For example, classroom-based pathways tend to be more costly for governments, as they need to maintain infrastructure and pay teaching professionals to a greater extent than if students are mainly based in the workplace.[52] Work-based tracks, however, require higher levels of spending from employers, as they will incur on-the-job training costs for apprentices or trainees.

Figure 3.2 Percentage of upper secondary students in technical pathways, and percentage of technical students in apprenticeships (in parenthesis), 2017



Source: Eurostat and Department for Education

Figure 3.2 provides the breakdown between classroom-based programmes and apprenticeships. International educational statistics classify qualifications as classroom-based if at least 75 per cent of the time is spent in the classroom, while in apprenticeship training 75-90 per cent of time needs to be spent training on the job. [53]

Interestingly, the countries with the highest proportion of students in technical pathways tend to be those with more students in classroom-based study. In the Netherlands, for example, 68 per cent of students choose a technical programme, but only 28 per cent of these do so in apprenticeship training.

The opposite is true for countries like Denmark, Germany, or Norway. While Denmark has the lowest percentage of upper secondary students in technical tracks, virtually all of them do apprenticeships. Similarly, 87 per cent of technical students in Germany are in apprenticeship training, and 67 per cent in Norway. Austria is unusual in that it has the second highest participation rate in technical study, whilst just under half of technical students do apprenticeships.

The case of England is also peculiar compared to the other countries studied in that it has a low proportion of students in apprenticeship training given the total proportion of technical students; more than half of upper secondary students are in technical programmes, but less than 20 per cent of them take qualifications involving significant work-based training.

However, does it matter whether technical education is just classroom-based or has a substantial work-based element? Research suggests that benefits of technical education for students, employers, and the wider economy are maximised when work-based learning is an integral part of a wider qualification, which also includes classroom-based learning.[54] Classroom-based and work-based provision should therefore not compete, but complement each other. In a report published in 2015, the OECD was unequivocal that any technical qualification should include work-based provision: "…in apprenticeships, but also more generally, work-based learning has such profound benefits, both as a learning environment and as a means of fostering partnership with employers, that it should be integrated into all vocational programmes and form a condition of public funding. It should be systematic, quality-assured, assessed and credit-bearing." [55] Arguably, the authors of the report would not approve of the low levels of take-up of 16-19 apprenticeships in England, where classroom-based provision dominates.

Apprenticeship policy in England is quite unique in attempting to achieve two objectives simultaneously, that at least in appearance have little in common. On the one hand, as in most other countries, apprenticeships are expected to offer young people a sound educational alternative to academic education (A levels), that should be labour market-focused and smooth the transition from school to work. On the other hand, apprenticeships in England are also available to older learners, without age limitation, who can access apprenticeship training to retrain or upskill. The apprenticeship levy may have reinforced this duality, as since its introduction we have seen a decrease in apprenticeship starts across the board, but an increase in the take-up of level 4+ apprenticeships by older learners.[56] Levy-paying employers, which have driven the increase in level 4+ provision, may have incentives to train their existing workforce with the funds in their digital levy account, as there is no requirement for companies to take on a minimum number of younger apprentices.

Research by EPI and its partners has shown that, with the right reforms (including more, longer apprenticeships, for younger students), both learners and employers can reap benefits from apprenticeships.[57] In England, however, the scarcity of apprenticeship opportunities for younger learners and the substantial amount of low-quality apprenticeships, may have prevented higher levels of returns for apprentices.[58] However, there is evidence that the introduction of the apprenticeship levy and new requirements to ensure more substantial learning for apprentices has led to a reduction of starts in apprenticeships of low quality and little market currency.[59]

When it comes to funding implications, more work-based training tends to increase the costs to employers, and most likely, reduce spending for government. However, in some cases subsidies to employers discussed in chapter 2 can reduce the financial burden borne by companies.

Programme length and balance between classroom-based and work-based study

Clearly the length of study programmes will have an impact on the resulting spending figures, but it will also depend on the distribution of students across different subject groups.

