The Roehampton Annual Computing Education Report

Data from 2017

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Foreword

Can you imagine teaching, or indeed day-to-day life, without technology? Although many people view the *future* of our world as digital - they are wrong. Our world is already digital - as any teacher or schoolchild will readily attest.

This environment moves fast. When I started teaching, our school had two BBC B micros and an Acorn, housed on enormous unwieldy trolleys with an old curtain draped over each. Our first projects included connecting the school to the (very text-heavy) internet, getting new 'PC' style computers for each classroom, and training for all staff.

Despite this, I could see that this new technology was going to be the future, and was tremendously excited about it and the potential opportunities that it could open up; in addition to how our economy, and indeed all of our lives, would be changed by it.

In showing us how far we've come on our journey to ensure that as a country we are educating all young people with the work ready digital and computing skills that our economy now needs, this report provides excellent detail. It provides an overview of the performance of computer science in education, covering 2014 to 2017, at both GCSE and A-level. The quality of this research also means we can discuss the societal and ethical issues in education from a position of knowledge rather than supposition.

Computing, as a subject, was introduced into the curriculum in England in 2014. Numbers taking it have grown steadily, and 2017 saw 67,000 students sit the Computer Science GCSE - a great achievement, given the qualification has only existed for four years. This is in addition to the 59,000 who sat ICT; a qualification being ended this summer.

Whilst the report highlights some positives, such as an increase in A-Level pupils, there are number of areas of concern. For example, the slowing of take-up of the subject at GCSE; the effect of class size; the gender gap; and the clear need to increase the ability range of those taking the qualifications.

The gender mix identified in this report also starkly shows the need to engage more girls in the subject, whilst the ethnicity data shows very patchy engagement. The report also raises the danger of further exacerbating these issues as GCSE and A-level ICT are removed from the curriculum in 2018.

What's clear from the report is that despite much good work to date, we still have a lack of young people with the work ready digital and computing skills that our economy needs.

We estimate that we need half a million more children to gain computing qualifications each year in addition to the half a million who are currently studying a range of computing qualifications. Naturally, as part of this, we need to ensure that, girls and students from poorer and ethnic minority backgrounds are not left behind.

This means we need a wholehearted commitment to deliver a world-class computing education to every child in every school, irrespective of their background.

To deliver these digital skills, we therefore need to improve the supply of qualified, capable, and confident computing teachers. We need to attract, retain, and importantly, support even more outstanding and inspirational specialist computing teachers to join those who already do an amazing job in schools. With the right support, computing teachers become more effective at developing pupils' advanced digital skills, increase the number of students gaining computing qualifications, and improve the grades that students achieve.

These teachers will be pivotal in developing children's understanding of the real-world through understanding the world of digital technology. They will also be at the forefront of ensuring that all sectors of the economy have the digital skills they need to thrive.

We also need to ensure that there is a range of suitable qualifications available to students at KS4 and beyond - a range that is relevant to employers and to young people as they transition either into further specialist study or the world of work. These options need to achieve the combination of being suitably inspirational

to young people, whilst at the same time being academically rigorous and equipping young people for the digital world.

We know that giving young people the opportunity to develop advanced digital and computing skills has a positive impact on their future life chances. Doing so helps them to gain a deeper understanding of computing and thinking skills that consequently gives them a much greater chance of reaching their potential in our digital world.

Indeed, in our own recent *BCS Social Mobility in IT* report, we found that careers in tech are a quicker, cheaper and more effective way of achieving a meaningful career path and well-paid job to help people become more socially mobile than many of the more traditional professions, such as law or medicine.

At the heart of the BCS's Royal Charter is a mandate to ensure that everyone has access to the widest range of educational opportunities necessary to become creative, empowered, capable, and safe citizens in a digital society. And that means that everyone, regardless of gender, ethnic or social group, has the fundamental right to a computing education.

I'm pleased to say that this research gives us the evidence base to identify and help address these issues.

Julia Adamson, Director of Education at BCS, The Chartered Institute for IT

1 Executive Summary

Increasing numbers of schools are offering computer science at GCSE (52.5%) and A level (36.2%), and so now there's a good chance that a student will find CS on offer at their school (76.3% at GCSE). However, relatively few students choose to take the subject: at GCSE, only 11.9%, and at A level, just 2.7%. Provision though remains 'patchy': grammar schools are more likely than comprehensives to offer CS, independent schools rather less so. Similarly, some local authorities and multi-academy trusts leading the way, and others lagging behind. Numbers taking the subject continue to rise, although not as rapidly as in the past. We now must rise to the challenge of encouraging (or perhaps allowing) more students to have a go at CS, learning from the good practice in schools, local authorities and trusts that are already succeeding here. This issue is particularly acute at A level, where less that 15% of colleges or sixth forms have cohorts that the DfE would regard as viable.

At GCSE, the typical CS student is academically strong, mathematically able, likely to be taking triple science (despite CS counting as a science for the EBacc), from a relatively affluent family, and overwhelming likely to be male (even if the smaller number of girls taking the subject do better in the exam). Some schools and local authorities are doing well in addressing the gender gap in CS, but there are 382 *mixed* schools where the CS students are all boys.

A level CS remains a niche subject: students typically have good maths grades, but their overall academic performance is not strong. CS is often taken in combination with maths and physics. 90% of entries come from boys, and boys are now outperforming girls at the top grades. In 25 local authorities, all the CS entries come from boys. Again students are likely to come from relatively affluent backgrounds, but rather more of these students will be on the school's SEN register than for most subjects.

GCSE and A level CS are hard! At GCSE, students typically get half a grade lower in CS than in their other subjects; at A level, CS grades are also a little lower (about a sixth of a grade) than those students get for their other subjects. CS and ICT are quite different qualifications, and thus are taken by quite different students: the latter are (on average) from less affluent backgrounds, weaker academically, closer to a typical mix for ethnicity, and more likely to be female: the decision to remove ICT as qualifications at GCSE and A level, seems likely to result in fewer, and rather less diverse, students overall taking qualifications in computing.

1.1 Key Findings

- 52.5% of schools now offer GCSE computer science with 11.9% of students taking the subject. 76.3% of students are in schools where GCSE computer science is offered. Independent schools are unlikely to offer GCSE computer science as are special schools and pupil referral units. University technical colleges enter the largest proportion of their cohorts (39.5%) into GCSE computer science.
- GCSE computer science is a hard subject. No groups of schools are doing better in CS than they are overall. Low performance of University Technical Colleges (students averaging a low E grade) might be partly explained by their entering higher proportions of their cohort, with other schools being more selective.
- Computer science students at GCSE are often academically strong: those taking computer science generally achieve more highly in their GCSEs than their peers in the same providers. Our findings confirm that computer science students have relatively high KS2 and GCSE maths scores. We note that some schools may limit enrolment to these courses by prior or expected performance in maths. At A level, however, students seem to be relatively weak academically in comparison to those for many other subjects.
- The rapid increase in the first few years of GCSE computer science has slowed, but it still shows a moderate increase. The subject has a potential student reach comparable to physics, although take-up by students is lower and there is no general 'computing' qualification to match the more general 'core science'.

- The increase in students sitting GCSE CS slowed between 2016 and 2017 and it looks likely that fewer students will be sitting a computing GCSE over the next few years due to the removal of ICT and ECDL being dropped from the Progress 8 school performance measure. The picture at A-level is better, with a sustained increase in student numbers over the last 4 years, albeit with still very small numbers (7215 students in 2017). However, cohort sizes remain small, with a mean of 6.7 students per provider and a median of just 5. Budgetary concerns among KS5 providers mean the ongoing sustainability of A-level CS remains a concern, with 86.5% of providers below the DfE's "minimum viable A level class size".
- Girls continue to be heavily underrepresented in computer science. At GCSE, 20% of entries are from female students (1 in 5) and only 10% (1 in 10) at A-level, even though girls do better than boys at GCSE. Only 34.2% of all females are taking a computing KS4 qualification, compared to 51.2% of all males. Compared to 2014, we have around 30,000 fewer females taking any computing qualification at KS4. Girls no longer outperform boys at the top A-level CS grades, A* and A.
- Female provision varies widely between regions, and local authorities. Girls are under a third of the entries at GCSE in all but 13 LAs. London does particularly well at engaging girls with 26.7% of GCSE CS and 13.2% of A-level CS students being female. There were 25 local authorities with A-level CS provision but no female participation.
- Compared to ICT, a lower proportion of pupil premium students study GCSE and A-level computer science, thus computing overall is becoming more exclusive. A much lower percentage of GCSE pupil premium students achieve grade A or A* (9.6% vs. 21.9%). This gap is narrower at A-level (10.3% vs. 17%).
- Student participation in GCSE and A-level CS is patterned by ethnicity, with Black students proportionally underrepresented and Chinese students proportionally overrepresented. For GCSE, the proportion of Black students who studied ICT and CS is similar at around 10%, but drastically different for Chinese students, with around 12% in ICT, compared to around 26% for CS.
- Students with SEN support have a higher tendency to study A-level CS than many other subjects, at 6.1% of the cohort, despite representing just 3.7% of all students. The percentage is more proportionally representative in subjects such as physics (4.1%) and ICT (3.3%). Further research is merited to explore the composition of these 6.1% A-level CS students, many of whom are likely to be male (given the overall dominance of boys here). At GCSE, the representation is more in line with the overall percentages.
- For subject combinations, students taking GCSE CS are more likely to be taking triple science than core science. Students taking A-level CS are most likely to taking maths and physics as their other choices.
- Female students are much better represented in digitally 'creative' qualifications such as iMedia and those available through BTEC, than they are in computer science.
- Numbers of students taking any computing qualification at KS4 have dropped since the introduction of computer science into the English national curriculum in 2014. The majority of this drop is amongst females. In 2017 these numbers were supported by the inclusion of ECDL (representing 38.7% of all computing qualifications at this level) into the 'Progress 8' school performance indicator. As of 2018, ECDL is no longer included in Progress 8 and it seems likely that many schools will drop this course without a clear replacement.
- ICT and computer science have substantially different student intakes. The removal of GCSE and A-level ICT from the qualification landscape in 2018 looks likely to have a negative impact on those looking to study a computing qualification at KS4 and KS5; this will disproportionately impact girls, poorer students and some ethnic minority groups. Few other ICT qualifications have been approved for KS4 league tables, leaving providers with a limited choice of options going forward. For some providers it seems likely there will be no provision beside computer science.

1.2 Recommendations

- Our findings lead us to call for an urgent inquiry into the long-term impact the removal of ICT will have on the digital education of young people. In particular, the analysis should examine if, and the extent to which, the current suite of available qualifications is truly inclusive and of benefit to all children. We believe there is a need for clarity on vocational qualifications and a need for a replacement for the ICT GCSE and A-level, or a 'single subject' computing GCSE that encompasses the CS, IT and digital literacy elements recommended by The Royal Society(Furber & others, 2012) and enshrined in the National Curriculum(DfE, 2014) itself.
- GCSE computer science is established in schools serving 76.3% of the country. We now need to grow the numbers of students in those schools sitting the subject as it remains an exclusive subject. Most providers appear to be only offering one class of computer science provision; schools should be encouraged to enter a wider ability range of students into the subject. This will of course require that there are enough qualified teachers to deliver the subject.
- We are concerned about the viability of small class sizes in computing. Given the small cohort sizes of A-level computer science providers, there is a need to review the sustainability of CS at A-level.
- Continued effort is needed to address the gender gap in computing participation. Given girls are generally better represented when taking digitally 'creative' courses, compared to computer science, we call for research to explore the concept of 'creative computing', in which computer science might be combined with creative work in a range of digital media. Furthermore, we found there are areas in which female uptake is good, the reasons for this engagement need to be explored, with the lessons learned widely shared.
- Some local authorities demonstrate excellent levels of participation amongst girls the reasons for this need to be explored further.
- The reasons for the differences in CS participation from students across social and ethnic backgrounds needs to be investigated, and discussions around inclusion in computing must include other factors in addition to gender.
- A-level CS students are more likely to be receiving SEN support than other students taking an A-level, including their peers taking ICT or physics. Research is needed here into the functioning profiles of those classified as having special educational needs and taking computer science, their reasoning for taking the subject and their performance in CS.

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2 About the study

The Roehampton Annual Computing Education Report (TRACER) was first published in 2016 (Kemp, Wong, & Berry, 2016) to provide an overview of the student and school characteristics in relation to GCSE and A-level computing qualifications. In 2017, we contributed analysis on the qualifications taken in 2016 to the Royal Society's After the Reboot report (Furber & others, 2017). In this June 2018 update, we continue our analyses of the Department of Education's (DfE) *National Pupil Database*[1] (NPD) linked to Department of Education's *Get information about schools* service[2] with the focus on data from exams taken in the 2016/17 academic year, although we also draw on statistics from as far back as 2013/14 to explore recent patterns where relevant.

The data is presented in three main sections: provider profile, student profile and qualifications overview. For each section, we are interested in the different ways in which participation and attainment in GCSE and A-level computer science might vary. Under the provider profile, we analyse the uptake of computer science by school governance (with a closer inspection on multi-academy trusts), types of school, gender composition of school, location of school (regions; local authority; rural/urban; coastal/inland), and provider/cohort size. Under the student profile, we explore the role of gender, socioeconomic status, ethnicity, Special education needs (SEN), English as an Additional Language (EAL), entry grade profile and subject combinations. Under the qualifications overview we look at the range of computing qualifications currently being taken by students in schools in England. In particular, comparisons are made with the subject ICT, where appropriate, given computer science is the de facto replacement (DfE, 2018), and physics, another single science.

3 Terminology

- Please note that computer science might be referred to as CS in the following text.
- `KS4` refers to students in secondary school, generally aged 14-16 years old.
- `KS5` refers to students at college or sixth form, generally aged 16-18 years old.
- `GCSE` refers to the General Certificate in Secondary Education, a qualification usually sat in KS4.
- `A-level` / `GCE A` refers to an Advanced level qualification, usually sat in the final year of KS5.
- `AS-level` / `GCE AS` refers to an Advanced Subsidiary level qualification, often sat in the first year of KS5.
- `Pupil premium` refers to students whose personal circumstances of family financial situation has qualified them to receive free school meals within the last 6 years
- `IDACI` a poverty indicator based on the postcode where a student lives. Higher numbers indicate higher levels of deprivation
- For columns titled `Total Schools` and `Total Students`, when in section 4.1 and 4.2 figures are taken from all institutions offering GCSEs or A-levels, and all students taking at least one full GCSE or A-level. When in section 4.3, figures are taken for all students listed in the DfE's KS4 and KS5 result tables.
- Where average grades are given, `Grade Avg Sch` = average grade of all students in a given provider / grouping, `Grade Avg Sub Students` = same as previous, but only for students taking Computer Science, `Grade Avg Subject` = average grade in for all students in a given provider / grouping. – For GCSE: 8=A*, 7=A, 6=B, 5=C, 4=D, 3=E, 2=F, 1=G, 0=U/X. – For A level: 6=A*, 5=A, 4=B, 3=C, 2=D, 1=E, 0=U/X.
- Any instance where `X` appears indicates that data has been redacted that would allow the recognition of 5 or fewer students. In these circumstances other data on the table may be rounded to the nearest 5 to prevent the calculation of the value of X. As a result, totals may vary slightly between tables. This data has been suppressed in line with the DfE National Pupil Database User guide (DfE, 2015).

[1] https://www.gov.uk/government/collections/national-pupil-database
[2] https://get-information-schools.service.gov.uk/

4 Research areas

4.1 Provider profile

There are many *types* of school specified by the DfE (2016). Using data from the DfE's *Get information about schools* service, students taking computing exams can be mapped to their school's profile and the school types and participation patterns analysed[3].

[3] A less fine grained analysis was recently conducted by Cambridge Assessment (Gill & Williamson, 2016)

4.1.1 Governance

52.5% of schools now offer GCSE computer science. 11.9% of students take the subject. See Provider / cohort size for more information on overall provision of GCSE CS. Independent schools are unlikely (n=227) to offer GCSE CS, although a few offer IGCSE CS instead (see Qualifications overview). Special schools and PRUs are also unlikely to offer GCSE CS. UTCs enter large proportions of their cohort for computer science, although, perhaps as a result, average grades are not particularly high.

GCSE computer science is hard - no groups of school are doing better in CS than they are overall.

The rapid increase seen in take up of GCSE CS in its first few years has slowed, but overall figures for 2017 still show a moderate increase on those for 2016.

Academy converters are now more likely to offer A-level computer science (47.0%) than further education and sixth form colleges (43.4%). University Technical Colleges show excellent take-up (52.8% of providers and 16.2% of students), but like at GCSE, this is accompanied by low grades (an average grade of 3.3 is equivalent to a low E grade).

Most providers see student A-level CS grades being lower than their other subjects. The grade profile of A-level CS students is lower on average than their peers in the same institutions: this seems to be a hard subject, often taken by less able candidates.

Cohort sizes remain low for most providers (an average of 6.7), with further education and sixth form colleges being the only large provider type to have an average cohort size larger than the DfE's "minimum viable A level class size" of 11.7 (Parish, Prime, & Day, 2017). Whilst this raises questions about the ongoing sustainability of the subject in other provider types, year on year numbers show the major provider types are increasingly likely to offer A-level computer science (Fig. 3).

4.1.1.1 KS4

Table 1: 2017 GCSE Computer Science by type of provider

Type	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Academy converter	1376	249561	1108	80.5	32310	12.9	29.2	5.0	5.4	5.0
Academy sponsor led	599	86081	395	65.9	9495	11	24.0	4.2	4.7	4.0
Community school	492	83449	393	79.9	10480	12.6	26.7	4.7	5.1	4.5
Other independent school	824	42546	222	26.9	2250	5.3	10.1	6.4	6.4	6.2
Foundation school	254	41791	199	78.3	5030	12	25.3	4.5	4.9	4.4
Voluntary aided school	260	39954	209	80.4	5195	13	24.9	4.9	5.3	4.7
Voluntary controlled school	33	6231	27	81.8	790	12.7	29.3	4.7	5.0	4.6
Pupil referral unit	189	3640	5	2.6	10	0.3	2.0	2.0	3.5	3.0
Free schools	52	3352	28	53.8	485	14.5	17.3	4.9	5.2	4.9
University technical college	37	2534	30	81.1	1000	39.5	33.3	3.9	4.3	3.3
Community special school	223	2018	4	1.8	25	1.2	6.2	2.2	2.7	1.4
Further education	215	1862	7	3.3	100	5.4	14.3	3.2	3.2	2.4
Studio schools	33	1203	13	39.4	215	17.9	16.5	3.8	4.6	3.9
Other independent special school	197	1155	5	2.5	20	1.7	4.0	2.6	3.8	3.7
Academy alternative provision converter	38	909	2	5.3	X	X	X	1.9	X	X
Academy special converter	74	738	2	2.7	X	X	X	2.1	X	X
Free schools alternative provision	31	666	1	3.2	X	X	X	1.8	X	X
City technology college	3	558	2	66.7	50	9	25.0	5.6	6.2	6.2
Foundation special school	43	401	1	2.3	X	X	X	2.4	X	X
Non-maintained special school	30	192	4	13.3	15	7.8	3.8	3.2	4.3	3.5
Academy 16-19 converter	2	15	1	50.0	X	X	X	3.9	X	X
Totals	5063	569427	2658	52.5	67495	11.9	25.4	4.8	5.2	4.7

Note that the following provider types had no GCSE Computer Science examination cohorts in 2017 (n = total number of providers): Academy alternative provision sponsor led (n=14); Academy special sponsor led (n=23); Secure units (n=9); Free schools special (n=7); Free schools 16 to 19 (n=2); Miscellaneous (n=1); Sixth form centres (n=1); Special post 16 institution (n=1).

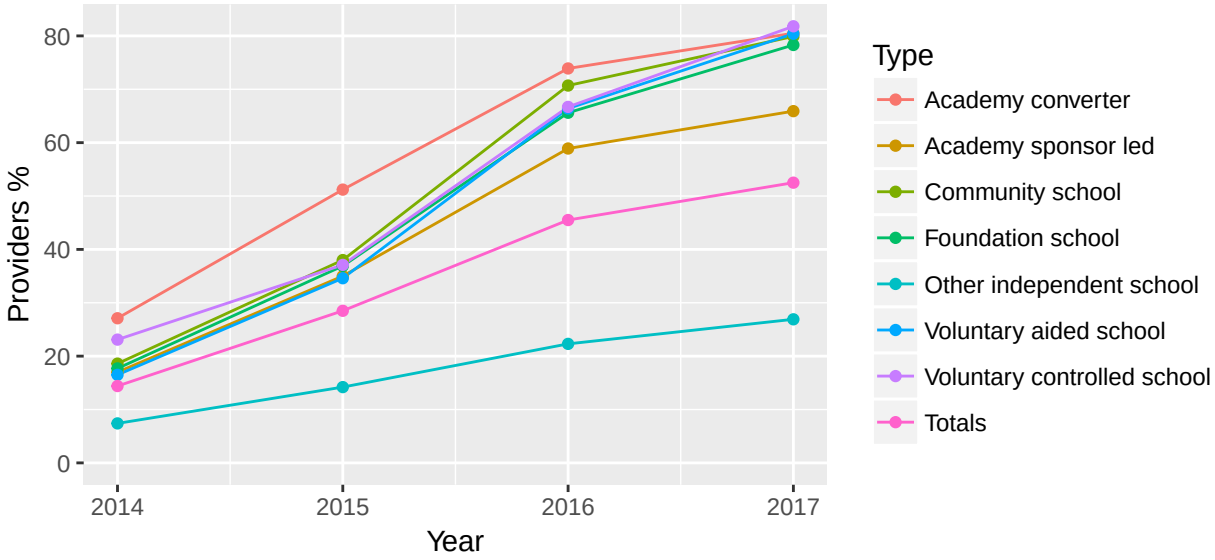

Figure 1: GCSE Computer Science provider uptake by governance. 2014-17

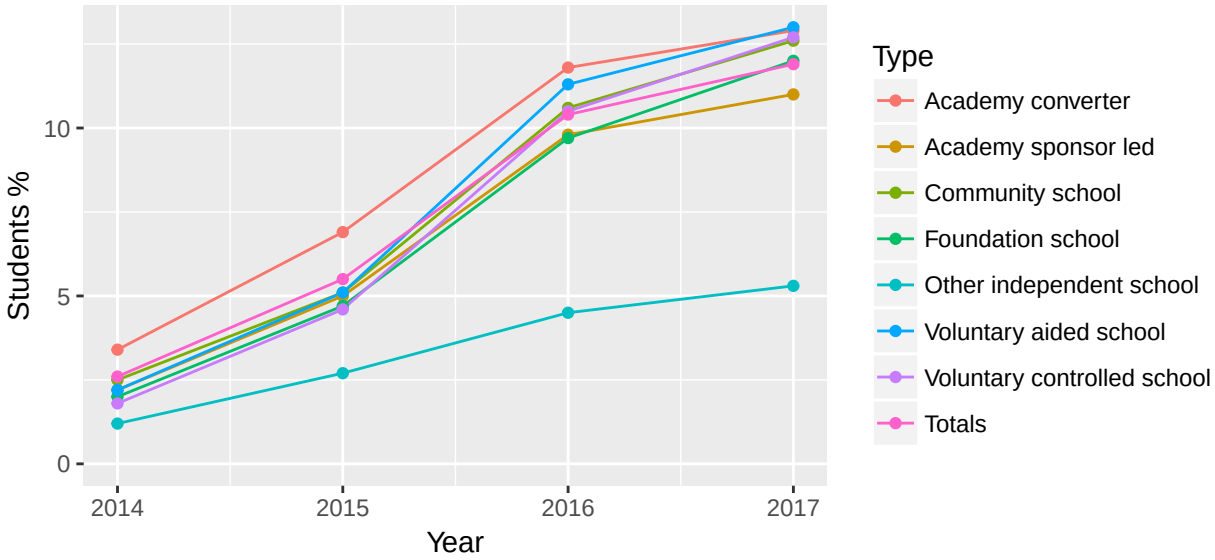

Figure 2: GCSE Computer Science student uptake by governance. 2014-17

4.1.1.2 KS5

Table 2: 2017 A level Computer Science by type of provider

Type	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Academy converter	1007	99401	473	47.0	2925	2.9	6.2	3.5	3.2	3.1
Further education	272	69597	118	43.4	2240	3.2	19.0	3.3	3.1	2.9
Other independent school	577	37044	136	23.6	440	1.2	3.2	4.2	3.7	3.4
Community school	238	17583	87	36.6	385	2.2	4.4	3.2	3.1	2.8
Academy sponsor led	356	15004	72	20.2	305	2	4.2	2.9	2.7	2.5
Voluntary aided school	150	11980	57	38.0	275	2.3	4.8	3.5	3.1	3.0
Foundation school	133	8939	45	33.8	230	2.6	5.1	3.2	3.1	2.9
Voluntary controlled school	25	1924	7	28.0	50	2.6	7.1	3.3	2.8	2.7
Free schools 16 to 19	13	1418	8	61.5	60	4.2	7.5	3.7	3.5	3.5
University technical college	36	989	19	52.8	160	16.2	8.4	2.2	1.8	1.7
Free schools	19	735	8	42.1	40	5.4	5.0	3.1	3.1	3.1
Academy 16-19 converter	3	591	2	66.7	35	5.9	17.5	3.1	2.7	2.8
Studio schools	19	228	7	36.8	30	13.2	4.3	2.6	2.7	2.7
Academy 16 to 19 sponsor led	1	200	1	100.0	15	7.5	15.0	3.1	2.0	2.0
Institution funded by other government department	1	156	1	100.0	10	6.4	10.0	3.9	3.3	3.3
Other independent special school	10	41	1	10.0	X	X	X	2.3	X	X
Sixth form centres	5	31	1	20.0	X	X	X	3.6	X	X
Community special school	2	X	1	50.0	X	X	X	X	X	X
Totals	2886	266240	1044	36.2	7215	2.7	6.9	3.5	3.1	3.0

Note that the following provider types had no A level Computer Science examination cohorts in 2017 (n = total number of providers): City technology college (n=3); Non-maintained special school (n=5); Special post 16 institution (n=4); Miscellaneous (n=2); Free schools alternative provision (n=2); Academy special converter (n=1); Academy special sponsor led (n=1); Pupil referral unit (n=1).

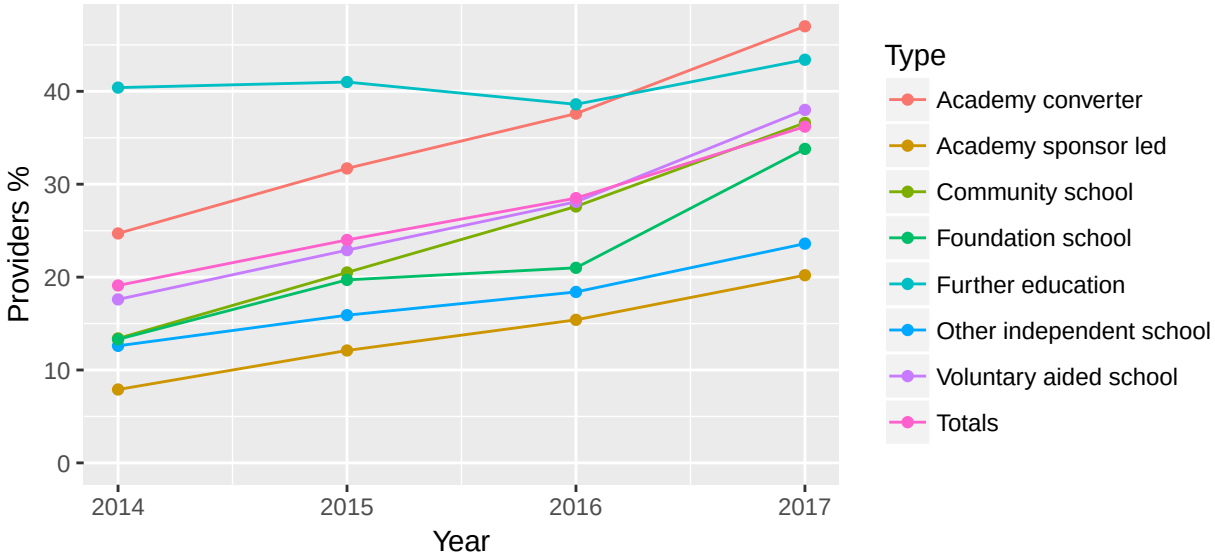

Figure 3: A level Computer Science provider uptake by governance. 2014-17

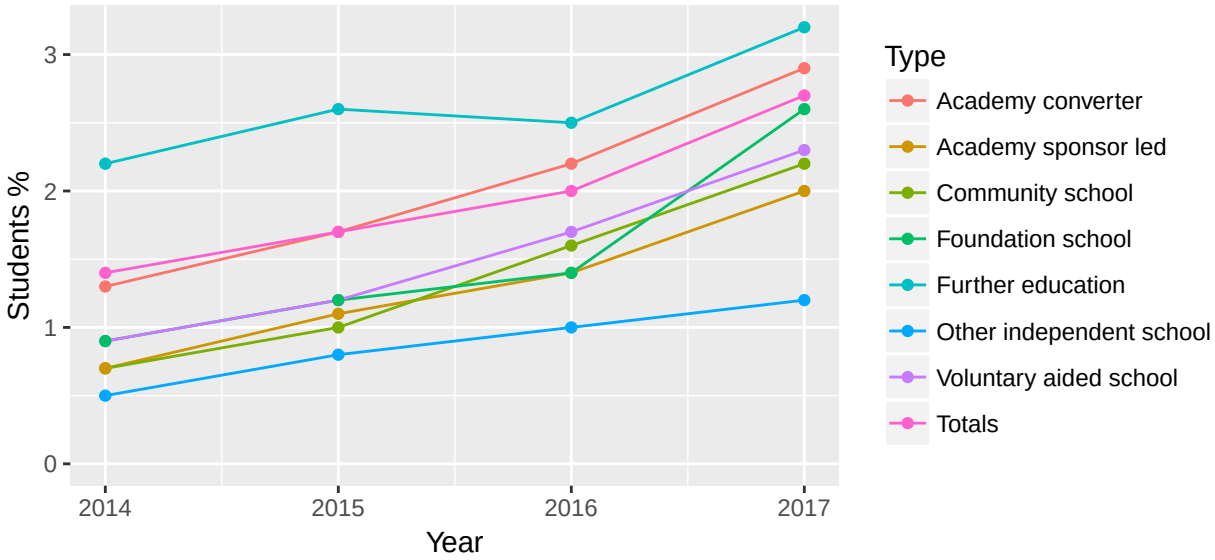

Figure 4: A level Computer Science student uptake by governance. 2014-17

4.1.2 Multi academy trusts

GCSE computer science provision varies widely between different MATs; for example United Learning Trust and the Northern Education Trust have 18.4% of their students sitting the subject, while the Outwood Grange Academies Trust only has 5% of its students doing so. This suggests that the educational policies and philosophies across MATs might be influential in schools offering CS and/or students taking it.

Whilst students generally underperform in GCSE CS compared to other subjects, some trusts buck the trend; in particular the Diocese of Westminster and Outwood Grange Academies Trust show similar performance in CS compared to students' other subjects.

Multi-academy trusts for A-level providers have smaller student numbers than at GCSE, this makes data on A-level computer science susceptible to the influence of small changes in numbers, and detailed analysis has been dropped. The North Tyneside Learning Trust which has no A-level CS provision in its seven providers.

Note: the trusts are listed here in rank of overall number of GCSE or A Level students.here may be many small multi-academy trusts (MATs) with high levels of provision not shown.

4.1.2.1 KS4

Table 3: 2017 GCSE Computer Science by trust

Trust	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
United Learning Trust	27	3851	23	85.2	710	18.4	30.9	4.5	4.9	4.2
Academies Enterprise Trust	25	3431	16	64.0	450	13.1	28.1	4.1	4.6	4.0
Ormiston Academies Trust	25	3346	13	52.0	300	9	23.1	4.2	4.9	4.5
Harris Federation	19	2648	11	57.9	205	7.7	18.6	5.0	5.7	5.1
Outwood Grange Academies Trust	15	2493	9	60.0	125	5	13.9	4.8	5.1	5.2
Oasis Community Learning	16	2249	8	50.0	150	6.7	18.8	4.0	4.7	3.9
ARK Schools	16	2099	6	37.5	125	6	20.8	4.6	5.6	5.4
The Kemnal Academies Trust	14	2083	11	78.6	255	12.2	23.2	4.2	4.6	3.6
Delta Academies Trust	16	1709	6	37.5	130	7.6	21.7	4.3	5.4	5.0
E-ACT	11	1655	6	54.5	175	10.6	29.2	4.0	4.9	4.5
The North Tyneside Learning Trust	12	1590	8	66.7	170	10.7	21.2	4.8	5.5	5.0
Academy Transformation Trust	11	1485	6	54.5	120	8.1	20.0	4.2	4.6	4.6
Northern Education Trust	10	1470	8	80.0	270	18.4	33.8	4.0	5.0	4.2
Greenwood Academies Trust	9	1351	3	33.3	80	5.9	26.7	3.8	3.7	3.5
Leigh Academies Trust	7	1313	7	100.0	250	19	35.7	4.3	4.7	3.9
Creative Education Trust	7	1170	4	57.1	80	6.8	20.0	4.4	4.9	4.5
The David Ross Education Trust	10	1091	5	50.0	65	6	13.0	4.3	4.7	4.4
Cabot Learning Federation	9	1082	9	100.0	220	20.3	24.4	4.2	4.5	3.7
Wakefield City Academies Trust	7	1062	5	71.4	75	7.1	15.0	3.8	4.0	2.7
The Diocese of Westminster Academy Trust	6	1023	5	83.3	110	10.8	22.0	5.3	6.1	6.1
Totals	2398	359889	1646	68.6	45270	12.6	27.5	4.8	5.2	4.7

4.1.2.2 KS5

Table 4: 2017 A level Computer Science by trust

Trust	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Harris Federation	16	918	5	31.2	15	1.6	3.0	3.3	2.5	1.9
King Edward VI Academy Trust Birmingham	6	798	4	66.7	30	3.8	7.5	4.2	3.9	3.7
United Learning Trust	17	697	5	29.4	10	1.4	2.0	3.2	2.9	3.0
Ormiston Academies Trust	14	576	2	14.3	10	1.7	5.0	2.8	3.5	3.4
Academies Enterprise Trust	13	526	3	23.1	10	1.9	3.3	2.9	3.5	3.3
Lionheart Academies Trust	2	524	1	50.0	20	3.8	20.0	3.5	3.2	3.1
The Diocese of Westminster Academy Trust	6	522	4	66.7	15	2.9	3.8	3.6	3.7	3.1
Outwood Grange Academies Trust	7	520	3	42.9	30	5.8	10.0	3.1	2.5	2.3
The Kemnal Academies Trust	9	483	1	11.1	X	X	X	2.8	X	X
Suffolk Academies Trust	1	482	1	100.0	30	6.2	30.0	3.2	3.0	3.1
The North Tyneside Learning Trust	7	475	0	0.0	0	0	0	3.5	0	0
East Midlands Education Trust	5	410	2	40.0	10	2.4	5.0	3.5	3.4	3.5
GLF Schools	3	407	1	33.3	X	X	X	3.6	X	X
River Learning Trust	3	406	3	100.0	10	2.5	3.3	3.8	4.7	4.6
Tudor Grange Academies Trust	4	396	4	100.0	15	3.8	3.8	3.3	4.2	3.7
ARK Schools	12	395	4	33.3	10	2.5	2.5	3.1	2.8	2.6
Impact Multi Academy Trust	2	362	0	0.0	0	0	0	3.4	0	0
Westcountry Schools Trust	4	357	2	50.0	X	X	X	3.1	X	X
Nonsuch and Wallington Education Trust	2	352	2	100.0	X	X	X	4.6	X	X
Leigh Academies Trust	7	346	2	28.6	X	X	X	3.0	X	X
Totals	1489	120705	603	40.5	4040	3.3	6.7	3.4	2.8	2.6

4.1.3 Admissions policy

GCSE computer science might still be seen as somewhat elitist, given the relatively high take up in grammar schools compared to comprehensives. However, the gap between GCSE CS provision in selective and non-selective state schools has narrowed over the last four years. Grammar schools show substantially larger cohort sizes (31.4 students), suggesting many are choosing to enter more than one class per year. Grammar schools out-perform comprehensive and independent schools, which is unsurprising given the selective nature of their intake.

Independent schools are unlikely to offer GCSE CS, and have small group sizes when they do. Whilst take up has increased, its been somewhat slower here than in other school types. This might be partially explained by some independent schools choosing to adopt the IGCSE (n=66) instead of GCSE CS (n=225), however, the number of students taking IGCSE are relatively small (813 vs 2273 for the GCSE), see the Qualifications overview section for more information about the IGCSE.

The majority of grammar schools now offer A-level CS (63.4%), compared to 37.8% of comprehensives and 23.6% of independent schools. It should be noted that uptake has increased in all provider types.

Mixed providers offering GCSE CS are doing a much better job of engaging girls than in 2015, with 16.3% of providers without any girls now, compared to 26.9% in 2015 At A-level the percentage of mixed providers without any girls has risen slightly to 66.3% from 65.3% in 2015.

4.1.3.1 KS4

Table 5: 2017 GCSE Computer Science by admissions policy

Type	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Comprehensive	3479	499584	2304	66.2	61532	12.3	26.7	4.6	5.1	4.5
Independent	824	42546	222	26.9	2249	5.3	10.1	6.4	6.4	6.2
Grammar	163	22592	116	71.2	3638	16.1	31.4	6.7	6.8	6.5
Special	597	4705	16	2.7	68	1.4	4.2	2.3	3.5	2.7
Totals	5063	569427	2658	52.5	67487	11.9	25.4	4.8	5.2	4.7

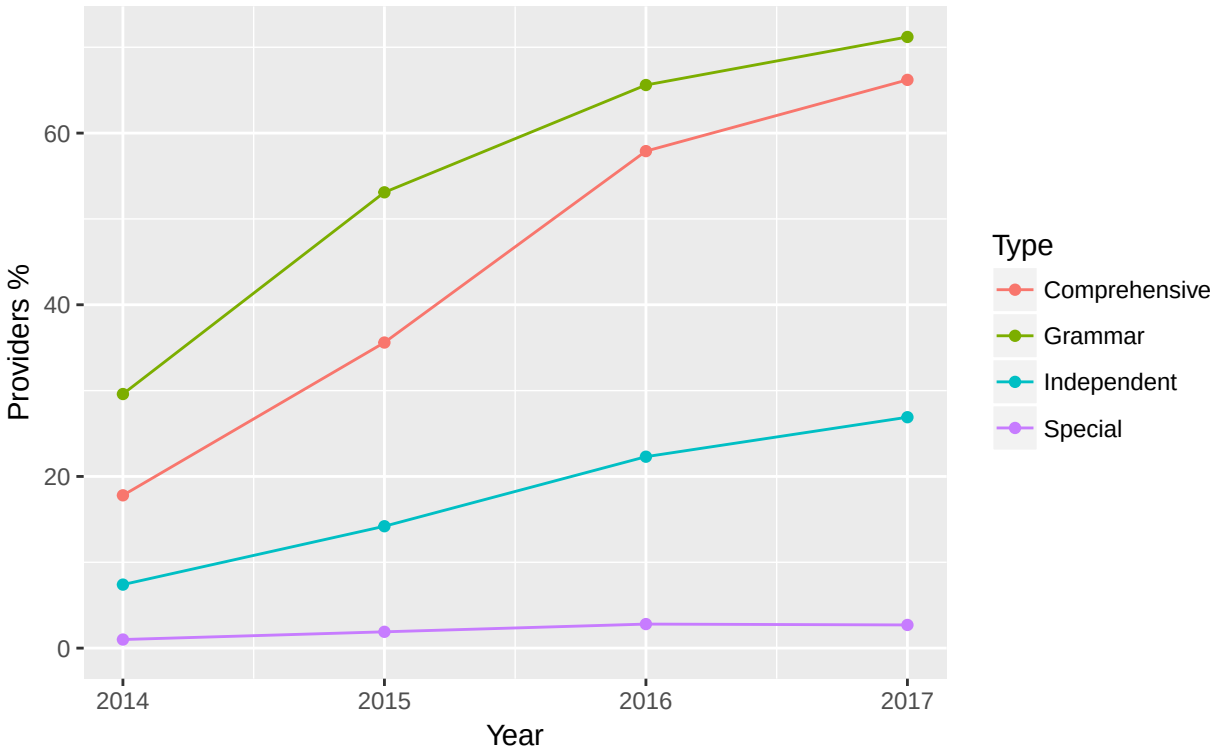

Figure 5: GCSE Computer Science provider uptake by admission profile. 2014-17

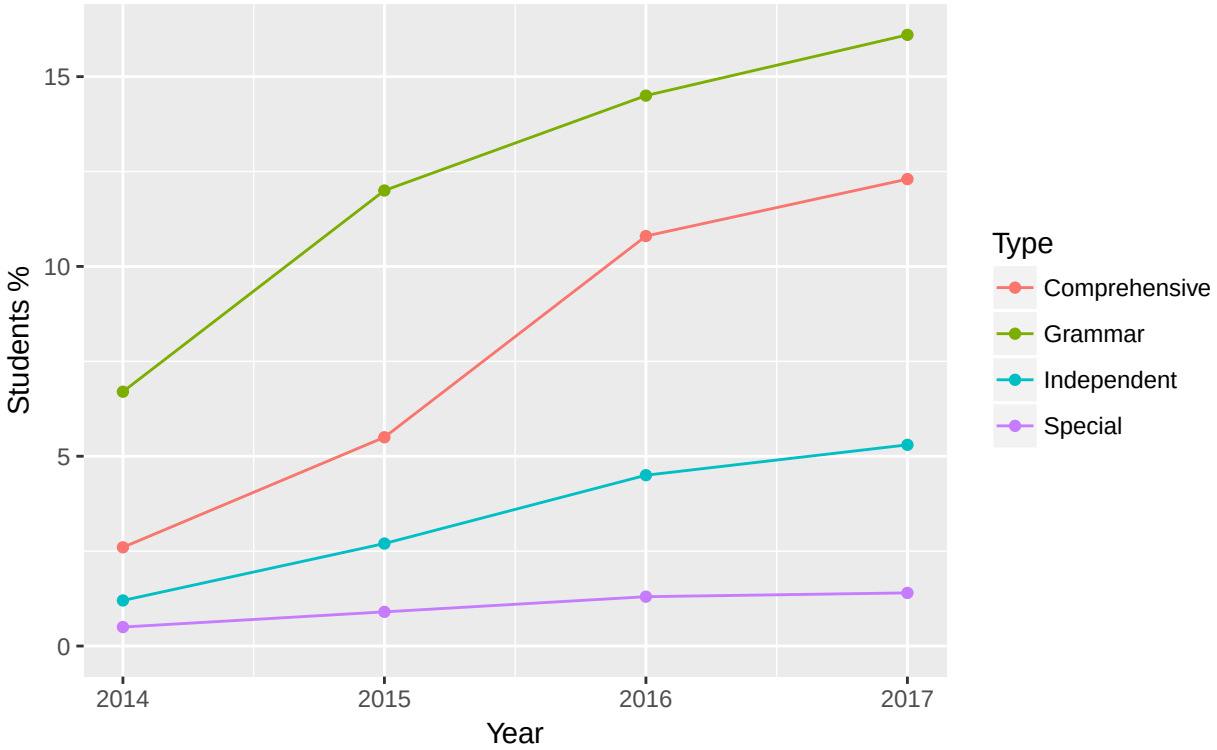

Figure 6: GCSE Computer Science student uptake by provider admission profile. 2014-17

Table 6: 2017 GCSE Computer Science mixed providers with no female students

Gender	Type	Total CS Providers	Female CS students	Male CS students	Providers with no females	Percentage of providers
Mixed	Comprehensive	2135	10145	47370	298	14.0
Mixed	Grammar	34	265	900	3	8.8
Mixed	Independent	169	265	1410	71	42.0
Mixed	Special	12	5	30	10	83.3
	Totals	2350	10680	49710	382	16.3

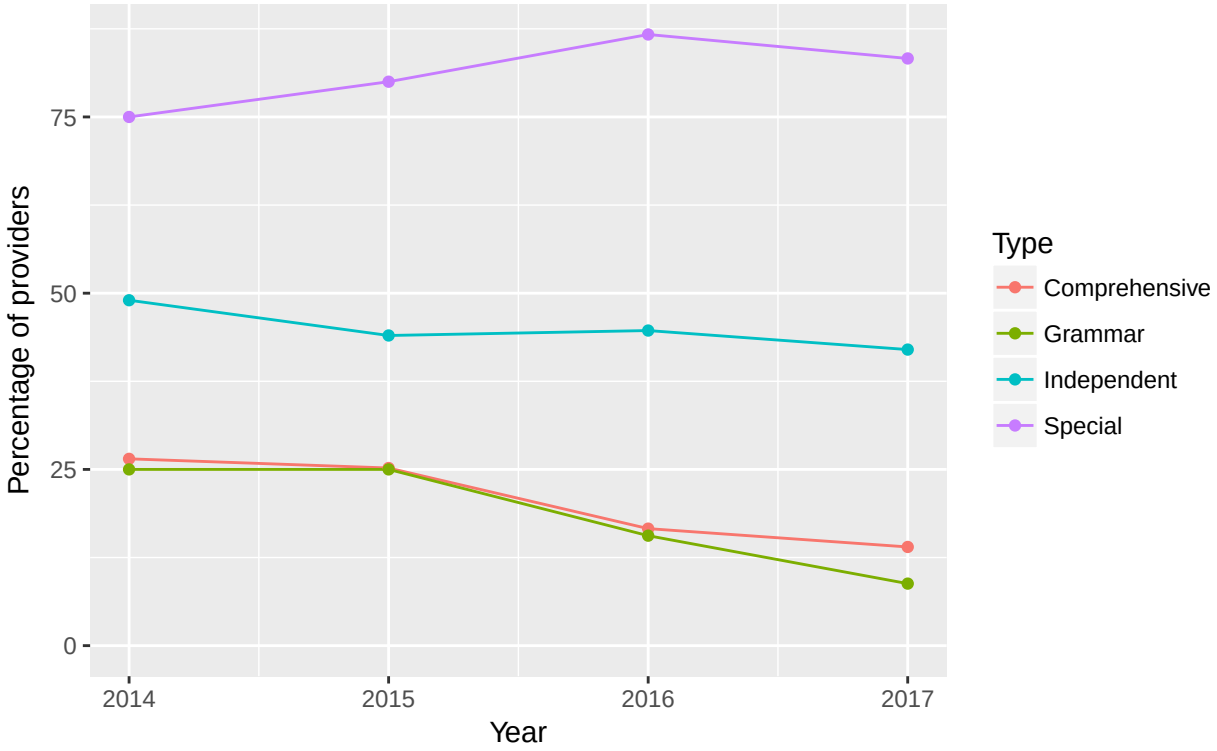

Figure 7: GCSE Computer Science mixed providers without any girls. 2014-17

4.1.3.2 KS5

Table 7: 2017 A level Computer Science by admissions policy

Type	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Comprehensive	2129	206058	804	37.8	5970	2.9	7.4	3.3	3.0	2.8
Independent	577	37044	136	23.6	440	1.2	3.2	4.2	3.7	3.4
Grammar	161	23066	102	63.4	780	3.4	7.6	4.0	3.8	3.6
Special	19	72	2	10.5	X	X	X	2.5	X	X
Totals	2886	266240	1044	36.2	7195	2.7	6.9	3.5	3.1	3.0

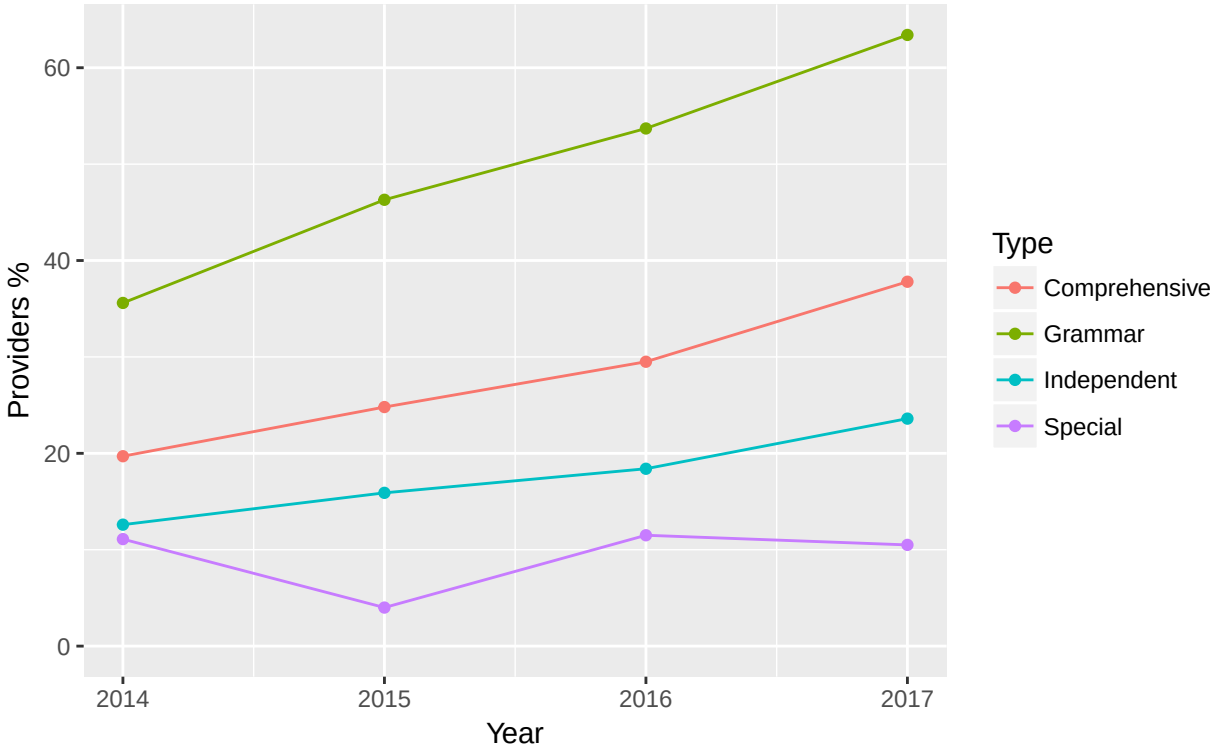

Figure 8: A-level Computer Science provider uptake by provider admission profile. 2014-17

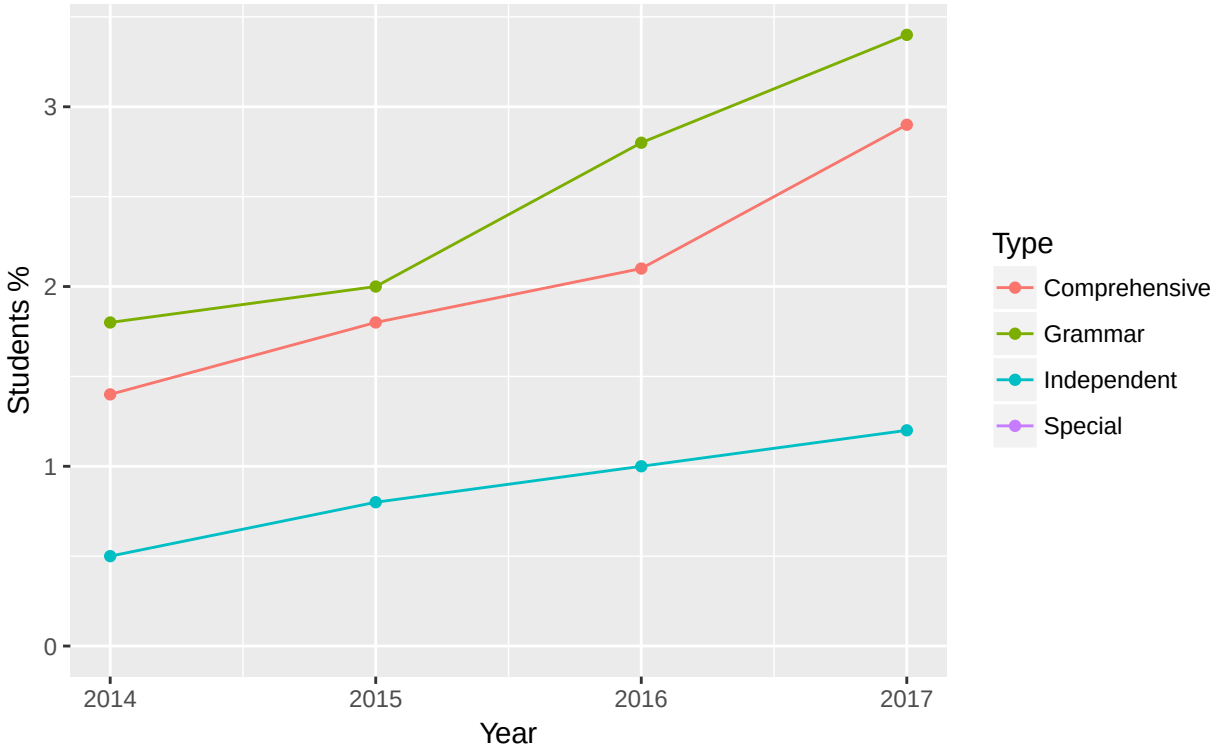

Figure 9: A-level Computer Science student uptake by provider admission profile (Special schools omitted due to small numbers). 2014-17

Table 8: 2017 A level Computer Science mixed providers with no female students

Gender	Type	Total CS Providers	Female CS students	Male CS students	Providers with no females	Percentage of providers
Mixed	Comprehensive	750	450	450	490	65.3
Mixed	Grammar	27	20	20	19	70.4
Mixed	Independent	104	35	35	75	72.1
Mixed	Special	1	X	X	1	100.0
	Totals	882	505	505	585	66.3

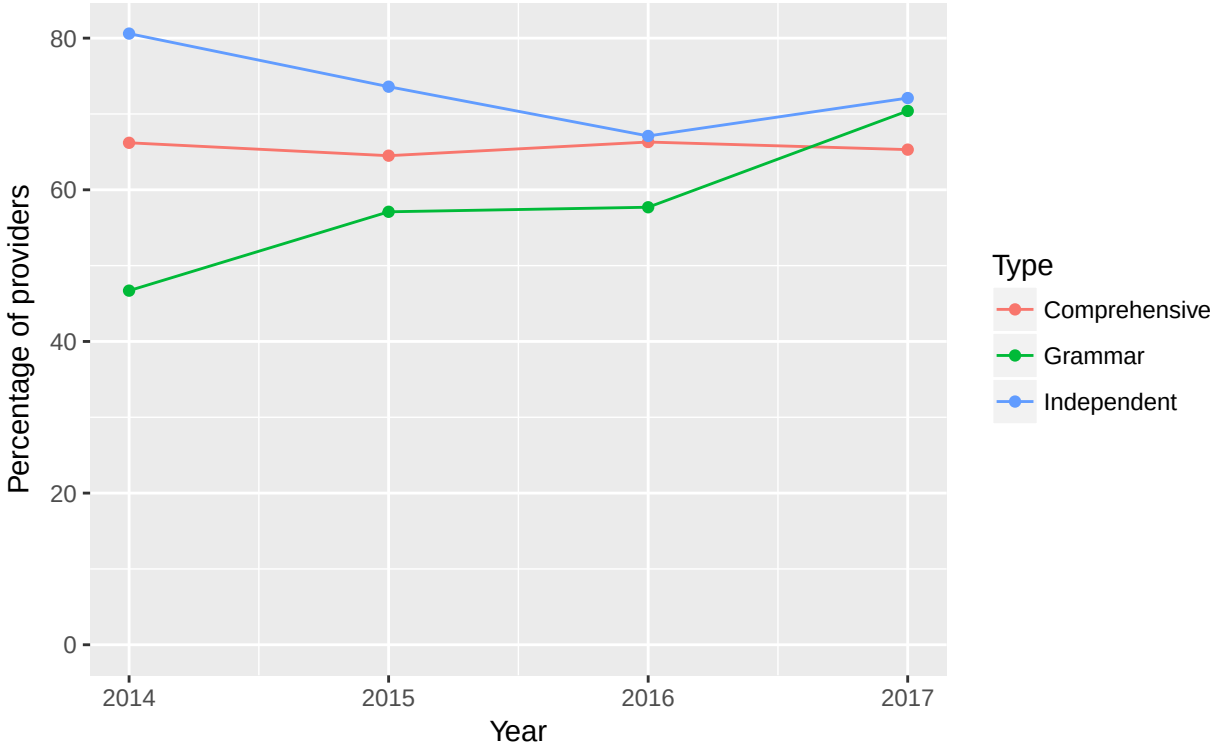

Figure 10: A level Computer Science mixed providers without any girls. 2014-17

4.1.4 Gender

The majority of mixed providers offer GCSE CS (53.6%), whilst similar numbers of girls' (44.4%) and boys' (46.9%) providers offer CS. However, student take-up of CS is lower in girls' schools (7.5% vs 15.2% for boys). Average results in single sex schools exceed those of mixed providers; however single sex providers typically have higher performing student populations to start with, which might be the result of relatively large numbers of independent and grammar providers being single sex.

