

The Roehampton Annual Computing Education Report

Pre-release snapshot from 2018

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Introduction

This report brings together government data on computing provision in English schools, including the school performance tables for exams taken in 2018 and the school workforce census up to 2017. We distinguish here between computing, the broad subject described by the national curriculum, and computer science, ICT and other specific qualifications under that umbrella. We look at schools offering GCSE computer science and other computing qualifications at Key Stage 4 (KS4). Our findings show that:

- The number of hours of computing/ICT taught in secondary school dropped by 36% from 2012 to 2017. Across the country, KS4 saw 31,000 fewer hours taught per week, a 47% decrease.
- There is hardly any timetabled computing in KS4 for non-exam classes.
- In Key Stage 3 (KS3), the time given for computing dropped from an hour in 2012 to just over 45 minutes in 2017, despite the marked increase in the demands of the national curriculum at this level.
- The overall number of qualifications taken by students at Year 11 decreased by 144,000, or 45%, between 2017 and 2018.
- The percentage of students sitting GCSE CS increased marginally from 12.1% in 2017 to 12.4% of all GCSE students in 2018.
- Whilst overall numbers of GCSE CS providers were up, 8.2% of schools that offered the subject in 2017 were *not* offering it in 2018. In this group, one in five (19%) girls' comprehensive schools who offered GCSE CS in 2017 dropped it in 2018.

With computer science GCSE student numbers leveling out and the removal of GCSE ICT in 2018, a further decline in the total numbers of hours of computing taught and qualifications taken seems highly likely for 2019.

Access to computer science GCSE

The number of schools that offer GCSE computer science has risen to 61.3% of schools in 2018, from 58.5% in 2017. This means that 79.2% of all Year 11 students were in schools that offered GCSE computer science¹.

There has been a slight increase in the percentage of the student population taking computer science, from 12.1% in 2017 to 12.4% in 2018. Amongst students in schools where computer science was offered, there was a slight decrease in the percentage of those taking the subject, from 15.7% in 2017 to 15.6% in 2018. This suggests that within schools GCSE computer science average cohort sizes remain stable.

Table 1: GCSE computer science uptake

Year	Population		CS Reach				CS Actual		
	Total students	Total Schools	Schools	Students	% of schools	% of all students	Students	% of students in these schools	% of all students
2017	569710	4595	2686	438975	58.5%	77.1%	68992	15.7%	12.1%
2018	565686	4615	2827	447867	61.3%	79.2%	70061	15.6%	12.4%
		Difference	141	8892	2.8%	2.1%	1069	-0.1%	0.3%

If we break down the schools that offer GCSE computer science by school type and school gender categorisation we find that:

- Boys-only schools were more likely to offer the qualification than other state schools with mixed and all-girls provision.
- Only 4.9% of state special schools offered the subject in 2018 compared to 80% of comprehensives.
- The turnover rate of providers is high, with 209 or 8.2% of schools dropping the qualification between 2017 and 2018. Overall, numbers of providers were up, as 321 new schools offered the course in 2018.
- Amongst those schools offering the qualification in 2017, 19% of girls-only comprehensives² dropped the subject in 2018, compared to 1% of boys-only schools. Amongst girls' grammar schools, 12% dropped the course, there were no instances of an all-boys grammar school dropping the course during this timeframe.
- Independent schools are less likely to offer the subject than other school types. This might be explained by the a number of these schools offering the IGCSE as an alternative qualification³.

¹ Numbers here differ slightly from TRACER 2017 due to different data sources.

² Comprehensive here means any non-selective state school, i.e. all state funded provision other than grammar schools and special schools.