Upper secondary technical education systems across the countries studied do not tend to have a single established duration for their vocational programmes. Instead countries tend to offer programmes of different durations; with differences being between classroom-based and apprenticeship programmes, and between programmes that account for different levels of prior attainment or the skill level of learners. Most countries offer programmes that combine substantial work-based (generally an apprenticeship) and classroom-based learning; these programmes are called 'dual system' or 'dual system apprenticeships'. In some countries, the programme will be broken down in classroom-based and work-based blocks, while in others both elements will be a lot more blended, with students spending time in the two settings intermittently.[60]

Denmark belongs to the latter group of countries. Most students in the technical pathway will begin their studies with a basic programme that lasts one year, and that will equip them with basic knowledge. This will be followed by a main programme of usually three to three-and-a-half years, which will allow them to specialise, meaning that the whole programme takes about four to four-and-a-half years to complete. Students typically spend around two thirds of the time with an employer and one third in the school, during their main programmes. [61,62]

In Norway, the dual system is the most popular technical option too, but the programme is divided in two two-year blocks: the first one classroom-based, the second one work-based ('2+2 system'). There are, however, variations, and while most programmes take four years to complete, some may require less or more time spent in the classroom, due to the characteristics of the trade. For instance, some will require more theoretical knowledge than others, and students will need to spend three years learning in the classroom, and one year with an employer. However, the 2+2 arrangement is by far the most popular. There is also a classroom-based track that lasts three years (as Norwegians are entitled to three years of funded upper secondary education), but this has no work-based element whatsoever and is sometimes taken by technical-oriented students to then take a bridge course and enter university.[63,64]

Other countries where the dual system is very popular are Germany and Austria, although both offer classroom-based alternatives. In Germany the dual system, which is taken by around 70 per cent of technical students, tends to last three years, although some programmes only take two years to complete. In Germany's classroom-based alternatives, students are required to spend between two and three years learning in a classroom. [65,66] In Austria, the first year of upper secondary education is the last year of compulsory education, and students are generally aged 15. At that point, students who want to undertake a technical qualification have two options: they can either go straight into a classroom-based programme, or undertake some further education before starting an apprenticeship, which only starts at age 16.[67,68]

This partly explains why upper secondary education comprises longer programmes in Austria than in other countries, as students in the first year of upper secondary education will generally be aged 15. Students opting for a classroom-based programme can choose between a five-year programme with around 30 per cent of work-based training, and that will later on lead to university studies either in academic or technical universities; or a three- to four-year programme that will generally require students to obtain a post-secondary qualification to become a master-craftsperson or similar or lead them to a job in the labour market, and entails 40 per cent of work-based training.

Austrian students wishing to do an apprenticeship will need to complete a pre-vocational programme in their last year of compulsory education, or transfer from another programme. The apprenticeship will usually take three years to complete, although it can take up to four years.

Unlike the other countries, students in the Netherlands are more likely to be found in classroom-based programmes, especially younger students. Although course duration varies, most students in classroom-based technical pathways choose programmes lasting two to three years, or programmes lasting three to four years.[69] However, official data reveals that many students need more than the nominal time to complete their studies.[70]

In England upper secondary education is expected to take two years to complete, with students starting upper secondary at age 16. Providers are funded less for an 18-year-old (who would be pursuing their third year of upper secondary) than for 16- and 17-year-olds. However, while the academic pathway is well defined, with most students sitting their A levels after two years of study, and many then progressing to university, this is not the case of the technical pathway.[71] Because there is not a standard model for technical study programmes, many students take a combination of qualifications. In addition, current regulations require apprenticeships to last at least one year, much less than in the other countries considered. [72] Some students who have already passed their GCSEs will go on to take another level 2 qualification if they wish to follow a technical pathway, which is uncommon elsewhere.