The majority of single gender boys' providers offer A-level CS (56.3%), with mixed (36.6%) and girls' (23.3%) providers trailing substantially. Cohort sizes amongst boys only providers are larger than the other groupings and the boys only providers command the highest average grade.

4.1.4.1 KS4

Table 9: 2017 GCSE Computer Science by gender group of provider

Gender	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Mixed	4384	502094	2350	53.6	60375	12	25.7	4.7	5.1	4.6
Girls	392	40416	174	44.4	3024	7.5	17.4	5.9	6.4	5.7
Boys	286	26911	134	46.9	4088	15.2	30.5	5.6	5.9	5.5
Totals	5062	569421	2658	52.5	67487	11.9	25.4	4.8	5.2	4.7

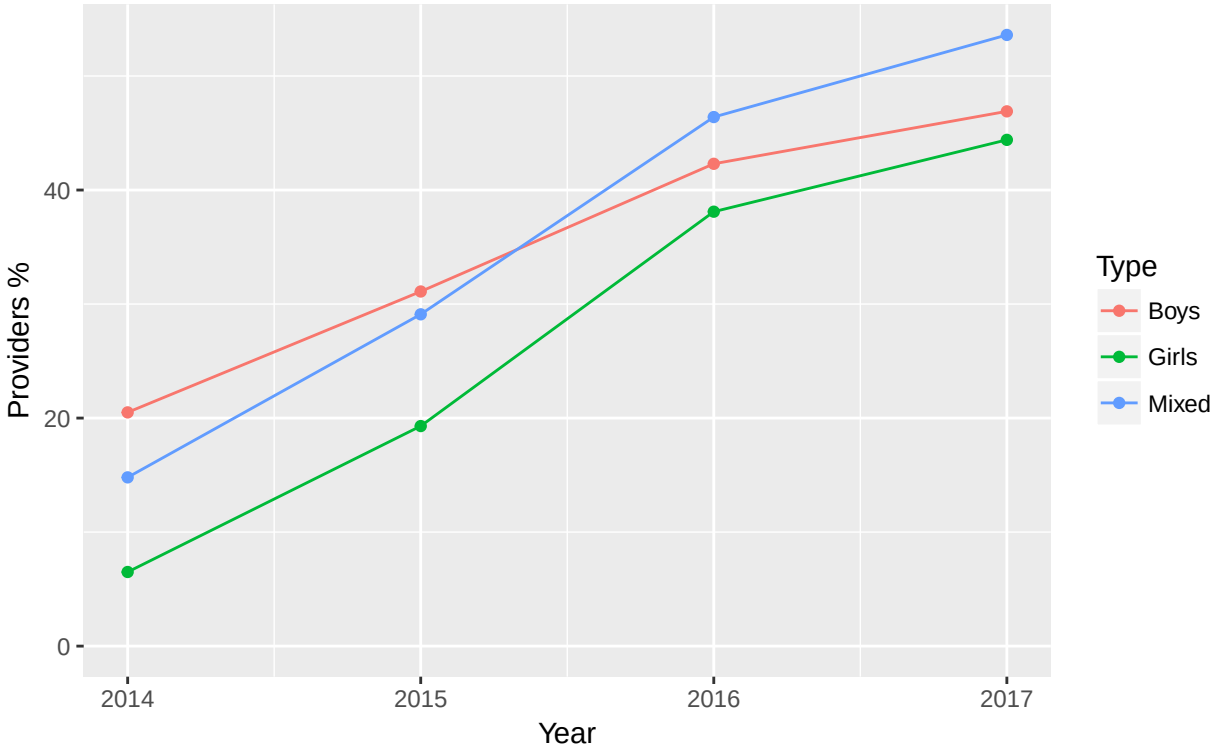

Figure 11: GCSE Computer Science provider uptake by provider gender characteristic. 2014-17

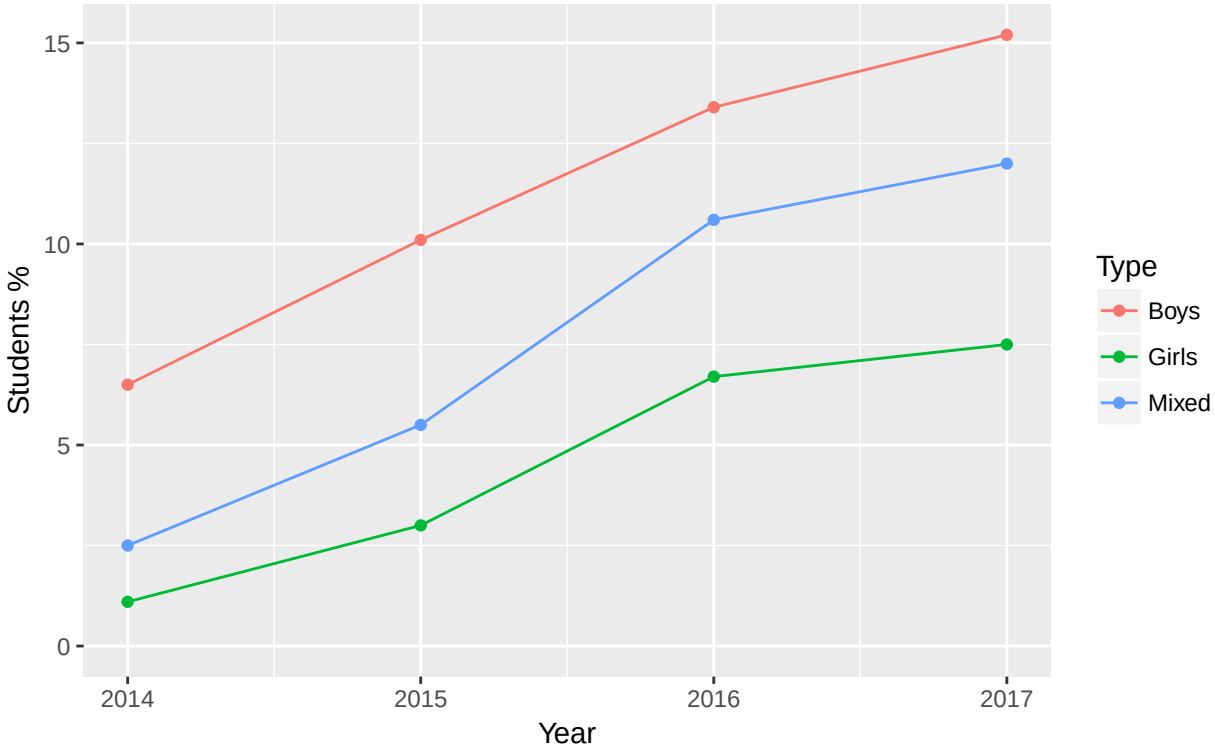

Figure 12: GCSE Computer Science student uptake by provider gender characteristic. 2014-17

4.1.4.2 KS5

Table 10: 2017 A level Computer Science by gender group of provider

Gender	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Mixed	2427	225769	882	36.3	6217	2.8	7.0	3.4	3.1	2.9
Girls	292	22930	68	23.3	229	1	3.4	3.9	3.5	3.1
Boys	167	17541	94	56.3	752	4.3	8.0	3.9	3.6	3.4
Totals	2886	266240	1044	36.2	7198	2.7	6.9	3.5	3.1	3.0

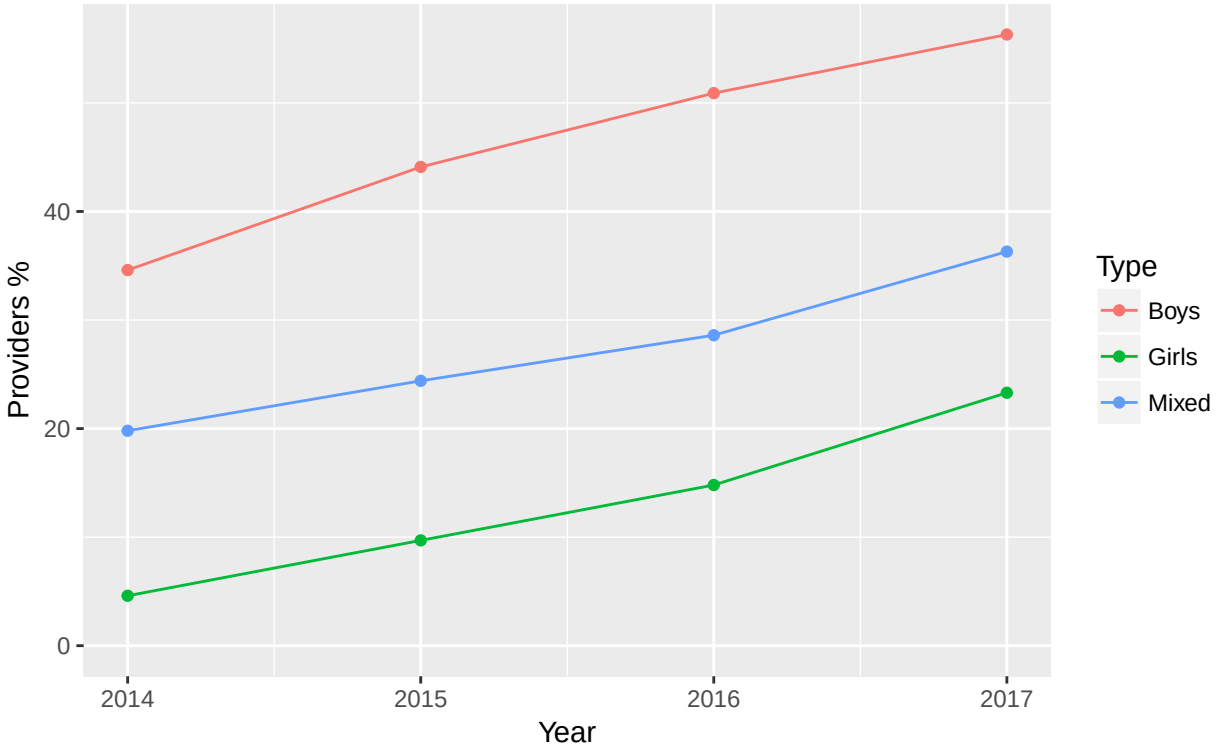

Figure 13: A-level Computer Science provider uptake by provider gender characteristic. 2014-17

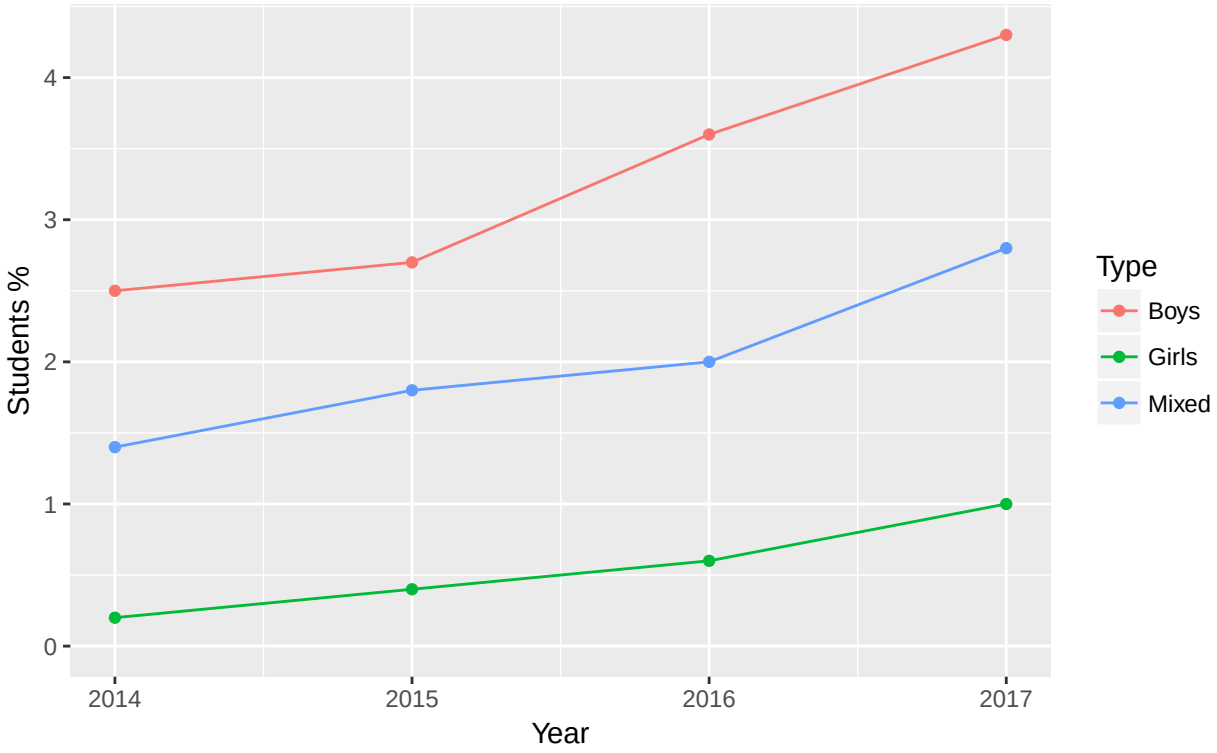

Figure 14: A-level Computer Science student uptake by provider gender characteristic. 2014-17

4.1.5 Region

There is substantial variation in GCSE CS provision between English regions, in particular London (49.2%) and the West Midlands (47.3%) see the lowest percentage of providers offering the subject, compared to 55.3% of providers in North West. Uptake ranges from 13% in the North West to 10.2% in Yorkshire and the Humber.

A-level CS shows dramatic variation between regions: only 29.1% of Yorkshire and Humber providers are offering CS, compared to 41.3% in the neighboring North East. Uptake varies between 2.1% of students in the underserved Yorkshire and the Humber region through to 3.1% in the East Midlands. Performance is low in London, with students sitting CS being substantially lower performing than their peers in the same school, and underperforming compared to their other subjects

Yorkshire and the Humber have substantially improved the offering of Computer Science at A-level over the last 4 years.

4.1.5.1 KS4

Table 11: 2017 GCSE Computer Science provision by region

Region	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
North West	688	75769	381	55.4	9854	13	25.9	4.7	5.1	4.6
South East	855	95213	454	53.1	12111	12.7	26.7	5.0	5.3	4.7
East of England	552	65562	304	55.1	8094	12.3	26.6	4.9	5.1	4.7
East Midlands	411	48162	217	52.8	5720	11.9	26.4	4.7	5.1	4.6
South West	509	55136	281	55.2	6467	11.7	23.0	4.9	5.1	4.6
London	745	83382	367	49.3	9405	11.3	25.6	5.1	5.6	5.1
West Midlands	590	62450	279	47.3	7069	11.3	25.3	4.7	5.2	4.7
North East	223	25507	123	55.2	2769	10.9	22.5	4.6	5.3	4.8
Yorkshire and The Humber	457	55993	240	52.5	5685	10.2	23.7	4.6	5.2	4.6
Totals	5030	567174	2646	52.6	67174	11.8	25.4	4.8	5.2	4.7

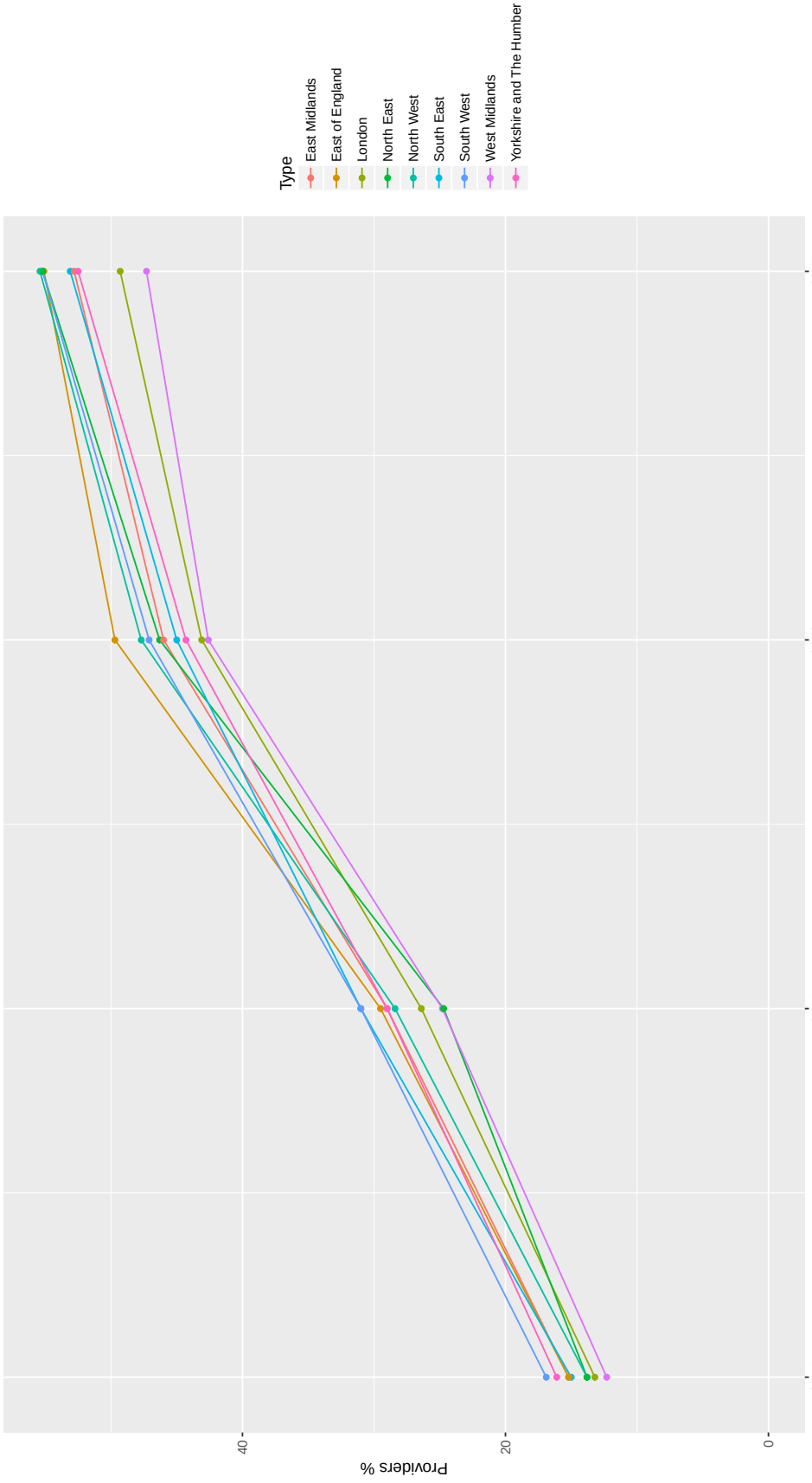

Figure 15: 2017 Computer Science GCSE provider uptake by region. 2014-17

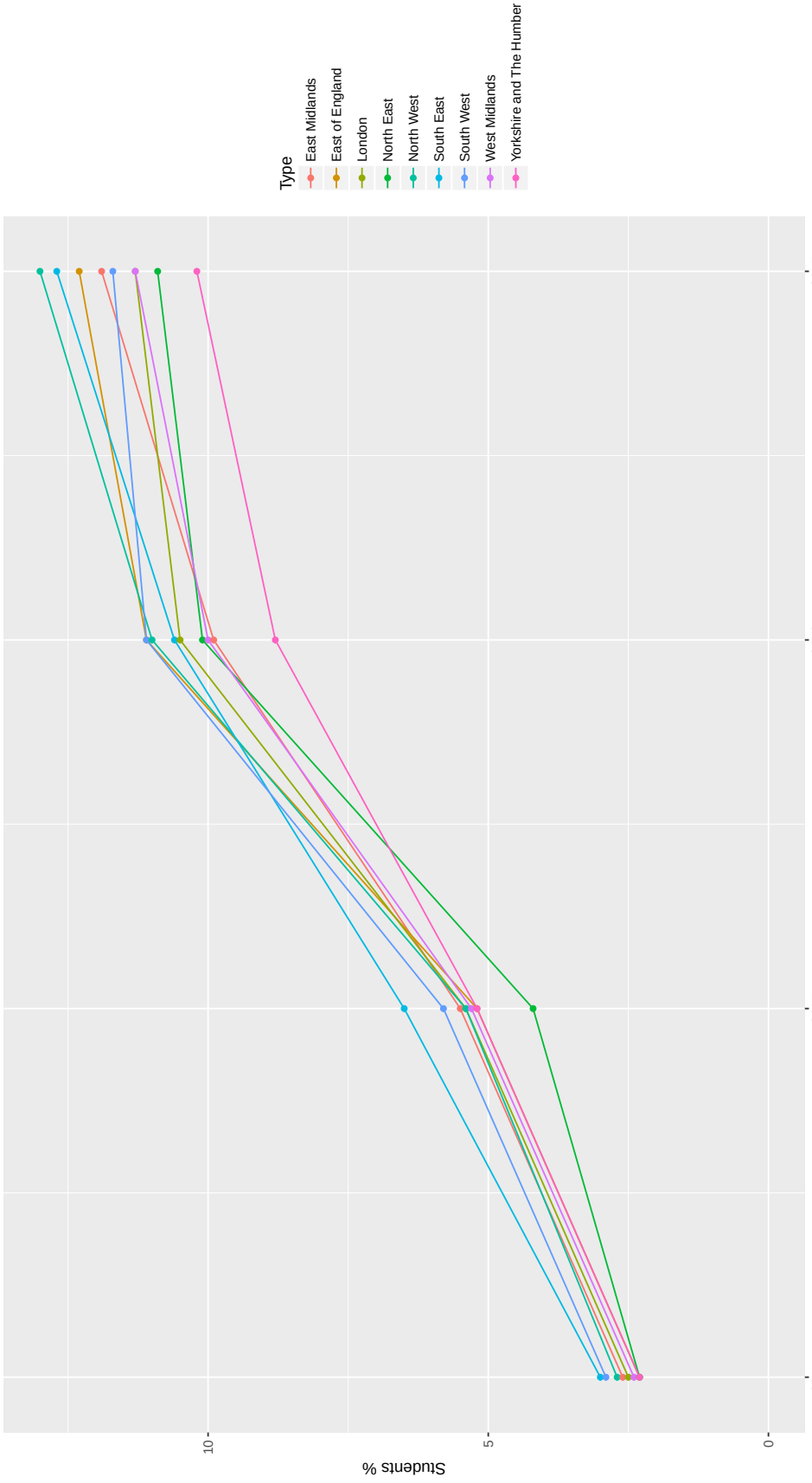

Figure 16: 2017 Computer Science GCSE student uptake by region. 2014-17

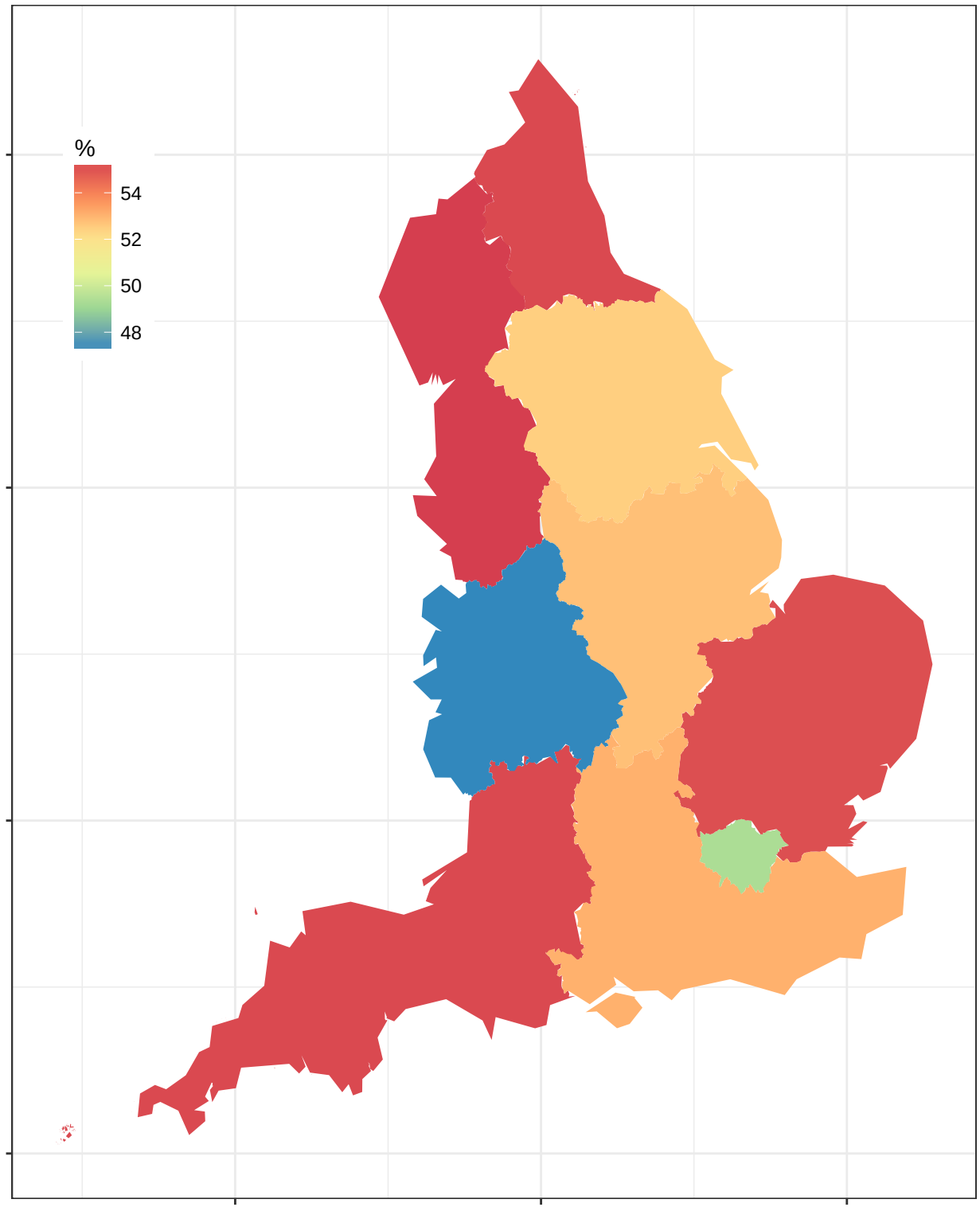

Figure 17: 2017 Computer Science GCSE regional provider uptake

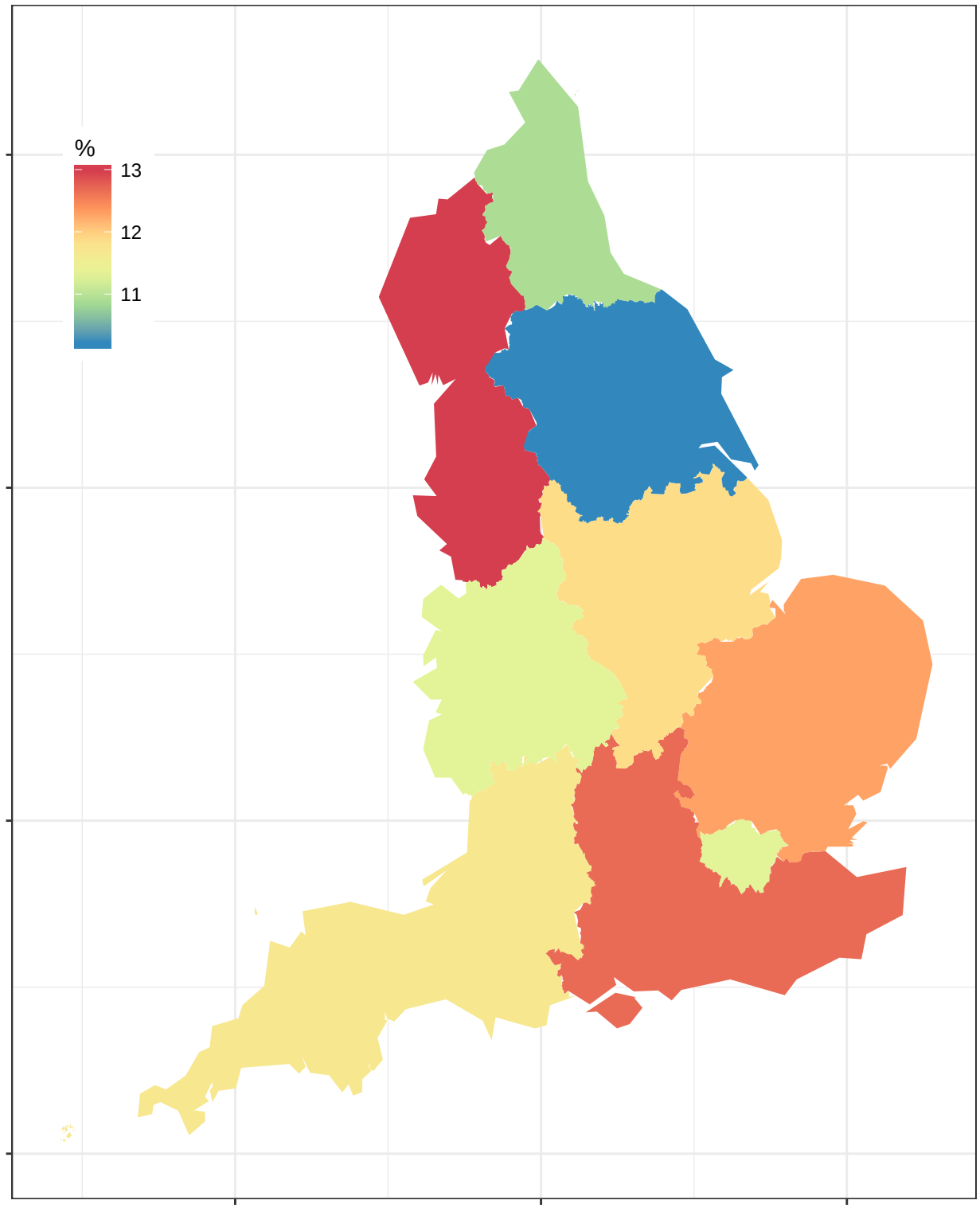

Figure 18: 2017 Computer Science GCSE regional student uptake

4.1.5.2 KS5

Table 12: 2017 A level Computer Science by region sorted by student uptake

Region	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
East Midlands	241	20340	96	39.8	632	3.1	6.6	3.3	3.1	3.0
North West	291	32186	109	37.5	1009	3.1	9.3	3.4	3.2	3.0
East of England	336	31648	138	41.1	956	3	6.9	3.5	3.2	3.1
South East	517	52068	188	36.4	1430	2.7	7.6	3.6	3.2	3.0
South West	296	26576	119	40.2	726	2.7	6.1	3.5	3.1	3.0
North East	104	9956	43	41.3	258	2.6	6.0	3.4	3.2	3.2
West Midlands	334	25966	98	29.3	672	2.6	6.9	3.3	3.0	2.9
London	517	44325	183	35.4	1027	2.3	5.6	3.6	3.0	2.7
Yorkshire and The Humber	234	22537	68	29.1	472	2.1	6.9	3.3	3.1	3.0
Totals	2870	265602	1042	36.3	7182	2.7	6.9	3.5	3.1	3.0

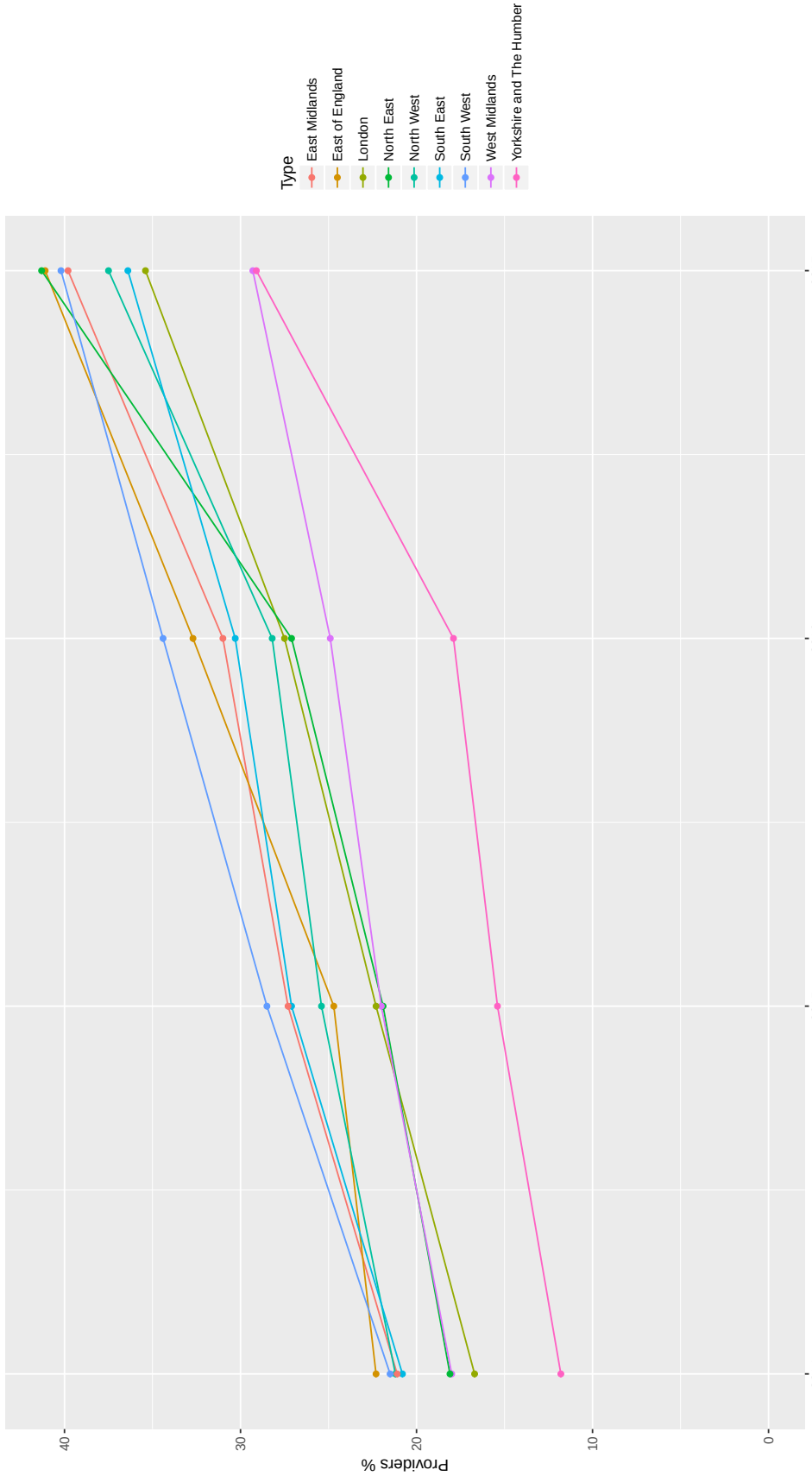

Figure 19: A-level Computer Science provider uptake by region. 2014-17

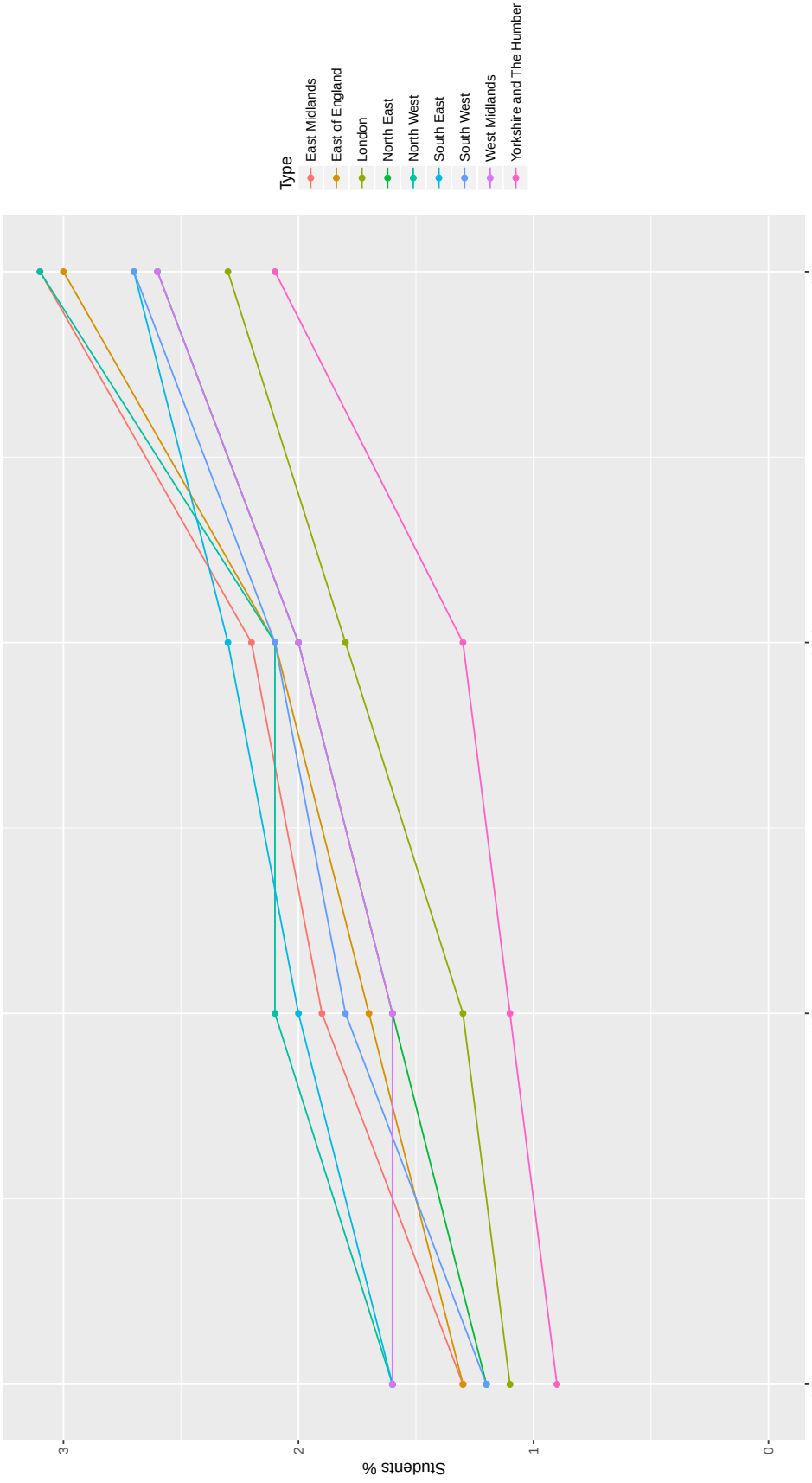

Figure 20: A-level Computer Science student uptake by region. 2014-17

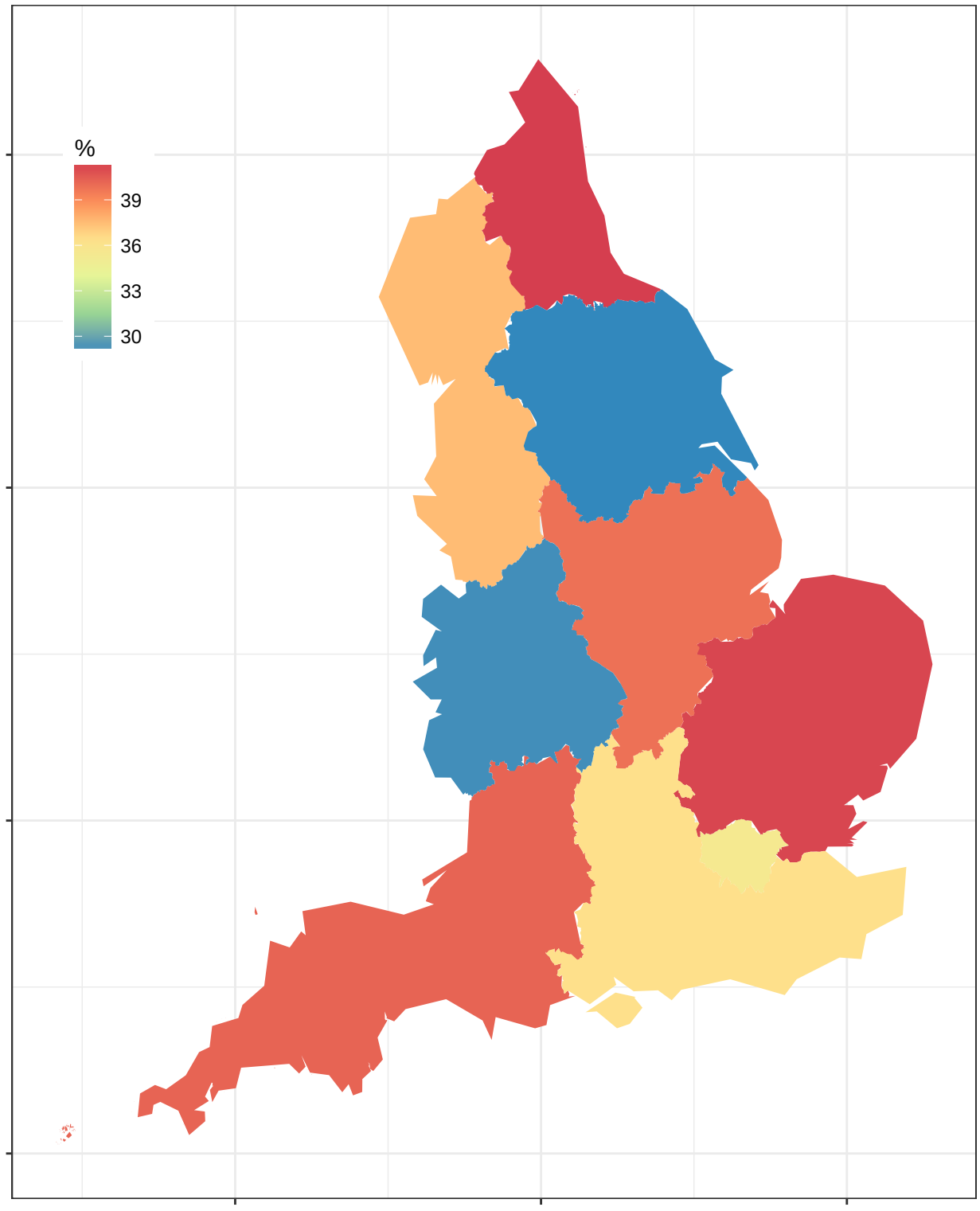

Figure 21: 2017 Computer Science A-level regional provider provision

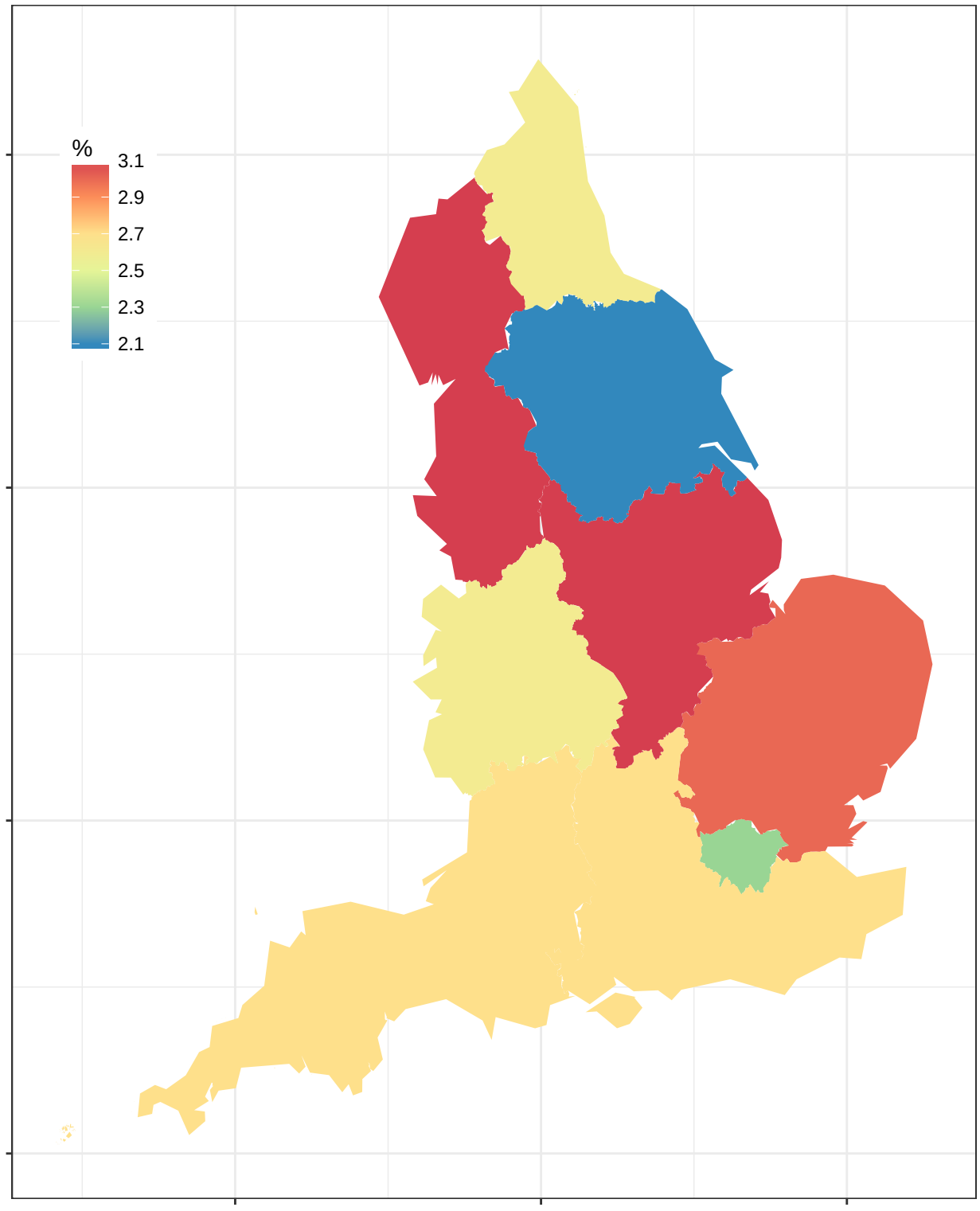

Figure 22: 2017 Computer Science A-level regional student uptake

4.1.6 Local Authority

There are some excellent examples of GCSE CS uptake across the country with Bournemouth, Knowsley, Trafford and Hartlepool local authorities (LAs) having more than one in five of their students studying the subject. However, schools in many local authorities still have a lot of work to do, with low uptake amongst several local authorities, e.g. Kingston upon Hull (3.9%) and Luton (5.1%).

Grades from some LAs are very strong, for example: Slough, Kensington and Chelsea, and Redbridge. However, it should be noted that almost all local authorities showed GCSE CS students on average getting a lower grade in CS than their other subjects.