³ See <http://bcs.org/roehampton> Table 43

Table 2: GCSE computer science provider retention

Type	Gender	Schools	%	GCSE computer science providers									
				n 2018	% 2018	reach 2018	n 2017	% 2017	reach 2017	n dropped	% dropped	n new	% new
Comp	Boys	88	2.1%	78	2.9%	89%	76	3.0%	86%	1	1%	3	4%
Comp	Girls	140	3.3%	90	3.4%	64%	86	3.4%	61%	16	19%	20	22%
Comp	Mixed	2591	60.4%	2082	78.1%	80%	2031	79.5%	78%	133	7%	184	9%
Grammar	Boys	55	1.3%	47	1.8%	85%	41	1.6%	75%			6	13%
Grammar	Girls	60	1.4%	46	1.7%	77%	43	1.7%	72%	5	12%	8	17%
Grammar	Mixed	46	1.1%	37	1.4%	80%	36	1.4%	78%	2	6%	3	8%
Special	Boys	39	0.9%	3	0.1%	8%	2	0.1%	5%			1	33%
Special	Girls	2	0.0%		0.0%			0.0%					
Special	Mixed	305	7.1%	14	0.5%	5%	9	0.4%	3%	4	44%	9	64%
Ind	Boys	70	1.6%	12	0.4%	17%	8	0.3%	11%	2	25%	6	50%
Ind	Girls	167	3.9%	58	2.2%	35%	43	1.7%	26%	5	12%	20	34%
Ind	Mixed	549	12.8%	192	7.2%	35%	175	6.8%	32%	39	22%	56	29%
Ind Spec	Boys	15	0.3%	2	0.1%	13%	2	0.1%	13%				
Ind Spec	Girls	4	0.1%		0.0%			0.0%					
Ind Spec	Mixed	157	3.7%	6	0.2%	4%	3	0.1%	2%	2	67%	5	83%
	All	4288	100%	2667	100%	62%	2555	100%	60%	209	8.2%	321	12.6%

How to read the above:

Note that total school numbers are lower here than elsewhere as we only consider schools that existed in 2017 and 2018, this excludes schools that shut, were opened, or converted to another URN between these years.

Type describes what sort of school we are looking at: state schools or paid for independent schools (Ind). Within state schools we have Grammar schools which require students to pass an entrance exam, and special schools where students are only admitted if they have special educational needs; all other state schools are categorised as comprehensive (Comp) schools. Some independent schools have entrance exams, but we only differentiate between Independent special schools (Ind Spec) and other independent schools (Ind)

Gender describes the school gender characteristic, split into boys only, girls only and mixed provision.

Schools lists the total number of schools that are of a given type and gender, offering any KS4 qualifications in 2017 and 2018.

% describes the comparative makeup of schools of any type and gender. E.g. Girls comprehensive schools made up 3.3% of all providers that existed across 2017 and 2018.

n 201x gives the number of schools in each school type and gender that offered GCSE CS in 2017 or 2018

% 201x describes the comparative makeup of schools of any type and gender that offered GCSE CS. E.g. Boys Grammar schools made up 1.6% of all providers that offered GCSE CS in 2017

reach 201x gives the overall percentage of schools of each school type and gender that offered GCSE CS. E.g. 3% of mixed special schools offered GCSE CS in 2017.

n dropped gives the numbers of schools that dropped GCSE CS between 2017 and 2018.

% dropped gives the previous figure as a percentage of 2017 schools.

n new gives the number of new schools that started offering GCSE in 2018 by school type and gender

% new gives the above as a percentage of 2018 schools.

When looking at state run non-special schools we find that, generally, the more affluent⁴ the intake, the more likely the school is to have offered GCSE computer science in 2018. This matches patterns seen in the USA⁵. Of note is the decrease in likelihood of provision amongst schools in the most affluent areas:

Table 3: GCSE computer science provider uptake by Pupil Premium decile

Decile	Comprehensive			Grammar			% Pupil premium	
	Schools	CS schs	%	Schools	CS schs	%	Min	Max
1	179	146	81.6	139	111	79.9	0%	10%
2	301	268	89	16	14	87.5	10%	14%
3	313	276	88.2	5	4	80	14%	17%
4	317	271	85.5				17%	21%
5	317	263	83	1	1	100	21%	25%
6	316	257	81.3	1	1	100	25%	29%
7	318	240	75.5				29%	34%
8	317	235	74.1				34%	41%
9	317	224	70.7	1	1	100	41%	50%
10	317	220	69.4				50%	91%

⁴ Affluence here being calculated by the percentage of a Y11 cohort being classified as pupil premium, this having received free school meals within the last 6 years.