In 2013 the government introduced the Technical Baccalaureate in order to bring some clarity into the system. The Technical Baccalaureate is awarded to students achieving:

- An approved tech level qualification, which are 16-19 qualifications that government has recognised to equip students with the relevant skills and knowledge to obtain a job in the labour market or pursue further study,[73]
- A level 3 maths qualification, and
- An extended project [74]

However, in 2017/18, only 184 students achieved a Technical Baccalaureate.[75] In the same year some 150,000 students achieved a tech level, just under 180,000 achieved an applied general qualification (which were not tech levels), and over 230,000 entered at least one A level. T levels, which will be rolled out from 2020/21 and are expected to become the backbone of 16-19 technical education in England, will take two years to complete.[76] For students who are not quite ready to start a T Level at age 16, the government plans to introduce a transition year in which young people receive further study in English and maths, are prepared for the workplace, introduced to the relevant technical skills and receive pastoral support. Clearly for those young people starting from a lower level, who take the transition year before starting their T level, their programme of study will take three rather than two years.

For students moving directly onto a level 3 qualification T levels are expected to increase the number of programme hours of training by more than 50 per cent, compared to existing technical routes.[77] However, even when T levels are introduced, upper secondary technical education will still be substantially shorter than in most of the countries studied. T levels will include a placement with an employer lasting no less than 315 hours or 45 days, which is substantially less than in the other countries. And many students will continue to take other, shorter, technical qualifications and apprenticeships. The latter will generally last between one and two years, although they can be longer.[78] This means that upper secondary apprentices will still be receiving less training than in other countries, who may spend two years in an apprenticeship, preceded by, or combined with, two years in classroom-based learning.

Table 2. Length of programmes by mode of provision

Country	Classroom-based programmes	Apprenticeship programmes
Germany	2-3 years	Most programmes take 3 years to complete, with 70 per cent of time spent in the workplace and 30 per cent in the classroom
Austria	3-4 year programmes with around 40 per cent work-based learning; 5-year programmes with around 30 per cent work-based learning often leading to tertiary education	Typically take 3 years to complete, with around 80 per cent of training in the workplace, and 20 per cent in the classroom
Norway	3 years	The norm is 2 years classroom-based and 2 years work-based
Denmark	No classroom-based provision	For a four-year programme, 2 years are classroom-based and 2 are work-based
Netherlands	Most common programmes last between 2 and 4 years	Same duration as classroom-based programmes, but at least 60 per cent of time spent in the company, and no more than 40 per cent in the classroom
England	Expected 2 years, with expected increase in teaching intensity for T levels	Two year, at least 20 per cent off the job

It is important to consider that, while in high-performing countries upper secondary technical education students will be studying full-time, this is not the case for many technical students in England, as there is large variation in the guided learning hours between qualifications (see 'breadth of curriculum' section).

Cost variation between subjects

The cost of provision varies between fields of study, as some are more expensive to provide than others. However, costs and funding rates are not straightforward to calculate. First, because data for all the countries studied is not available. Second, because figures available are not for the same year in different countries. Third, because countries split programmes in different subject groups, which do not coincide with those in other countries, or with the OECD grouping criteria.

If we look at data for England and Norway, we see a similar pattern in terms of which subjects are more expensive to deliver. In the case of England, we use cost weighting factors for 16-19 qualifications, which consider additional costs of technical subjects, although they may or may not reflect delivery costs accurately. For Norway, we use direct costs of delivering a range of subjects.

In both England and Norway there are five groups of subjects that are generally more expensive to deliver than others. These are agriculture; engineering and manufacturing; construction; services such as retail and hospitality and catering; and design and performing arts.