At A-level, Islington has one in ten of its students sitting CS; Reading, Poole, South Tyneside and Swindon have more than double the national average. There remain three local authorities where there was no A-level CS provision in 2017: Halton, Knowsley and the City of London (as well as the Isles of Scilly); however it should be noted that each of these authorities have very small A-level cohorts.

There are many areas of the country where the provision is largely limited to independent and/or grammar schools, which makes A-level CS a far from inclusive subject.

4.1.6.1 KS4

Table 13: 2017 GCSE Computer Science provision by local authority. Top 30 sorted by student uptake.

LA	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Bournemouth	14	1715	11	78.6	408	23.8	37.1	4.9	5.1	3.9
Knowsley	9	962	6	66.7	213	22.1	35.5	4.1	4.2	3.1
Trafford	26	2740	17	65.4	599	21.9	35.2	5.5	5.7	5.1
Hartlepool	8	970	5	62.5	199	20.5	39.8	4.3	4.9	3.8
Southend-on-Sea	20	2137	11	55.0	400	18.7	36.4	5.1	6.0	5.5
Slough	16	1726	10	62.5	318	18.4	31.8	5.1	6.0	5.7
Bexley	19	3131	15	78.9	533	17.0	35.5	4.8	5.2	4.5
Harrow	20	2483	12	60.0	421	17.0	35.1	5.3	5.9	5.5
Blackpool	10	1205	6	60.0	201	16.7	33.5	4.0	4.2	3.6
Peterborough	20	2300	13	65.0	384	16.7	29.5	4.3	4.4	3.8
Rochdale	18	2284	12	66.7	377	16.5	31.4	4.4	4.8	3.9
Telford and Wrekin	17	1870	11	64.7	307	16.4	27.9	4.6	5.1	4.7
Bracknell Forest	12	1480	8	66.7	242	16.4	30.2	5.1	5.5	4.8
Barking and Dagenham	15	2288	9	60.0	371	16.2	41.2	4.8	4.7	4.3
Hillingdon	27	3287	16	59.3	527	16.0	32.9	4.8	5.5	5.2
Warrington	17	2259	12	70.6	354	15.7	29.5	4.9	5.2	4.5
Newham	26	3642	14	53.8	573	15.7	40.9	4.9	5.8	5.1
Waltham Forest	25	2718	17	68.0	427	15.7	25.1	4.9	5.4	5.0
Sefton	30	3191	17	56.7	497	15.6	29.2	4.7	5.0	4.7
West Berkshire	20	2147	12	60.0	330	15.4	27.5	5.2	5.4	4.9
Leicestershire	59	7424	34	57.6	1147	15.4	33.7	4.9	5.0	4.4
Hampshire	126	13846	69	54.8	2102	15.2	30.5	4.9	5.1	4.6
Swindon	17	2113	10	58.8	320	15.1	32.0	4.5	4.7	4.4
Stoke-on-Trent	25	2246	15	60.0	329	14.6	21.9	4.3	4.8	4.1
Wiltshire	45	5227	30	66.7	761	14.6	25.4	5.0	5.0	4.3
Kensington and Chelsea	17	970	6	35.3	142	14.6	23.7	5.6	6.3	5.8
Walsall	30	3254	14	46.7	470	14.4	33.6	4.4	5.2	4.7
Liverpool	45	4493	22	48.9	644	14.3	29.3	4.5	5.3	4.4
Redbridge	27	3661	17	63.0	521	14.2	30.6	5.2	6.0	5.6
Herefordshire	25	1826	9	36.0	254	13.9	28.2	4.7	5.2	4.6
Totals	5063	569427	2658	52.5	67487	11.9	25.4	4.8	5.2	4.7

Table 14: 2017 GCSE Computer Science provision by local authority. Bottom 30 sorted by student uptake.

LA	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Rotherham	25	3044	10	40.0	295	9.7	29.5	4.5	5.1	4.6
Stockport	28	3031	14	50.0	291	9.6	20.8	5.1	5.5	5.1
Barnsley	16	2139	9	56.2	205	9.6	22.8	4.4	4.8	3.9
Lewisham	20	2426	12	60.0	233	9.6	19.4	4.7	5.6	4.9
East Riding of Yorkshire	23	3504	16	69.6	332	9.5	20.8	4.8	5.2	4.5
Wandsworth	23	2169	8	34.8	206	9.5	25.8	5.3	5.7	5.3
Reading	16	1451	6	37.5	135	9.3	22.5	5.2	5.2	4.5
Tower Hamlets	30	2857	12	40.0	267	9.3	22.2	4.9	5.8	5.1
Hackney	25	2233	10	40.0	205	9.2	20.5	5.1	5.4	4.5
Sutton	22	2841	9	40.9	253	8.9	28.1	5.6	5.9	5.3
Leicester	36	3542	13	36.1	311	8.8	23.9	4.5	5.1	4.2
Camden	20	1837	8	40.0	162	8.8	20.2	5.3	6.1	5.5
Southwark	23	2828	12	52.2	249	8.8	20.8	5.4	5.8	5.4
Blackburn with Darwen	21	2015	8	38.1	173	8.6	21.6	4.7	5.0	4.5
Somerset	58	5781	22	37.9	486	8.4	22.1	4.8	5.1	4.5
Barnet	39	3970	14	35.9	316	8.0	22.6	5.6	5.5	4.9
Bradford	46	6107	20	43.5	482	7.9	24.1	4.4	5.5	5.0
Calderdale	21	2581	8	38.1	203	7.9	25.4	4.8	5.7	5.4
Westminster	22	1998	9	40.9	157	7.9	17.4	5.6	6.3	5.8
Havering	22	2781	11	50.0	199	7.2	18.1	4.9	5.4	4.7
Shropshire	41	3346	14	34.1	237	7.1	16.9	5.0	5.3	5.0
Hammersmith and Fulham	21	1784	6	28.6	127	7.1	21.2	5.6	5.9	5.2
Sunderland	24	2823	11	45.8	197	7.0	17.9	4.4	5.2	4.8
Merton	14	1700	6	42.9	119	7.0	19.8	5.4	5.9	5.4
Hounslow	24	2638	10	41.7	171	6.5	17.1	5.0	5.9	5.5
Brent	25	3016	9	36.0	184	6.1	20.4	5.0	6.0	5.3
Luton	18	2536	7	38.9	129	5.1	18.4	4.4	5.6	5.4
Kingston upon Hull City of	21	2443	6	28.6	95	3.9	15.8	4.2	4.9	4.5
City of London	2	210	1	50.0	8	3.8	8.0	7.4	7.8	8.0
Isles Of Scilly	1	19	0	0.0	0	0.0	0	5.2	0	0
Totals	5063	569427	2658	52.5	67487	11.9	25.4	4.8	5.2	4.7

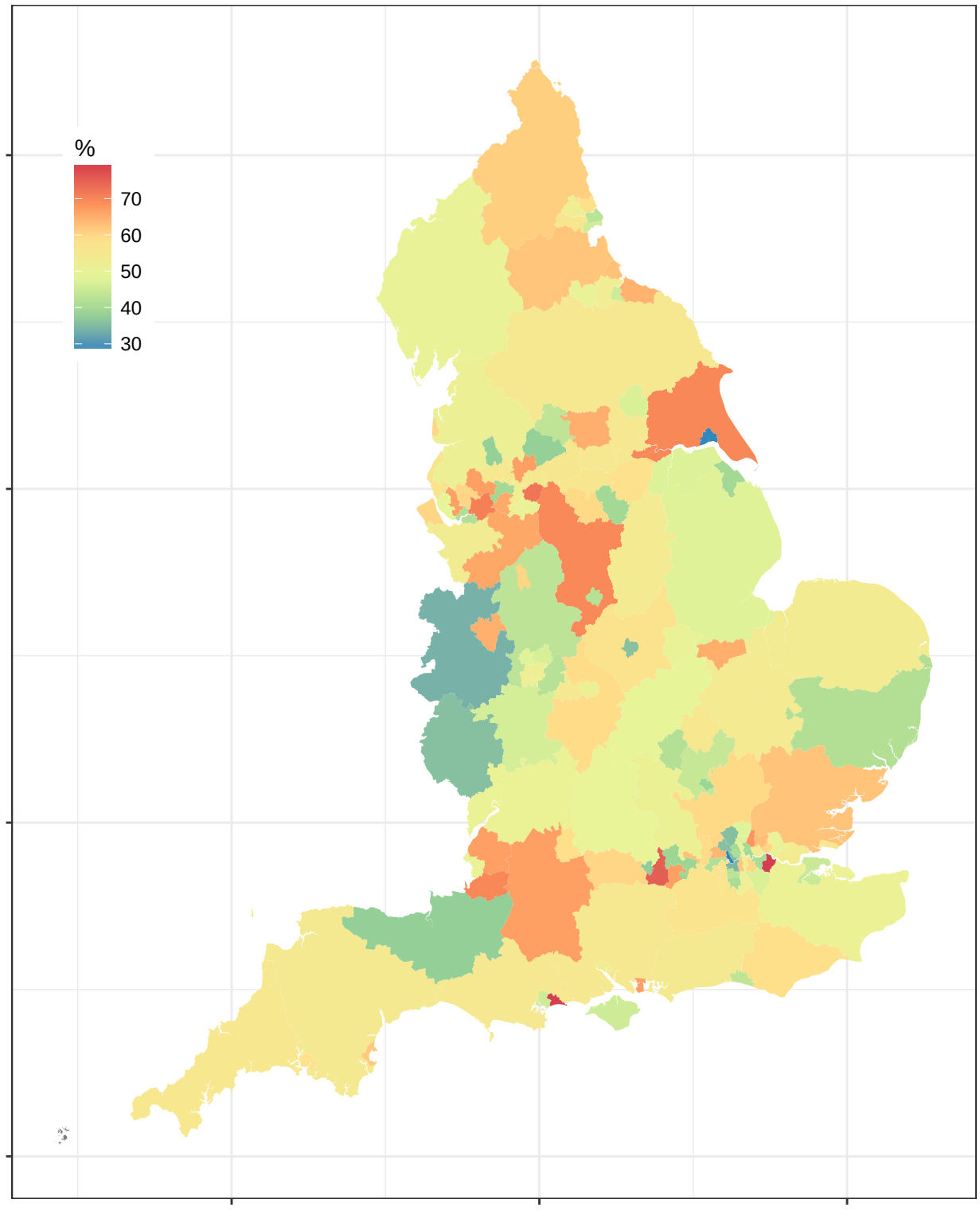

Figure 23: 2017 Computer Science GCSE local authority provider provision

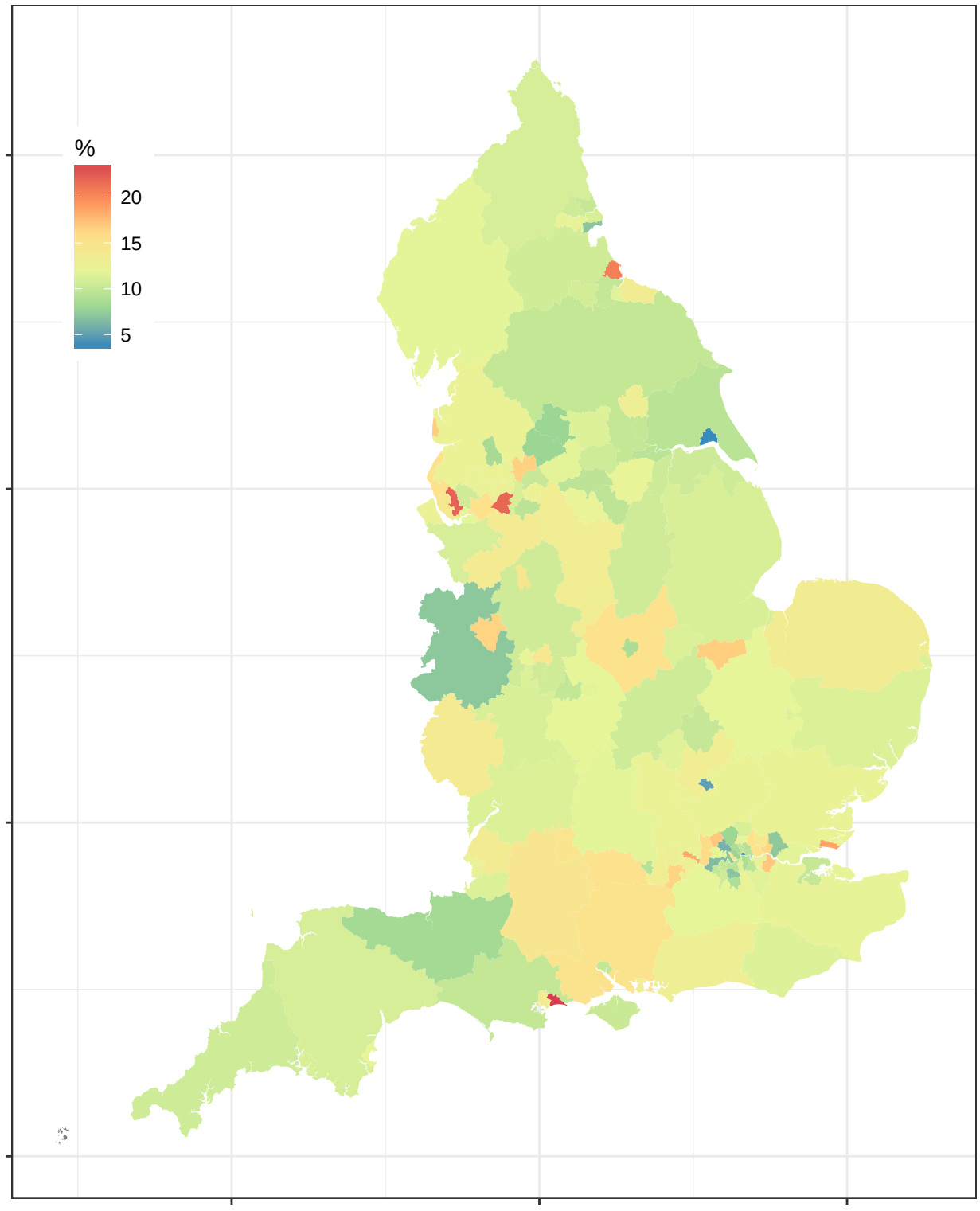

Figure 24: 2017 Computer Science GCSE local authority student uptake

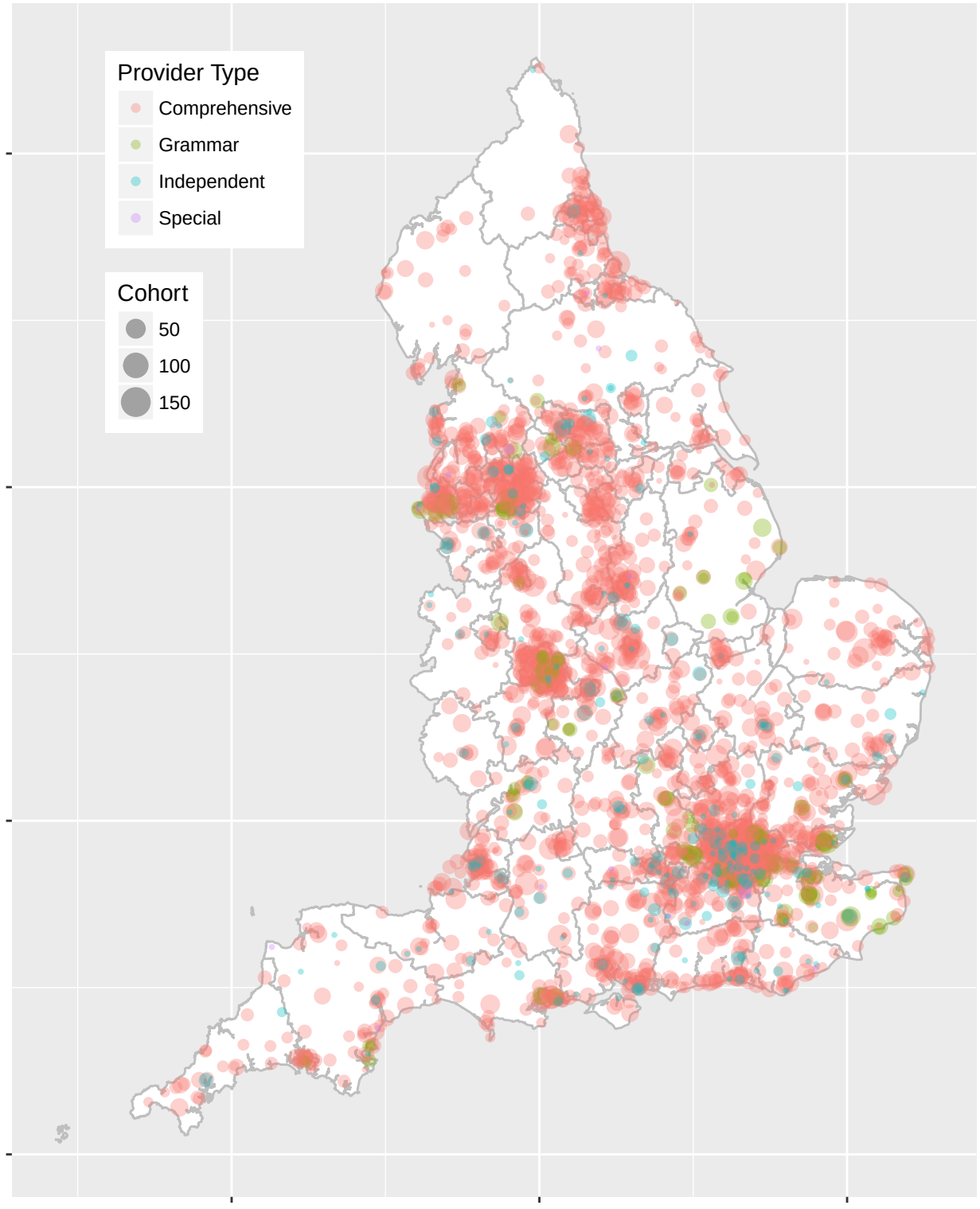

Figure 25: 2017 Computer Science GCSE providers

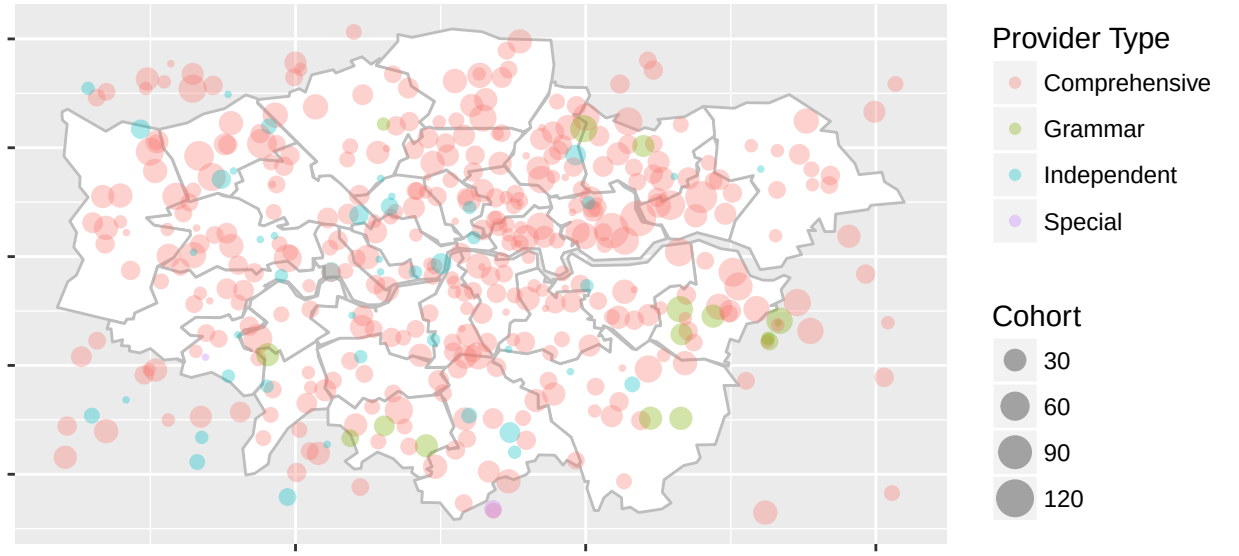

Figure 26: 2017 Computer Science GCSE providers, London

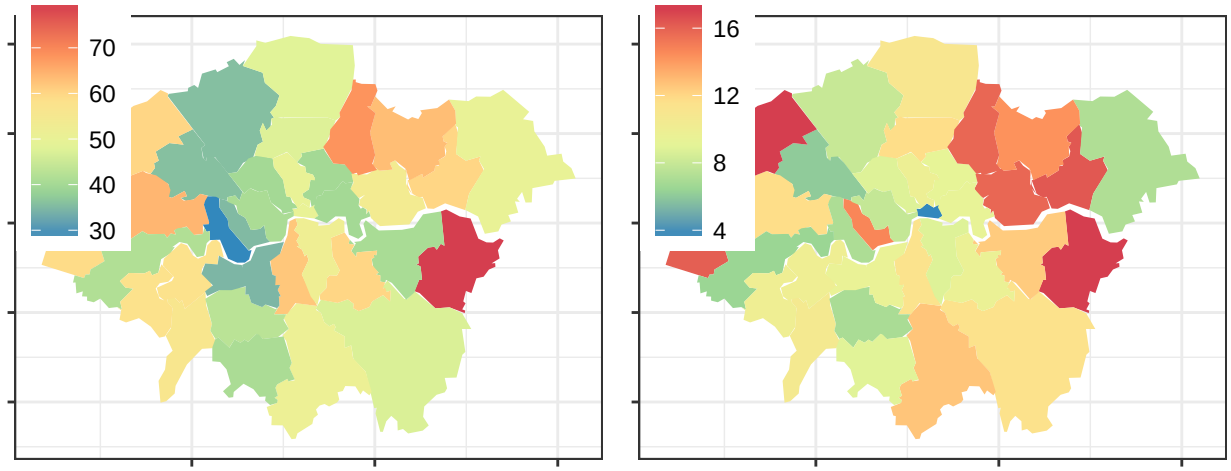

Figure 27: 2017 Computer Science GCSE providers and students, London

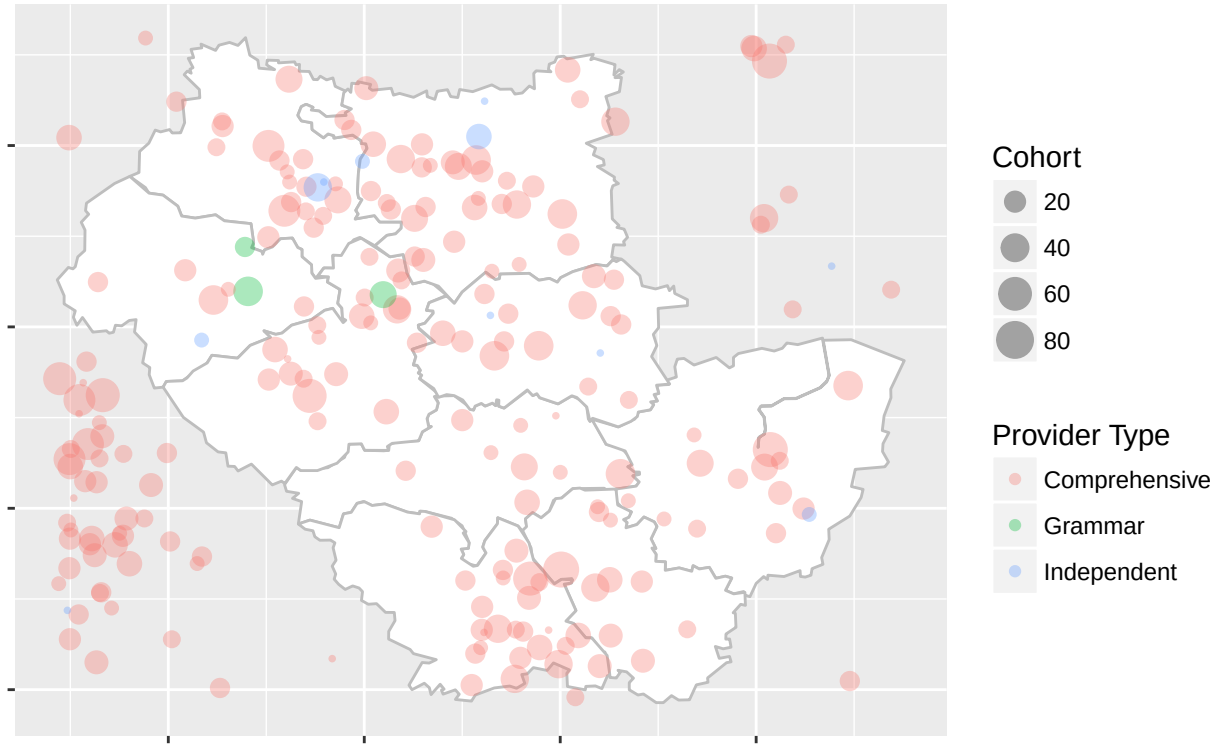

Figure 28: 2017 Computer Science GCSE providers, Leeds

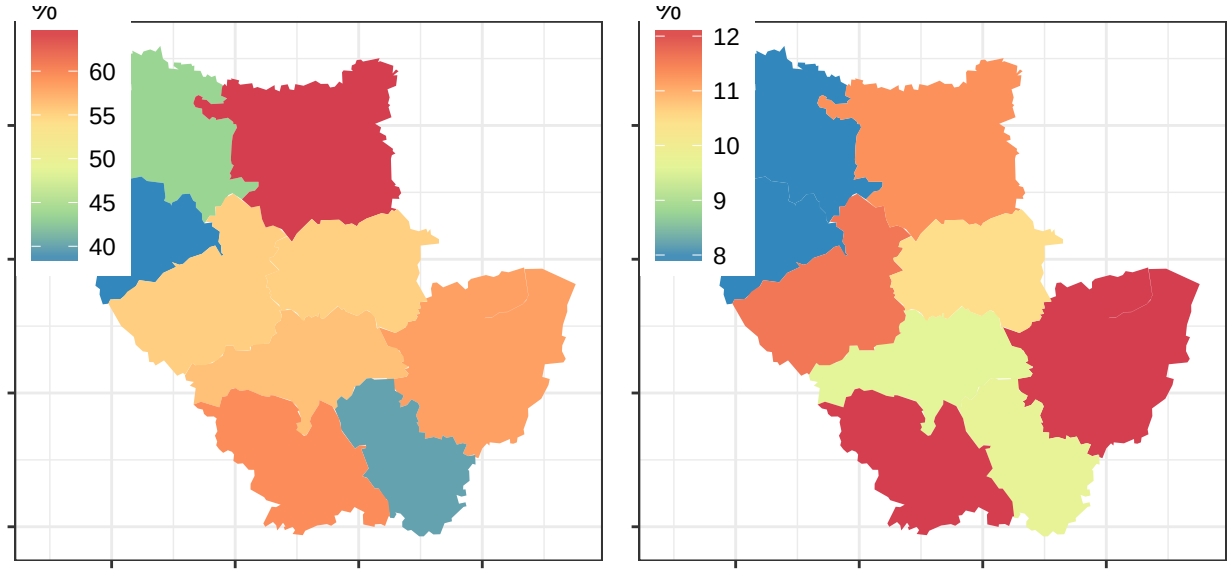

Figure 29: 2017 Computer Science GCSE providers and students, Leeds

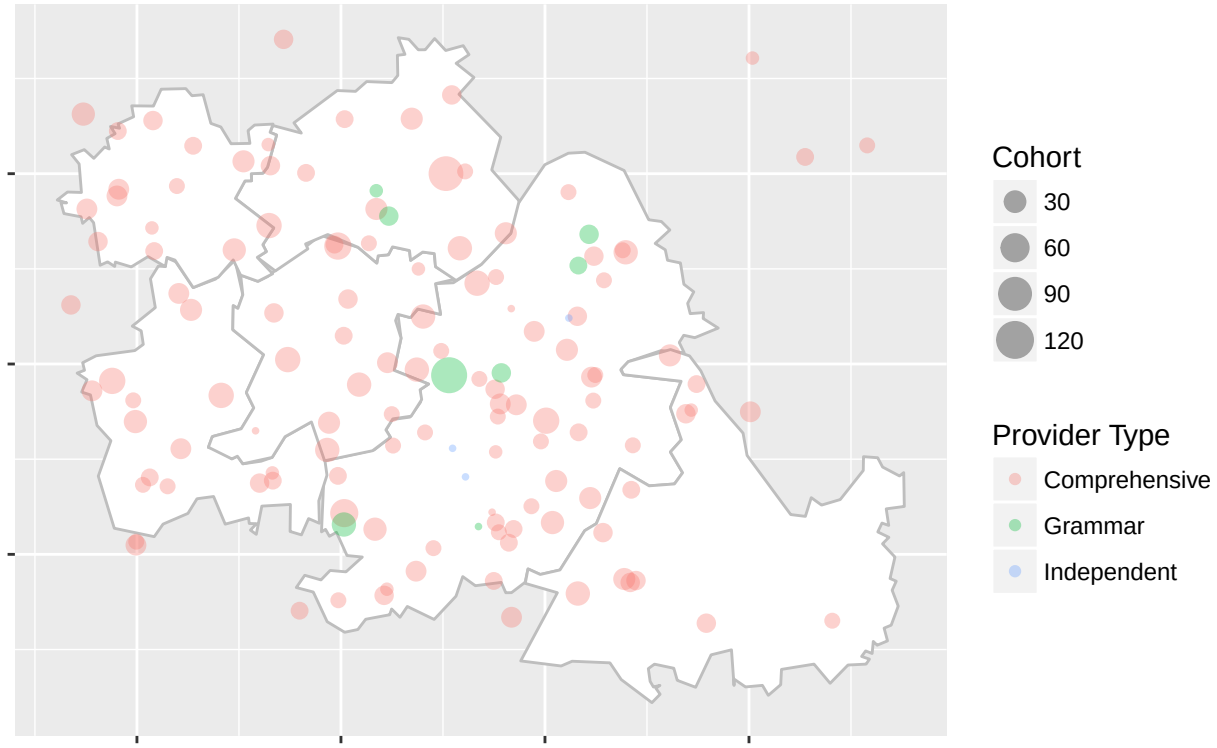

Figure 30: 2017 Computer Science GCSE providers, Birmingham

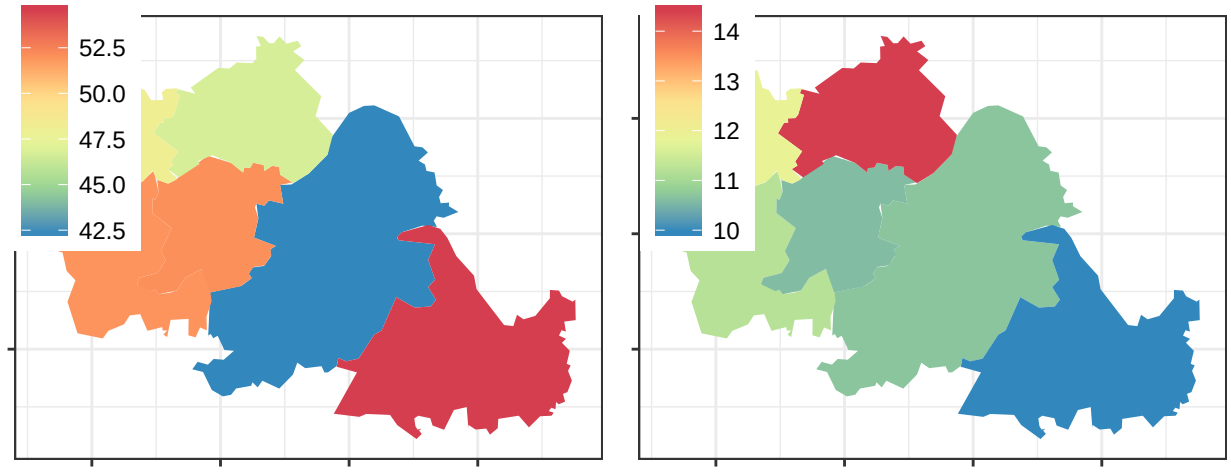

Figure 31: 2017 Computer Science GCSE providers and students, Birmingham

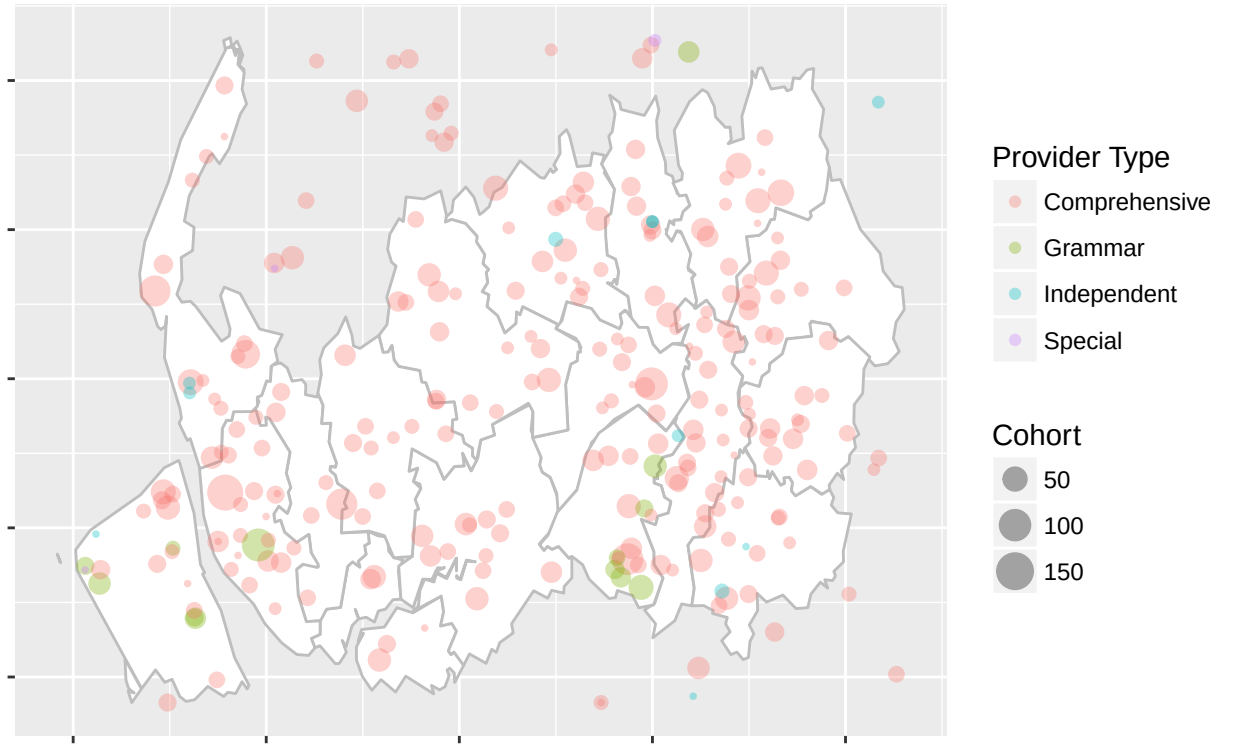

Figure 32: 2017 Computer Science GCSE providers, Manchester and Liverpool

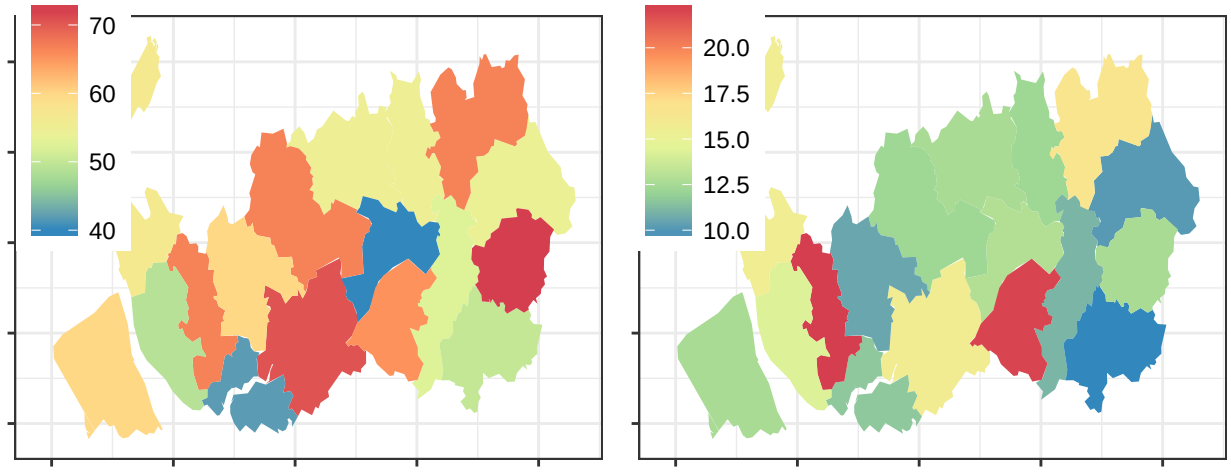

Figure 33: 2017 Computer Science GCSE providers and students, Manchester and Liverpool

4.1.6.2 KS5

Table 15: 2017 A level Computer Science by local authority. Top 30 sorted by student uptake

LA	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Islington	8	294	5	62.5	30	10.2	6.0	3.2	2.6	2.1
Reading	11	782	5	45.5	60	7.7	12.0	3.9	3.2	3.2
Poole	8	835	6	75.0	55	6.6	9.2	3.5	3.5	3.4
South Tyneside	5	389	4	80.0	25	6.4	6.2	3.3	2.4	2.0
Swindon	7	736	4	57.1	40	5.4	10.0	2.8	2.4	2.2
Herefordshire	11	1248	3	27.3	65	5.2	21.7	3.5	3.6	3.8
Trafford	14	1206	5	35.7	60	5.0	12.0	3.9	4.0	4.2
Dudley	7	1703	4	57.1	85	5.0	21.2	3.2	2.7	2.4
Hartlepool	3	409	3	100.0	20	4.9	6.7	3.1	2.6	2.4
South Gloucestershire	16	1033	12	75.0	50	4.8	4.2	3.2	2.7	2.7
Bury	6	1266	3	50.0	60	4.7	20.0	3.2	2.7	2.7
Southwark	17	1284	9	52.9	60	4.7	6.7	4.0	3.4	3.1
Derby	13	968	8	61.5	45	4.6	5.6	3.1	2.8	2.6
Stoke-on-Trent	7	646	5	71.4	30	4.6	6.0	3.0	3.0	3.2
Stockport	9	1440	4	44.4	65	4.5	16.2	3.4	3.0	3.2
Hillingdon	24	1539	9	37.5	70	4.5	7.8	3.3	3.2	2.8
Southend-on-Sea	11	1131	4	36.4	50	4.4	12.5	3.7	3.8	3.7
Thurrock	5	565	2	40.0	25	4.4	12.5	2.8	2.9	3.0
Bournemouth	12	722	4	33.3	30	4.2	7.5	3.4	3.0	2.9
Isle of Wight	9	472	4	44.4	20	4.2	5.0	3.0	2.4	2.2
Calderdale	14	955	6	42.9	40	4.2	6.7	3.2	2.4	2.5
Hampshire	31	8539	18	58.1	355	4.2	19.7	3.5	3.1	3.0
Leicestershire	29	3592	20	69.0	150	4.2	7.5	3.5	3.1	2.9
Barnsley	2	367	2	100.0	15	4.1	7.5	3.2	2.4	2.3
Waltham Forest	12	1467	8	66.7	60	4.1	7.5	3.1	2.9	2.8
Lancashire	40	4801	17	42.5	195	4.1	11.5	3.7	3.5	3.2
Salford	5	498	1	20.0	20	4.0	20.0	2.8	X	X
Redcar and Cleveland	3	638	2	66.7	25	3.9	12.5	3.3	3.2	3.2
Cheshire West and Chester	20	2159	10	50.0	85	3.9	8.5	3.6	3.4	3.3
West Berkshire	17	1300	8	47.1	50	3.8	6.2	3.5	3.4	3.3
Totals	2886	266240	1044	36.2	7235	2.7	6.9	3.5	3.1	2.9

Table 16: 2017 A level Computer Science by local authority. Bottom 30 sorted by student uptake

LA	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Sutton	17	1814	7	41.2	35	1.9	5.0	3.9	4.2	3.5
Surrey	75	8568	27	36.0	160	1.9	5.9	3.7	3.4	3.3
North Lincolnshire	7	553	3	42.9	10	1.8	3.3	3.2	2.0	2.2
Liverpool	32	1898	5	15.6	35	1.8	7.0	3.2	3.5	3.3
Wirral	20	1895	6	30.0	35	1.8	5.8	3.4	3.0	2.9
Sheffield	17	1978	4	23.5	35	1.8	8.8	3.4	3.0	2.9
Newham	7	1088	4	57.1	20	1.8	5.0	3.6	2.4	2.2
Warrington	8	877	2	25.0	15	1.7	7.5	3.2	3.1	3.1
Northumberland	18	1288	4	22.2	20	1.6	5.0	3.2	2.9	3.0
Gateshead	9	613	2	22.2	10	1.6	5.0	3.5	3.1	3.5
Oxfordshire	60	4547	21	35.0	75	1.6	3.6	3.7	3.6	3.6
Blackburn with Darwen	9	686	3	33.3	10	1.5	3.3	3.4	3.0	2.9
Cornwall	18	1951	5	27.8	30	1.5	6.0	3.5	3.6	3.2
Sunderland	8	654	3	37.5	10	1.5	3.3	3.2	4.0	3.6
Bradford	31	1991	5	16.1	30	1.5	6.0	3.2	3.7	3.6
Buckinghamshire	43	3731	9	20.9	55	1.5	6.1	3.8	3.8	3.4
Telford and Wrekin	8	721	2	25.0	10	1.4	5.0	3.3	2.5	2.0
Merton	11	692	2	18.2	10	1.4	5.0	3.8	2.6	2.0
Shropshire	19	1936	1	5.3	25	1.3	25.0	3.5	3.2	3.1
Barnet	32	3225	6	18.8	40	1.2	6.7	3.8	3.1	2.8
Hammersmith and Fulham	13	1253	3	23.1	15	1.2	5.0	3.8	2.7	2.5
North Somerset	9	909	3	33.3	10	1.1	3.3	3.4	3.9	4.0
Enfield	18	1374	4	22.2	15	1.1	3.8	3.5	2.3	1.9
Windsor and Maidenhead	16	1129	2	12.5	10	0.9	5.0	3.9	2.7	2.8
Solihull	13	1700	4	30.8	15	0.9	3.8	3.2	4.0	4.0
Rotherham	11	1198	2	18.2	10	0.8	5.0	3.0	3.6	3.4
Kensington and Chelsea	15	1442	3	20.0	10	0.7	3.3	3.6	3.0	2.7
Westminster	20	1516	3	15.0	10	0.7	3.3	3.8	2.4	1.8
Halton	5	288	0	0.0	0	0	0	3.3	0	0
Knowsley	2	30	0	0.0	0	0	0	3.0	0	0
City of London	2	225	0	0.0	0	0	0	4.9	0	0
Totals	2886	266240	1044	36.2	7235	2.7	6.9	3.5	3.1	2.9