⁵ https://code.org/files/2018_state_of_cs.pdf p.74

Likelihood of state school offering GCSE CS, 2018 (excluding special schools)

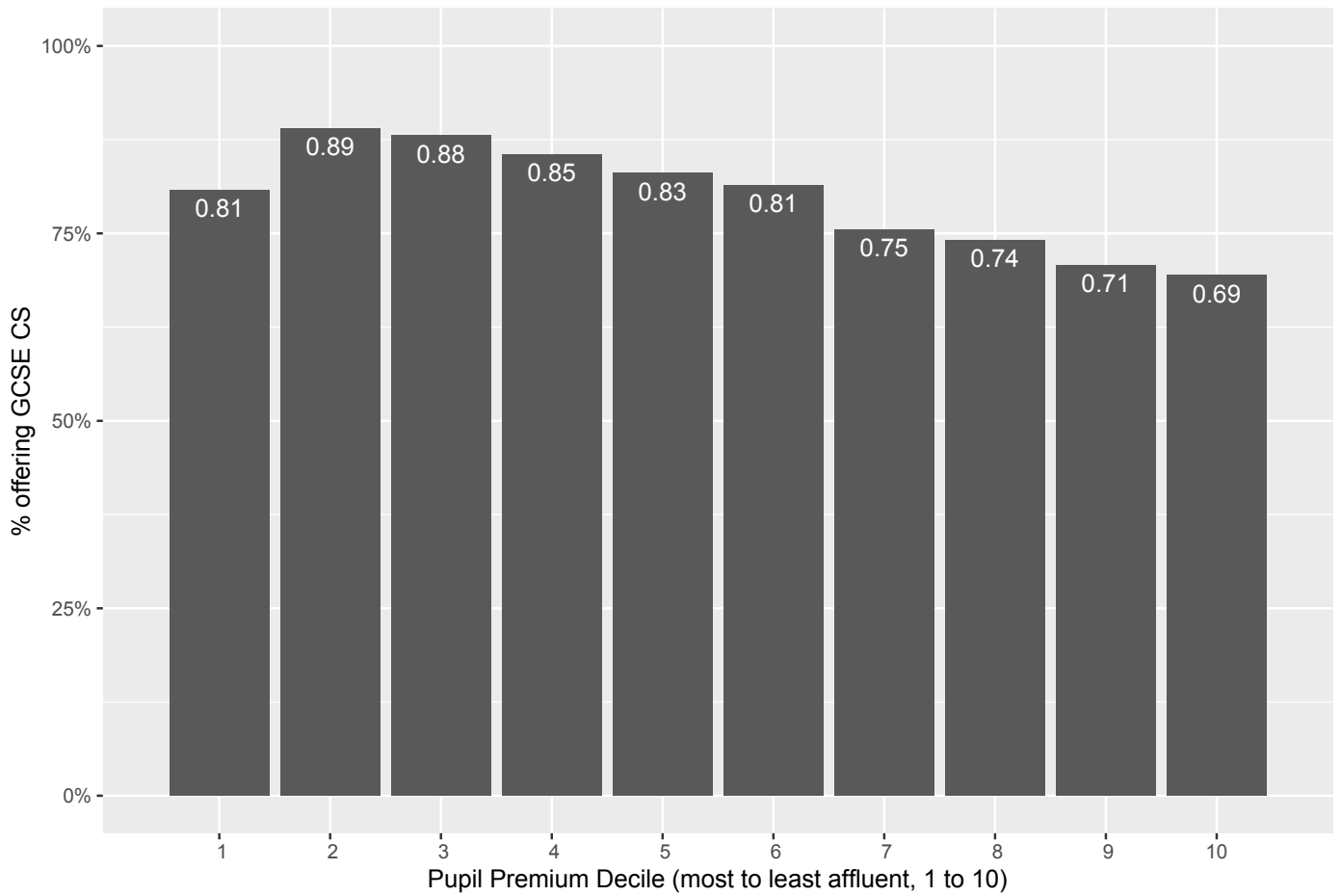


Figure 1: Likelihood of state funded schools offering GCSE CS, 2018, by PP decile (excluding special schools)

Access to all computing qualifications

The overall number of computing⁶ qualifications being taken by students decreased to 175,230 in 2018 from 318,781 in 2017, a 45% decrease. This is largely explained by the collapse in VRQ Level 2 entries, which decreased to 21,015 in 2018 from 154,796 in 2017; this qualification group included ECDL which was removed from DfE performance table calculations over this period. The decrease in the number of qualifications has been accompanied by a decrease in the number of schools offering any computing qualification; dropping to 3,571 in 2018 from 3,786 in 2017. This means that, in 2018, 43,101 students (7.6 %) were in a school where no KS4 computing qualifications were offered.