In the case of England, the basic funding rate for 16- and 17-year-olds in 2019/20 is £4,000, but medium-cost programmes get a 20 per cent premium, and high-cost courses, 30 per cent. High-cost programmes include agriculture and engineering/manufacturing, while medium-cost ones include construction, retail, hospitality and catering, or design and performing arts. If the programme is specialist or land-base, then the top up is not 30 per cent but 75 per cent, that is £7,000. This is the case for some programmes in agriculture.[79] Funding for higher cost programmes is expected to increase further following a government announcement in September 2019 for an additional £120 million for courses with higher equipment and other running costs.[13]

Data from Norway show a similar pattern. Courses in agriculture have the highest running costs (£14,700), followed by catering and food processing trades (£9,600), design, arts, and craft (£9,100), construction (£8,800) and technical and industrial production (£8,300). Media and communication courses (£7,200) and health and social care (£7,400) have the lowest direct costs, and neither of the two receive funding top-up in England either.[80] [f]

It is important to bear in mind that these figures reflect gross rather than net costs, meaning that the benefits from training (increases in tax collection, wage increases, productivity gains), which can be substantial, are not considered. [81]

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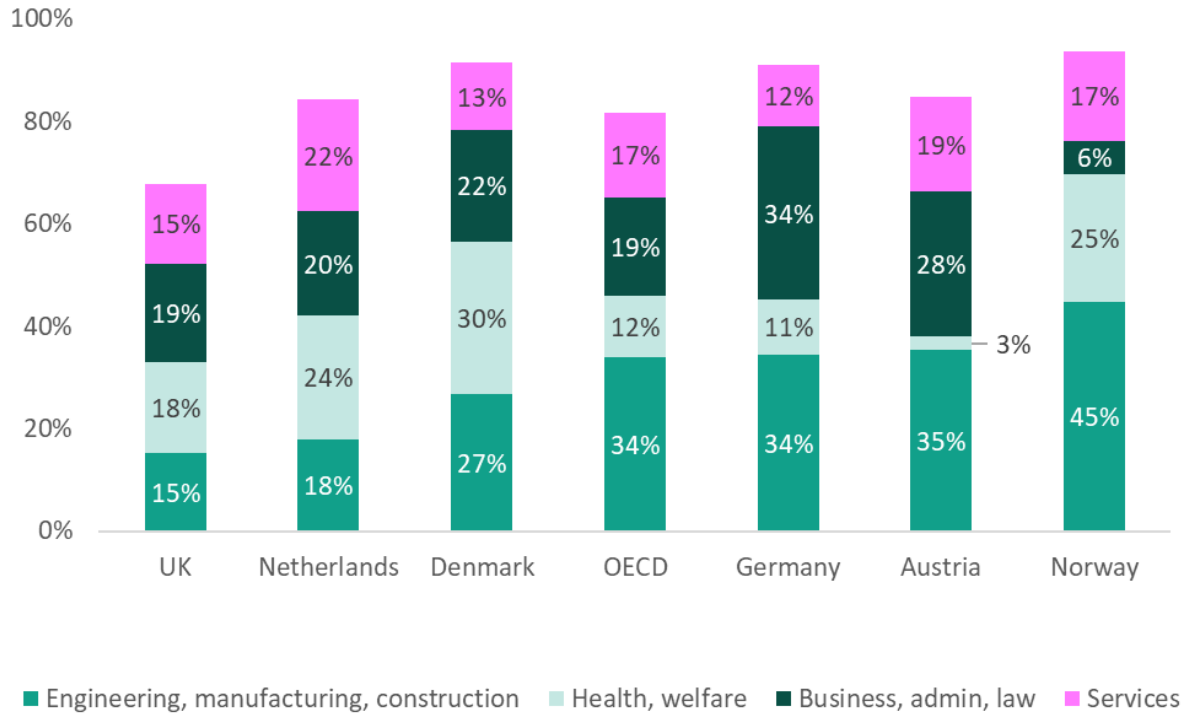
[f] Original cost figures were in Norwegian krone for 2015. Figures in this section are provided in 2019 prices and pounds, using the 31st of December 2015 exchange rate.