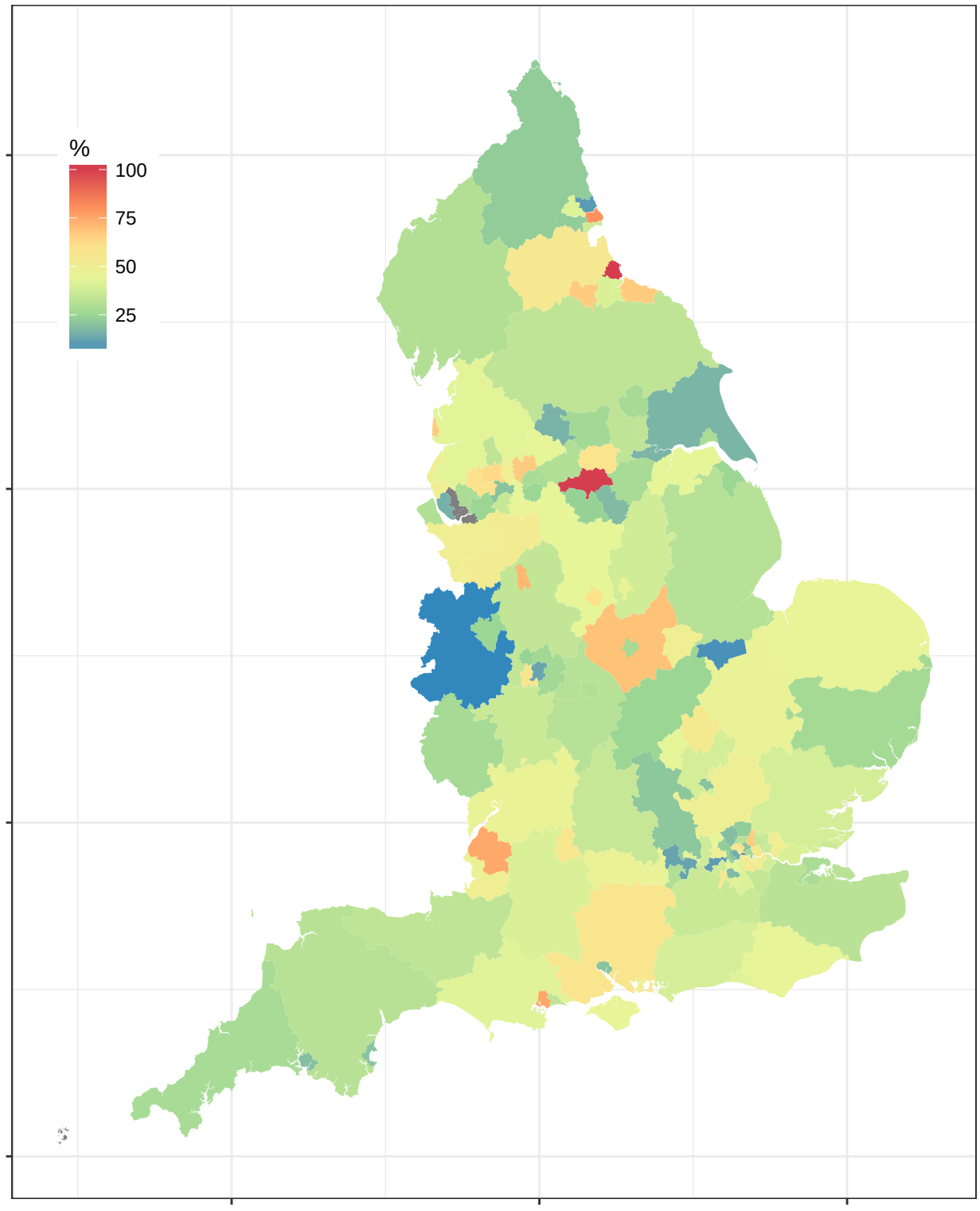

Figure 34: 2017 Computer Science A-level local authority provider provision

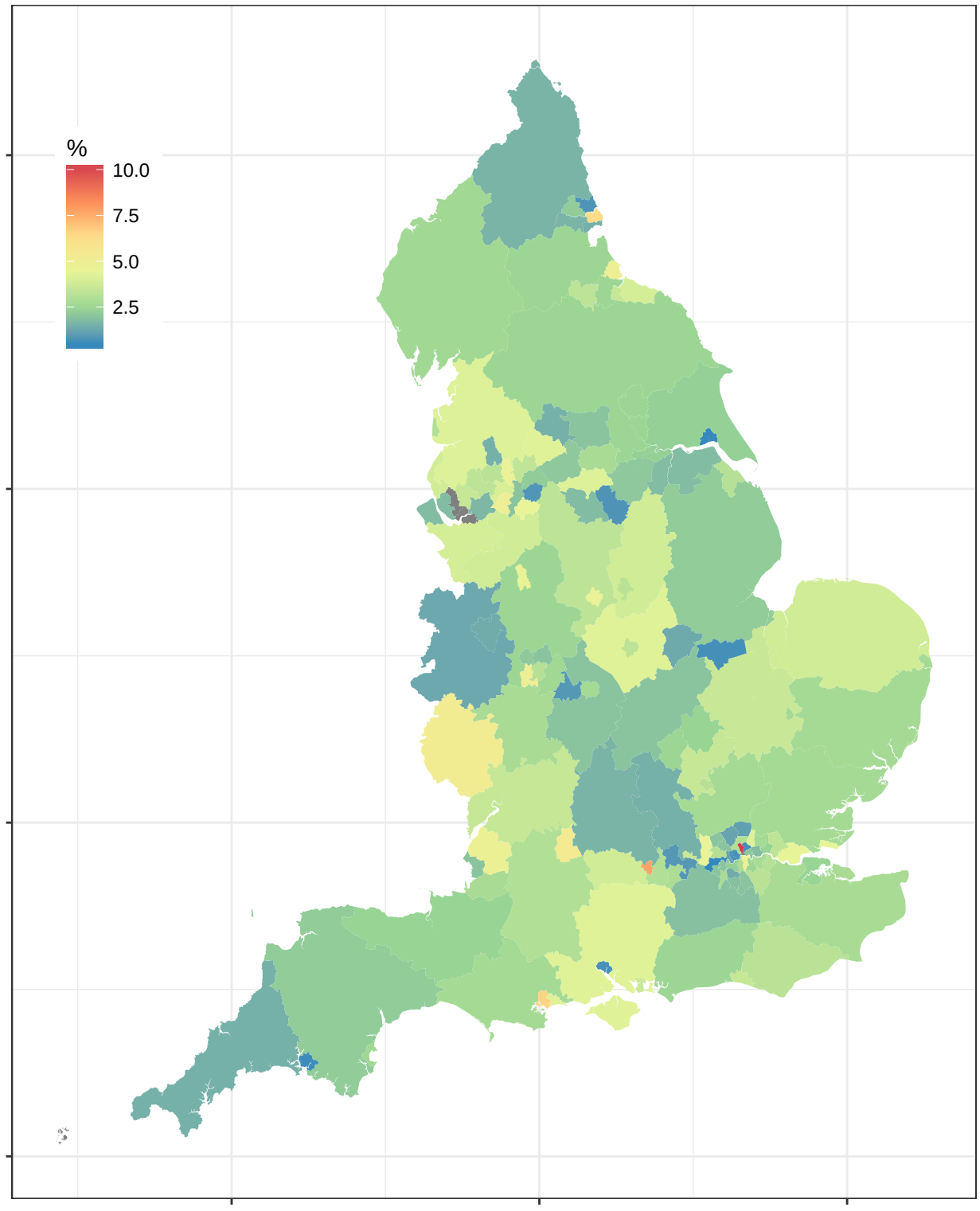

Figure 35: 2017 Computer Science A-level local authority student uptake

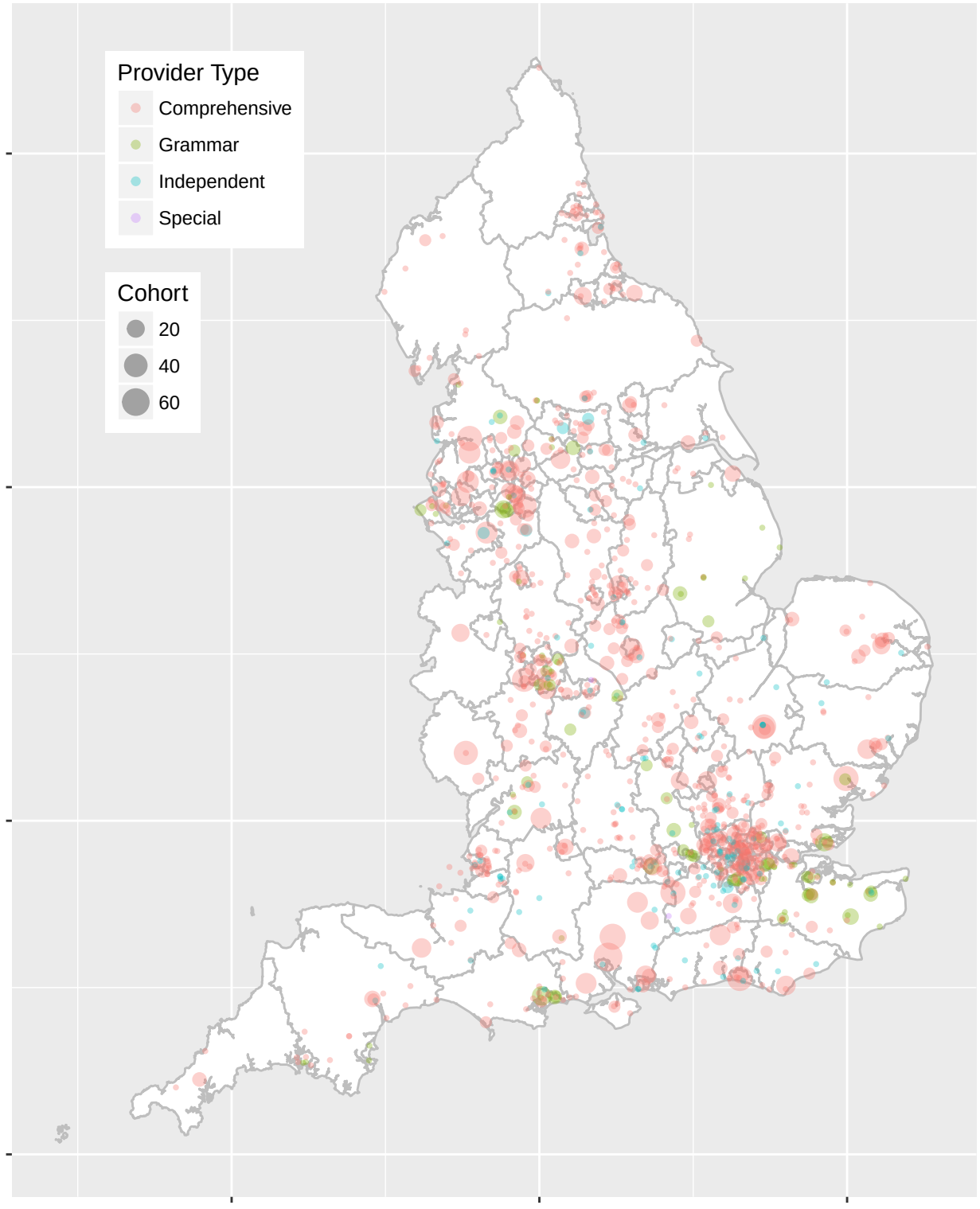

Figure 36: 2017 Computer Science A-level providers

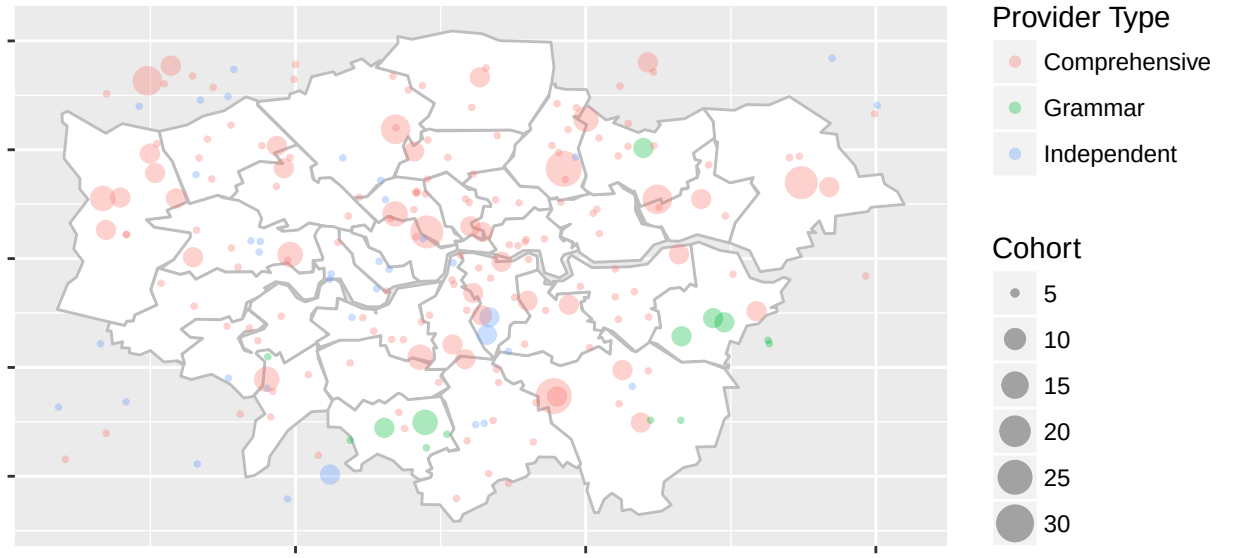

Figure 37: 2017 Computer Science A-level providers, London

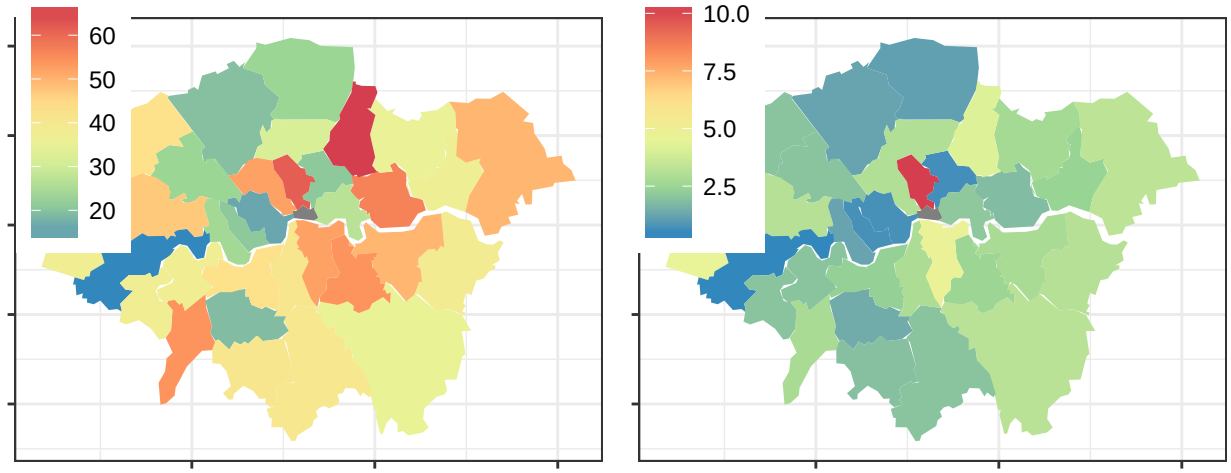

Figure 38: 2017 Computer Science A-level providers and students, London

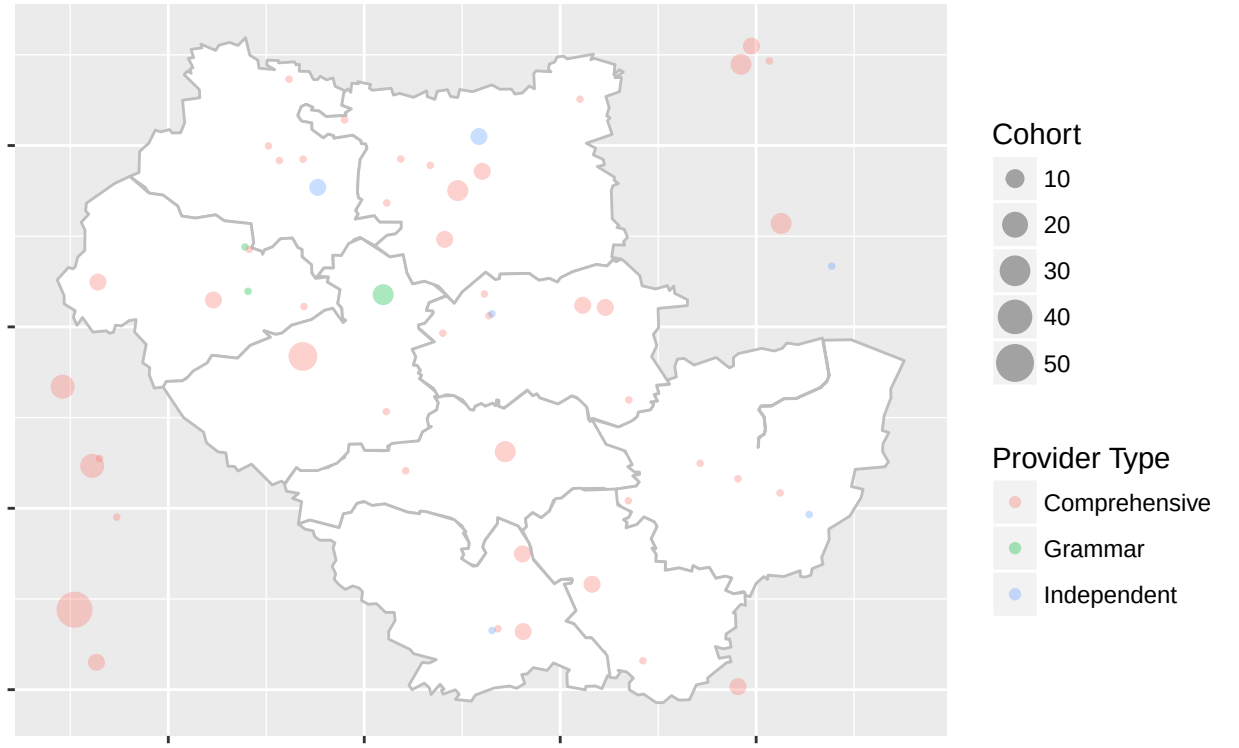

Figure 39: 2017 Computer Science A-level providers, Leeds

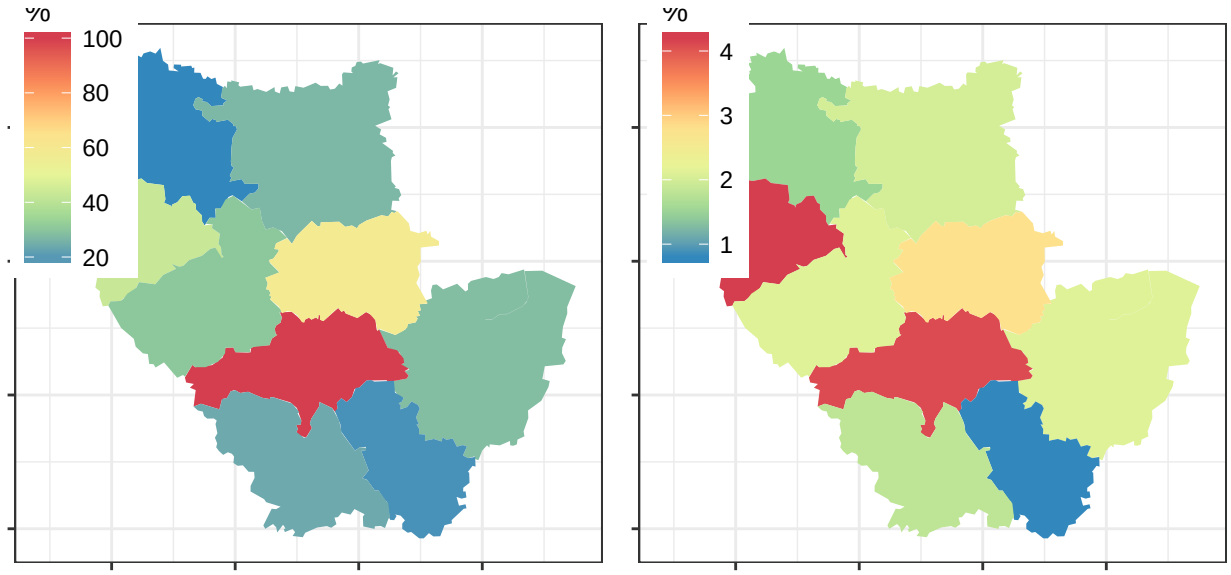

Figure 40: 2017 Computer Science A-level providers and students, Leeds

Figure 41: 2017 Computer Science A-level providers, Birmingham

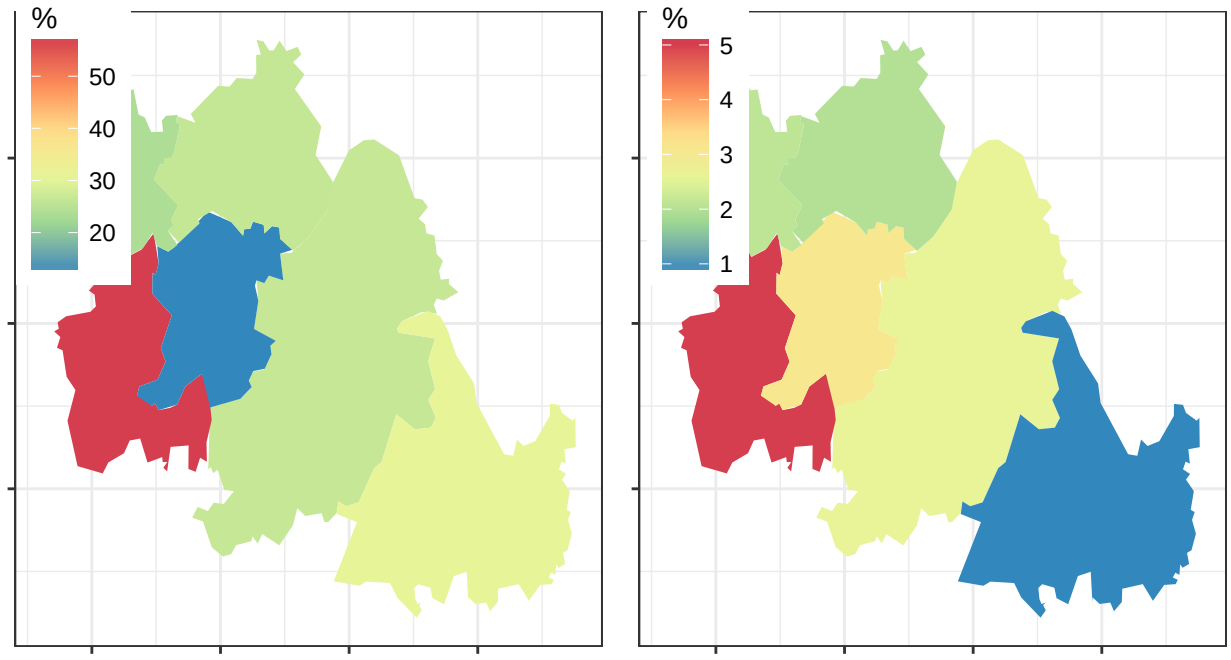

Figure 42: 2017 Computer Science A-level providers and students, Birmingham

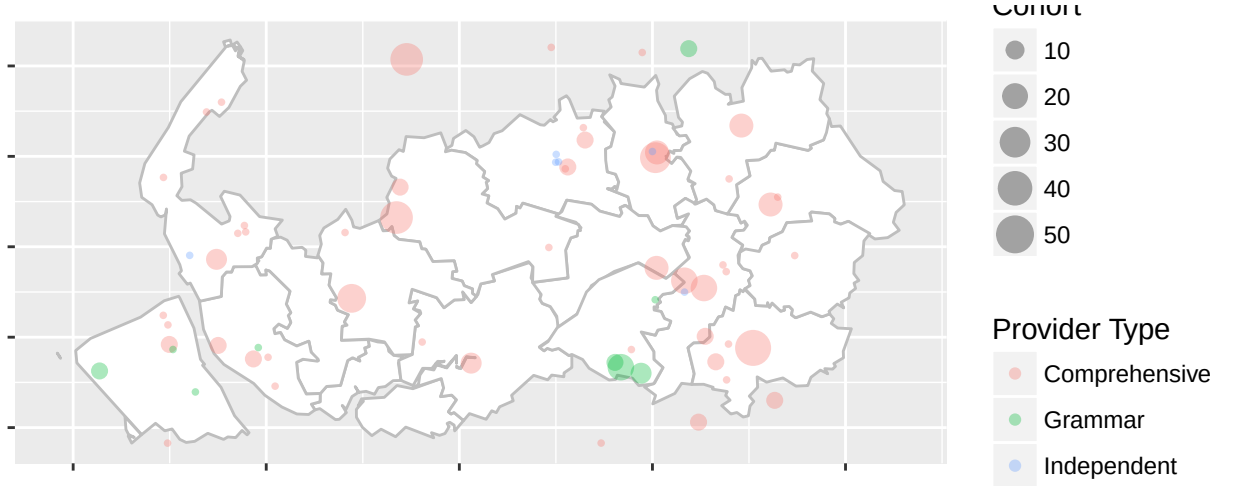

Figure 43: 2017 Computer Science A-level providers, Manchester and Liverpool

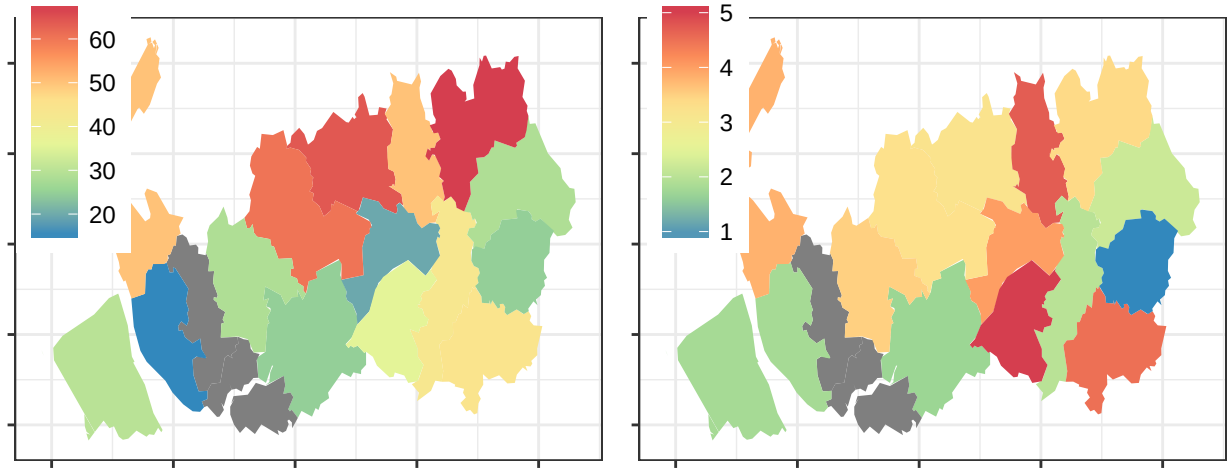

Figure 44: 2017 Computer Science A-level providers and students, Manchester and Liverpool

4.1.7 Rural and Urban

Urban schools are more likely to offer CS, and have slightly higher proportions studying GCSE computer science.

At A-level, urban providers are much more likely to offer CS than their rural counterparts, with more urban students likely to study the subject than their rural counterparts.

It is possible that this disparity is explained, or partly explained, through differences in the size of provider, as discussed below.

4.1.7.1 KS4

Table 17: 2017 GCSE Computer Science by urban and rural characteristic

Type	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Urban	4267	495003	2275	53.3	59352	12	26.1	4.8	5.2	4.7
Rural	795	74422	383	48.2	8135	10.9	21.2	5.0	5.3	4.8
Totals	5062	569425	2658	52.5	67487	11.9	25.4	4.8	5.2	4.7

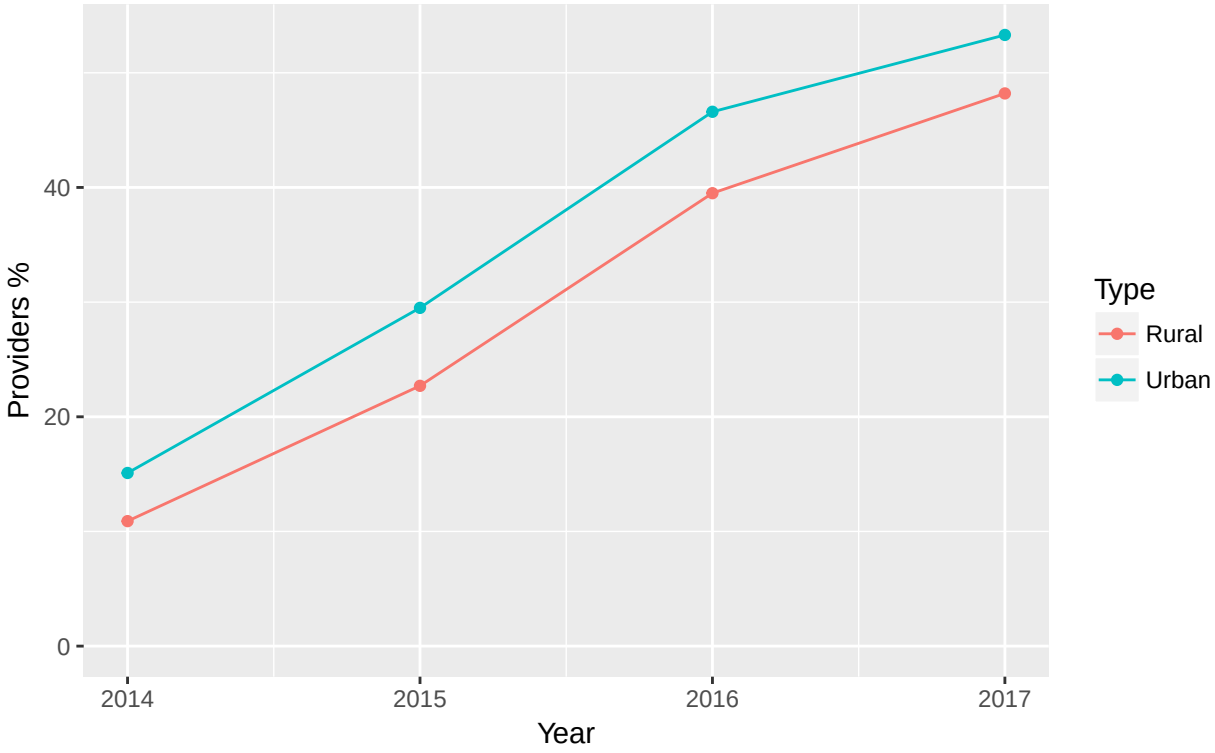

Figure 45: GCSE Computer Science provider uptake by urban/rural categorisation. 2014-17

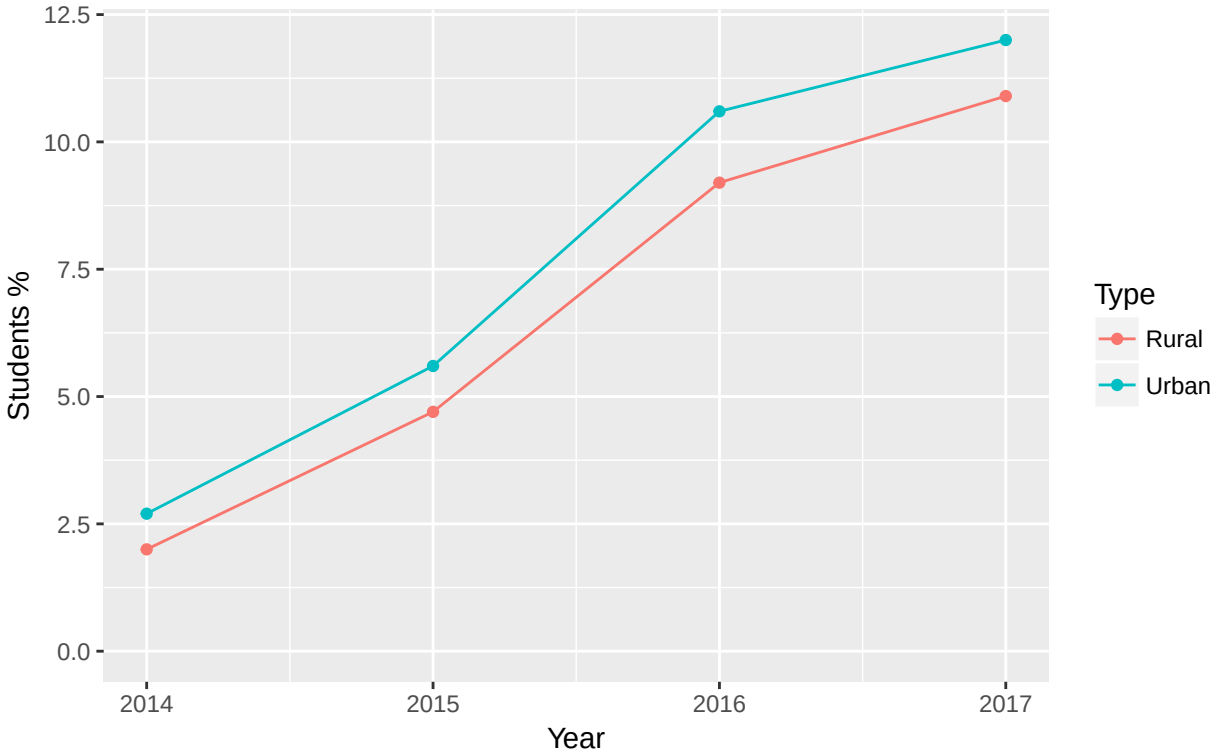

Figure 46: GCSE Computer Science student uptake by urban/rural categorisation. 2014-17

4.1.7.2 KS5

Table 18: 2017 A level Computer Science by urban and rural characteristic

Type	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Urban	2480	237706	928	37.4	6588	2.8	7.1	3.5	3.1	3.0
Rural	404	28518	116	28.7	610	2.1	5.3	3.5	3.0	2.9
Totals	2884	266224	1044	36.2	7198	2.7	6.9	3.5	3.1	3.0

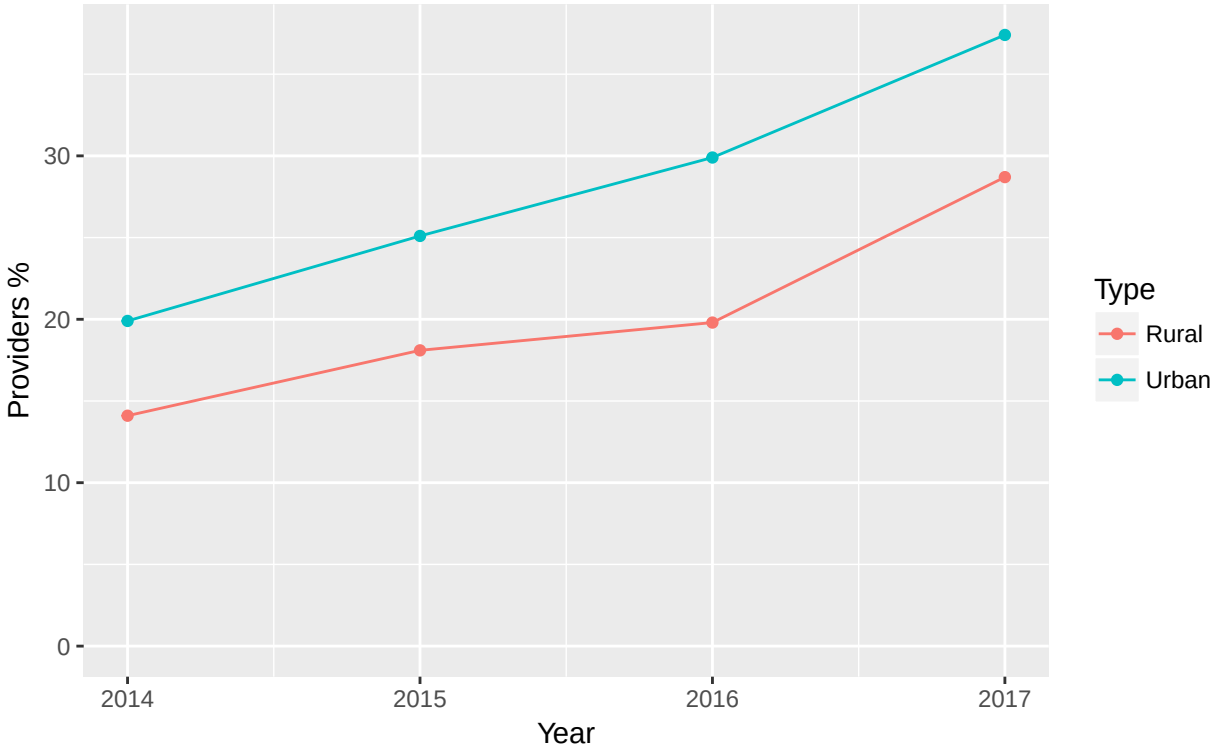

Figure 47: A-level Computer Science provider uptake by urban/rural categorisation. 2014-17

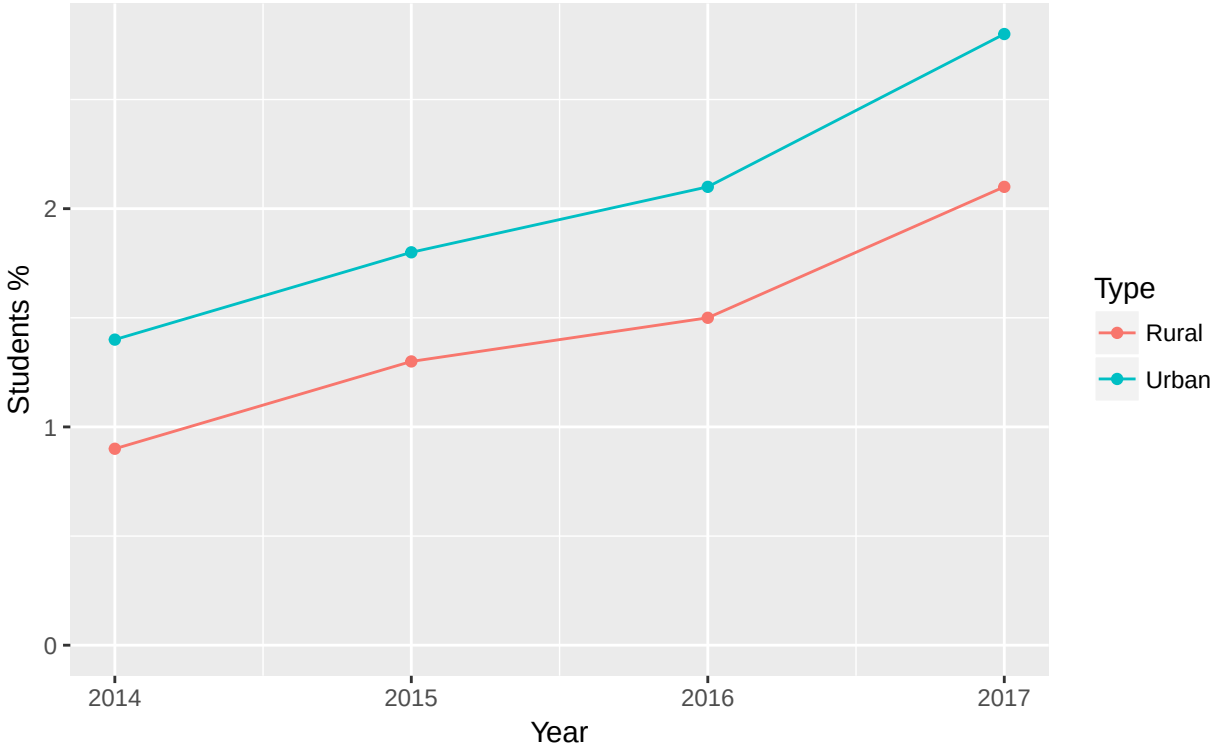

Figure 48: A-level Computer Science student uptake by provider urban/rural categorisation. 2014-17

4.1.8 Coastal and inland

There is very little difference in GCSE CS provision or take up between inland and coastal schools.

At A-level, a higher proportion of inland schools offer CS, although a slightly higher proportion of coastal students take the subject. Again the differences are not large.

4.1.8.1 KS4

Table 19: 2017 GCSE Computer Science by coastal/inland characteristic

Type	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Inland	4226	477217	2214	52.4	56100	11.8	25.3	4.9	5.3	4.8
Coastal	837	92210	444	53.0	11387	12.3	25.6	4.6	5.0	4.4
Totals	5063	569427	2658	52.5	67487	11.9	25.4	4.8	5.2	4.7

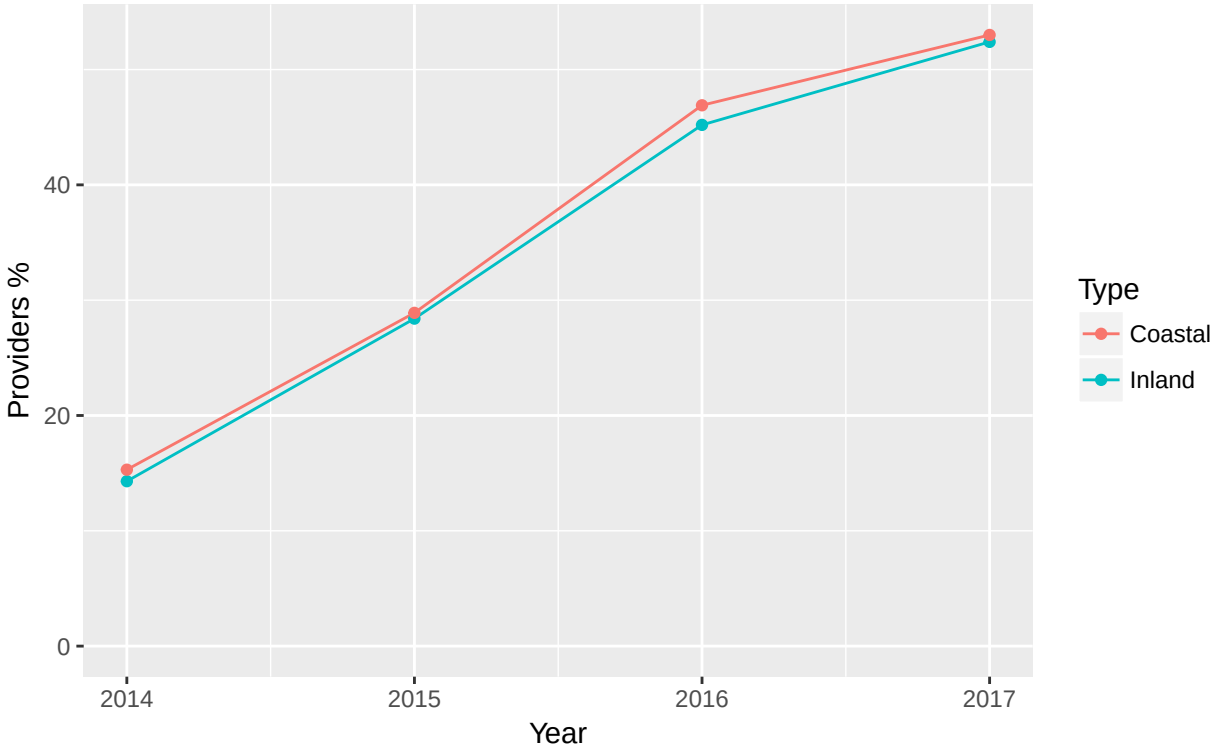

Figure 49: GCSE Computer Science provider uptake by coastal categorisation. 20 14 - 17

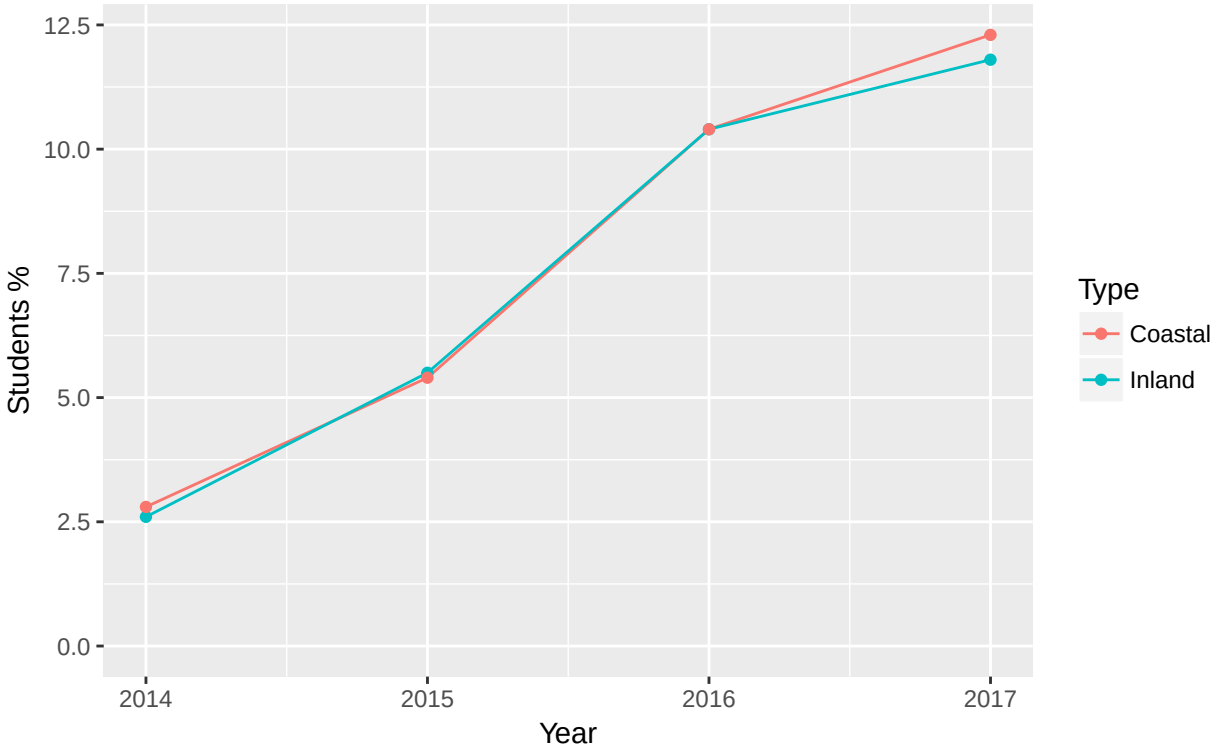

Figure 50: GCSE Computer Science student uptake by provider coastal categorisation. 20 14 - 17

4.1.8.2 KS5

Table 20: 2017 A level Computer Science by coastal/inland characteristic

Type	Total Schools	Total Students	Subject Providers	Providers %	Subject Students	Students %	Average Cohort Size	Grade Avg Sch	Grade Avg Sub Students	Grade Avg Subject
Inland	2462	229280	904	36.7	6170	2.7	6.8	3.5	3.1	3.0
Coastal	422	36944	140	33.2	1028	2.8	7.3	3.3	3.0	2.9
Totals	2884	266224	1044	36.2	7198	2.7	6.9	3.5	3.1	3.0

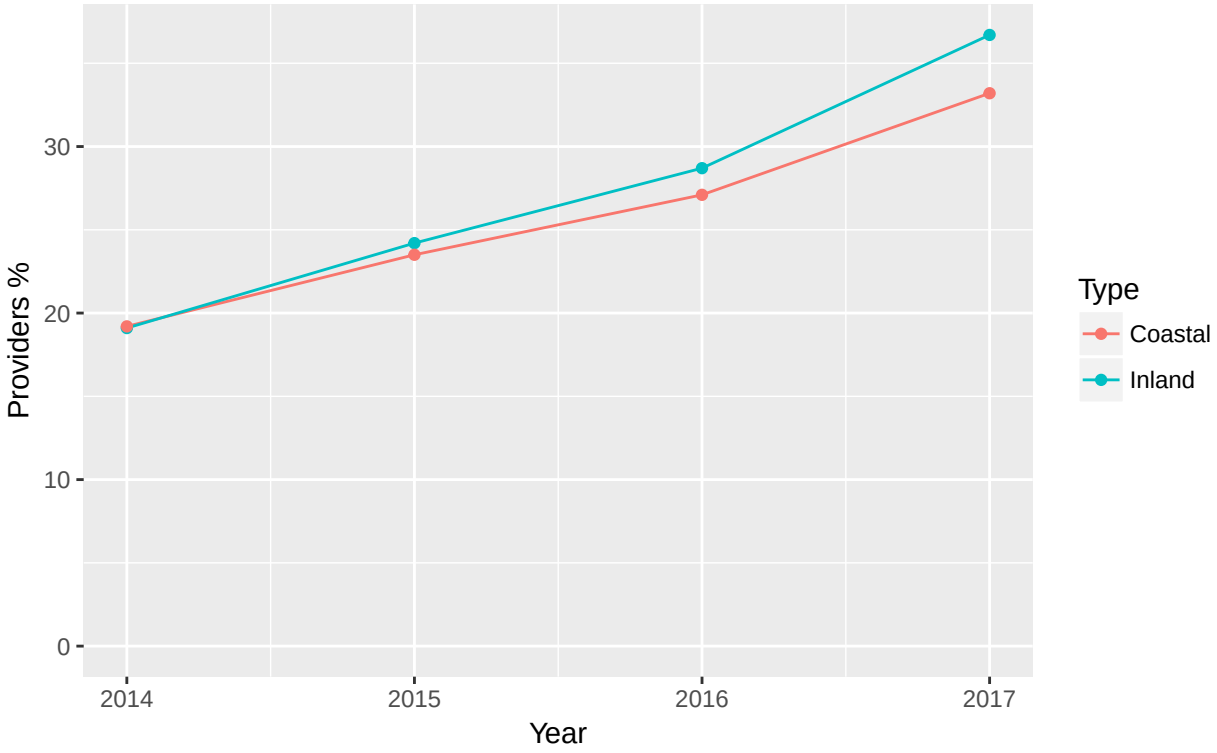

Figure 51: A-level Computer Science provider uptake by coastal categorisation. 2014-17

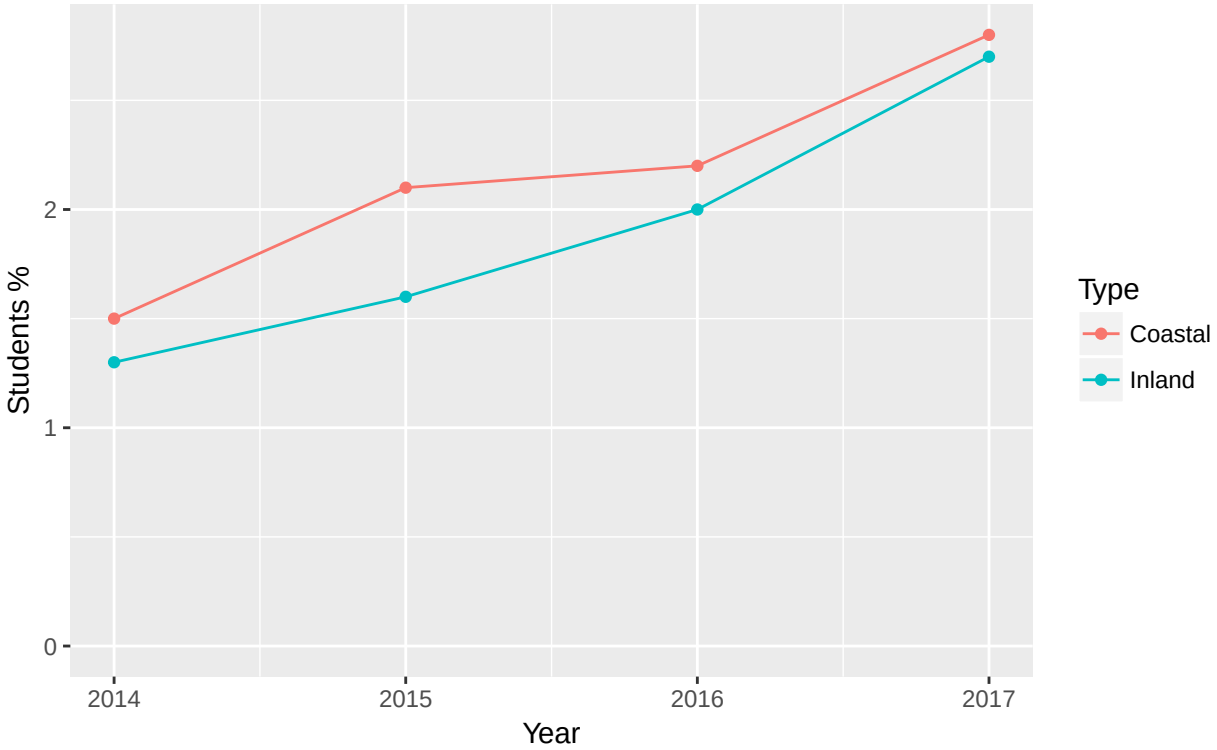

Figure 52: A-level Computer Science student uptake by provider coastal categorisation. 2014-17

4.1.9 Provider / cohort size

42.9% of CS providers at GCSE have a cohort smaller than 20, this is slightly better than in 2015 (47.6%)

The larger the school (both in terms of pupils and GCSE offerings), the more likely it is to offer computer science. The picture for computer science provision by schools (although not yet take up by students) is now broadly comparable to that for GCSE physics.

Cohort size for GCSE CS, where it is offered, seem to be sustainable in the majority of schools, although it is still well below those for ICT and Physics.

Whilst only 52.5% of providers offer GCSE CS, the schools that do are typically larger schools, and thus 76.3% of students are in schools where the subject is offered: in fact more students are in schools where CS is offered than physics (although the take up of the subject is substantially lower). There has been a rapid increase in this measure over the last four years.

86.5% of A-level CS groups have fewer than 12 students, which DfE guidance regards as being the level that is needed to make a course viable in a provider (11.7 students (Parish et al., 2017)). The mean cohort size is 6.7 and the median just 5 students. With ongoing budgetary concerns in sixth form education, computer science is at risk of being financially unsustainable in the majority of providers.

As with GCSE, larger providers are more likely to offer CS at A level than smaller ones, but the likelihood that any provider offers the subject is much less than for physics. Whilst only 36% of providers offer CS at A-level, the reach of the subject (ie the proportion of students in centres where the subject is offered) is 57% - this has increased over the last four years, but it remains substantially below Physics (96.6%).