Table 4: KS4 computing uptake

Year	Population		Computing Reach				Computing actual	
	Total students	Total URN	URNs	Students	URN %	Pop %	Total Quals	Quals per student
2017	569,710	4595	3,786	545,010	82.4%	95.7%	318,781	0.56
2018	565,686	4615	3,571	522,585	77.4%	92.4%	175,230	0.31
	Difference		-215	-22,425	-5.0%	-3.3%	-143,551	-0.25

⁶ Computing courses are those categorised as being in the Computer Appreciation / Introduction, Computer Architecture / Systems, Information & Communications Technology, Computer Studies/Computing and Applied ICT subject groups

Hours of computing taught

The total number of hours of computing/ICT taught at key stages 3, 4 and 5⁷ has decreased substantially, with 2017 figures being 35.8% lower than those in 2012. The decrease has been most acute amongst KS4 classes, where schools are now offering 35,400 hours a week, compared to 66,400 hours a week in 2012, a 46.7% decrease in lesson time.

Figures here only cover up to 2017, and a further decline is expected in the 2018 figures, reflecting the overall decrease in qualifications offered by schools and the uptake of those qualifications by pupils.

Table 5: School computing hours

Year	Total Hours of Computing/ICT per week (thousands)			
	KS3	KS4	KS5	Total
2012	70.2	66.4	29.4	166.0
2013	65.3	58.7	28.6	152.6
2014	58.0	51.8	27.1	136.9
2015	56.1	44.4	25.0	125.5
2016	53.6	40.1	22.9	116.6
2017	51.8	35.4	19.4	106.6

⁷ numbers of hours of computing taught at key stages 1 and 2 are not available

Total Hours of Computing/ICT per week (thousands)