Distribution of students between subjects

The next step is to identify what proportion of learners take courses in each of the subject groups. Generally speaking, students in England are fairly evenly distributed across the main subject groupings. This is not the case in most other countries (figure 3.3). Few students in England are concentrated in high-cost subjects (engineering, manufacturing, construction; and services). Norway, Germany, and Austria, which have more students taking engineering qualifications than the other countries, were also found to have the most expensive upper secondary technical education systems (chapter 2). However, subject groups presented in this section are very broad, and they span a wide range of individual subjects that will, certainly, vary when it comes to cost of delivery.

Figure 3.3 Distribution of upper secondary technical students between selected fields of study, 2016



Source: OECD

Breadth of curriculum

England is almost unique in requiring young people to specialise in a small number of subjects at age 16, with many dropping English and maths. [82] The other countries studied certainly offer a broader curriculum to upper secondary students than England. Technical students in Norway spend half of their time of the two classroom-based years taking common programme subjects, 25-30 per cent of their time in common core subjects, and 20-25 per cent in vocational specialisation subjects. The common core subjects, which are the same for all technical programmes, include Norwegian, English, maths, physical education, natural sciences, and social sciences.[83]

Denmark follows a similar approach, breaking down the curriculum in general, subject specific, and specialised subjects. Among the general subjects, technical students study English, maths, Danish, and other general courses, alongside industry- and occupation-specific training. General subjects will generally be adapted to the specific field of study chosen to make it relevant to the student.[84] [85]

Students in the German dual-system attend a vocational school one or two days a week, and apart from theoretical and practical knowledge relevant to their apprenticeship, they also take general subjects. These include economics, social sciences, and foreign languages, among others. Similarly, in Austria technical students take general courses on entrepreneurship, digital skills, communication skills, and at least one foreign language (up to three in some cases).[86] Likewise, in the Netherlands the curriculum has recently been broadened to strengthen general subjects in technical studies, including Dutch, numeracy, citizenship, career management skills, and in some cases, English. [87]

However, breadth of curriculum varies within countries too, as different programmes have different levels of provision of general subjects. In Austria, Germany and the Netherlands, general subjects are more present in classroom-based programmes than in apprenticeship training, especially if the classroom-based track is designed to lead to tertiary education. In Denmark, on the other hand, the amount of general content also depends on the qualification level, among other variables.

It is hard to say how narrow or broad the technical 16-19 curriculum is in England, due to the lack of a standard model for technical study programmes and the diversity of the qualification market. Tech levels and/or applied generals can be taken as single qualifications or in combination with others – as many are the size of one A level or less. [88,89] A look at the curriculum of many of these qualifications suggest that, despite the valuable and broader skills they may allow younger people to develop, the breadth of curriculum of other countries, defined as the inclusion of general subjects beyond the scope of the core qualification, is largely missing. It is true, though, that in many cases these qualifications are taken alongside academic qualifications, including English, maths, or other general subjects.[90] In fact, those who did not achieve a 4-9 grade in their English and maths GCSEs will be required to retake these subjects, in order for providers to secure funding. There are, however, longer technical qualifications, for example extended diplomas, which will not be taken alongside A levels or other qualifications. Extended diplomas and similar qualifications are industry-specific and have little to no provision of broader subjects including English and maths.

If we consider T levels, which are expected to become the backbone of 16-19 technical education in England, the curriculum looks narrower than in other neighbouring countries. T levels will include:

- A technical qualification, comprising both sector- and occupation-specific study,
- An industry placement, and

- Level 2 (GCSE level) English and maths study if not previously achieved.[91]

The technical qualification involves core content, and occupational specialisms. The core content should take between 20 and 50 per cent of the technical qualification duration and provides the student with necessary knowledge and concepts relevant to the T level and the wider technical route. In the case of the construction T level, this involves training around health and safety, design, and sustainability, among others. Then each T level will have several specialisms, which take between 50 and 80 per cent of the technical qualification duration. In the case of construction there are four specialisms: surveying and design for construction and the built environment; civil engineering; building services design; and hazardous materials analysis and surveying.[92] [93]