4.1.9.1 KS4

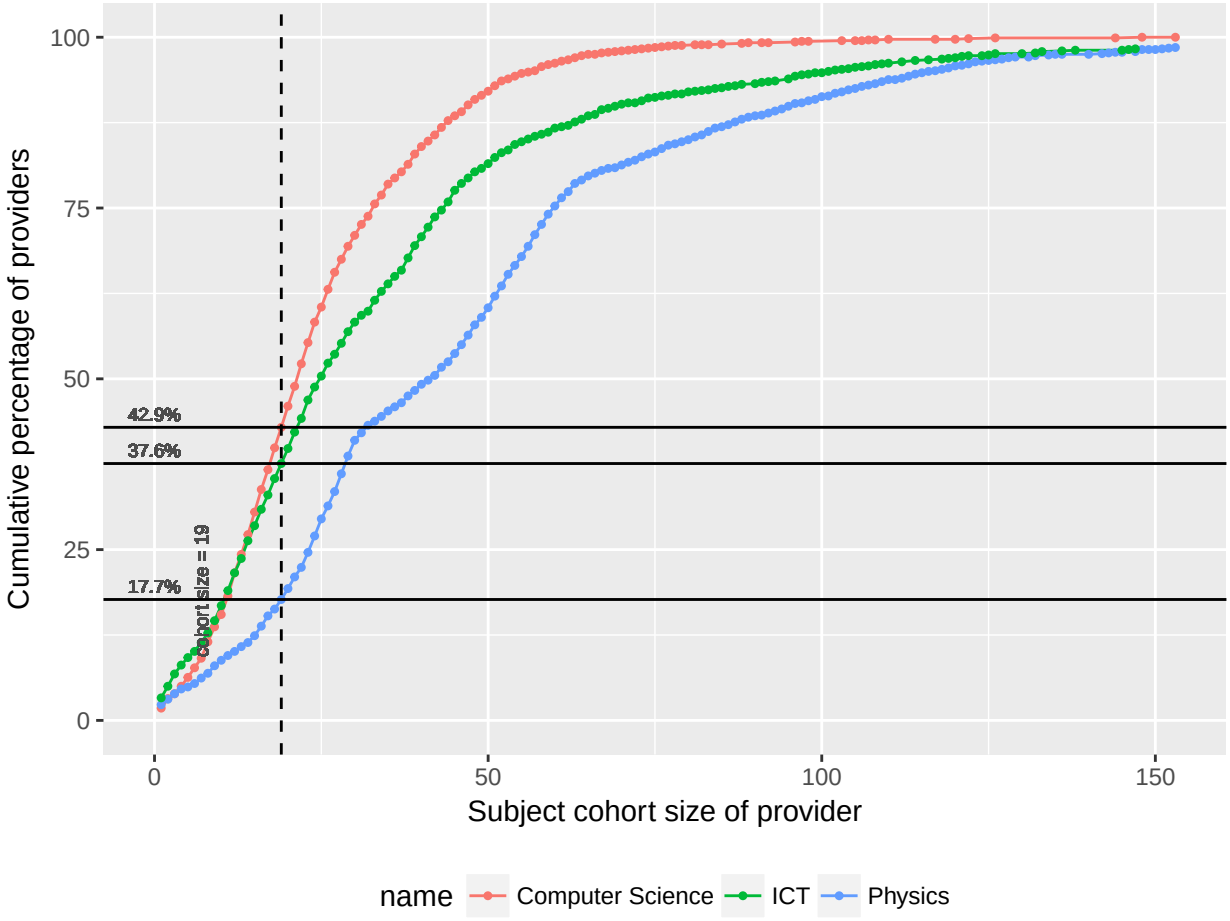

Figure 53: 2017 Computer Science GCSE cohort sizes cumulative

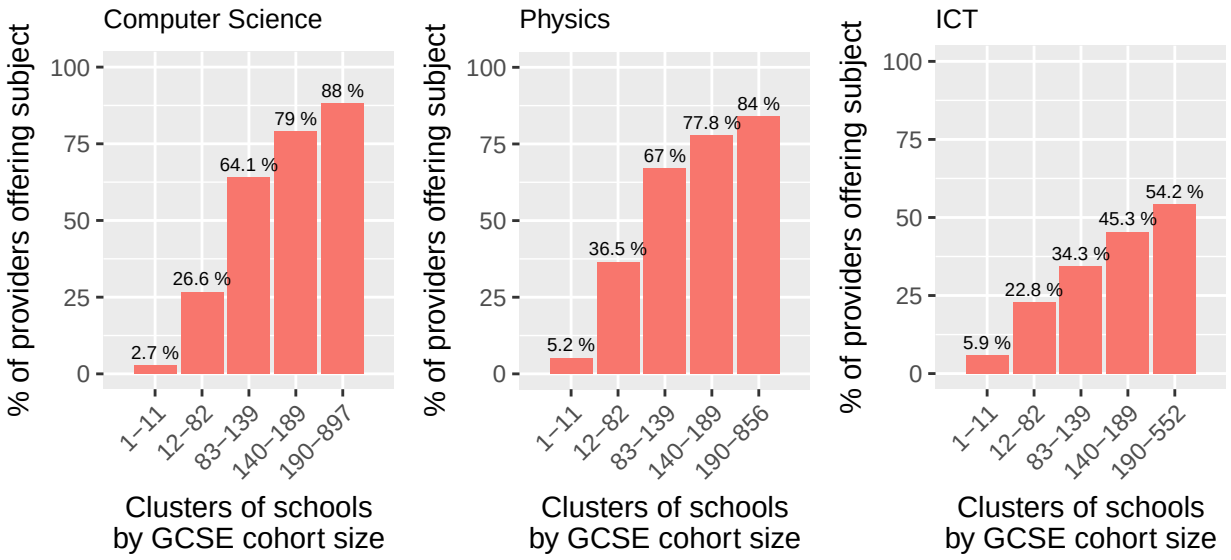

Figure 54: 2017 Computer Science GCSE offering by school cohort size

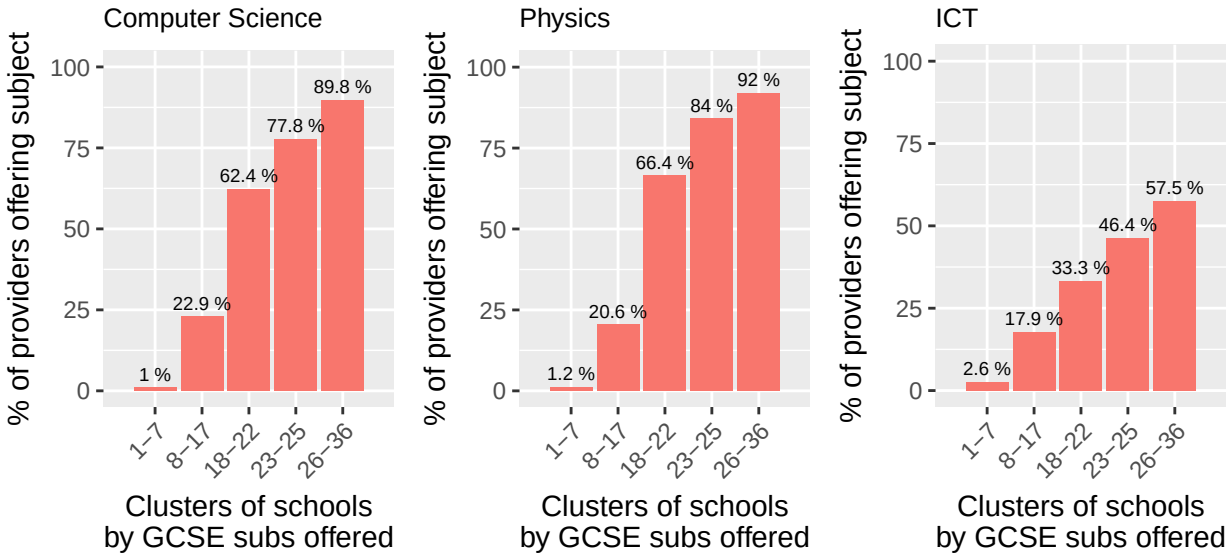

Figure 55: 2017 Computer Science GCSE offering by number of qualifications offered

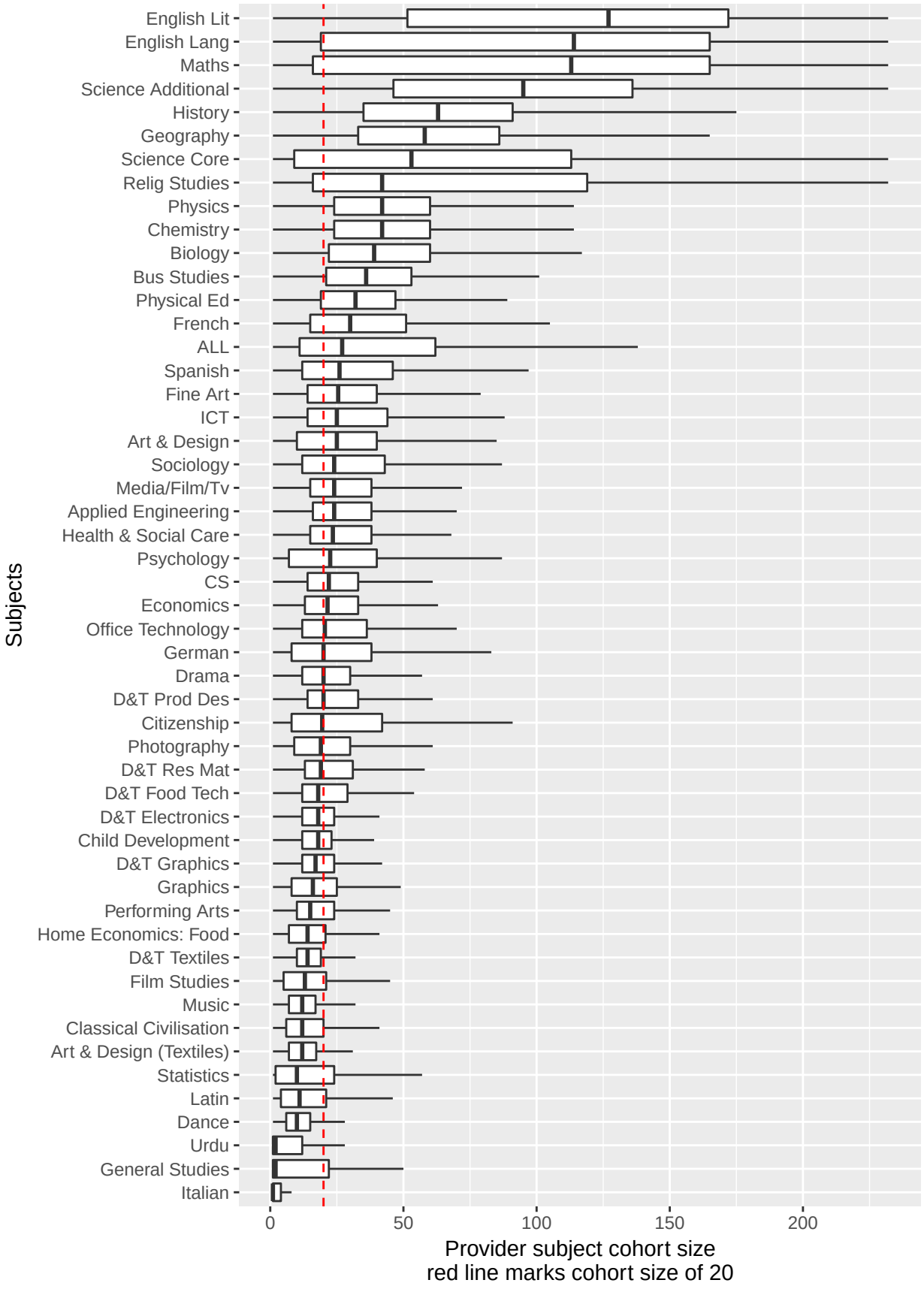

Figure 56: 2017 Computer Science GCSE all subjects cohort size spread

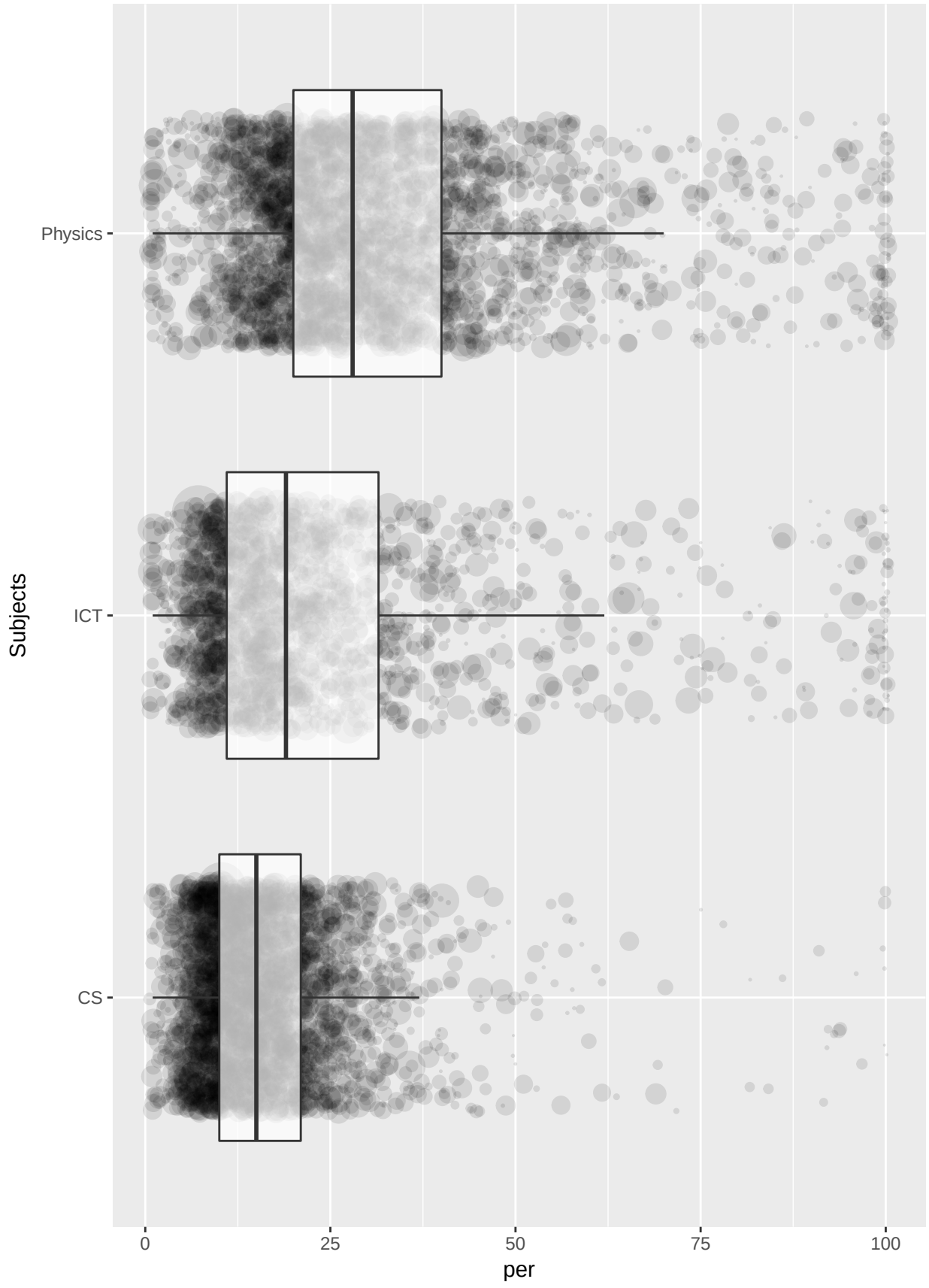

Figure 57: 2017 Computer Science GCSE cohort size as percentage of school

Table 21: 2017 GCSE subject offering

Subject	Providers	Providers %	Students able to sit subject	Students % able to sit subject	Students sitting subject	Student % of all students	Student % of able students
English Lang	4505	89.0	547112	96.1	537949	94.5	98.3
Maths	4543	89.7	544592	95.6	536647	94.2	98.5
English Lit	3988	78.8	539907	94.8	525437	92.3	97.3
Science Additional	3674	72.6	525084	92.2	357069	62.7	68.0
Science Core	3969	78.4	513607	90.2	275261	48.3	53.6
Relig Studies	3139	62.0	466054	81.8	240253	42.2	51.6
History	3617	71.4	526456	92.5	237164	41.6	45.0
Geography	3674	72.6	536544	94.2	229000	40.2	42.7
Physics	2759	54.5	429525	75.4	131400	23.1	30.6
Chemistry	2742	54.2	427526	75.1	130882	23.0	30.6
Biology	2822	55.7	431202	75.7	130068	22.8	30.2
French	3186	62.9	486755	85.5	118533	20.8	24.4
Physical Ed	3114	61.5	477208	83.8	108336	19.0	22.7
Spanish	2525	49.9	398374	70.0	82404	14.5	20.7
Art & Design	2634	52.0	346142	60.8	71943	12.6	20.8
Bus Studies	1811	35.8	294988	51.8	71771	12.6	24.3
CS	2658	52.5	434385	76.3	67487	11.9	15.5
Drama	2675	52.8	422640	74.2	60530	10.6	14.3
ICT	1658	32.7	258724	45.4	57625	10.1	22.3
Fine Art	1695	33.5	239105	42.0	48081	8.4	20.1
D&T Res Mat	1858	36.7	282562	49.6	42155	7.4	14.9
German	1547	30.6	255193	44.8	40779	7.2	16.0
Media/Film/Tv	1333	26.3	224761	39.5	37707	6.6	16.8
Music	2891	57.1	449917	79.0	37456	6.6	8.3
D&T Prod Des	1404	27.7	227720	40.0	34433	6.0	15.1
D&T Food Tech	1355	26.8	225926	39.7	28559	5.0	12.6
Photography	1128	22.3	175103	30.8	23652	4.2	13.5
D&T Graphics	1070	21.1	190626	33.5	21271	3.7	11.2
Sociology	662	13.1	116403	20.4	19342	3.4	16.6
D&T Textiles	1128	22.3	203390	35.7	17418	3.1	8.6

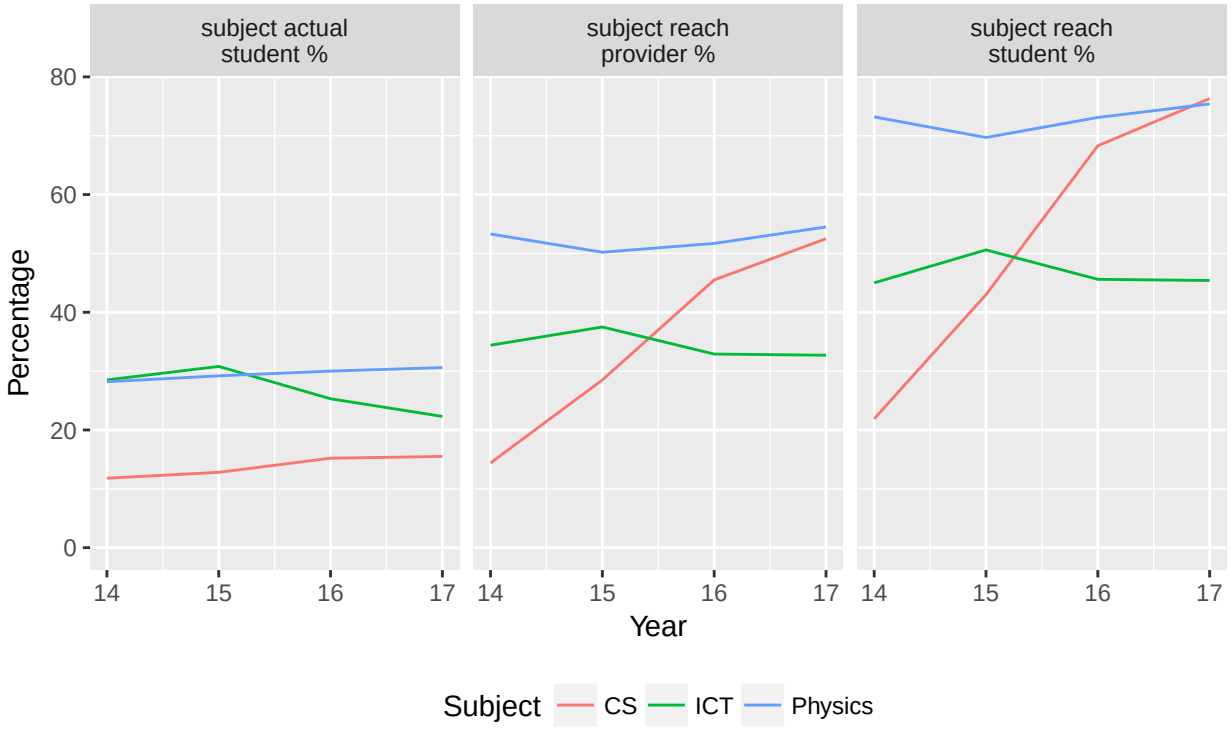

Figure 58: Longitudinal:Computer Science GCSE uptake of schools and students

4.1.9.2 KS5

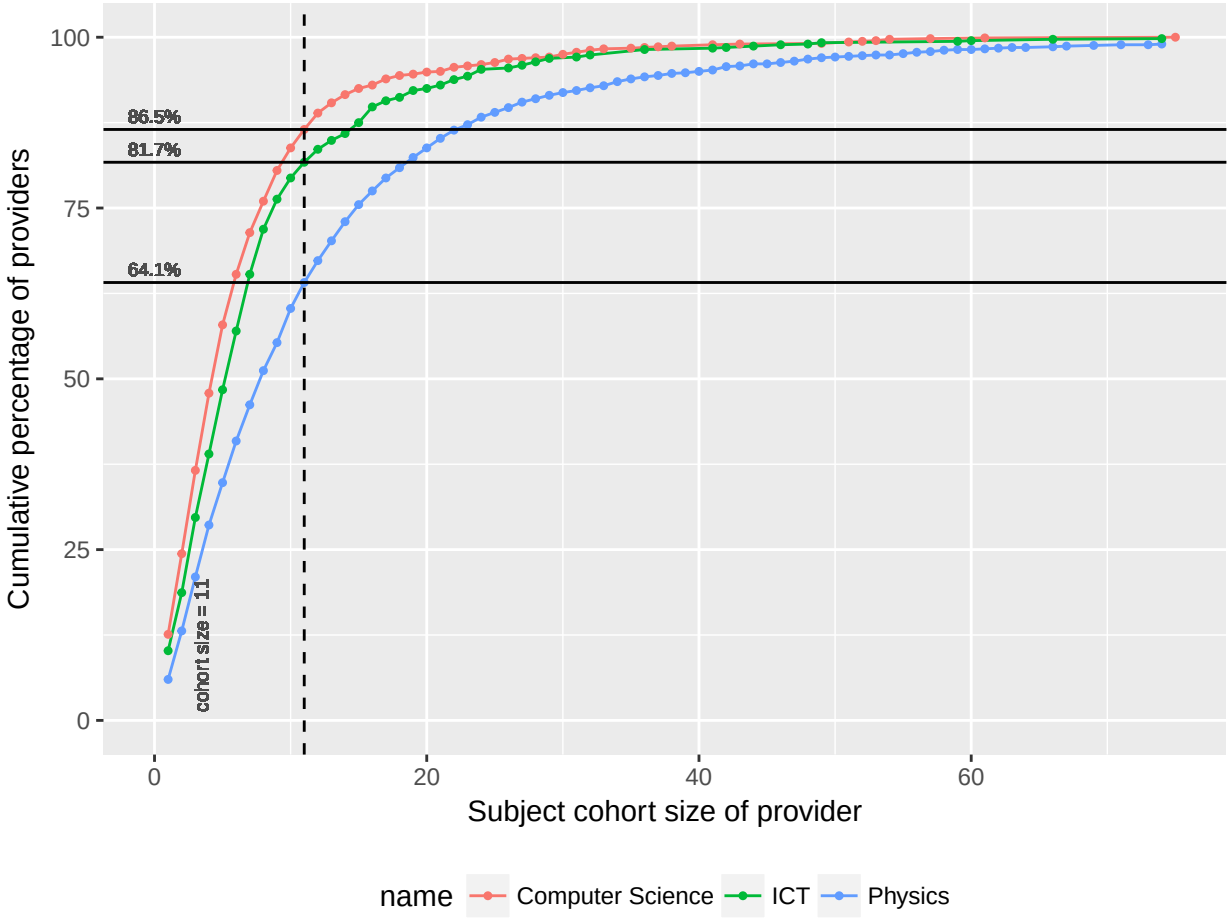

Figure 59: 2017 Computer Science A-level cohort sizes cumulative

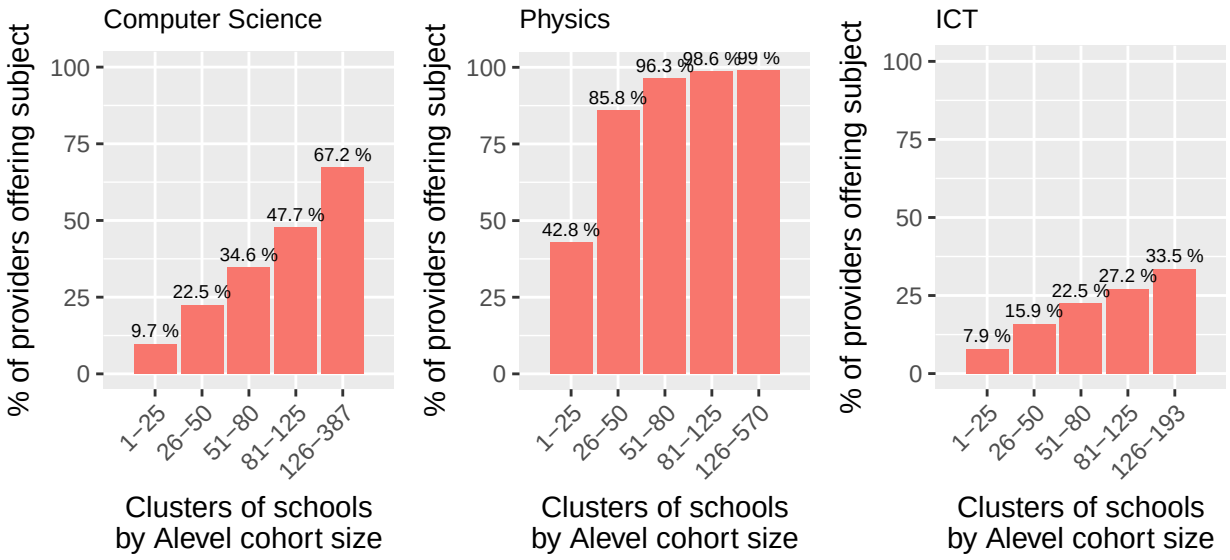

Figure 60: 2017 Computer Science A-level offering by school cohort size

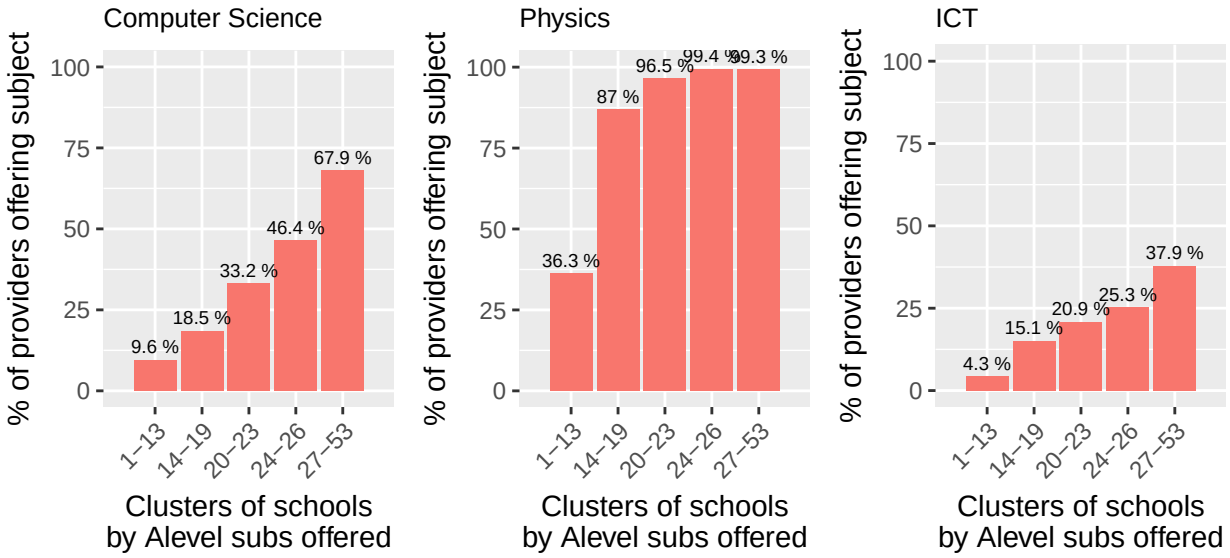

Figure 61: 2017 Computer Science A level offering by number of qualifications offered

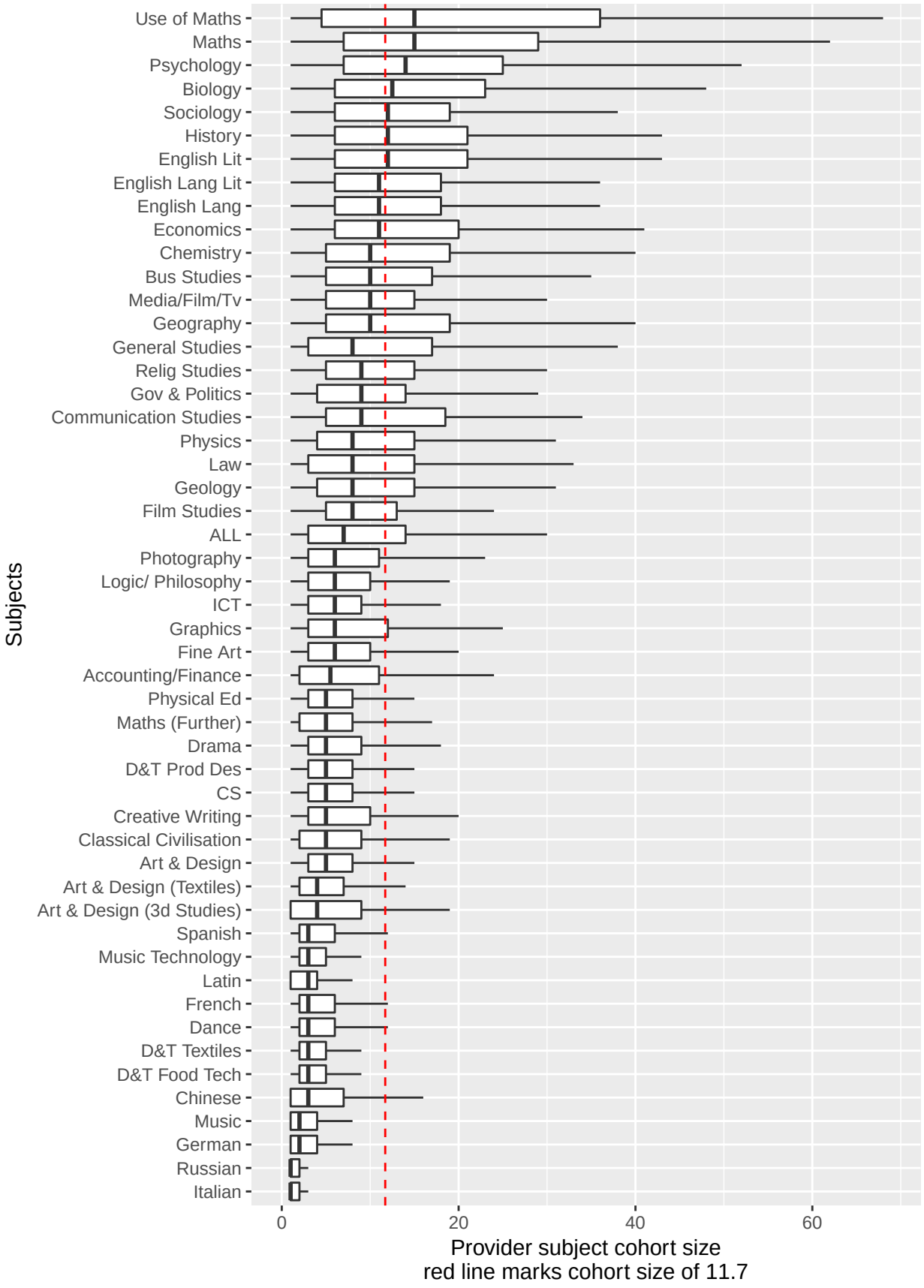

Figure 62: 2017 Computer Science A-level all subjects cohort size spread

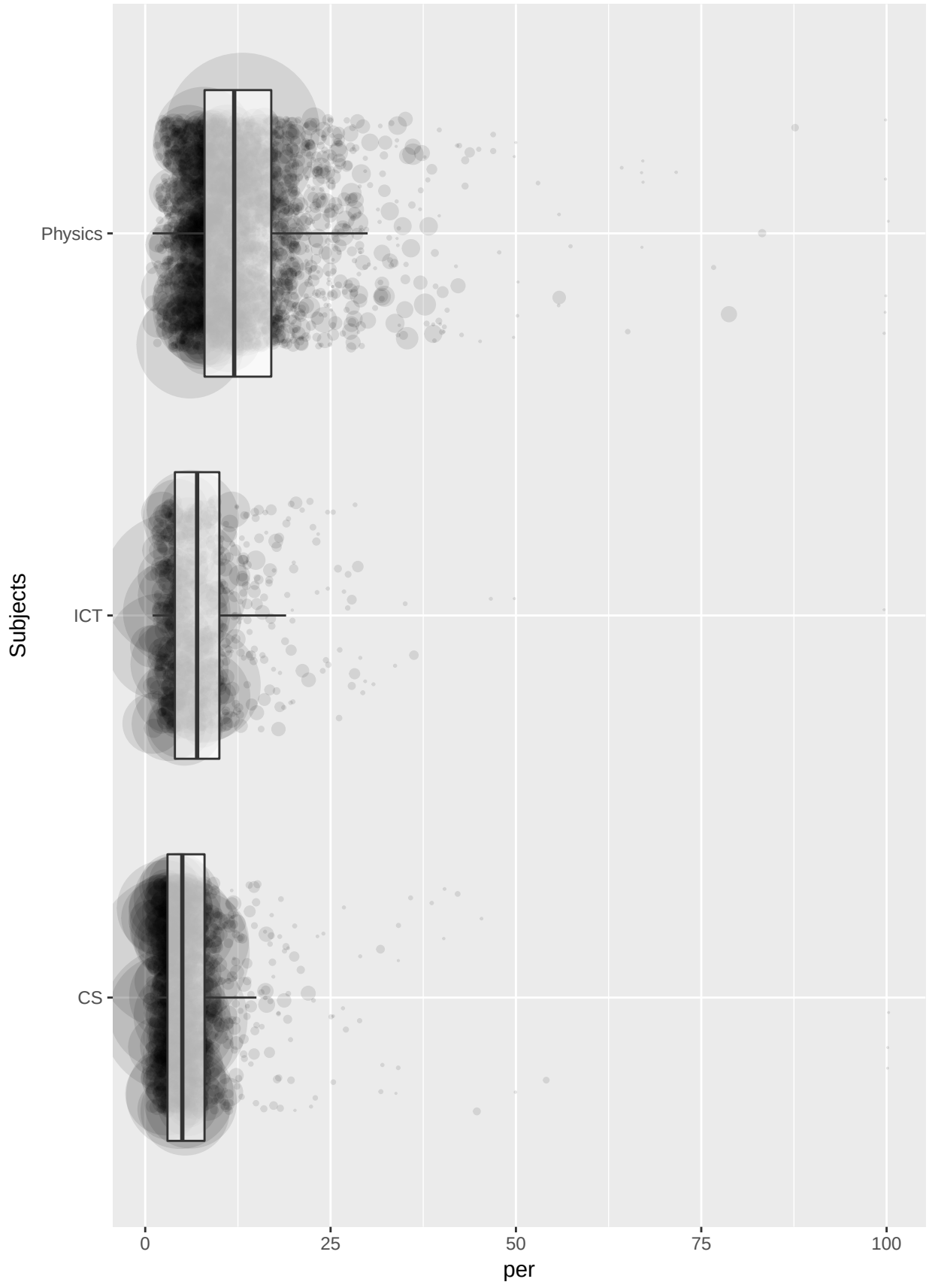

Figure 63: 2017 Computer Science A-level cohort size as percentage of school

Table 22: 2017 A level subject offering

Subject	Providers	Providers %	Students able to sit subject	Students % able to sit subject	Students sitting subject	Student % of all students	Student % of able students
Maths	2707	93.8	264995	99.5	77837	29.2	29.4
Psychology	2379	82.4	242963	91.3	53352	20.0	22.0
Biology	2568	89.0	261027	98.0	51377	19.3	19.7
Chemistry	2510	87.0	260003	97.7	43852	16.5	16.9
History	2495	86.5	257744	96.8	43310	16.3	16.8
English Lit	2424	84.0	253236	95.1	40760	15.3	16.1
Geography	2265	78.5	250088	93.9	32878	12.3	13.1
Sociology	1712	59.3	194624	73.1	30993	11.6	15.9
Physics	2430	84.2	257210	96.6	30937	11.6	12.0
Economics	1684	58.4	212269	79.7	27204	10.2	12.8
Bus Studies	1700	58.9	201566	75.7	25803	9.7	12.8
Relig Studies	1805	62.5	205849	77.3	21171	8.0	10.3
English Lang	1079	37.4	144131	54.1	18069	6.8	12.5
Media/Film/Tv	1298	45.0	161005	60.5	17248	6.5	10.7
Gov & Politics	1292	44.8	179007	67.2	15131	5.7	8.5
Maths (Further)	1927	66.8	235201	88.3	14103	5.3	6.0
Fine Art	1623	56.2	184078	69.1	13168	4.9	7.2
Photography	1248	43.2	155372	58.4	11336	4.3	7.3
Drama	1448	50.2	190466	71.5	10420	3.9	5.5
Law	636	22.0	103298	38.8	10059	3.8	9.7
English Lang Lit	641	22.2	97789	36.7	9837	3.7	10.1
Physical Ed	1467	50.8	186806	70.2	9489	3.6	5.1
D&T Prod Des	1385	48.0	150910	56.7	8315	3.1	5.5
French	1649	57.1	213471	80.2	8025	3.0	3.8
Spanish	1470	50.9	194963	73.2	7295	2.7	3.7
CS	1044	36.2	152215	57.2	7198	2.7	4.7
General Studies	302	10.5	42974	16.1	6980	2.6	16.2
Film Studies	510	17.7	97516	36.6	5919	2.2	6.1
Art & Design	768	26.6	79449	29.8	5296	2.0	6.7
ICT	615	21.3	83511	31.4	5051	1.9	6.0

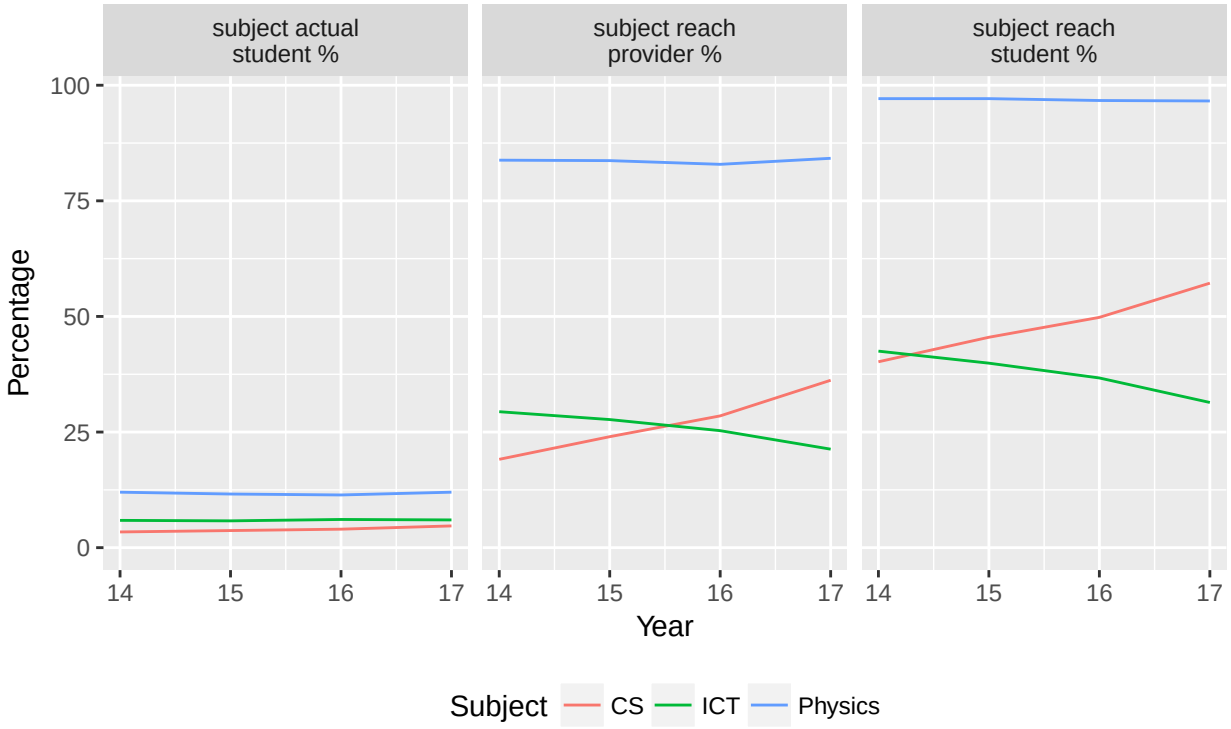

Figure 64: Longitudinal:Computer Science A level uptake of schools and students

4.2 Student profile

4.2.1 Gender

Take up of CS by girls at GCSE is very low - only 20% of those taking the qualification were female. The proportion remains roughly in line with 2016; however overall numbers are up as the numbers taking CS have increased overall. GCSE ICT shows much better female representation (38%), and its removal will almost certainly lead to fewer females studying a computing GCSE beyond 2018.

When girls do take GCSE CS, they obtain good grades, with higher proportions of A*, A and B grades than their male counterparts.

Very few female students opt to take A-level CS, with the percentage roughly the same as in 2016, however overall numbers are up as the numbers taking CS have increased overall. The removal of ICT as a qualification will likely lead to a significant decrease in the numbers of females studying a computing qualification at KS5.

Boys now outperform girls at the top grades for A-level; this is a change from 2015, where girls were outperforming boys.

There are several local authorities where females are almost equally represented at GCSE CS: Camden, Hartlepool, Tower Hamlets, Kingston upon Thames and Newham all have roughly four in ten students taking CS being female. This contrasts with much poorer uptake amongst girls in Poole, Barnet, Stockport and Middlesborough, where fewer than one in ten students were female. At regional level, London shows the best female proportional representation in GCSE CS (26.7% of students), contrasting with the South West where only 16.8% of the cohort was female.

There were 25 A-level local authorities with CS provision but no female participation, namely: Wigan, Central Bedfordshire, Liverpool, Brent, Thurrock, Bracknell Forest, Stockton-on-Tees, Torbay, Enfield, Rotherham, Blackburn with Darwen, Telford and Wrekin, North Somerset, Windsor and Maidenhead, Hackney, Southampton, North Tyneside, Halton, Knowsley, City of London, Kingston upon Hull City of, Hounslow, Peterborough, Tameside, Rutland. In addition, Three local authorities had no CS provision, namely Halton, Knowsley and the City of London. Numbers are small across all local authorities, we have chosen to remove the local authority table to maintain the anonymity of students.

At A-level CS, London again shows the best proportional representation of girls, at 13.2% of the cohort. The worst representation is in the East of England, with girls making up only 6.3% of the entries.

4.2.1.1 KS4

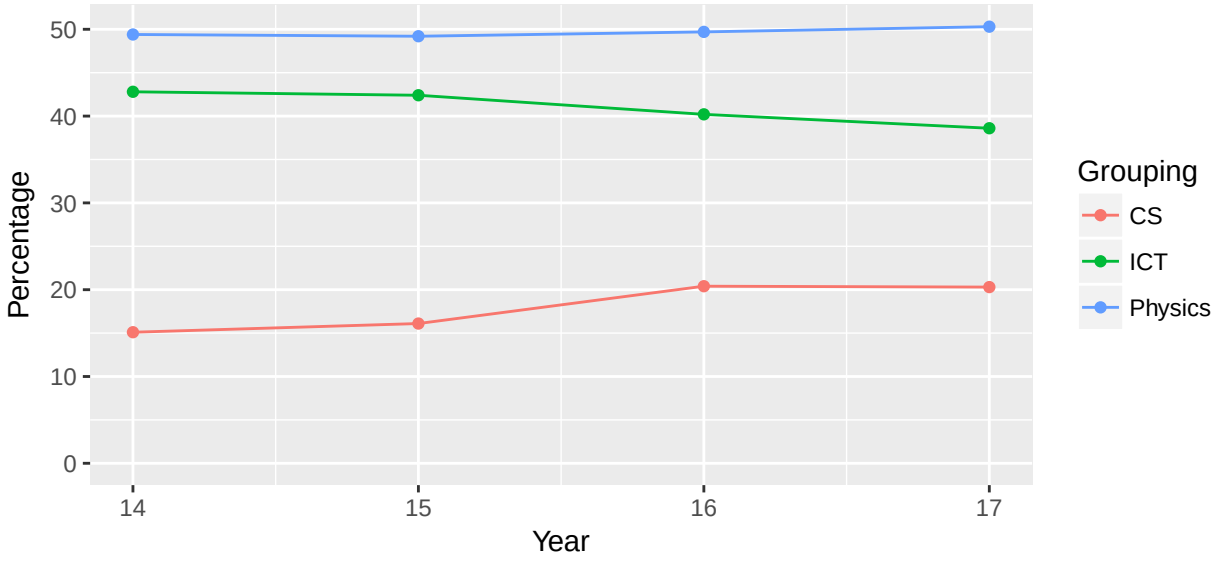

Figure 65: Longitudinal: GCSE female uptake by subject. 2014-17

Table 23: 2017 GCSE Computer Science student grades by gender

GENDER		*	A	B	C	D	E	F	G	U
F	%	7.6	17.1	20.7	18.6	13.4	9	6.1	3.9	3.7
F	n	1034	2339	2831	2547	1831	1236	832	537	507
M	%	5.3	13.9	19.5	19.7	14.9	10.1	7.1	4.8	4.7
M	n	2846	7460	10502	10615	8003	5420	3807	2604	2537

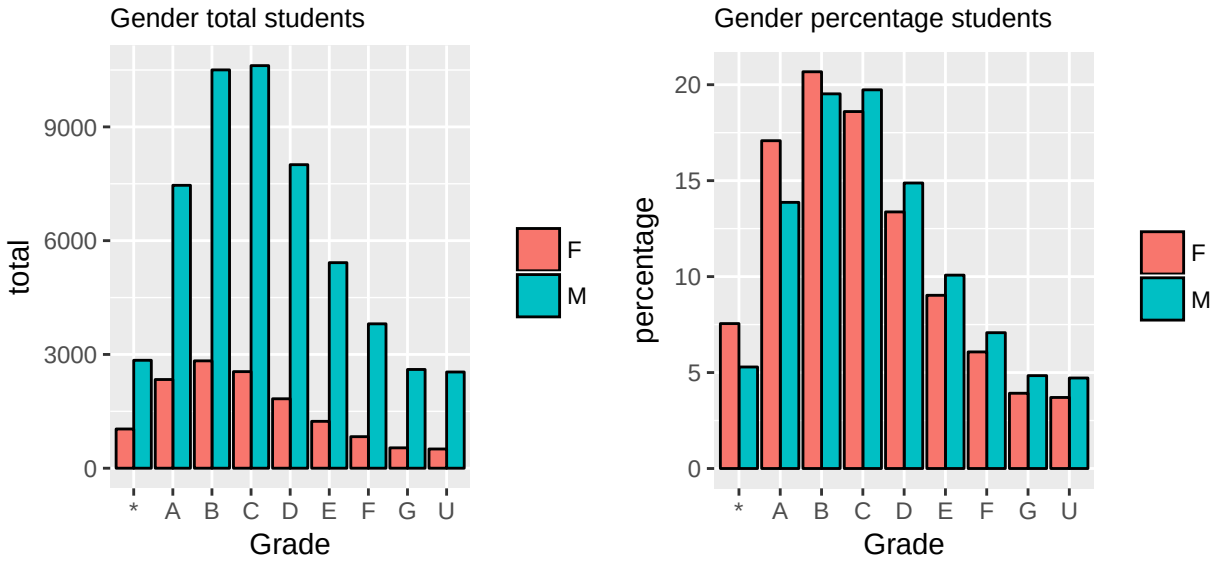

Figure 66: 2017 Computer Science GCSE gender grade outcomes

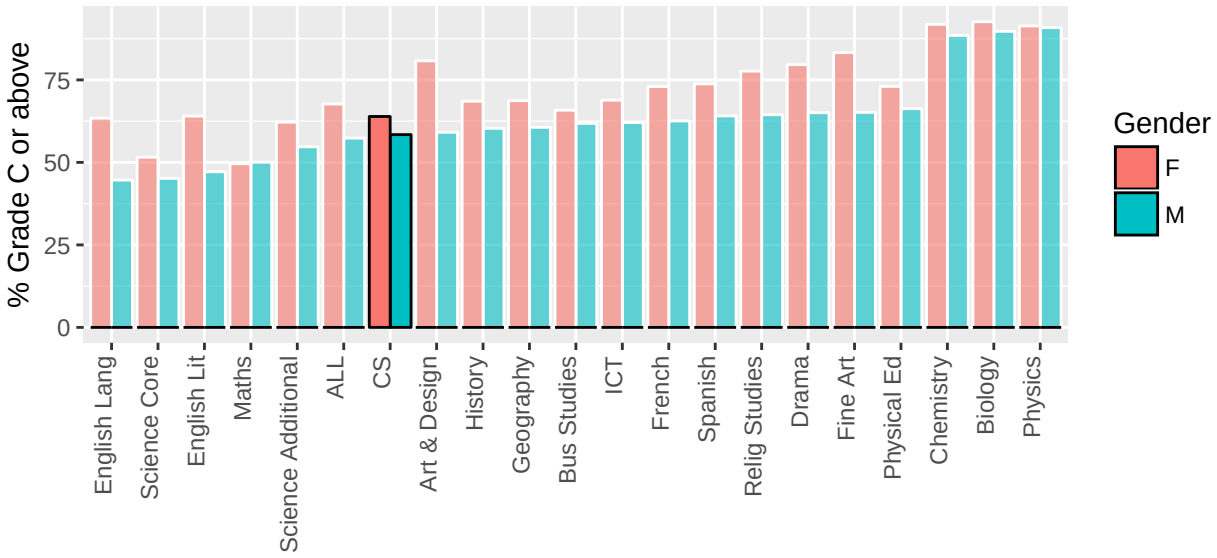

Figure 67: 2017 Computer Science GCSE C grade pass rate comparison for gender

Table 24: 2017 GCSE Computer Science female provision by local authority. Top 30

LA	Total providers	Total CS providers	CS Sch with females	Total students	Female students	% of total students	Total subject students	Female subject students	% of subject students
City of London	2	1	1	210	90	42.9	10	10	100.0
Camden	20	8	5	1850	1035	55.9	160	65	40.6
Hartlepool	8	5	5	970	480	49.5	200	80	40.0
Tower Hamlets	30	12	9	2865	1370	47.8	265	105	39.6
Kingston upon Thames	16	9	6	1800	1000	55.6	190	75	39.5
Newham	26	14	11	3655	1855	50.8	575	225	39.1
Wirral	31	18	13	3475	1690	48.6	440	170	38.6
Bournemouth	14	11	7	1715	850	49.6	410	155	37.8
Croydon	38	19	17	4195	2055	49	530	195	36.8
Westminster	22	9	7	2000	1080	54	155	55	35.5
Sefton	30	17	12	3190	1575	49.4	495	170	34.3
Sutton	23	9	7	2845	1420	49.9	255	85	33.3
Southend-on-Sea	20	11	7	2140	1055	49.3	400	130	32.5
Birmingham	133	56	41	13015	6540	50.2	1395	445	31.9
Liverpool	45	22	15	4500	2255	50.1	645	205	31.8
Trafford	26	17	14	2740	1345	49.1	600	190	31.7
Salford	25	10	7	2210	1125	50.9	285	90	31.6
Kingston upon Hull City of	21	6	3	2450	1160	47.3	95	30	31.6
Harrow	20	12	8	2485	1150	46.3	420	130	31.0
Hounslow	24	10	6	2650	1265	47.7	170	50	29.4
Bexley	19	15	11	3130	1570	50.2	535	155	29.0
Redbridge	27	17	15	3660	1750	47.8	520	150	28.8
South Tyneside	14	6	4	1475	730	49.5	160	45	28.1
Lewisham	21	12	9	2430	1190	49	235	65	27.7
Buckinghamshire	53	26	23	6095	3035	49.8	765	210	27.5
Leicester	36	13	10	3545	1715	48.4	310	85	27.4
Greenwich	27	11	8	2400	1150	47.9	295	80	27.1
Wandsworth	25	8	7	2180	1050	48.2	205	55	26.8
Hillingdon	27	16	16	3300	1650	50	525	140	26.7
Rochdale	18	12	10	2285	1105	48.4	375	100	26.7
TOTAL	5208	2663	2142	568125	279995	49.3	67245	13655	20.3

Table 25: 2017 GCSE Computer Science female provision by local authority. Bottom 30

LA	Total providers	Total CS providers	CS Sch with females	Total students	Female students	% of total students	Total subject students	Female subject students	% of subject students
Northamptonshire	64	31	23	7800	3840	49.2	820	115	14.0
Warwickshire	55	32	24	6025	2955	49	715	100	14.0
York	17	8	7	1890	910	48.1	250	35	14.0
East Sussex	51	30	23	5485	2695	49.1	620	85	13.7
Derby	26	11	8	2860	1370	47.9	370	50	13.5
Cornwall	45	25	23	5325	2620	49.2	560	75	13.4
Wigan	25	16	14	3375	1660	49.2	415	55	13.3
Northumberland	24	14	12	3110	1555	50	340	45	13.2
Bedford	20	10	7	2275	1090	47.9	230	30	13.0
Darlington	13	6	4	1065	540	50.7	115	15	13.0
Wakefield	29	16	13	3715	1855	49.9	390	50	12.8
Shropshire	44	14	10	3350	1650	49.3	235	30	12.8
Devon	70	38	27	7185	3435	47.8	785	100	12.7
Cheshire West and Chester	32	17	10	3665	1770	48.3	400	50	12.5
Calderdale	21	8	8	2580	1245	48.3	205	25	12.2
Dorset	41	22	19	4585	2235	48.7	460	55	12.0
Rutland	6	3	3	760	355	46.7	85	10	11.8
North Yorkshire	67	37	21	6570	3240	49.3	655	75	11.5
Luton	19	7	5	2540	1255	49.4	130	15	11.5
South Gloucestershire	24	16	14	2575	1230	47.8	355	40	11.3
Bath and North East Somerset	24	16	9	2435	1220	50.1	270	30	11.1
Reading	16	6	4	1450	785	54.1	135	15	11.1
Isle of Wight	11	5	5	1360	630	46.3	140	15	10.7
Somerset	58	22	19	5785	2825	48.8	485	50	10.3
Sunderland	25	12	6	2825	1360	48.1	195	20	10.3
Poole	12	5	4	1485	725	48.8	205	20	9.8
Barnet	39	14	10	3980	1950	49	315	30	9.5
Stockport	29	14	10	3040	1510	49.7	290	25	8.6
Middlesbrough	11	5	4	1370	655	47.8	155	10	6.5
Isles Of Scilly	1	0	0	20	10	50	0	0	0.0
TOTAL	5208	2663	2142	568125	279995	49.3	67245	13655	20.3

Table 26: 2017 GCSE Computer Science female provision by region sorted by female percentage of subject students

Region	Total providers	Total CS providers	CS Sch with females	Total students	Female students	% of total students	Total subject students	Female subject students	% of subject students
London	759	368	290	83570	41290	49.4	9405	2515	26.7
North West	709	383	304	75870	37425	49.3	9855	2175	22.1
West Midlands	608	282	235	62510	31040	49.7	7070	1545	21.9
South East	872	458	372	95310	46565	48.9	12110	2345	19.4
North East	232	126	102	25525	12570	49.2	2770	525	19
East of England	568	305	249	65620	32340	49.3	8095	1485	18.3
East Midlands	419	217	172	48195	23685	49.1	5720	990	17.3
Yorkshire and The Humber	462	241	192	56030	27700	49.4	5685	980	17.2
South West	514	283	226	55185	27145	49.2	6465	1085	16.8
TOTAL	5143	2663	2142	567815	279760	49.3	67175	13645	20.3

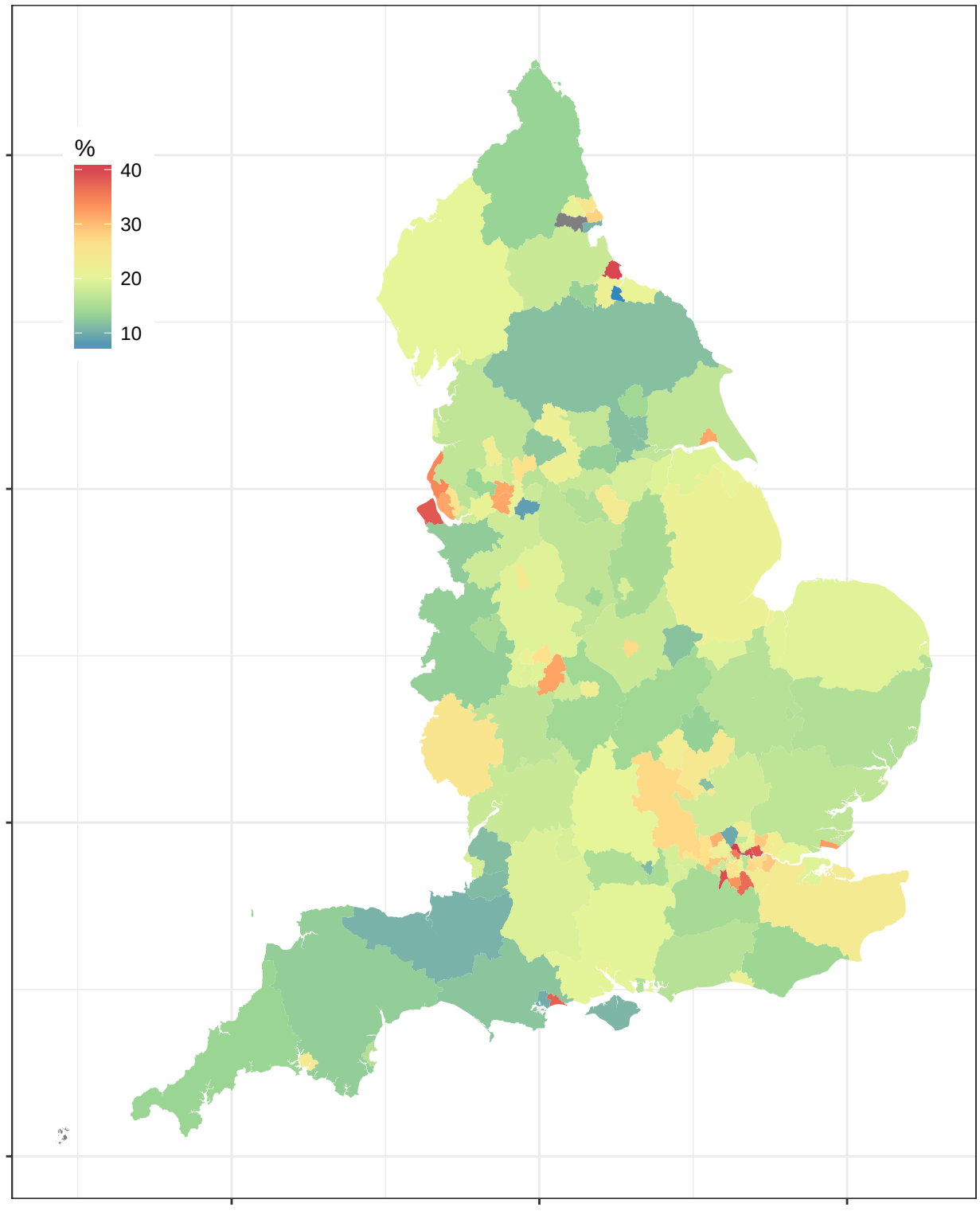

Figure 68: 2017 Computer Science GCSE female provision by local authority.

Note: The City of London is not shown to prevent its 100% provision skewing the colours.

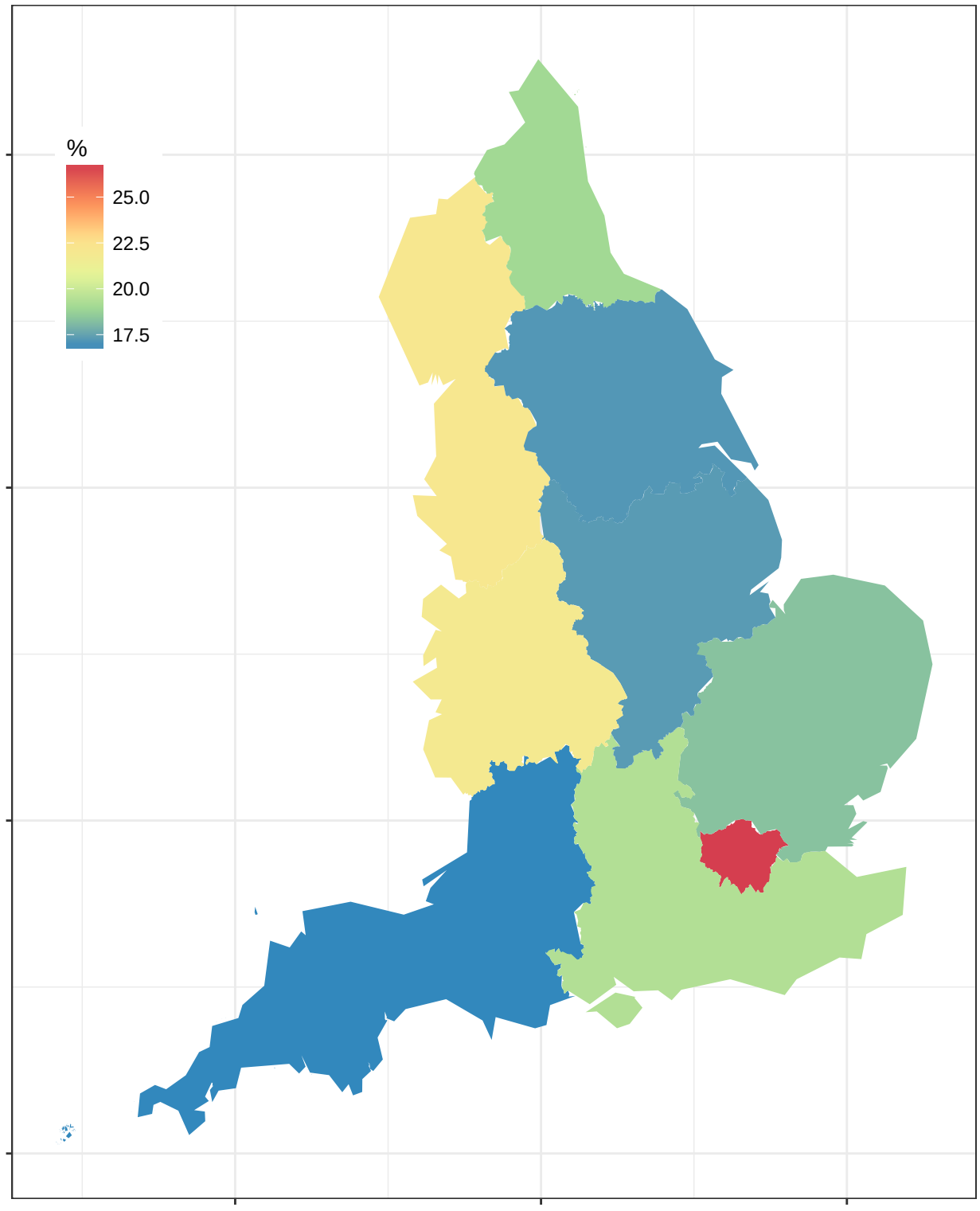

Figure 69: 2017 Computer Science GCSE female provision by region.

4.2.1.2 KS5

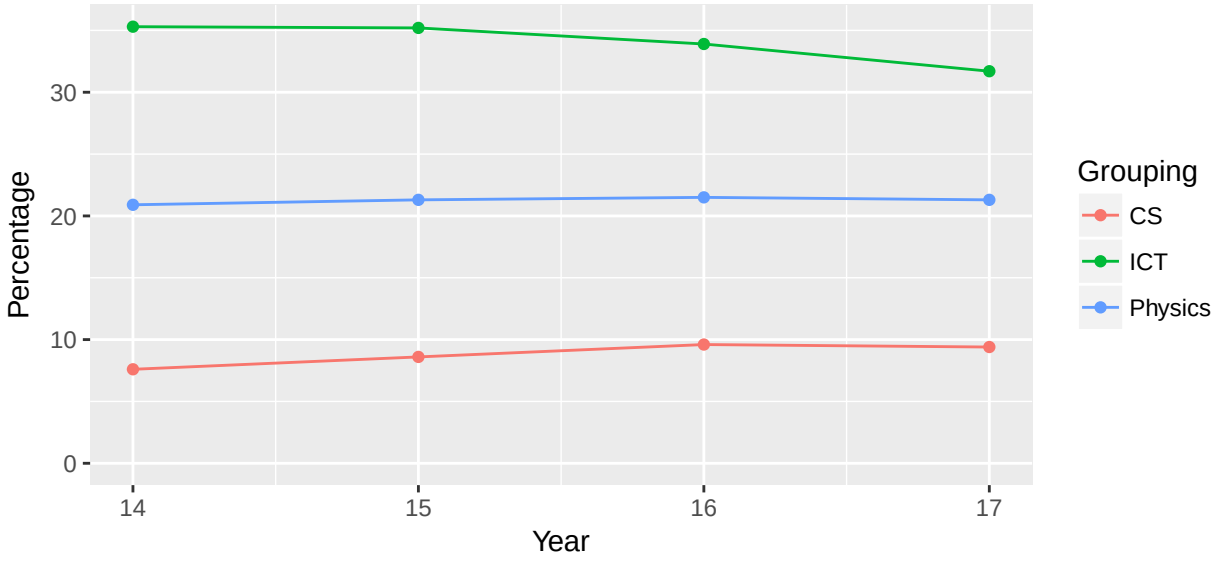

Figure 70: Longitudinal: A level female uptake by subject. 2014-17

Table 27: 2017 A level Computer Science student grades by gender

GENDER		*	A	B	C	D	E	U
F	%	1.9	12.3	20.7	26.4	22.8	11.4	4.4
F	n	13	83	140	178	154	77	30
M	%	3.3	14.4	20.5	22.9	20.9	12.5	5.5
M	n	213	937	1339	1497	1364	817	359

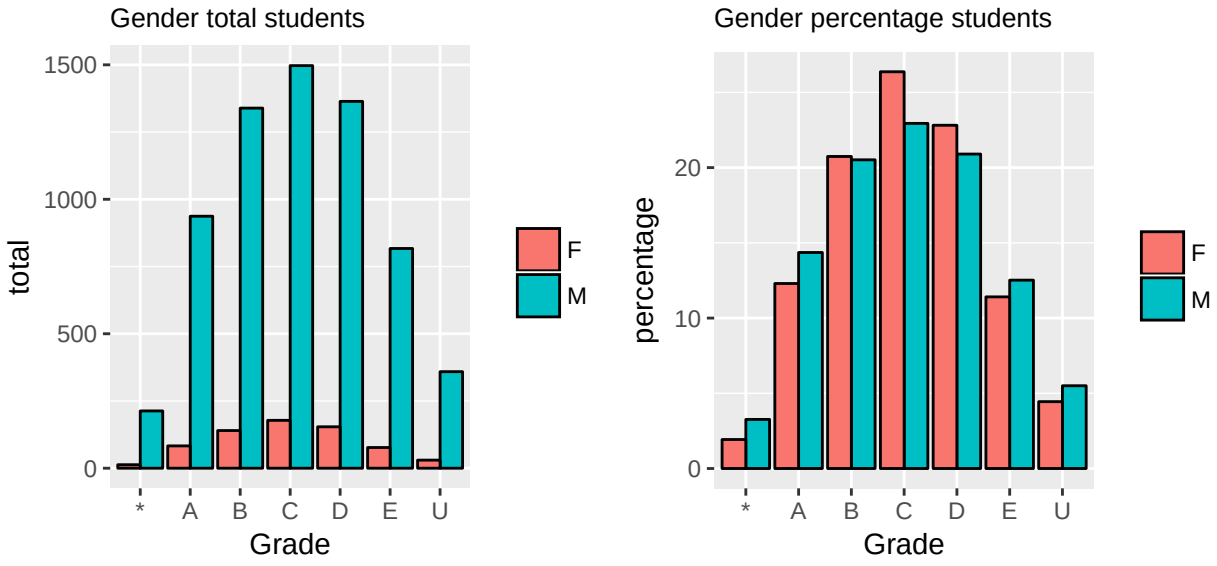

Figure 71: 2017 Computer Science GCSE gender grade outcomes

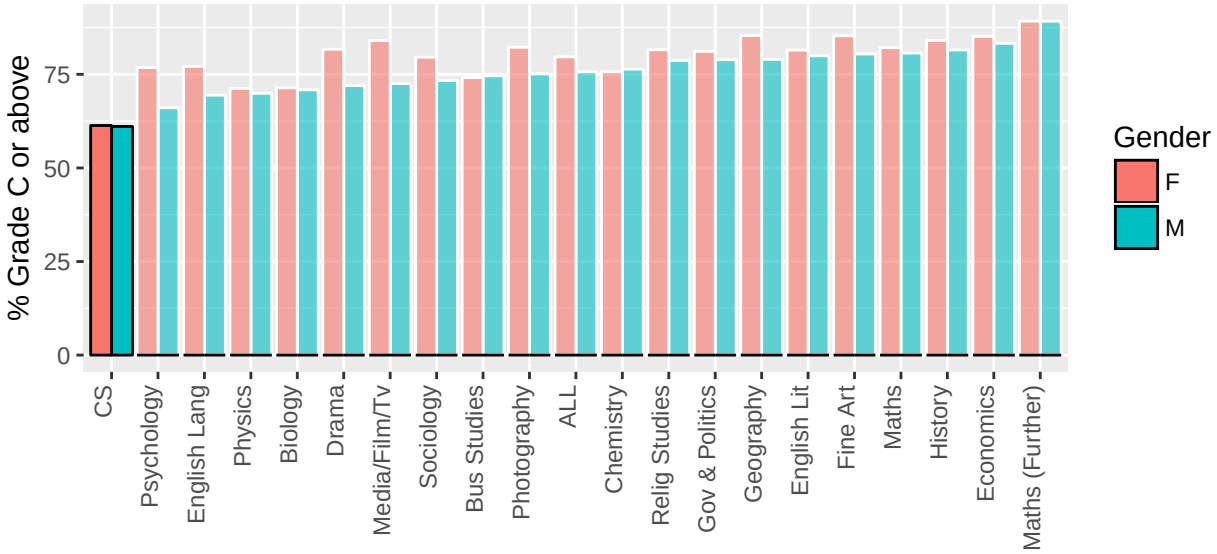

Figure 72: 2017 Computer Science A-level C grade pass rate comparison for gender

Table 28: 2017 A level Computer Science female provision by region sorted by female percentage of subject students

Region	Total providers	Total CS providers	CS Sch with females	Total students	Female students	% of total students	Total subject students	Female subject students	% of subject students
London	522	185	72	44325	24380	55	1025	135	13.2
South East	520	187	73	52070	28260	54.3	1430	150	10.5
West Midlands	336	98	34	25965	14590	56.2	670	65	9.7
North East	106	43	17	9955	5725	57.5	260	25	9.6
East Midlands	241	96	35	20340	11285	55.5	630	60	9.5
North West	292	109	45	32185	17925	55.7	1010	85	8.4
South West	297	120	35	26575	14650	55.1	725	60	8.3
Yorkshire and The Humber	235	68	24	22535	12840	57	470	35	7.4
East of England	337	138	38	31650	17035	53.8	955	60	6.3
TOTAL	2886	1044	373	265600	146690	55.2	7175	675	9.4

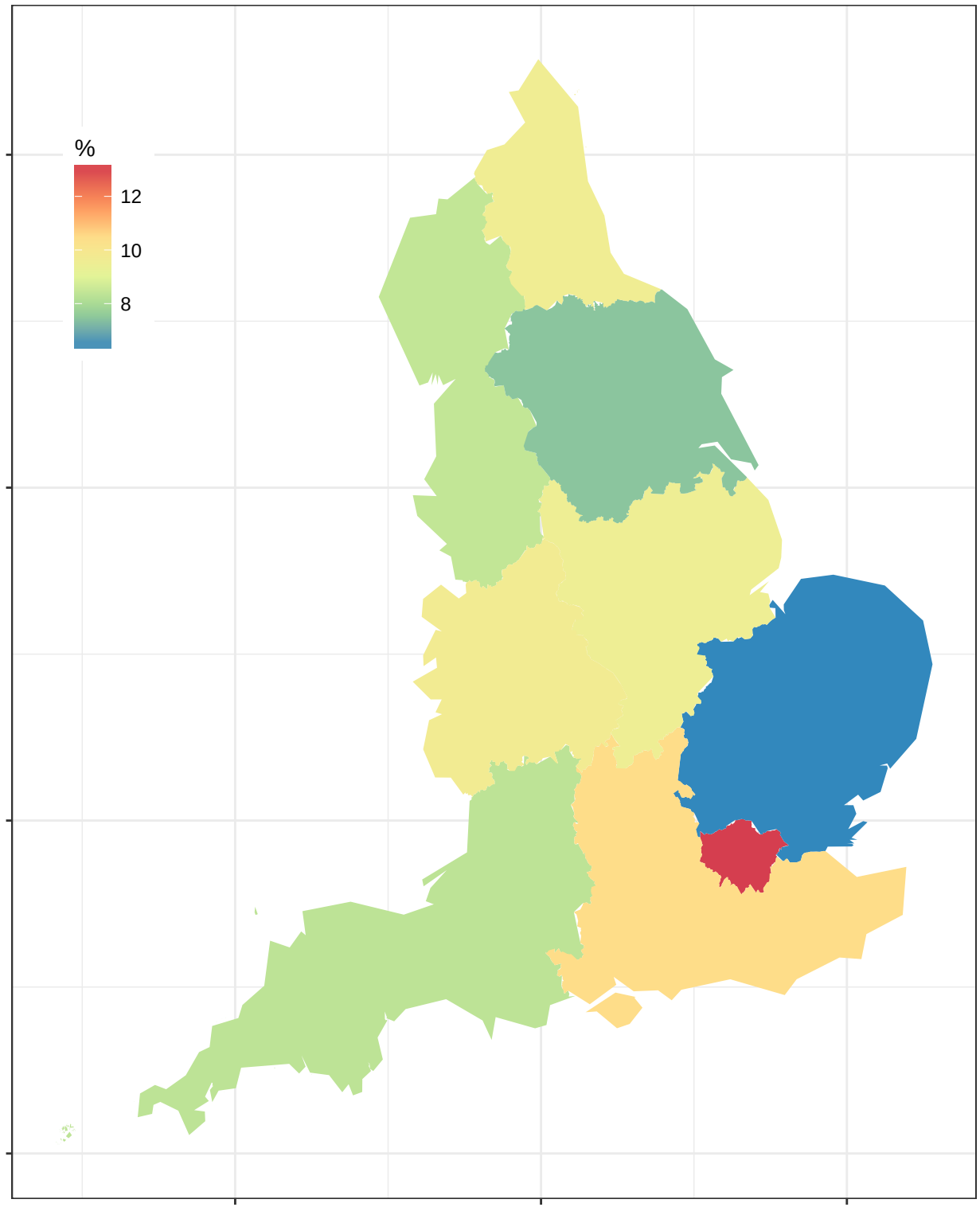

Figure 73: 2017 Computer Science A level female provision by region.

4.2.2 Socio-economic status

Alongside the increase in uptake of CS at GCSE, we have also seen an increase over and above this for pupil premium students since 2015 (and a corresponding drop in IDACI measures). In this area at least, CS has become a more inclusive subject than it was, perhaps through more providers choosing to offer the subject, although it still compares unfavourably with many other subjects. Pupil Premium students score lower grades (43.2% gain a C or above) than their more affluent counterparts (62.7%)

At A-level, a lower proportion of A-level CS students have been in receipt of Pupil Premium than in previous years. Again, Pupil Premium students score lower grades than their more affluent counterparts, with only 7 (1.5%) pupil premium students gaining an A* in 2017, compared to 188 (3%) of their more affluent peers.

4.2.2.1 KS4

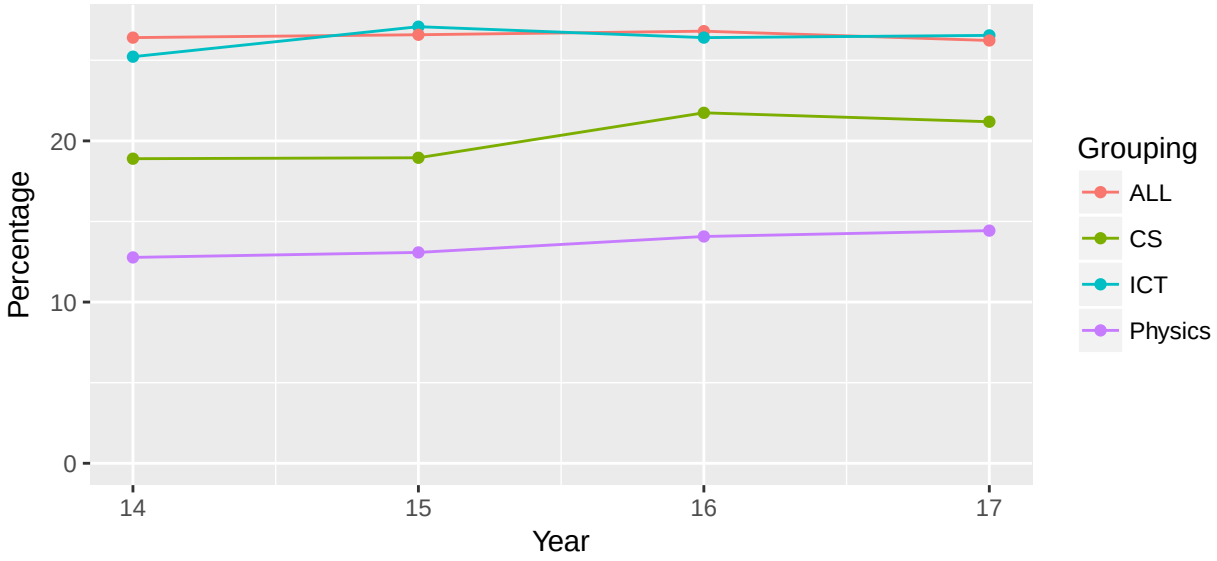

Figure 74: Longitudinal: GCSE pupil premium uptake by subject

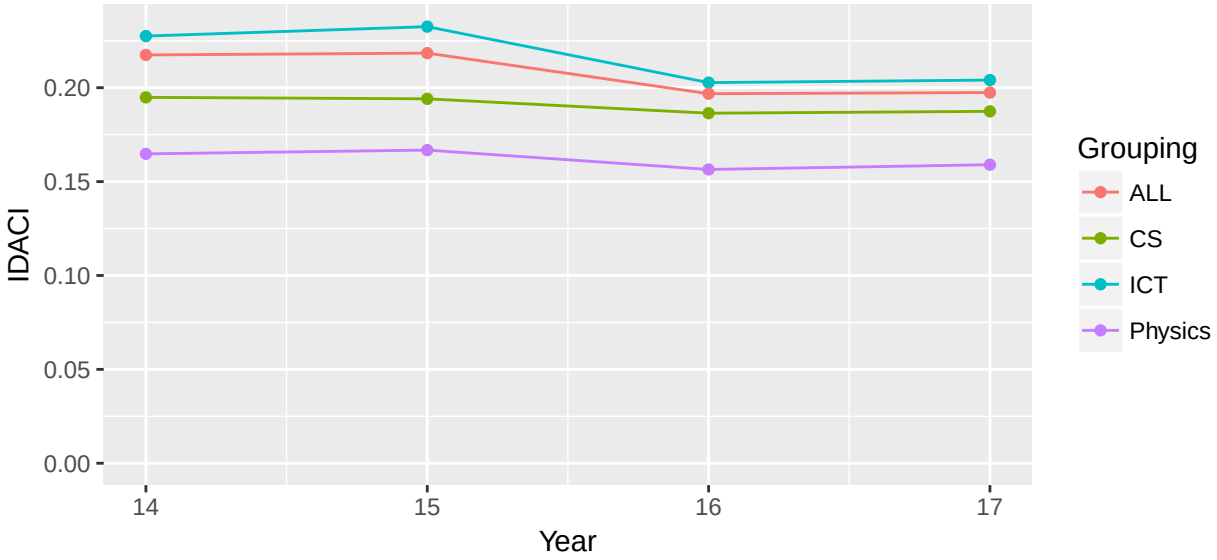

Figure 75: Longitudinal: GCSE average IDACI score of subject students (note that IDACI calculations changed after 2015)

Table 29: 2017 GCSE Computer Science student grades by pupil premium

Pupil premium		*	A	B	C	D	E	F	G	U
0	%	6.1	15.8	20.8	20	14.3	9.2	6.2	4	3.5
0	n	3154	8124	10690	10285	7331	4707	3185	2043	1785
1	%	1.9	7.7	15.2	18.4	16.7	13.4	10.2	7.7	8.8
1	n	268	1060	2094	2540	2303	1842	1405	1061	1219

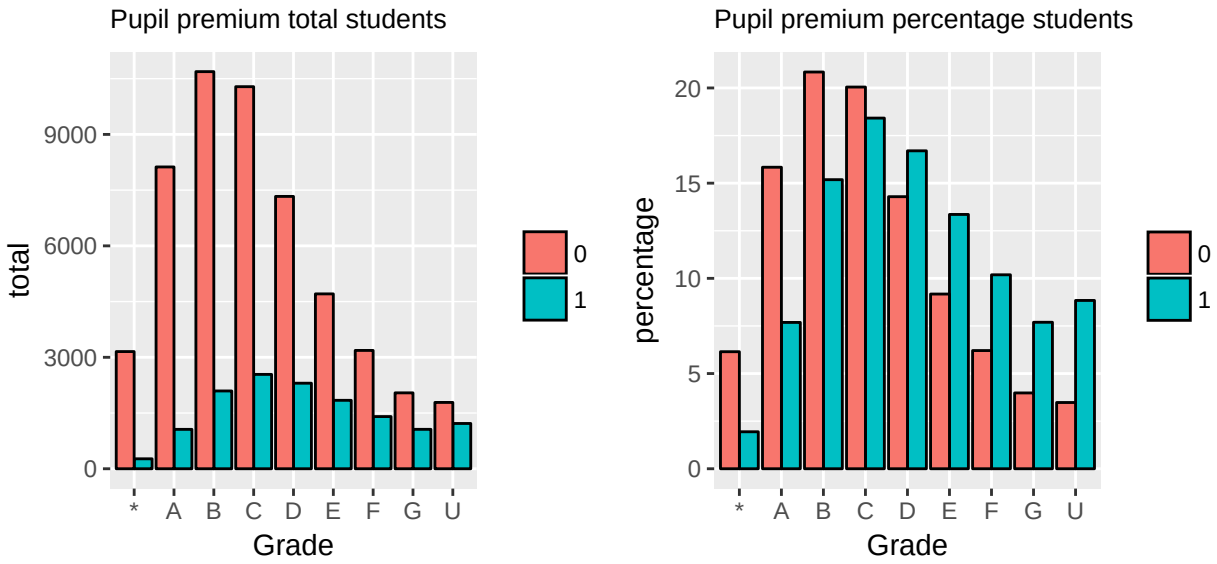

Figure 76: 2017 Computer Science GCSE pupil premium grade outcomes

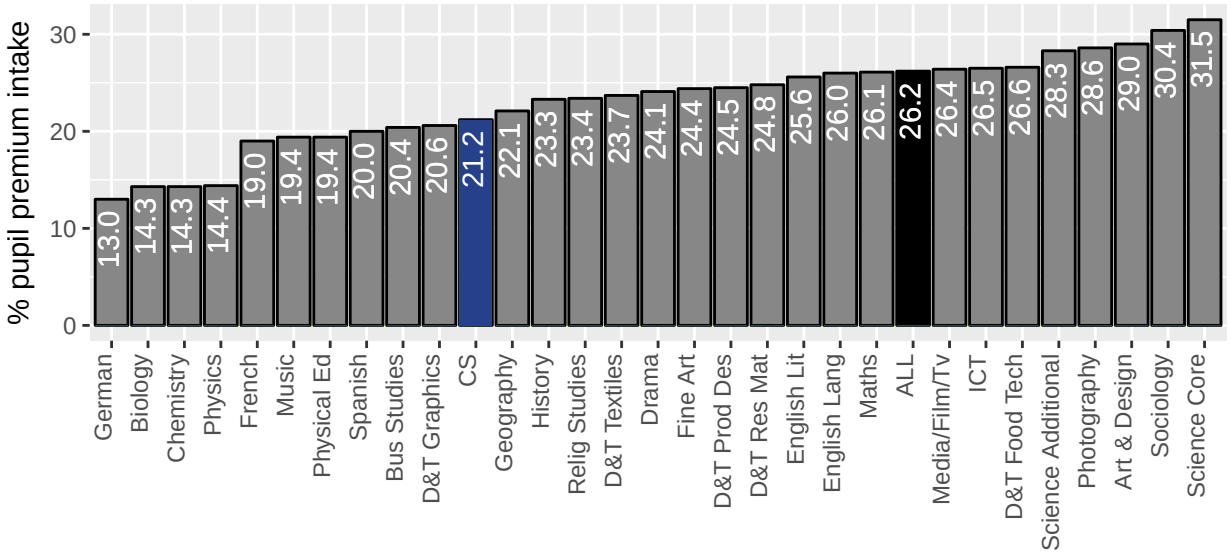

Figure 77: 2017 Computer Science GCSE pupil premium cohort

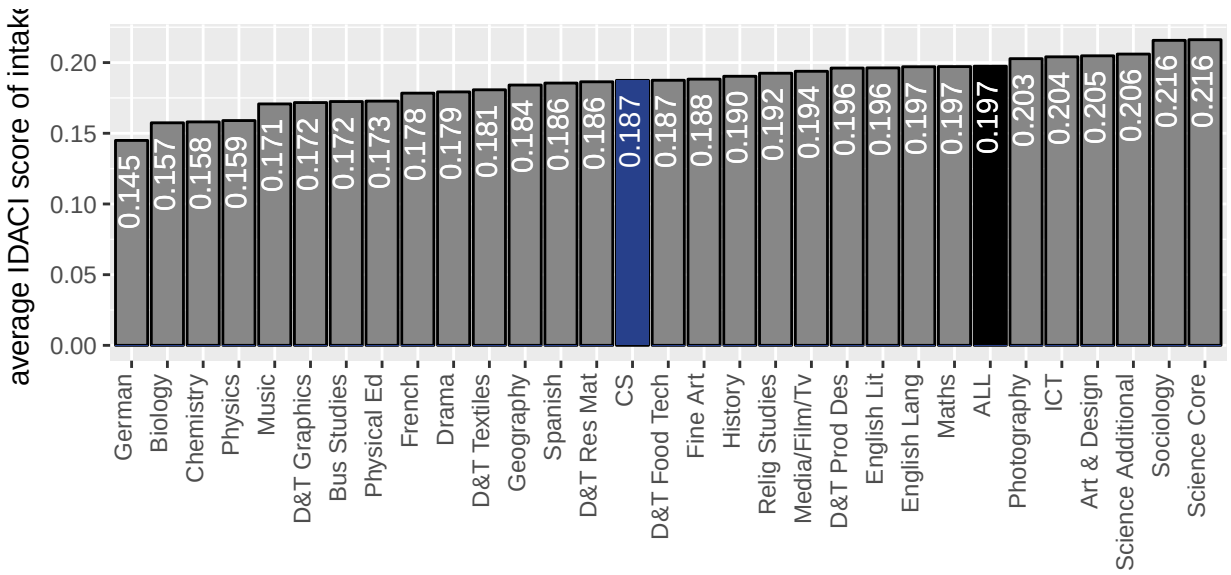

Figure 78: 2017 Computer Science GCSE average IDACI score of cohort

4.2.2.2 KS5

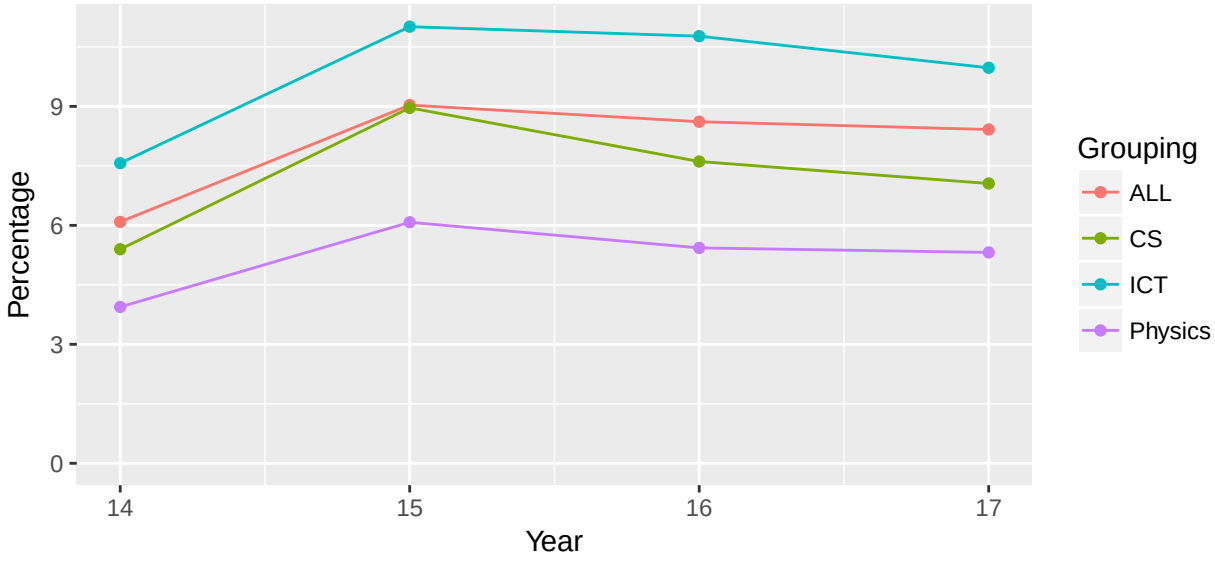

Figure 79: Longitudinal: A level pupil premium uptake by subject

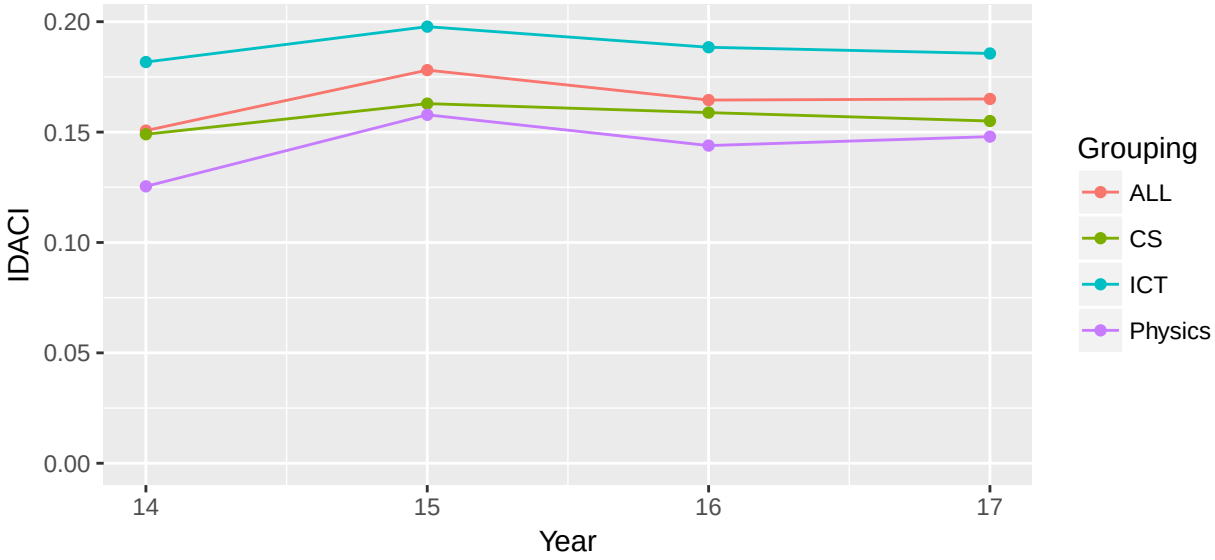

Figure 80: Longitudinal: A level average IDACI score of subject students

Table 30: 2017 A level Computer Science student grades by pupil premium

Pupil premium		*	A	B	C	D	E	U
0	%	3	14	20.6	23.4	21.3	12.5	5.1
0	n	188	863	1271	1444	1314	768	317
1	%	1.5	8.8	15.2	22.9	23.7	17.3	10.7
1	n	7	41	71	107	111	81	50

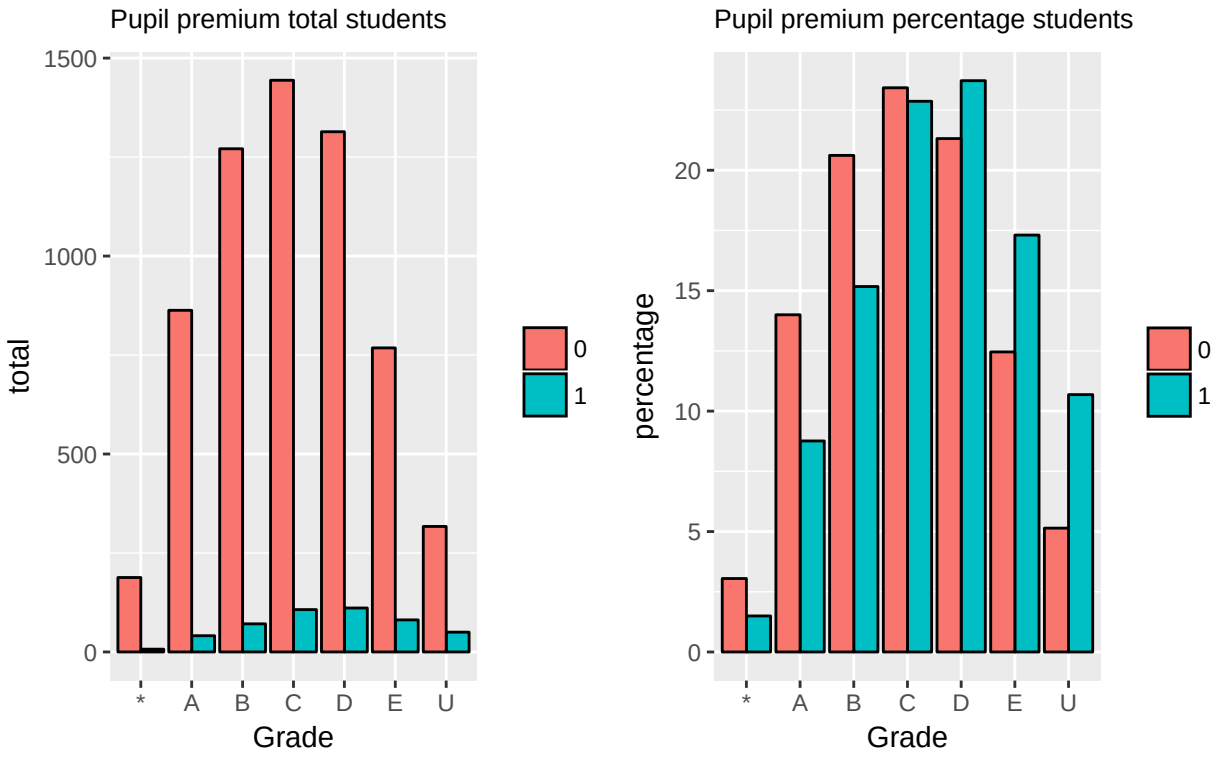

Figure 81: 2017 Computer Science A level pupil premium grade outcomes

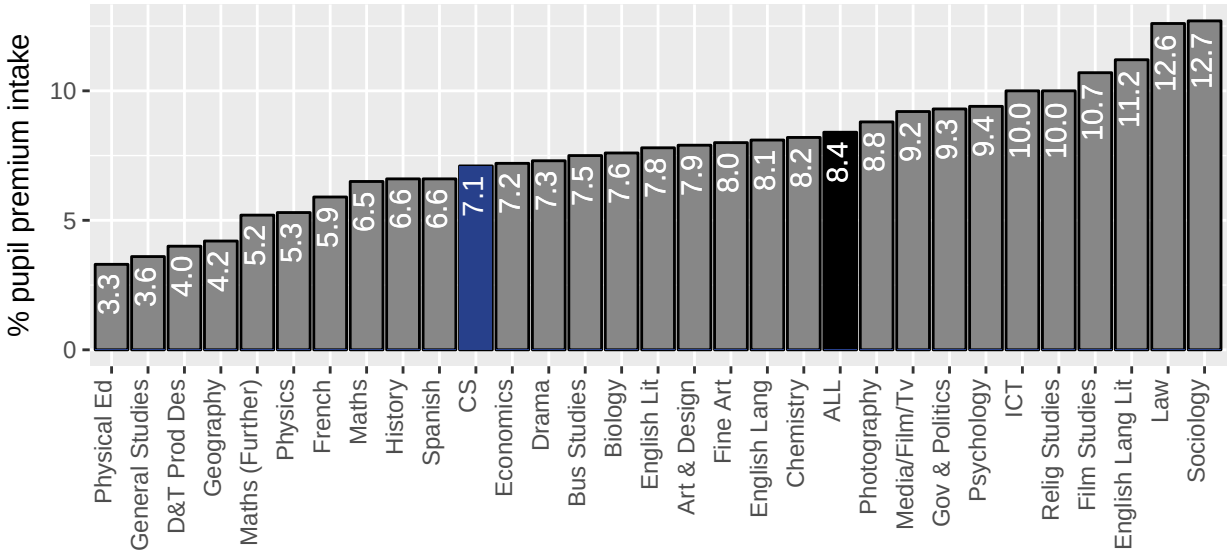

Figure 82: 2017 Computer Science A level pupil premium cohort

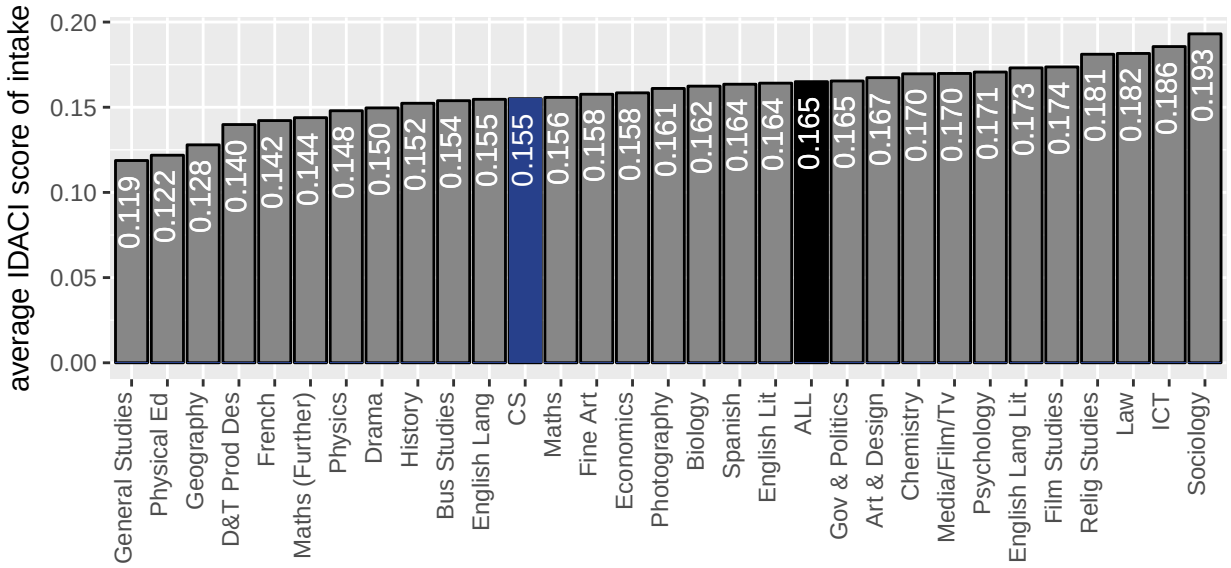

Figure 83: 2017 Computer Science A level average IDACI score of cohort

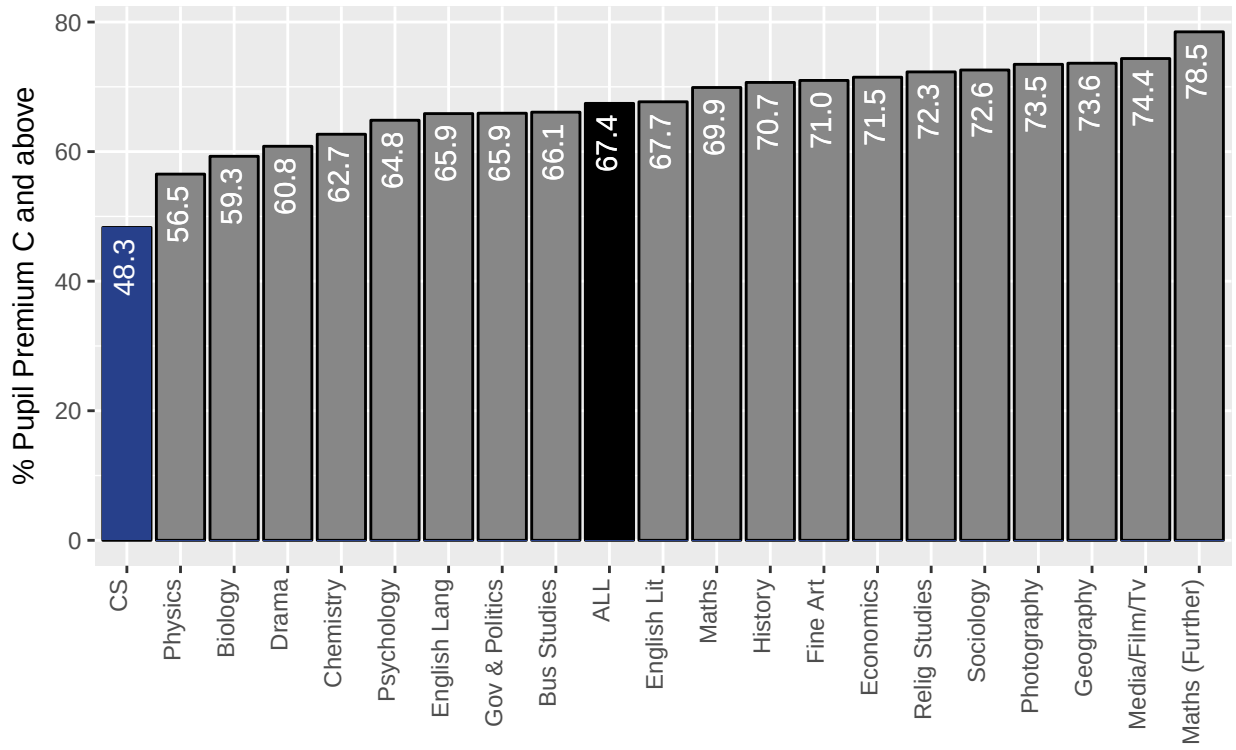

Figure 84: 2017 Computer Science A level pupil premium C grade pass rate

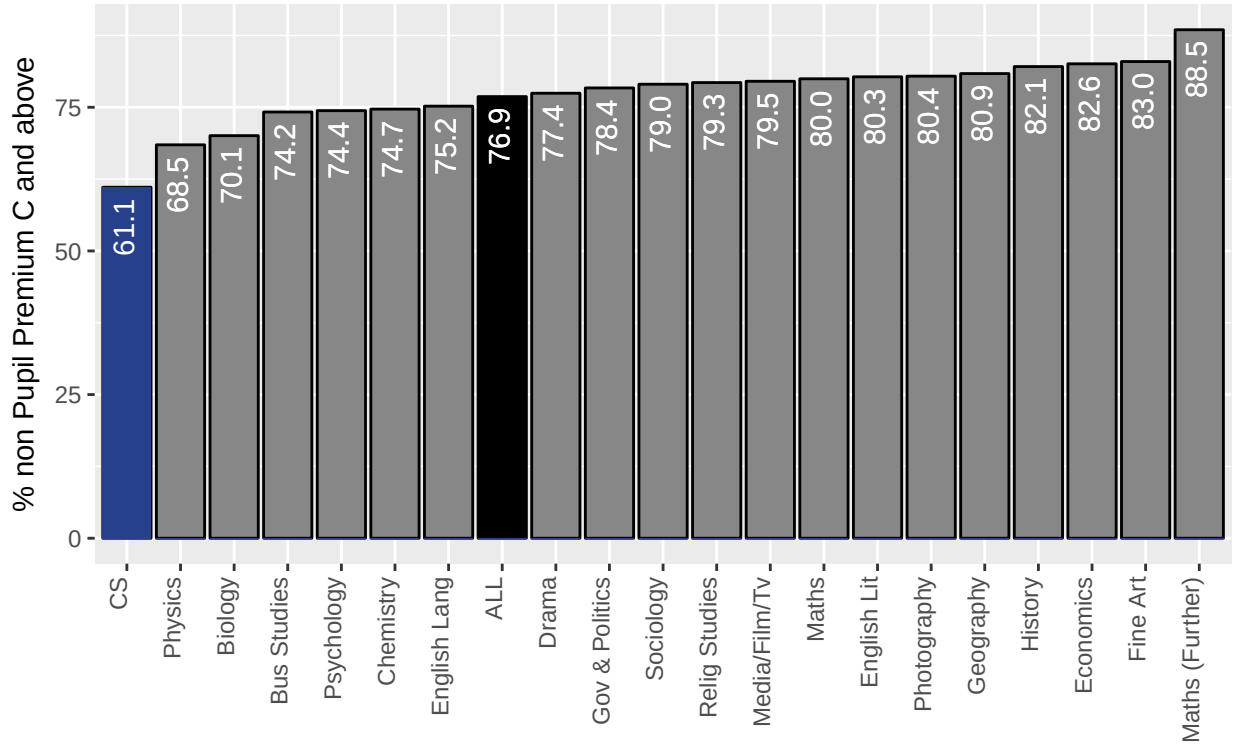

Figure 85: 2017 Computer Science A level non pupil premium C grade pass rate

4.2.3 Ethnicity

Take up of GCSE CS has increased in all ethnic groups, with the subject proving particularly popular amongst Chinese and Asian students. Black students are still the most underrepresented group taking CS.

At A-level, CS again proves particularly popular amongst Chinese students, with Black students being under represented

The ethnic spread for both GCSE and A-level ICT is much closer to that for the population as a whole. Asian students have the best representation at both qualification levels, and Mixed ethnicity students are the most underrepresented.