The amount of guided learning hours that students receive may partly explain the narrowness of the upper secondary technical curriculum in England. A study in 2017 found that, in most of the countries included in this report, students in classroom-based technical provision generally received around 1,000 supervised learning hours per year: 719-1,160 in Germany, 980 in Norway, 1,000 in the Netherlands 1,040 in Denmark.[94] A recent EPI report showed that, in 2016/17 16-19 year-olds received 665 guided learning hours per year, down from 730 hours in 2012/13.[95] These figures include both academic and technical students, and show that students in England have less supervised learning hours than elsewhere. Curriculum narrowness in England is not just an issue in technical education, as academic students sitting A levels will also face high levels of specialisation, with many focusing on just three subjects over the course of two years.

There is no consensus on the ideal breadth of curriculum, which will depend on the aims of technical education in each country. As previously discussed, many learners in the dual-systems of Germany or Norway leave education with a technical upper secondary qualification as their highest qualification – it therefore may make sense for their curriculum to be broader. However, in countries where technical education leavers want to pursue further or higher education, a more solid academic base may also be advantageous, which general subjects in a broader curriculum may help provide.

In any case, England remains an outlier when compared against other countries, and scrutiny of the new T level regulations suggests that whilst overall teaching hours will increase significantly, there will be no major shift in the breadth of actual subjects studied. While technical upper secondary students in other countries take general subjects including their local language, a foreign language, maths, social and natural sciences, or there are specific subjects to develop non-cognitive skills, this is not the case of England, and T levels will not address this beyond securing basic levels of literacy and numeracy. The fact that they will take two years to complete, rather than three or four as is the norm elsewhere, probably stands in the way of a further broadening of the curriculum. As shown in chapter 1, students at age 19 in England have significantly worse literacy and numeracy skills than one would expect from reading and maths proficiency levels at age 15. A narrow 16-19 curriculum, allowing students to drop English and maths, might partly explain this trend.

The 16-19 funding formula sets out the funding rates by age; £4,000 for 16 and 17 year-olds, and £3,300 for 18 year-olds. If programmes were to be lengthened to allow for the broadening of curriculum, as happens in high-performing countries, then funding for students in longer qualifications should decrease in the last year(s) of training.

Conclusions

There are many programme design-related elements that have an impact on the cost of upper secondary technical education, either the total sum or the spending per student:

- Countries with more students in the technical pathway may end up with an overall more expensive system, except in countries like the UK or Norway, where technical students receive less funding than academic students, at least according to OECD data. In the case of Norway, however, spending on both academic and technical students is among the highest in the OECD.
- Countries with more classroom-based provision tend to have more expensive systems, as government costs tend to be lower if students spend time learning on the job, where no bespoke facilities are needed, and the training staff will usually be existing employees. This is not to say that employers do not incur large costs, especially if apprentice wages are included. In the case of Norway, large public subsidies to employers increase overall spending per apprentice.
- Robust apprenticeship programmes are generally seen as the cornerstone of high-quality technical education. However, apprenticeship starts among 16-19 students in England are very low by international standards, and apprenticeships tend to be shorter than elsewhere.
- Longer programmes tend to be more expensive. England, where students are generally expected to complete upper secondary education in only two years, is an outlier. This compares with Austria, where some programmes may take five years to complete, or Denmark (four to four-and-a-half years) and Norway (four years).
- Due to the higher running costs, the more students in engineering-related programmes, the more expensive technical education will be. In the UK, a low proportion of technical students choose an engineering programme.
- Breadth of curriculum: arguably, the more diverse the curriculum gets, the more expensive the system may become. Especially if this translates into more teaching hours, or if it puts recruitment pressures on providers. England is clearly an outlier, with a narrow curriculum compared to other countries.

It is important to bear in mind that all the figures presented in this chapter refer to the costs of provision, but do not take into account the benefits i.e. there is evidence that additional cost of long apprenticeship programmes is compensated for by the increased productivity of the apprentices.

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