4.2.3.1 KS4

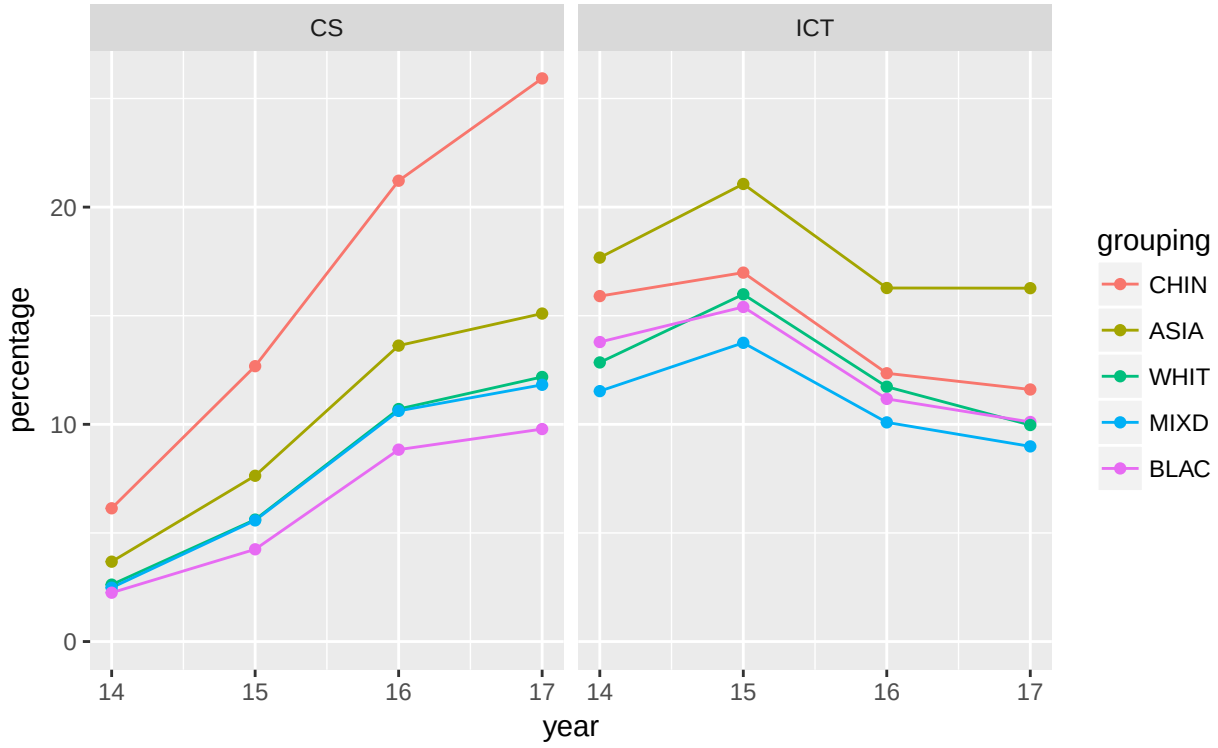

Figure 86: Longitudinal: GCSE uptake by ethnicity as % of those taking subject

Table 31: 2017 GCSE Computer Science ethnicity of subject students

Ethnicity	Total	Pop %	Computer Science	Physics	ICT	Computer Science %	Physics %	ICT %
White	404163	77.1	49234	95922	40288	75.6	76.6	72.7
Asian	52298	10.0	7897	14478	8508	12.1	11.6	15.4
Black	27836	5.3	2723	5182	2814	4.2	4.1	5.1
Mixed	23595	4.5	2789	5617	2120	4.3	4.5	3.8
Other	8296	1.6	1118	1820	922	1.7	1.4	1.7
Undeclared	5870	1.1	819	1340	520	1.3	1.1	0.9
Chinese	2025	0.4	525	895	235	0.8	0.7	0.4

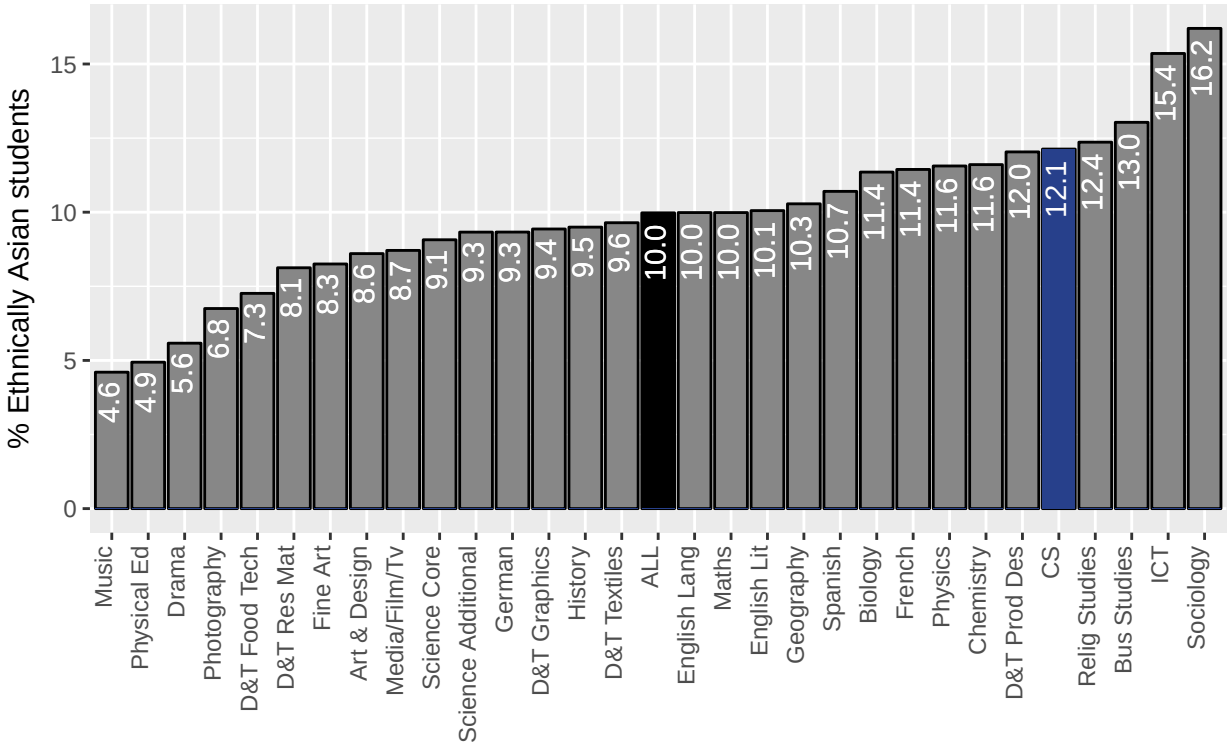

Figure 87: 2017 GCSE Computer Science Asian student subject representation

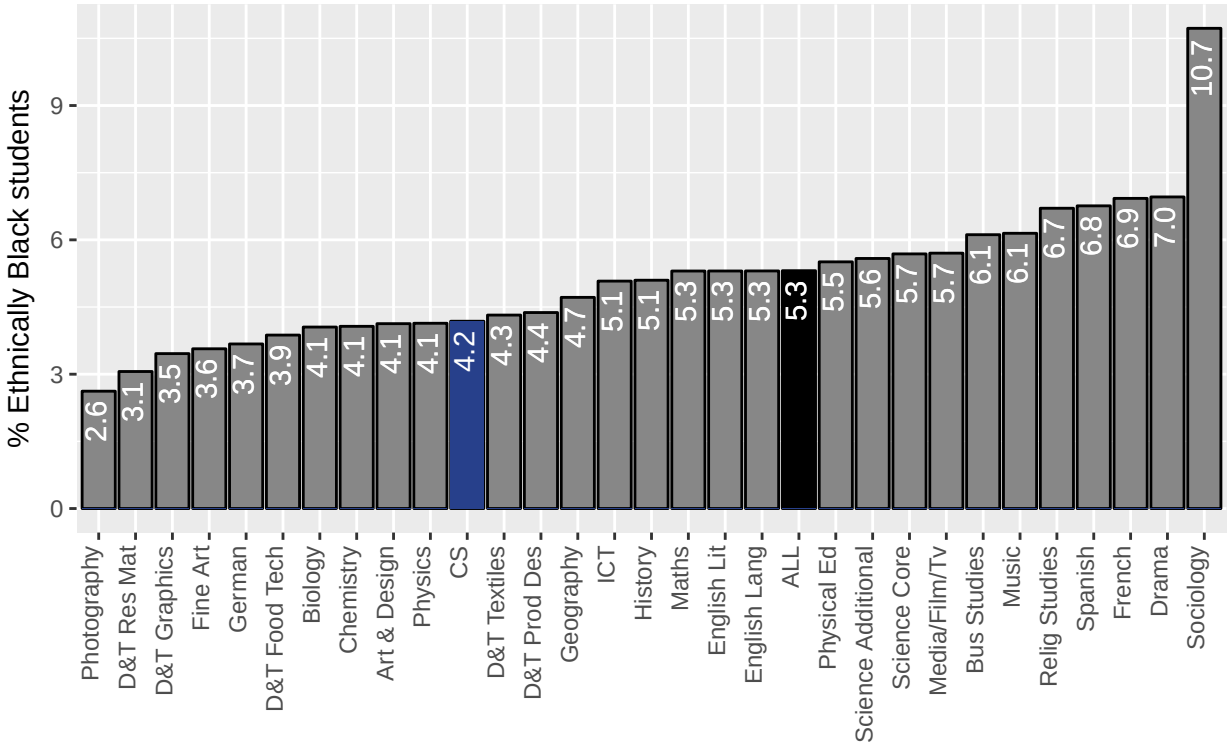

Figure 88: 2017 GCSE Computer Science Black student subject representation

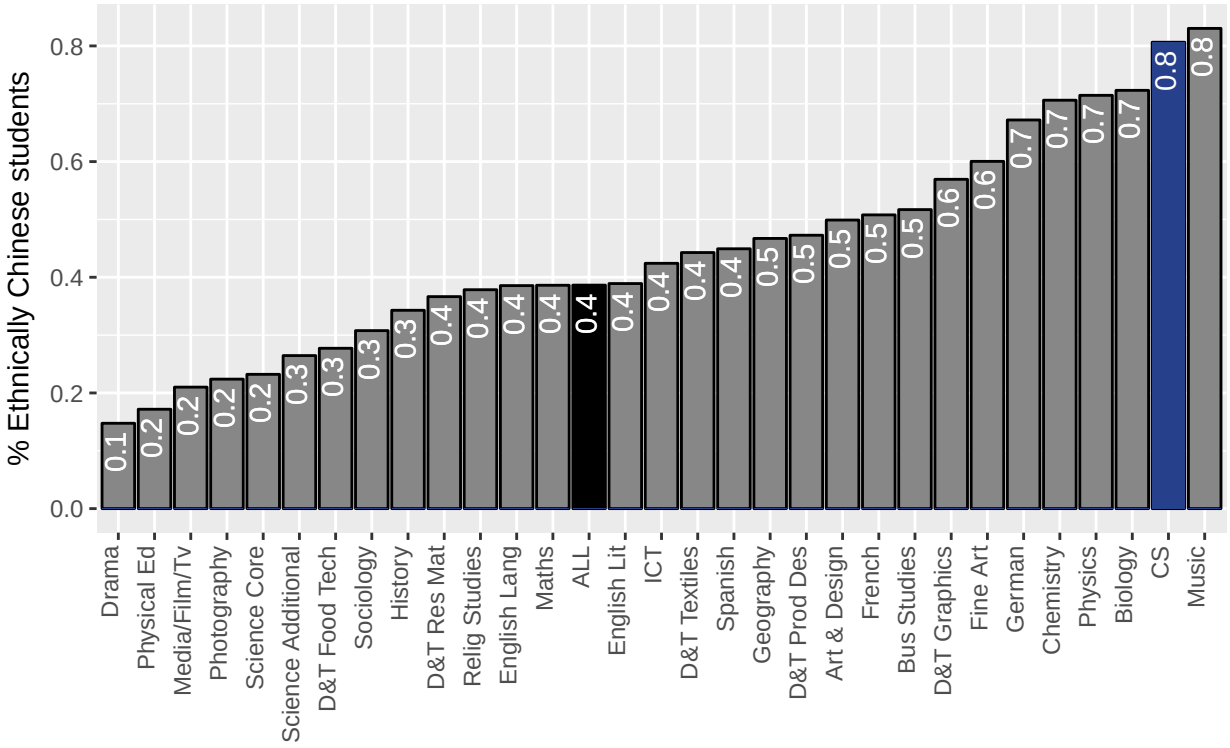

Figure 89: 2017 GCSE Computer Science Chinese student subject representation

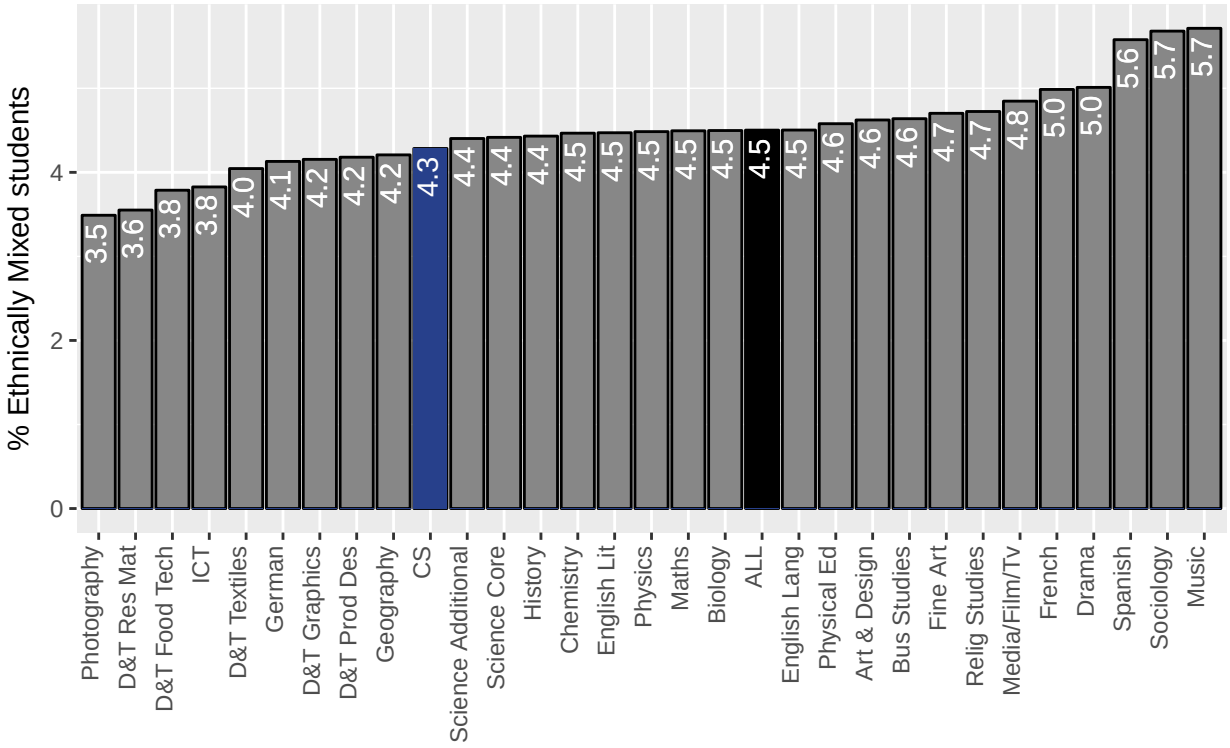

Figure 90: 2017 GCSE Computer Science Mixed student subject representation

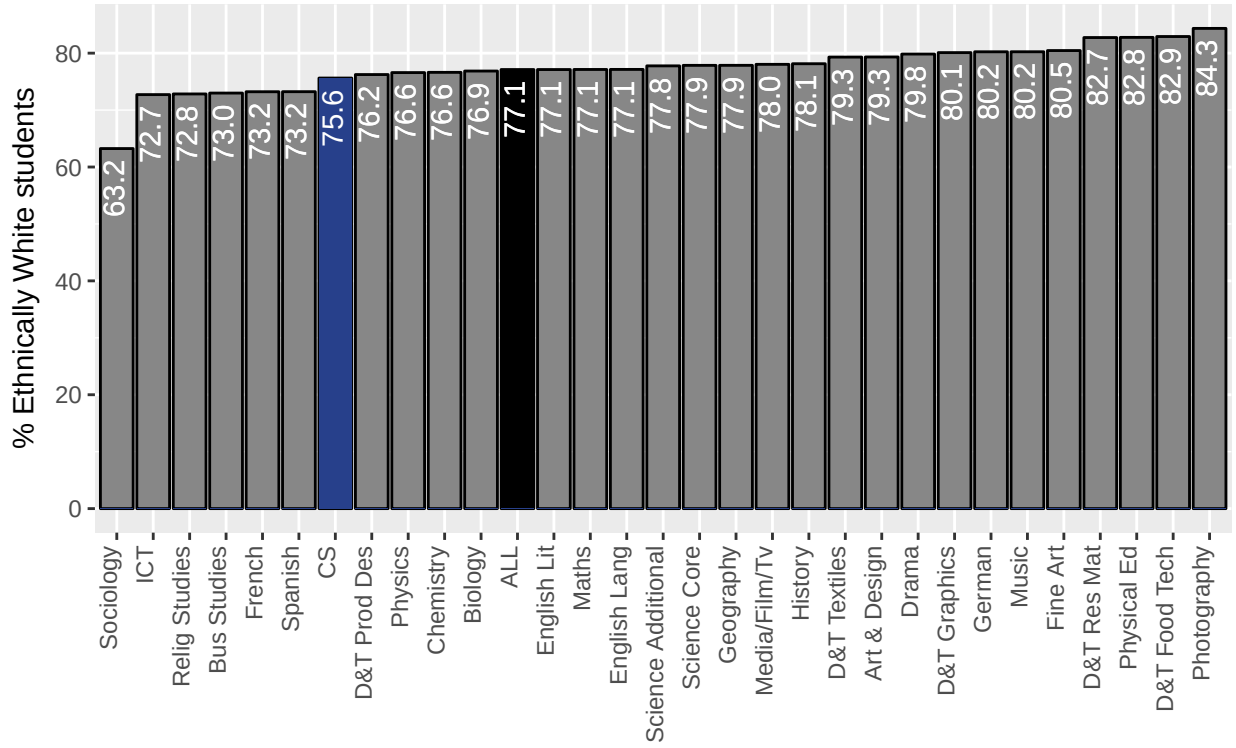

Figure 91: 2017 GCSE Computer Science White student subject representation

4.2.3.2 KS5

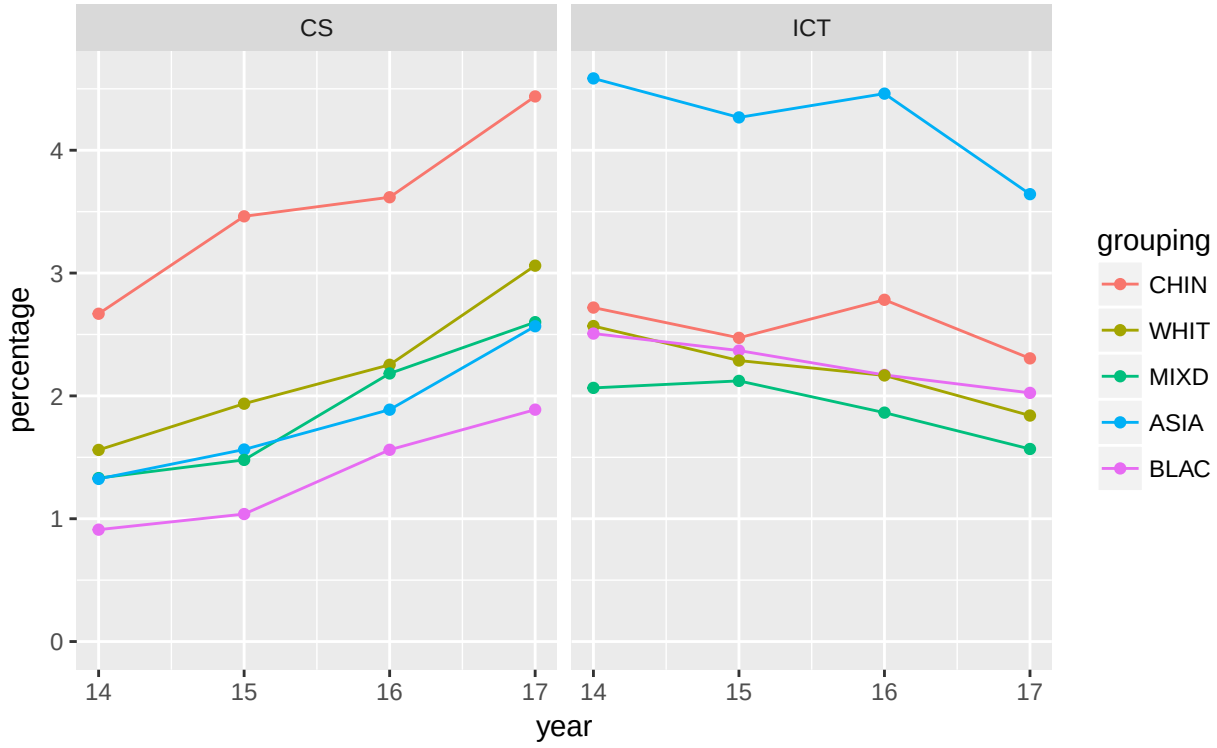

Figure 92: Longitudinal: A level uptake by ethnicity as % of those taking subject

Table 32: 2017 A-level Computer Science ethnicity of subject students

Ethnicity	Total	Pop %	Computer Science	Physics	ICT	Computer Science %	Physics %	ICT %
White	169787	74.9	5196	18519	3124	78.3	74.3	66.9
Asian	26412	11.6	678	3088	962	10.2	12.4	20.6
Black	11706	5.2	221	941	237	3.3	3.8	5.1
Mixed	10461	4.6	272	1227	164	4.1	4.9	3.5
Other	3979	1.8	85	410	93	1.3	1.6	2.0
Undeclared	2674	1.2	105	318	52	1.6	1.3	1.1
Chinese	1735	0.8	77	422	40	1.2	1.7	0.9

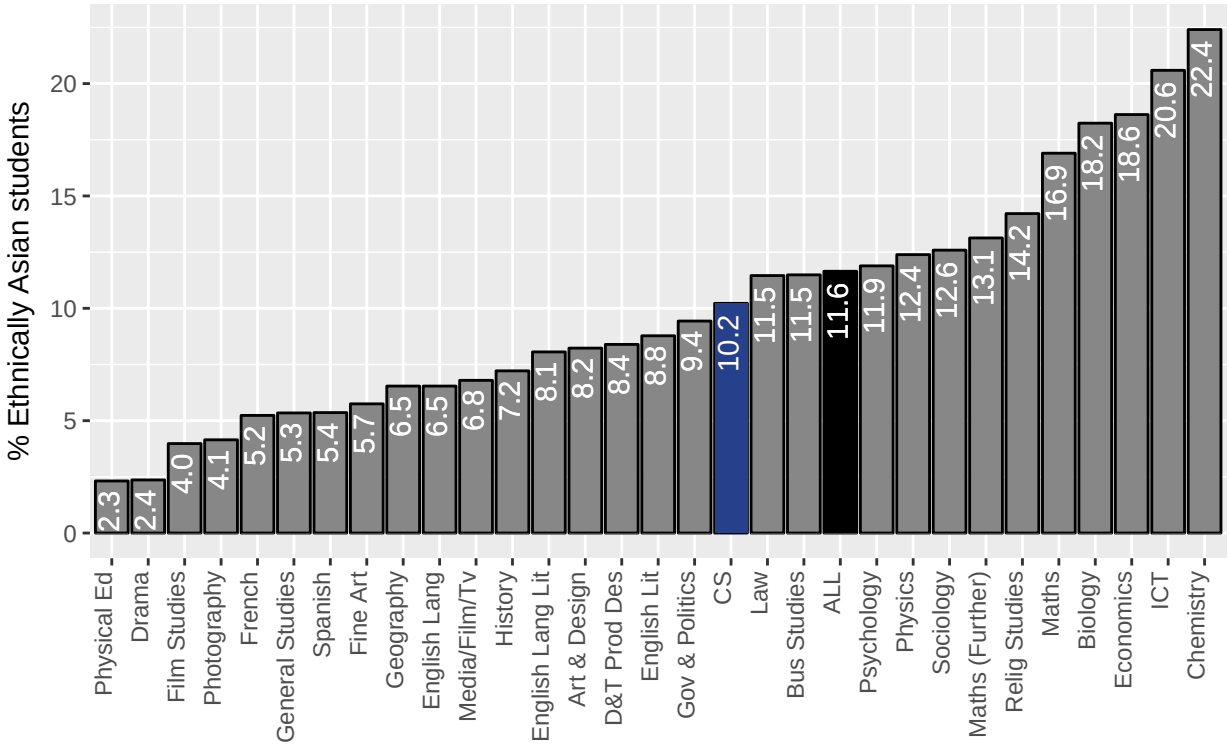

Figure 93: 2017 A level Computer Science Asian student subject representation

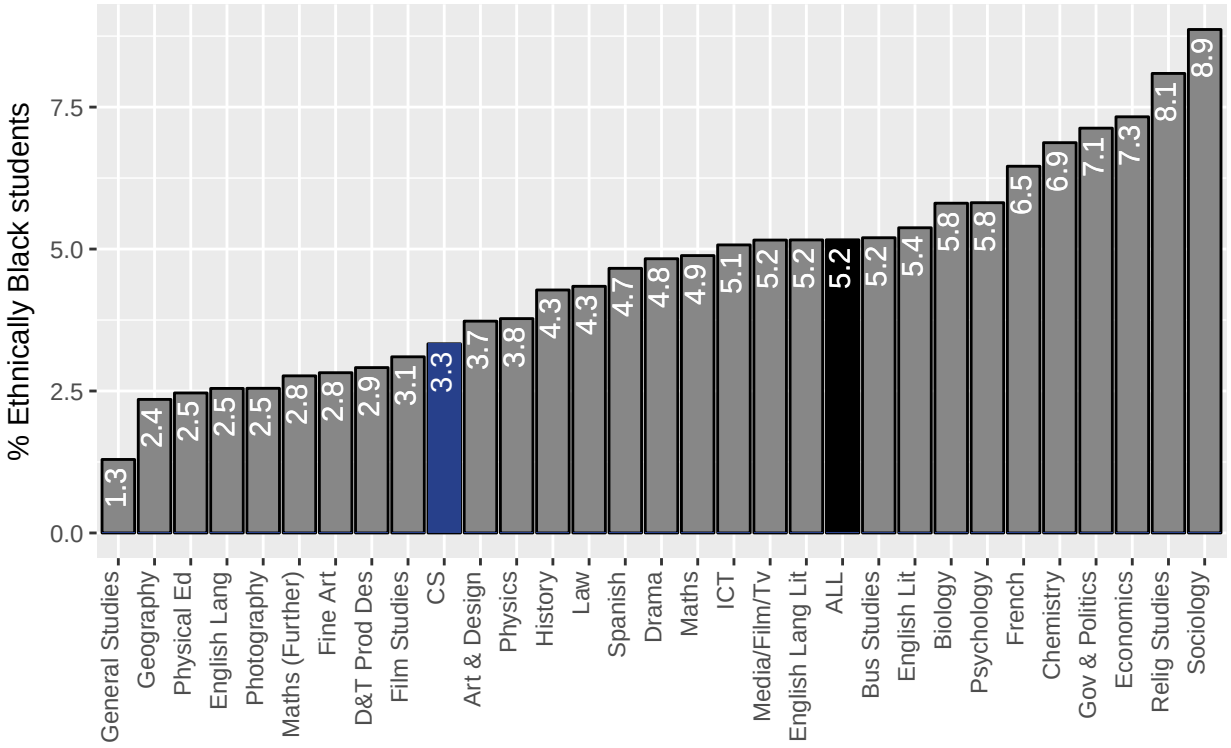

Figure 94: 2017 A level Computer Science Black student subject representation

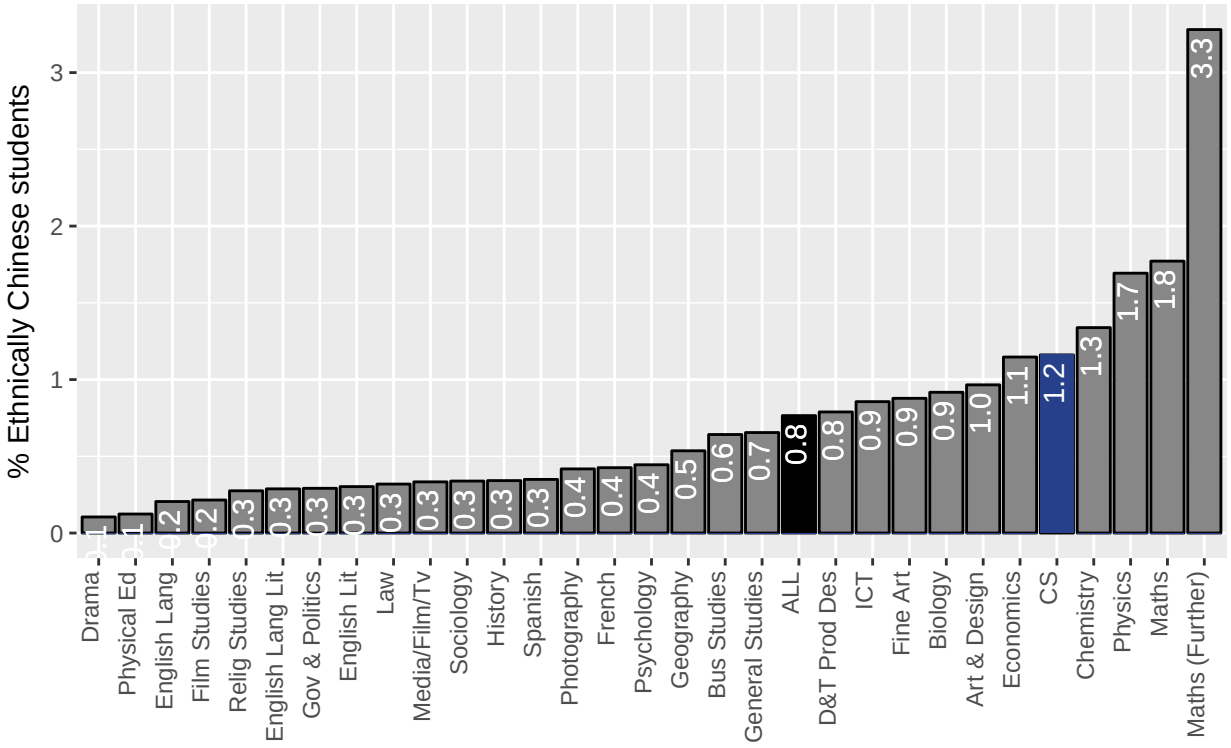

Figure 95: 2017 A level Computer Science Chinese student subject representation

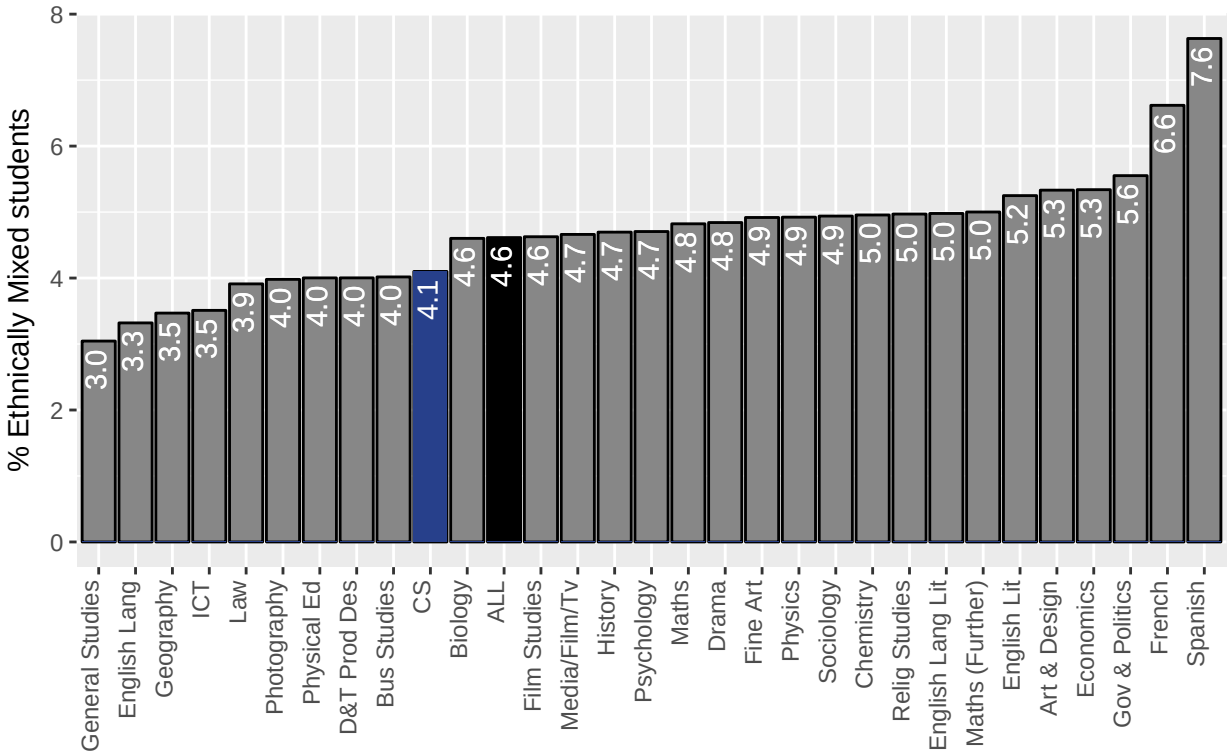

Figure 96: 2017 A level Computer Science Mixed student subject representation

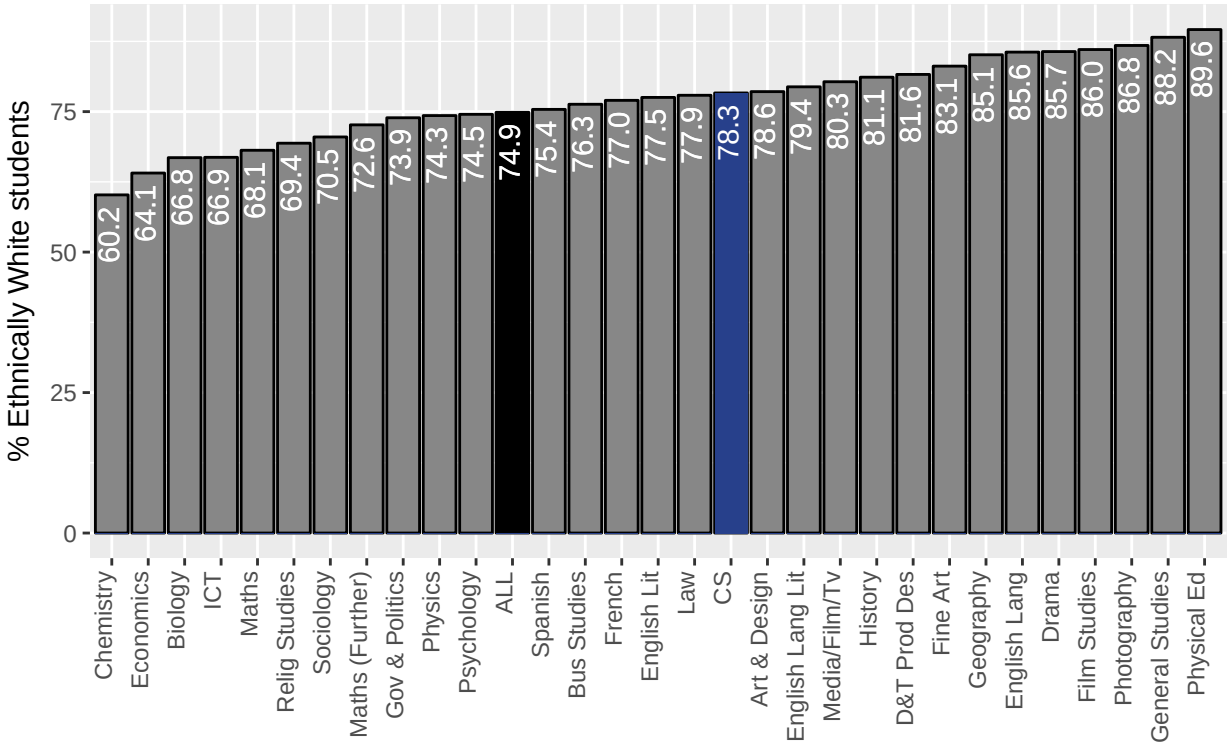

Figure 97: 2017 A level Computer Science White student subject representation

4.2.4 SEN

At GCSE, students with any Special Educational Needs (SEN) categorisation are less likely to have sat computer science than ICT. At A-level, computer science students are substantially more likely to have a SEN categorisation than their peers taking ICT and physics; the reasons for this remain unclear.

Note that SEN policy has changed since 2014, with students now being less likely to qualify for SEN categories. This may explain the overall decrease in the number of students classified as having SEN provision.

4.2.4.1 KS4

Table 33: 2017 GCSE SEN uptake

SEN category	ALL	CS	ICT	Physics
None	86.5	90.6	87.5	95.6
SEN support	11.0	8.1	10.4	3.9
Statement	1.3	0.7	1.1	0.3
EHC plan	1.2	0.6	1.0	0.2

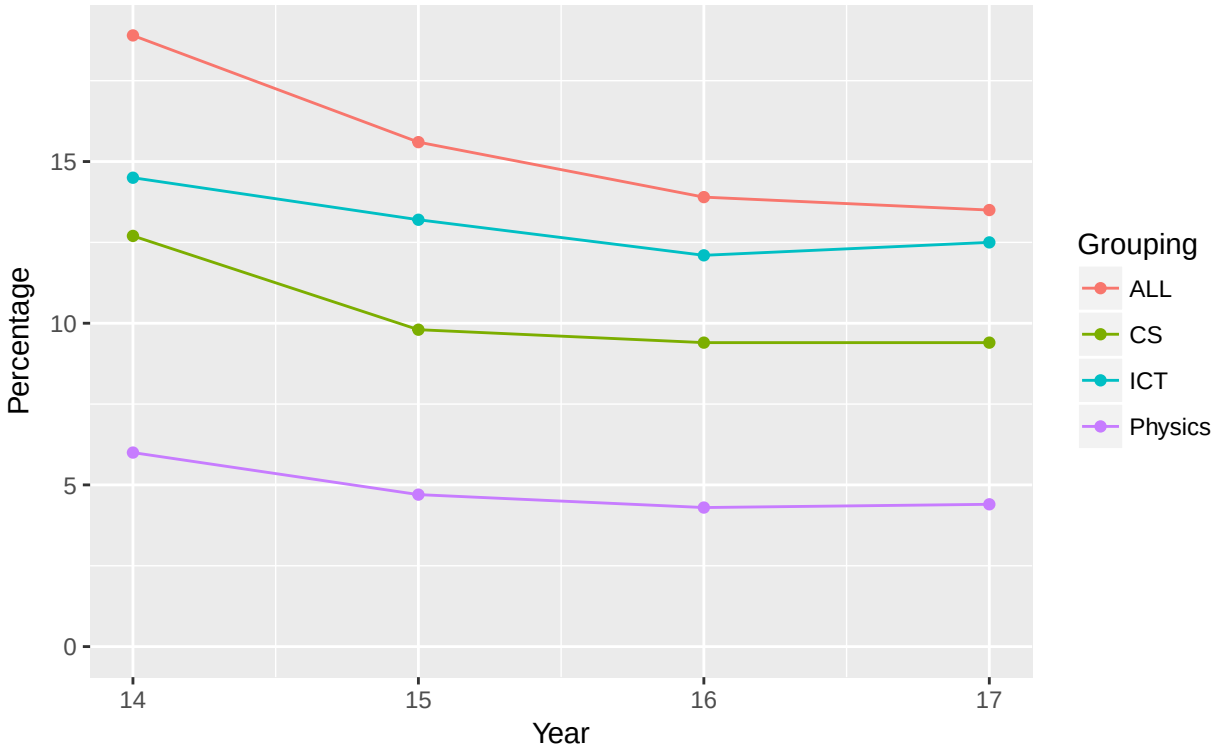

Figure 98: Longitudinal: GCSE students who have SEN categorisation, by subject and year

4.2.4.2 KS5

Table 34: 2017 A level SEN uptake

SEN category	ALL	CS	ICT	Physics
None	95.8	92.4	95.7	95.2
SEN support	3.7	6.1	3.3	4.1
EHC plan	0.3	0.9	0.6	0.3
Statement	0.2	0.6	0.3	0.3

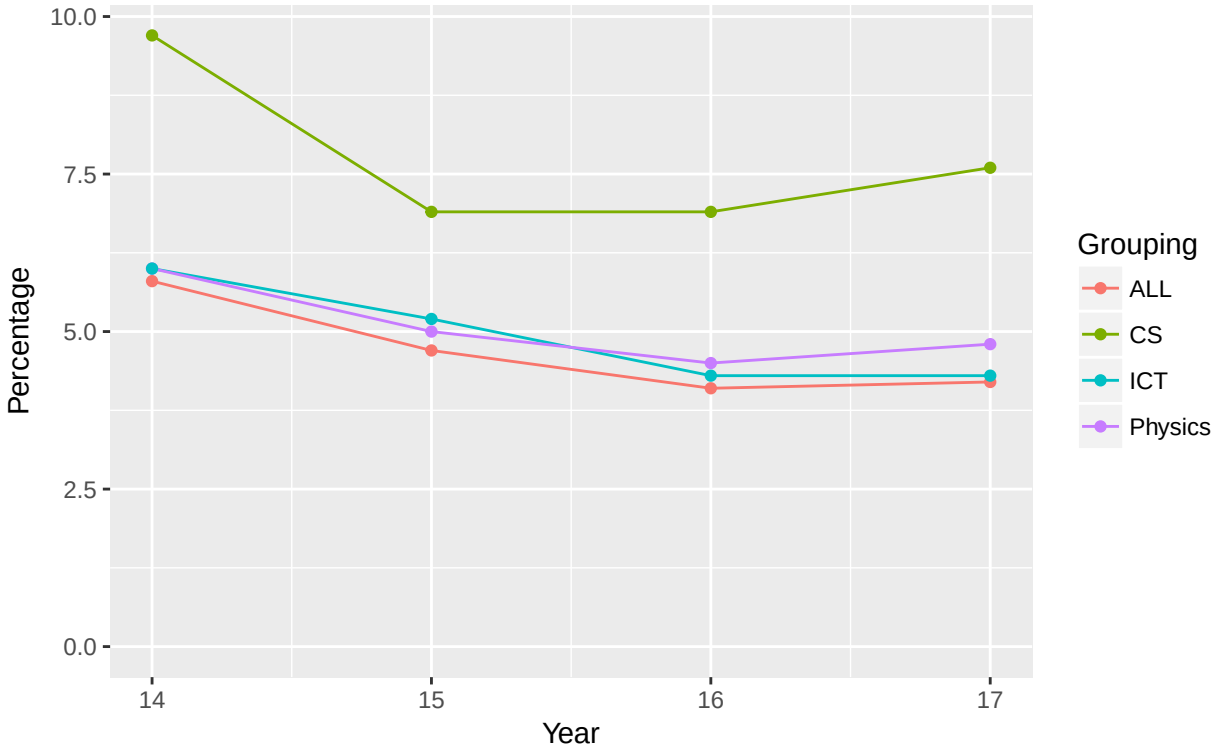

Figure 99: Longitudinal: A level students who have SEN categorisation, by subject and year

4.2.5 EAL

At GCSE, students with English as an Additional Language (EAL) are overrepresented in the computer science cohort, whilst at A-level they are underrepresented. EAL students taking A-level ICT have been substantially overrepresented in the last four years.

4.2.5.1 KS4

Table 35: 2017 GCSE EAL uptake

Language	ALL	CS	ICT	Physics
English	83.8	82.4	79.7	85.5
English Additional Language	15.8	17.4	20.2	14.4
Unclassified	0.4	0.1	0.2	0.1

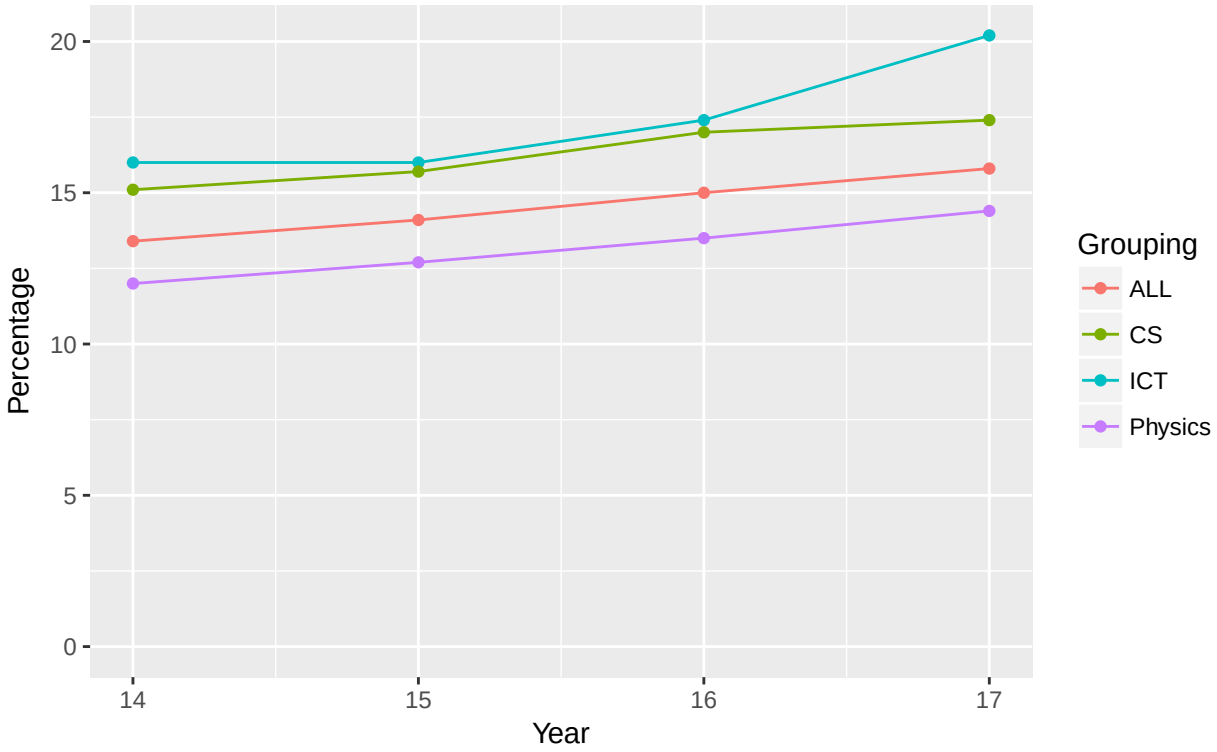

Figure 100: Longitudinal: GCSE students who have English as an additional language, by subject and year

4.2.5.2 KS5

Table 36: 2017 A level EAL uptake

Language	ALL	CS	ICT	Physics
English	83.1	85.3	76.9	82.8
English Additional Language	16.6	14.4	22.9	16.9
Unclassified	0.3	0.3	0.2	0.3

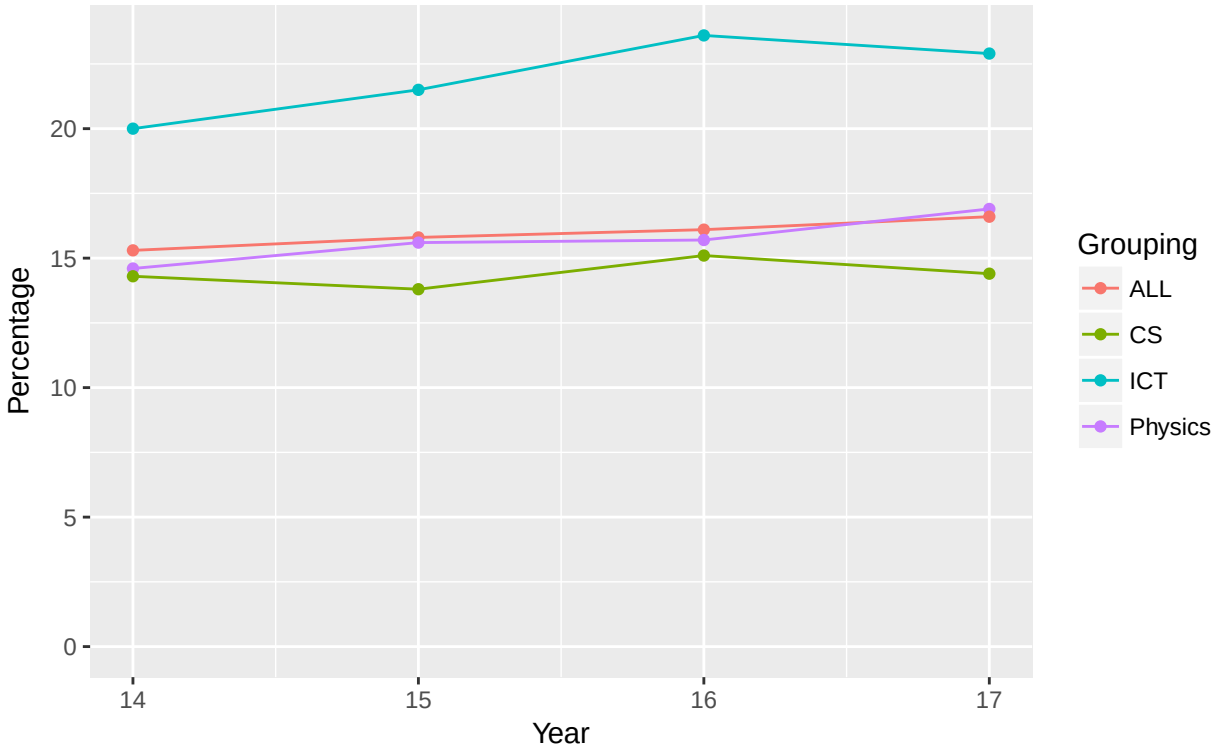

Figure 101: Longitudinal: A level students who have English as an additional language, by subject and year

4.2.6 Entry grade profile

Computer science students have relatively high KS2 and GCSE maths scores - perhaps the subject appeals more to 'mathematical' pupils, or some schools may limit enrolment to these courses by prior, or expected, performance in maths.

4.2.6.1 KS4

Table 37: 2017 GCSE average KS2 Mathematics grade

SubjectName	mean	sd
Physics	4.72	0.48
Chemistry	4.72	0.48
Biology	4.72	0.49
German	4.60	0.57
CS	4.52	0.63
French	4.50	0.62
Spanish	4.49	0.63
Music	4.42	0.69
Bus Studies	4.37	0.66
Physical Ed	4.36	0.67
History	4.32	0.70
Geography	4.31	0.72
Relig Studies	4.31	0.72
D&T Graphics	4.30	0.72
Sociology	4.25	0.67
English Lit	4.25	0.75
English Lang	4.24	0.76
Maths	4.23	0.76
ALL	4.23	0.77
D&T Prod Des	4.22	0.75
ICT	4.21	0.74
Drama	4.21	0.75
Fine Art	4.19	0.79
D&T Textiles	4.15	0.77
D&T Res Mat	4.14	0.78
Media/Film/Tv	4.13	0.74
Science Additional	4.12	0.73
Art & Design	4.11	0.82
D&T Food Tech	4.04	0.81
Photography	4.03	0.78
Science Core	4.02	0.77

Note that the GCSE grades here have been converted from the 9 point system into the A*-U system (mapped to 8-0 as noted in the Terminology section). This allows for consistency across subjects and will change in the 2018 report.

Table 38: 2017 GCSE average GCSE Mathematics grade

SubjectName	mean	sd
Physics	6.40	1.64
Chemistry	6.40	1.65
Biology	6.39	1.67
German	5.91	1.85
CS	5.60	1.99
French	5.57	1.90
Spanish	5.46	1.90
Music	5.40	2.11
Bus Studies	4.94	1.85
History	4.89	2.00
Geography	4.88	2.04
Relig Studies	4.86	2.03
D&T Graphics	4.84	1.97
Physical Ed	4.73	1.88
English Lit	4.63	2.09
Drama	4.61	1.96
English Lang	4.59	2.12
Maths	4.58	2.13
ALL	4.58	2.13
D&T Prod Des	4.58	2.05
Sociology	4.57	1.83
Fine Art	4.56	2.07
ICT	4.52	1.93
D&T Textiles	4.49	1.98
Art & Design	4.33	2.08
D&T Res Mat	4.28	2.03
Media/Film/Tv	4.19	1.83
Science Additional	4.11	1.80
D&T Food Tech	4.06	1.97
Photography	3.94	1.87
Science Core	3.76	1.78

4.2.6.2 KS5

Table 39: 2017 A level average KS2 mathematics grade

SubjectName	mean	sd
Maths (Further)	4.96	0.21
Physics	4.88	0.35
Maths	4.88	0.35
Chemistry	4.80	0.43
Economics	4.77	0.44
CS	4.76	0.45
Biology	4.73	0.47
French	4.70	0.52
General Studies	4.69	0.50
Spanish	4.65	0.54
Physical Ed	4.64	0.50
Geography	4.64	0.51
Gov & Politics	4.57	0.55
History	4.56	0.55
Bus Studies	4.56	0.54
ALL	4.55	0.57
Psychology	4.54	0.55
D&T Prod Des	4.50	0.58
Law	4.49	0.57
English Lit	4.48	0.57
ICT	4.47	0.58
English Lang	4.41	0.58
Relig Studies	4.41	0.60
Drama	4.38	0.61
Fine Art	4.38	0.63
Art & Design	4.38	0.63
English Lang Lit	4.36	0.59
Sociology	4.34	0.59
Film Studies	4.30	0.61
Media/Film/Tv	4.29	0.60
Photography	4.21	0.64

Note that the GCSE grades here have been converted from the 9-1 system into A*-U system (or 8-1 as noted above). This allows for consistency across subjects and will change in the 2018 report.

Table 40: 2017 A level average GCSE mathematics grade

SubjectName	mean	sd
Maths (Further)	7.84	0.46
Maths	7.40	0.69
Physics	7.35	0.76
Chemistry	7.17	0.84
Biology	6.85	0.90
CS	6.85	0.92
Economics	6.75	0.91
French	6.66	1.09
General Studies	6.51	1.06
Spanish	6.47	1.12
Geography	6.37	0.96
ALL	6.23	1.15
Physical Ed	6.20	0.93
History	6.15	1.04
D&T Prod Des	6.11	1.02
Psychology	6.11	0.92
Gov & Politics	6.08	1.02
Bus Studies	6.04	0.90
ICT	5.94	0.92
English Lit	5.93	1.05
Law	5.90	0.93
Fine Art	5.83	1.12
Art & Design	5.82	1.12
Relig Studies	5.81	1.02
Drama	5.72	1.07
English Lang	5.67	0.95
English Lang Lit	5.60	0.96
Sociology	5.59	0.91
Media/Film/Tv	5.44	0.94
Film Studies	5.44	0.98
Photography	5.39	1.02

4.2.7 Subject mix

GCSE CS students are more likely to take physics and chemistry, but are less likely to take history or single or double subject science.

Very few students (2.2% of all CS entrants, c. 1480) are taking computer science as a replacement for one of the other single sciences (i.e. 3 single science staken including CS). CS is taken in addition to the three other single sciences for 33.6% of CS students (c. 22700), and as an addition to core science for 38.2% of the CS cohort (c. 25800).

A-level CS students are likely to also take maths physics, further maths; less likely to take other popular subjects. For comparison, ICT students are more likely to take business studies, film/media and D&T product design.

When reading the following graphs: the top 10 combination subjects for each focus subject are shown; a subject above the line means that students of the focus subject of the graph are more likely to take take that subject than the general population; a subject below the line means that students are less likely to take that subject than the rest of the population.

4.2.7.1 KS4

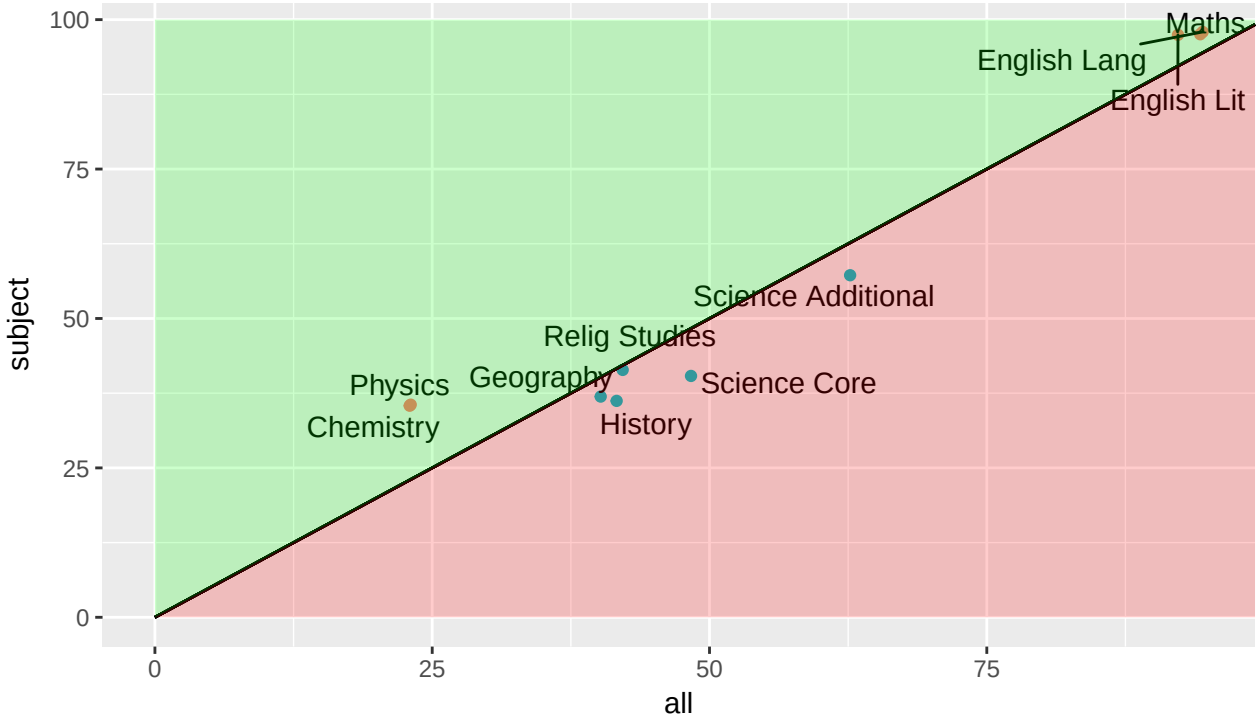

Figure 102: 2017 Computer Science GCSE subject choice combinations

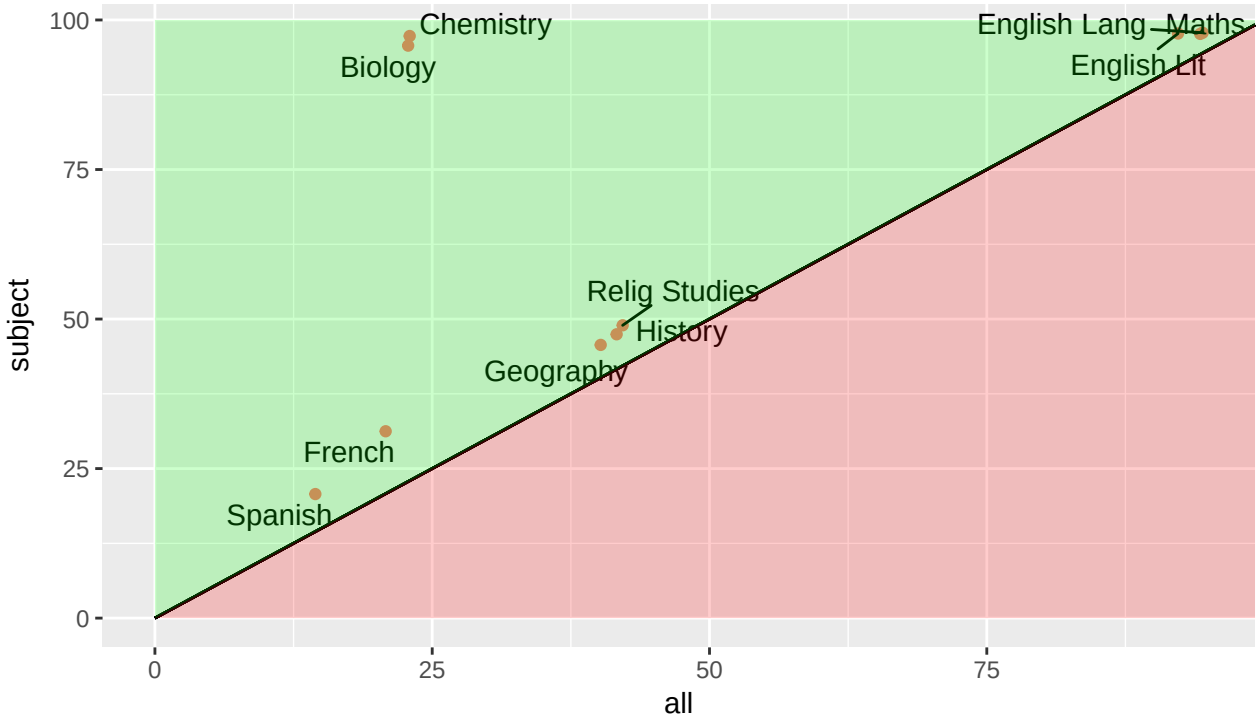

Figure 103: 2017 Physics GCSE subject choice combinations

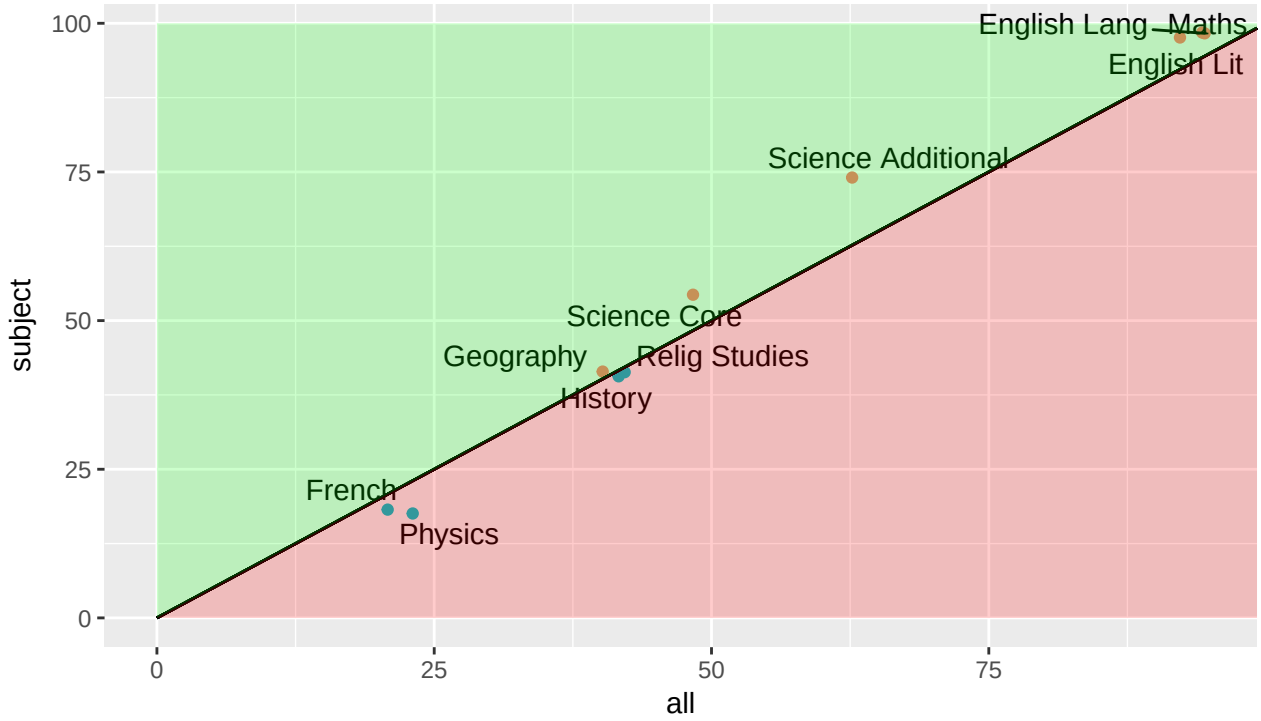

Figure 104: 2017 ICT GCSE subject choice combinations

4.2.7.1.1 EBacc

Table 41: GCSE Computer Science EBacc summary 2014-17

Year	Subject	Students	% EBacc single sciences	% 4 single sciences	% 3 single sciences	% EBacc core science
14	Computer Science	15606	38.5	33.7	4.8	14.1
14	All	602188	18.3	0.9	17.4	15.9
15	Computer Science	32825	36.5	33.1	3.4	22.2
15	All	597117	18.7	1.8	16.9	24.0
16	Computer Science	60736	35.0	32.1	2.9	32.2
16	All	583547	20.6	3.3	17.2	35.0
17	Computer Science	67488	35.9	33.6	2.2	38.2
17	All	569812	21.9	4.0	17.9	43.1

4.2.7.2 KS5

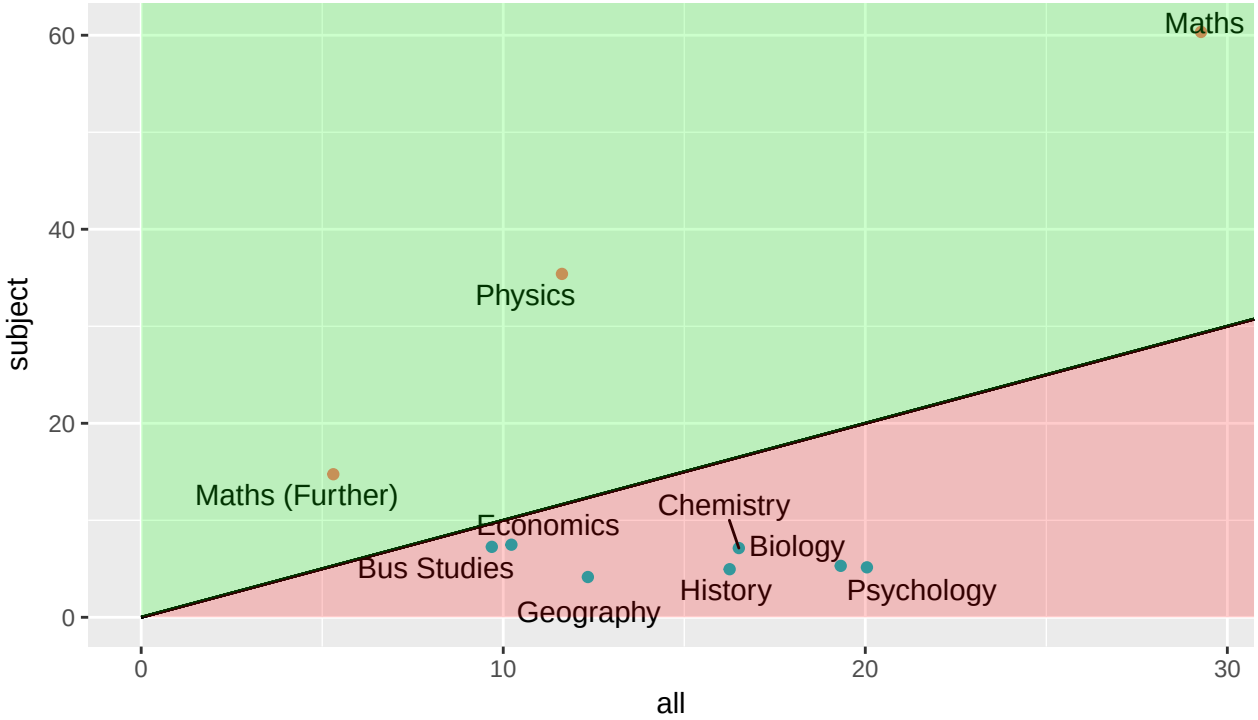

Figure 105: 2017 Computer Science A level subject choice combinations

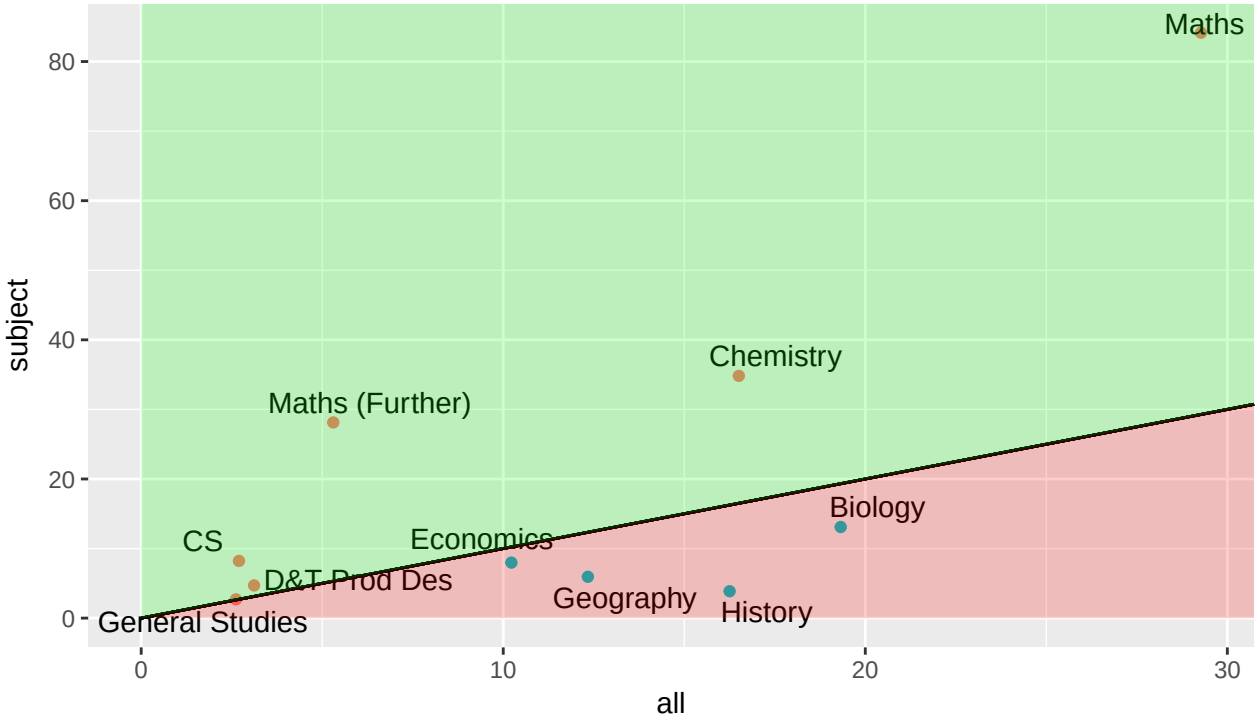

Figure 106: 2017 Physics A level subject choice combinations

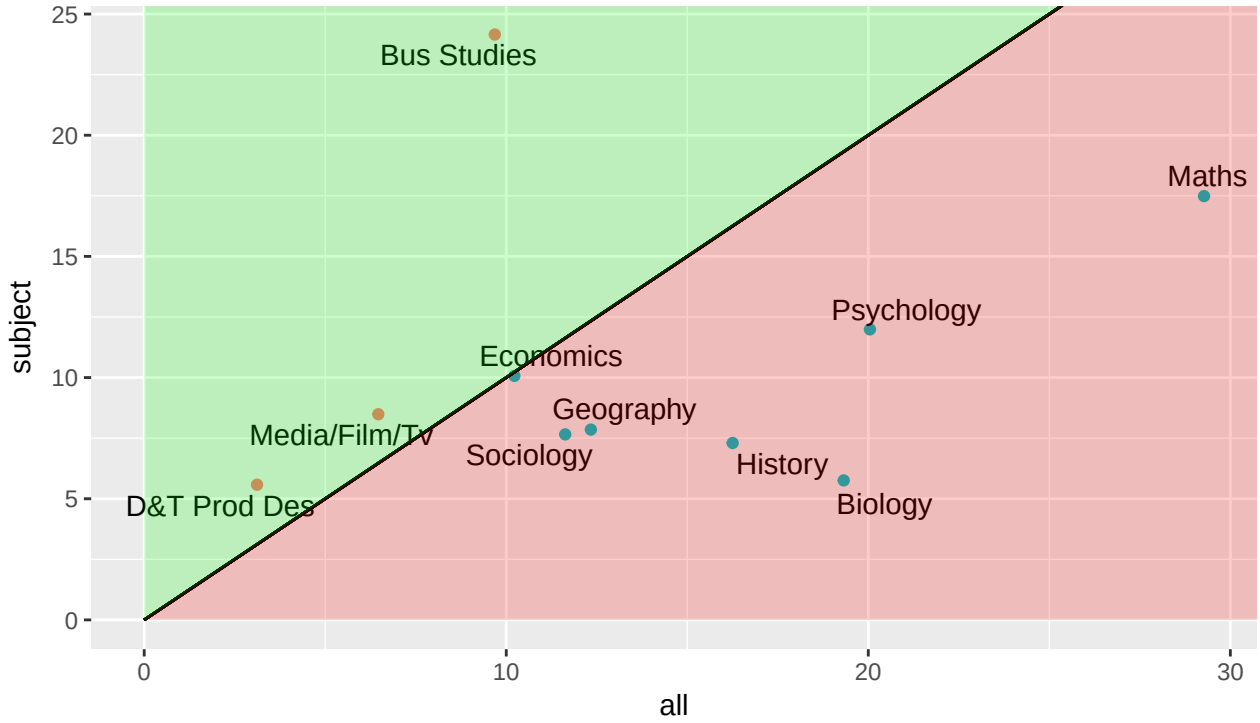

Figure 107: 2017 ICT A level subject choice combinations

4.3 Qualifications overview

This section looks to expand our understanding of computing education for KS4 (~16 year olds) and KS5 (~18 year olds) beyond GCSE and A-level. We look at other qualifications that are categorised as being under the computing umbrella. This includes courses that involve digital media and electronics, as well as entry level exams and a range of vocational courses, including Pearson BTECs and Cambridge Nationals.

he BCS European Computing Driving Licence (ECDL) was the most common computing qualification for a KS4 student to sit in 2017. This course made up nearly four in ten of all computing examinations sat at this level. ECDL was a valid qualification in the government's Progress 8 measurement for 2017 and it has been suggested that schools used this qualification disproportionately to help with their league table position (Thomson, 2016). As of 2018, ECDL can no longer be counted towards Progress 8 (Busby, 2017), and we thus expect to see uptake of this course decrease dramatically. Note: students might sit multiple computing exams.

We previously predicted that there would be an overall decrease in the number of students sitting any computing course at KS4 and KS5. The 2017 report shows a small decrease in student numbers at KS4 since 2015. However, with ECDL being responsible for nearly four in ten entrants, its decline, and the disappearance of GCSE ICT, means we may be facing a 'cliff edge' for students studying computing from 2018. This decline will be most acute amongst girls, who make up almost half of ECDL (45.3%), 38% of GCSE ICT and only around 20% of GCSE computer science students. Only 34.2% of all KS4 girls are taking a computing qualification, compared to 51.2% of boys. Since 2014, we have ~30,000 fewer females taking a computing qualification each year at KS4; this is a drop of nearly 20%.

A number of replacement vocational computing qualifications suitable for Progress 8 have not been approved (Hazell, 2017), meaning that many schools might choose to drop computing qualifications altogether, in favour of other courses that will help with their standing in league tables.

At KS5, overall numbers have increased to just over 100,000 students sitting any computing qualification, with female uptake increasing by nearly 6,000 (an 8% increase) on 2014 figures. There has been a huge drop in the number of students taking AS qualifications (a course that is often seen as a subset of the A-level). Again, the demise of the ICT qualification looks likely to lead to a significant decrease in students taking any computing course at KS5. In particular, this will impact girls who make up c. 30% of the cohort as opposed to c. 9.5% of the computer science qualification. Only 4.9% of girls are taking any computing KS5 qualification, compared to 13.6% of boys.

It was previously speculated that many independent schools were choosing to sit the IGCSE instead of the GCSE (the International GCSE is a course covering similar material to the GCSE, but not seen as equivalent by Ofqual and thus not accepted for school performance measures). Whilst there are more independent schools entering this qualification than those in the state sector, the numbers remain low (66 independent schools and 813 students)

Girls are generally better represented when taking digitally 'creative' computing courses, compared to computer science (see also Wong & Kemp, 2018).

4.3.1 KS4

Table 42: 2017 KS4 qualification choices by student gender. Courses with 130 students and over.

Qaulification	Level	Type	Entries	f%	m%
BCS ECDL Certificate in IT Application Skills	2	QCF	123750	45.3	54.7
OCR GCSE in Computing	1/2	GCSE	51430	20.2	79.8
Pearson Edexcel GCSE in ICT	1/2	GCSE	41800	38.1	61.9
OCR Cambridge National Certificate in ICT	1/2	Other	11945	38.7	61.3
AQA GCSE in Computer Science	1/2	GCSE	9675	20.8	79.2
WJEC GCSE in ICT	1/2	GCSE	5915	43.0	57.0
OCR GCSE in ICT	1/2	GCSE	5380	38.2	61.8
Pearson Edexcel Certificate in Digital Applications	2	Other	5120	36.1	63.9
TLM Certificate in IT User Skills in Open Systems and Enterprise (ITQ)	2	QCF	5070	41.9	58.1
OCR Cambridge National Certificate in Creative iMedia	1/2	Other	5025	31.5	68.5
TLM Certificate for IT User Skills in Open Systems and Enterprise	2	QCF	5020	42.6	57.4
TLM Award in IT User Skills in Open Systems and Enterprise (ITQ)	2	QCF	4630	43.2	56.8
Pearson Edexcel GCSE in Computer Science	1/2	GCSE	4615	22.4	77.6
AQA GCSE in ICT	1/2	GCSE	4555	37.9	62.1
Pearson BTEC First Award in Creative Digital Media Production	1/2	Other	3665	33.3	66.7
TLM Award in IT User Skills in Open Systems and Enterprise (ITQ)	1	QCF	2725	42.8	57.2
TLM Award in ICT Open Systems and Enterprise (ITQ) (Entry 3)	Entry	QCF	2160	45.4	54.6
WJEC GCSE in Computer Science	1/2	GCSE	1800	14.8	85.2
OCR Cambridge National Award in ICT	1/2	Other	1325	42.1	57.9
Cambridge International Certificate in ICT	1/2	Other	1275	33.7	66.3
AQA GCSE in Design and Technology: Systems and Control Technology	1/2	GCSE	1240	8.1	91.9
Cambridge International Certificate in Computer Science	1/2	Other	1225	21.6	78.4
Pearson Edexcel Award in Functional Skills ICT (Entry 3)	Entry	Func skills	580	31.9	68.1
Pearson Edexcel Functional Skills qualification in ICT	1	Func skills	545	34.5	65.5
OCR Certificate in ICT	Entry	Entry	500	31.7	68.3
AQA GCSE in ICT (short course)	1/2	GCSE	410	49.4	50.6
TLM Certificate In Open Systems and Enterprise	1	QCF	345	37.7	62.3
Pearson Edexcel Functional Skills qualification in ICT at Entry 2	Entry	Func skills	330	34.3	65.7
TLM Certificate in IT User Skills in Open Systems and Enterprise (ITQ)	1	QCF	300	36.7	63.3
OCR Functional Skills qualification in ICT at Entry 3	Entry	Func skills	295	30.5	69.5
AQA Functional Skills Qualification in ICT at Entry 3	Entry	Func skills	295	30.5	69.5
OCR Certificate in Computing	Entry	Entry	290	44.8	55.2
WJEC GCSE in Design and Technology (Systems and Control Technology)	1/2	GCSE	280	8.8	91.2
AQA Functional Skills qualification in ICT	1	Func skills	265	34.0	66.0
OCR Cambridge National Award in Creative iMedia	1/2	Other	265	35.8	64.2

AQA Functional Skills qualification in ICT	2	Func skills	245	37.5	62.5
OCR GCSE in ICT (Short Course)	1/2	GCSE	240	81.2	18.8
Pearson BTEC Certificate for IT Users (ITQ)	1	QCF	225	29.5	70.5
OCR Functional Skills qualification in ICT	1	Func skills	205	34.1	65.9
OCR Functional Skills qualification in ICT	2	Func skills	205	43.9	56.1
Pearson Edexcel Functional Skills qualification in ICT at Entry 1	Entry	Func skills	195	30.8	69.2
Pearson BTEC Award for IT Users (ITQ)	1	QCF	145	37.9	62.1
OCR Award in IT User Skills (ITQ)	1	QCF	140	42.9	57.1
Pearson Edexcel GCSE in ICT (Double Award)	1/2	GCSE	140	14.3	85.7
TLM Extended Certificate in IT User Skills in Open Systems and Enterprise (ITQ)	2	QCF	140	14.3	85.7
OCR Award in IT User Skills (ITQ)	2	QCF	135	59.3	40.7
Totals			308617	37.0	63.0

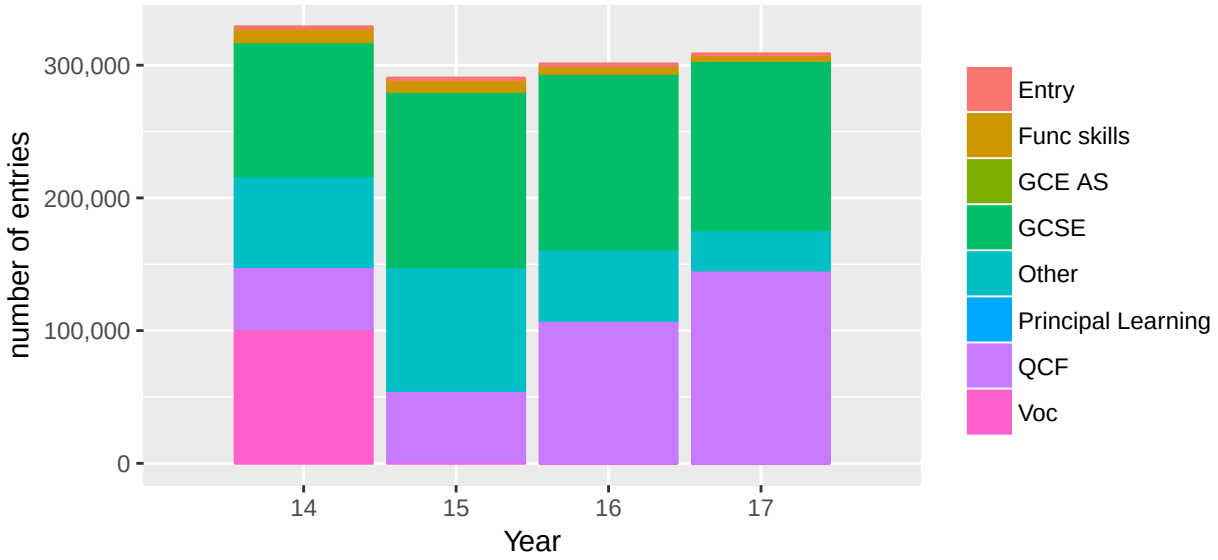

Figure 108: KS4 computing qualifications by year and type. 2014-17

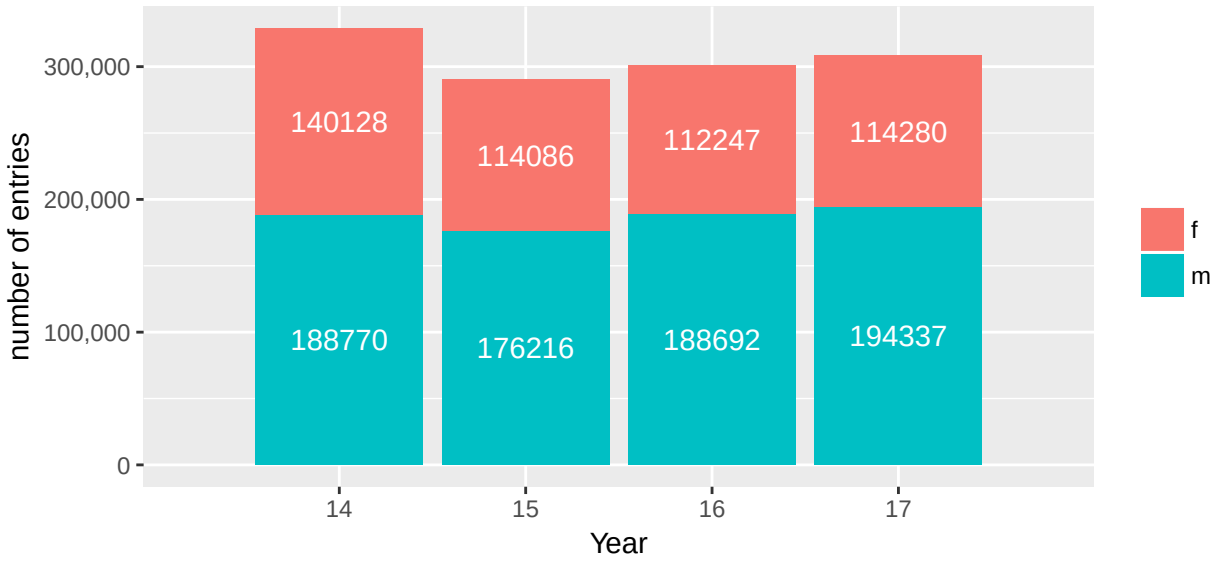

Figure 109: KS4 total computing qualifications by year and gender. 2014-17

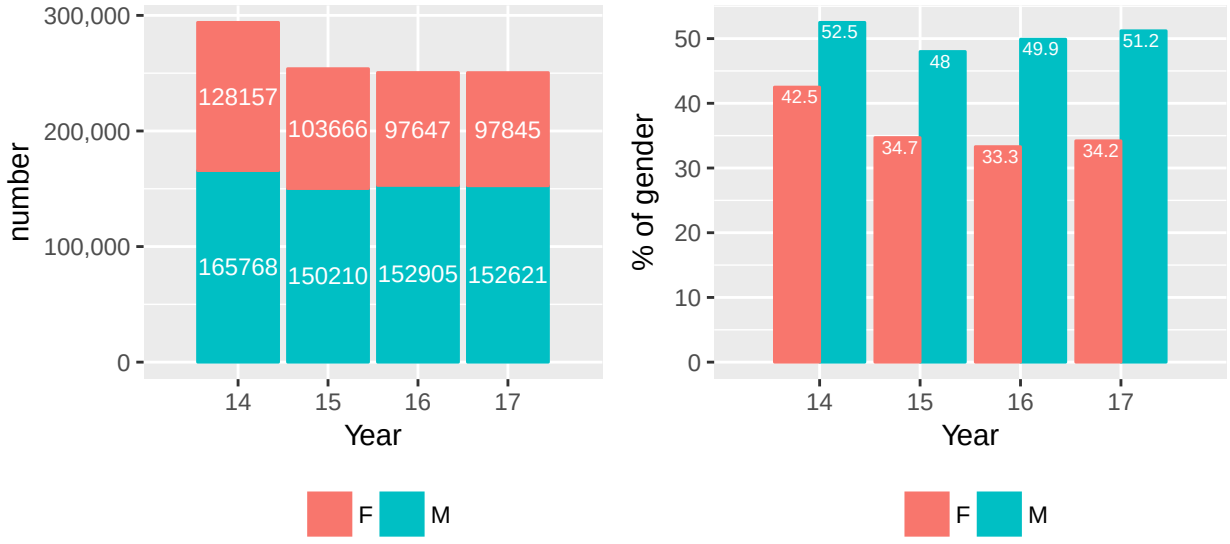

Figure 110: KS4 computing uptake by year and gender. 2014-17

Table 43: 2017 IGCSE Computer Science provision

Type	GCSE students	IGCSE students	GCSE providers	IGCSE providers
Comprehensive	61682	352	2312	29
Grammar	3678	55	118	3
Independent	2273	813	225	66
Special	239	6	37	2

Table 44: 2017 KS4 computing qualification by region

Name	Total providers	Total students	Subject schools	Subject students	% students	% providers
North East	242	26161	207	13849	52.9	85.5
Yorkshire and The Humber	495	57295	408	29498	51.5	82.4
West Midlands	638	64226	518	30671	47.8	81.2
North West	761	77490	624	36873	47.6	82.0
East Midlands	440	49208	379	21599	43.9	86.1
East of England	595	67045	473	28605	42.7	79.5
South East	924	97373	732	37139	38.1	79.2
South West	559	56338	440	20570	36.5	78.7
London	798	85795	625	30617	35.7	78.3
Totals	5452	580931	4406	249421	42.9	80.8

4.3.2 KS5

Table 45: 2017 KS5 qualification choices by student gender. Courses with 130 students and over.

Qaulification	Level	Type	Entries	f%	m%
Pearson BTEC Subsidiary Diploma in IT (QCF)	3	QCF	8765	21.9	78.1
Pearson BTEC Extended Diploma in IT (QCF)	3	QCF	5820	7.0	93.0
City & Guilds Functional Skills qualification in ICT	1	Func skills	5205	43.8	56.2
Pearson BTEC 90-credit Diploma in IT (QCF)	3	QCF	4415	8.5	91.5
City & Guilds Functional Skills qualification in ICT	2	Func skills	4290	32.8	67.2
OCR Cambridge Technical Introductory Diploma in IT	3	QCF	3840	29.2	70.8
Pearson Edexcel Functional Skills qualification in ICT	1	Func skills	3510	45.9	54.1
AQA Advanced GCE in Computer Science	3	GCE A	3355	9.1	90.9
Ascentis Award In Internet Safety For IT Users	1	Voc	3345	49.3	50.7
OCR Advanced GCE in Computer Science	3	GCE A	3330	9.6	90.4
OCR Advanced Subsidiary GCE in Computer Science	3	GCE AS	3085	11.3	88.7
Pearson Edexcel Functional Skills qualification in ICT	2	Func skills	2995	34.7	65.3
Pearson BTEC Certificate in IT (QCF)	3	QCF	2580	21.5	78.5
AQA Advanced Subsidiary GCE in ICT	3	GCE AS	2510	30.7	69.3
WJEC Advanced Subsidiary GCE in ICT	3	GCE AS	2510	26.1	73.9
AQA Advanced Subsidiary GCE in Computer Science	3	GCE AS	2435	13.1	86.9
Pearson BTEC Diploma in IT (QCF)	3	QCF	2255	12.0	88.0
WJEC Advanced GCE in ICT	3	GCE A	1875	31.7	68.3
AQA Advanced GCE in ICT	3	GCE A	1830	32.6	67.4
OCR Advanced Subsidiary GCE in ICT	3	GCE AS	1790	26.1	73.9
OCR Advanced GCE in ICT	3	GCE A	1355	30.4	69.6
Pearson Edexcel Advanced GCE in Applied ICT	3	GCE A	1305	33.2	66.8
OCR Cambridge Technical Diploma in IT	2	QCF	1240	9.7	90.3
BCS ECDL Certificate in IT Application Skills	2	QCF	1170	45.1	54.9
City & Guilds Functional Skills qualification in ICT at Entry 3	Entry	Func skills	1060	42.5	57.5
OCR Advanced Subsidiary GCE in Applied ICT	3	GCE AS	1040	30.9	69.1
Pearson BTEC First Extended Certificate in Creative Digital Media Production	1/2	Other	965	21.9	78.1
OCR Advanced GCE in Applied ICT	3	GCE A	935	36.4	63.6
Pearson Edexcel Award in Functional Skills ICT (Entry 3)	Entry	Func skills	725	35.9	64.1
Pearson BTEC National Certificate in IT	3	Voc	700	28.6	71.4
Pearson BTEC Diploma for IT Users (ITQ)	1	QCF	685	8.8	91.2
OCR Functional Skills qualification in ICT	1	Func skills	645	56.6	43.4
OCR Cambridge Technical Certificate in IT	3	Other	620	25.0	75.0
OCR Cambridge Technical Certificate in IT	3	QCF	600	28.6	71.4
City & Guilds Functional Skills qualification in ICT at Entry 2	Entry	Func skills	530	36.8	63.2
OCR Functional Skills qualification in ICT	2	Func skills	525	49.0	51.0
Skillsfirst Functional Skills qualification in ICT at Level 1	1	Func skills	510	34.3	65.7
Pearson BTEC Diploma in Professional Competence for IT and Telecoms Professionals	3	QCF	500	14.0	86.0
WJEC Eduqas Advanced GCE in Computer Science	3	GCE A	490	10.2	89.8
NCFE Functional Skills Qualification in ICT	1	Func skills	455	64.4	35.6
Pearson Edexcel Functional Skills qualification in ICT at Entry 2	Entry	Func skills	450	37.8	62.2

Pearson BTEC Extended Diploma in Electrical/Electronic Engineering (QCF)	3	QCF	440	5.7	94.3
OCR Cambridge Technical Extended Certificate in IT	2	QCF	430	20.9	79.1
Pearson BTEC Certificate for IT Users (ITQ)	1	QCF	395	12.7	87.3
City & Guilds Diploma in ICT Professional Competence	3	QCF	385	7.8	92.2
OCR Cambridge Technical Diploma in IT	3	QCF	350	15.9	84.1
AQA Advanced Subsidiary GCE in Design and Technology: Systems and Control Technology	3	GCE AS	335	10.4	89.6
WJEC Eduqas Advanced Subsidiary GCE in Computer Science	3	GCE AS	315	9.5	90.5
Pearson BTEC First Award in Creative Digital Media Production	1/2	Other	310	30.6	69.4
Pearson BTEC Diploma in Electrical/Electronic Engineering (QCF)	3	QCF	305	8.2	91.8
OCR Cambridge Technical Subsidiary Diploma in IT	3	QCF	305	12.9	87.1
City & Guilds Functional Skills qualification in ICT at Entry 1	Entry	Func skills	295	28.8	71.2
Pearson Edexcel Functional Skills qualification in ICT at Entry 1	Entry	Func skills	295	33.9	66.1
City & Guilds Certificate for IT Users (ITQ)	2	QCF	290	13.8	86.2
Skillsfirst Functional Skills qualification in ICT	2	Func skills	290	25.4	74.6
OCR Award in IT User Skills (ITQ)	1	QCF	285	24.6	75.4
City & Guilds Diploma in ICT Systems and Principles for IT Professionals	3	QCF	275	3.6	96.4
OCR Functional Skills qualification in ICT at Entry 3	Entry	Func skills	260	36.5	63.5
AQA Advanced GCE in Design and Technology: Systems and Control Technology	3	GCE A	245	12.2	87.8
NCFE Functional Skills Qualification in ICT	2	Func skills	245	46.9	53.1
OCR Cambridge Technical Certificate in IT	2	QCF	240	29.2	70.8
OCR Cambridge Technical Extended Diploma in IT	3	QCF	240	12.5	87.5
Pearson BTEC First Diploma in Creative Digital Media Production	1/2	Other	230	30.4	69.6
Pearson Edexcel Advanced Subsidiary GCE in Applied ICT	3	GCE AS	220	34.1	65.9
City & Guilds Award in ICT Systems Support - PC Maintenance	1	QCF	200	20.0	80.0
BCS Certificate in IT User Skills (ECDL Extra) (ITQ)	2	QCF	180	38.9	61.1
Pearson BTEC Extended Diploma in ICT Systems and Principles	3	QCF	170	8.8	91.2
Pearson BTEC First Certificate in Creative Digital Media Production	1/2	Other	170	41.2	58.8
OCR Functional Skills qualification in ICT at Entry 2	Entry	Func skills	160	37.5	62.5
Pearson BTEC Introductory Certificate in IT	1	Voc	160	15.6	84.4
Pearson BTEC Introductory Diploma in IT	1	Voc	155	6.5	93.5
Pearson Edexcel GCSE in ICT	1/2	GCSE	145	37.9	62.1
City & Guilds Certificate in ICT Systems and Principles	3	QCF	140	10.7	89.3
City & Guilds Diploma for IT Users (ITQ)	3	QCF	140	96.4	3.6
City & Guilds Diploma in ICT Systems and Principles for IT Professionals	2	QCF	135	7.4	92.6
Totals			100274	25.5	74.5

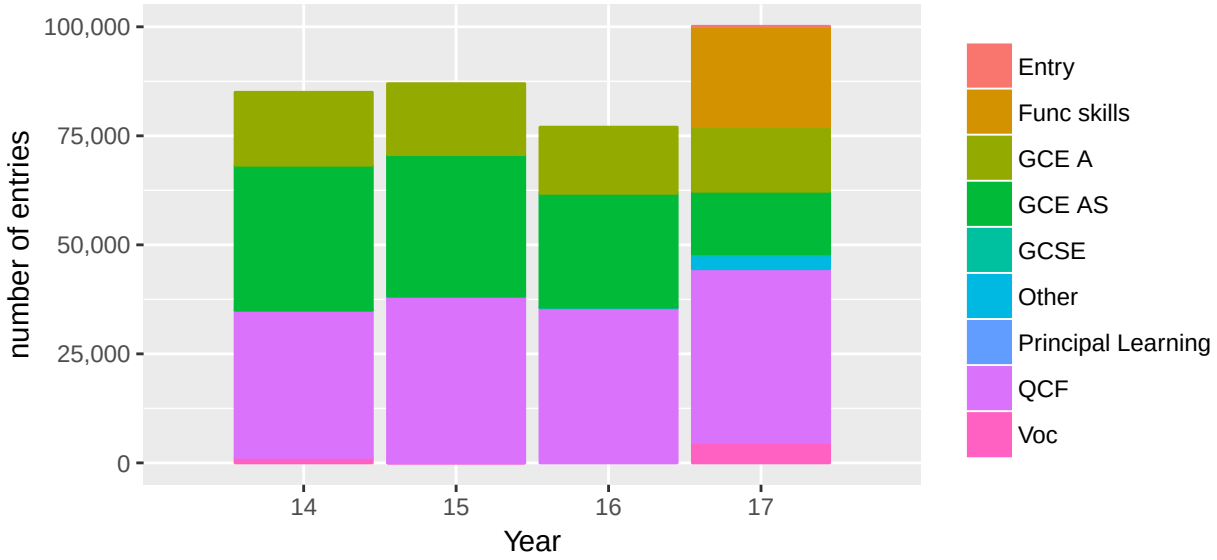

Figure 111: KS5 computing qualifications by year and type. 2014-17

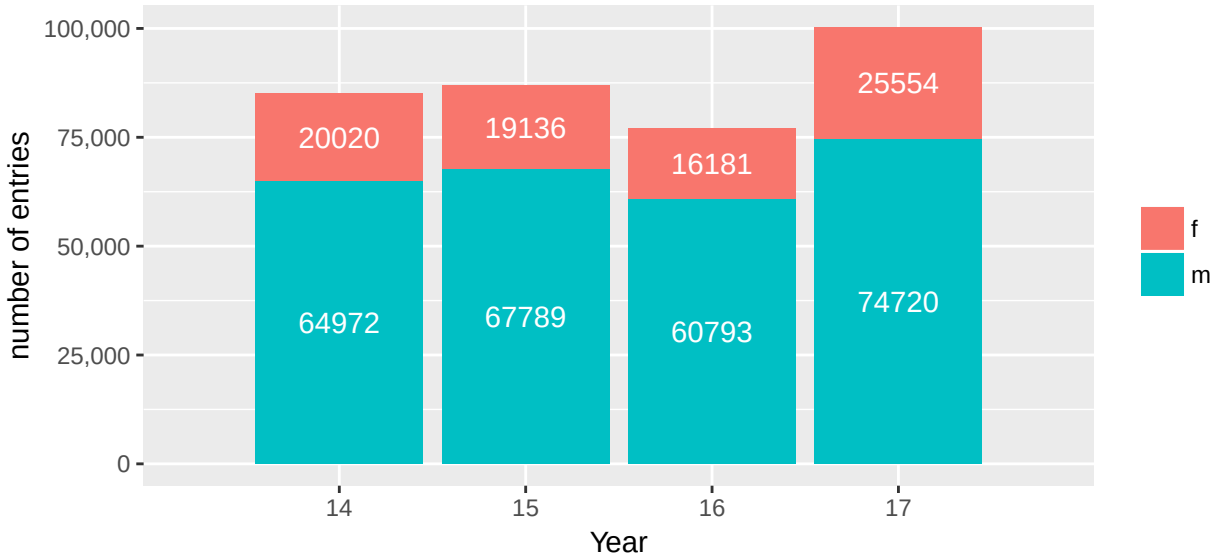

Figure 112: KS5 total computing qualifications by year and gender. 2014-17

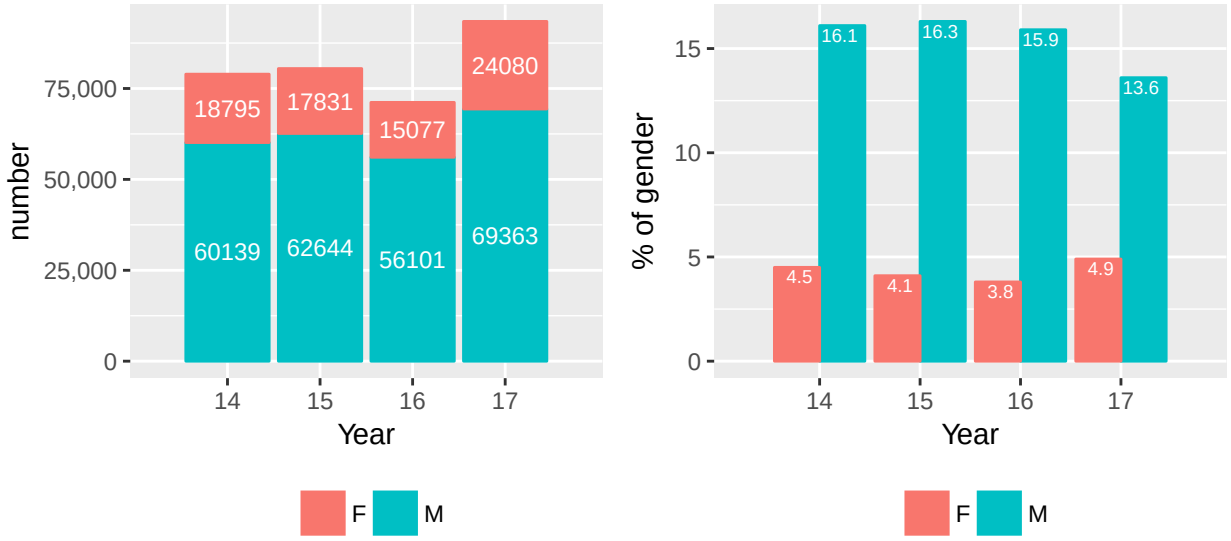

Figure 113: KS5 computing uptake by year and gender. 2014-17

Table 46: 2017 KS5 computing qualification by region

Name	Total providers	Total students	Subject schools	Subject students	% students	% providers
North East	166	44410	123	4778	10.8	74.1
East Midlands	353	73983	240	7095	9.6	68.0
West Midlands	464	107000	327	10258	9.6	70.5
North West	443	124513	310	11628	9.3	70.0
London	673	144518	445	12698	8.8	66.1
South West	409	94102	269	8172	8.7	65.8
Yorkshire and The Humber	331	93000	244	8003	8.6	73.7
East of England	443	108314	308	9051	8.4	69.5
South East	701	164198	470	12836	7.8	67.0
Totals	3983	954038	2736	84519	8.9	68.7

Note: the totals in the table above differ from the numbers in Figure 113 as a large number of students are not linked to providers stored edubase, and we have been unable to map them to regions.

5 Notes

- Where data is missing it has been excluded from calculations, for example a student might have ethnicity data stored against their student record, but not information about their pupil premium status, as a result totals for the same subject might be slightly different
- Providers with fewer than 6 students are represented on the maps as having 5 students.
- There is currently a discrepancy in naming conventions for computing qualifications. Historically computer science qualifications have been called "computing", however, most new computer science qualifications are named "computer science" with a similar content set. We have tried to use "computing" to refer to the national curriculum subject that incorporates computer science, information technology and digital literacy (Furber & others, 2012), and "computer science" when we are talking about particular qualifications.
- Unless otherwise specified, 2017 data has been used; a report based on 2018 data will be published in late 2018/early 2019.
- 2017 saw the transition of several courses to the 1-9 grading system. For the sake of consistency, 1-9 grades have been converted to A*-U grading in this report.
- Comparisons are made throughout the document between computer science and ICT and physics. ICT was chosen because it is was previously the dominant 'computing' qualification that is now being withdrawn. Physics was chosen so that comparisons can be made between computer science and another science. In particular, physics was chosen over the other sciences as it is considered to be highly mathematical, and mathematics appears to be one of the main skill sets used to determine entry onto computing courses. In addition, the BCS used GCSE physics as the benchmark comparison when outlining the need for a computer science qualification (BCS, 2012). It was decided against using mathematics as the main comparison subject, because mathematics GCSE is taken by nearly all students and any comparison would not distinguish from population data.
- There were 64 providers and 385 students attached to schools with URN numbers of 900000 and above. These institutions are not on DfE's *get information about schools* service and it is unclear how these results are treated for statistical purposes by the DfE and other organisations. For this report, these results have been redacted.
- Isle of Scilly data is not included in heat maps for GCSE.
- Coastal schools are schools that are within 5.5 km of the coast.
- A-level student details have been derived from earlier KS4 data where possible. For example a student might be missing pupil premium or ethnicity information in their A-level record, but it exists in their previous GCSE record; we then map the GCSE descriptors into the A-level record. Descriptive data at A-Level still remains relatively patchy and categories such a historic pupil premium indicators can change; as a result, caution should be taken when interpreting these statistics.

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