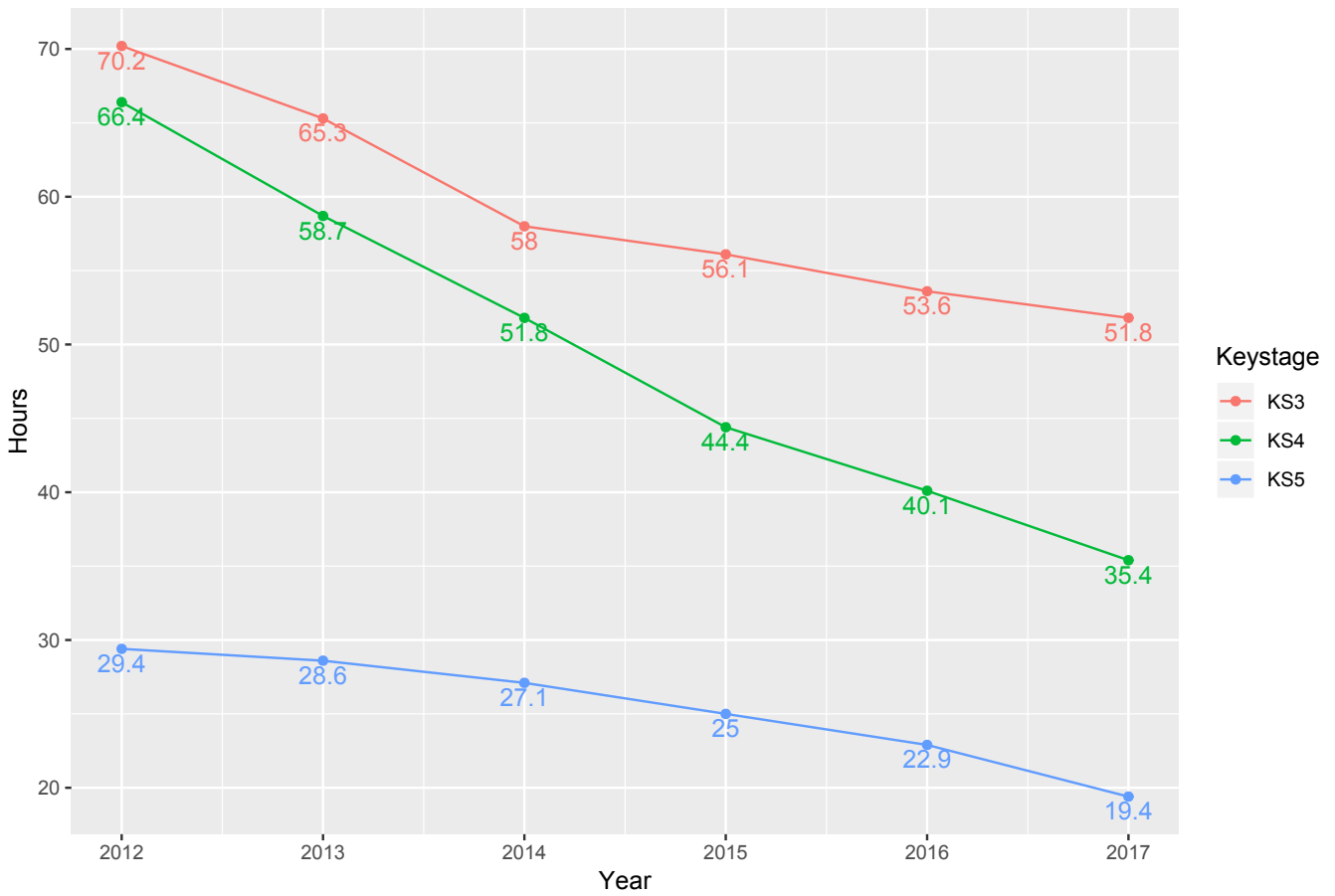


Figure 2: Decline in computing taught at KS3-5, hours, 2012-2017

Hours of Computing/ICT per week as percentage of 2012 figure

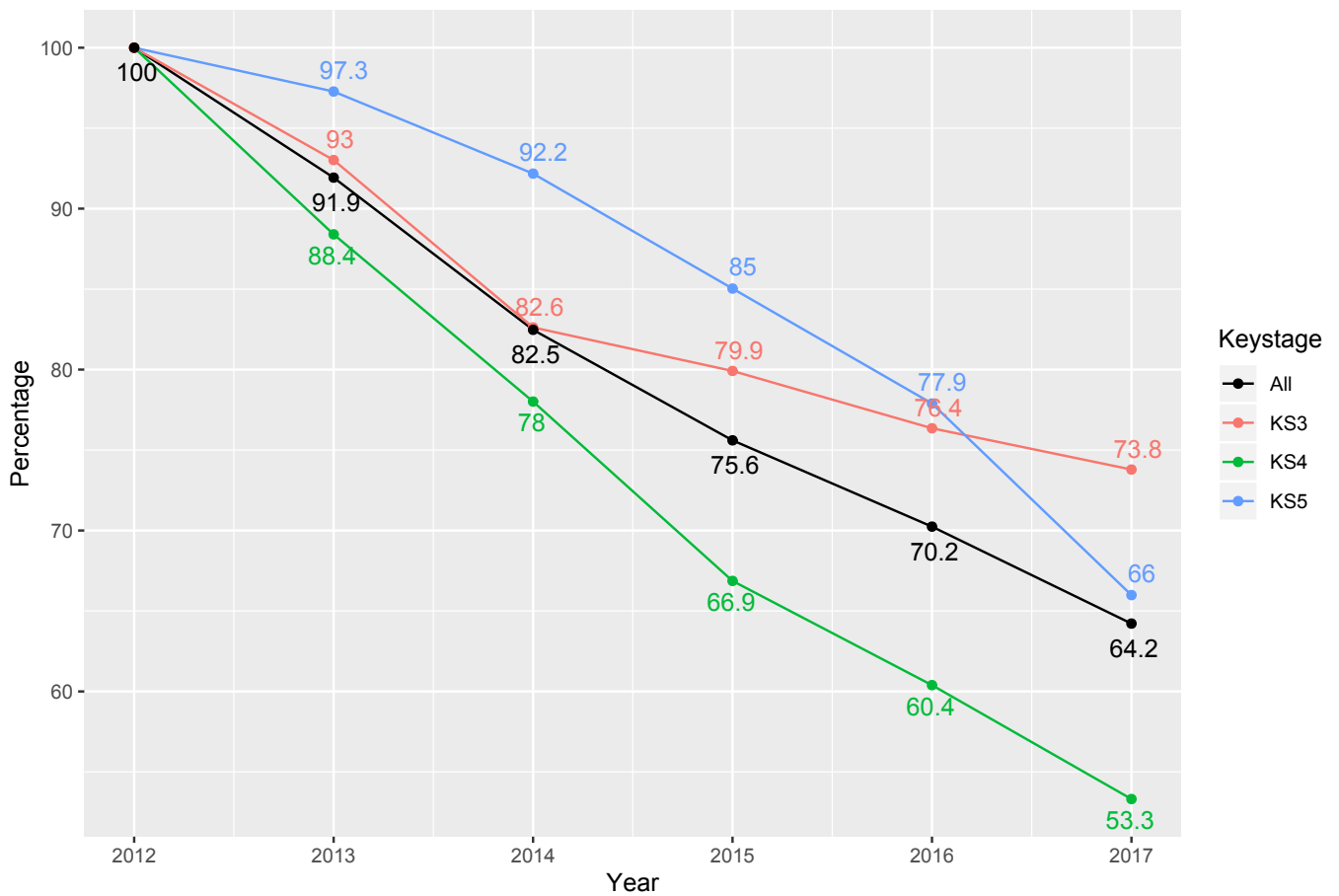


Figure 3: Decline in computing taught at KS3-5, percentage, 2012-2017

Using the taught hours given in Table 5 we can model the number of hours of computing per student per week at KS3 and KS4. Several assumptions have been made in the following models:

- The class size for KS3 and non-GCSE KS4 is 25 students, the rough size of a form group, actual figures will vary from this.
- Class size for GCSE computer science is 18.9 and for ICT, 20.5, this comes from analysis of mean cohort entry sizes in the NPD for 2017. We assume that this size holds for Y10 and Y11 students in 2017.
- There were 2.5 hours of GCSE CS taught each week, this comes from discussions with teaching groups on social media.
- Total number of students taking KS4 GCSE computing is the number of students taking GCSE computer science + number taking GCSE ICT⁸.
- Other computing qualifications at KS4⁹ in 2017, e.g. ECDL, are not included in the model as the number of hours taught is harder to ascertain. Their inclusion would substantially lower the KS4 Weekly time given for computing to non-CS/ICT GCSE students.

Key Stage 3

There was roughly one hour of computing taught per student in 2012 at key stage 3. In 2017 this figure had dropped by a quarter to 48 minutes. This is below the figure of “typically [...] one hour per week” given recently by the Royal Society¹⁰, to what extent this figure hides cross curricula provision remains unclear.

Table 6: KS3 computing hours

Year	Hours	Students	Class size	Weekly
2012	70,200	1,656,000	25	1h04m
2017	51,800	1,632,000	25	48m

⁸ In 2016 4144 GCSE CS students also took GCSE ICT (Kemp, Wong and Berry under review), this was 6.8% of the GCSE CS cohort. Whilst not modelled here, including these students would lower the number taking GCSE computing and raise the number of non-CS/ICT GCSE students.

⁹ <https://www.bcs.org/upload/pdf/computing-education-report.pdf> Section 4.3

¹⁰ “From ages 5 to 14, pupils typically have one hour per week of computing lessons”
<https://royalsociety.org/~media/policy/projects/computing-education/computing-education-report.pdf> p.6

Key Stage 4

At key stage 4 the teaching of GCSE ICT and computer science in 2017 accounted for 30,430 of the 35,400 hours of computing, 86% of the total. This left only 4,970 hours of computing for the 849,995 students who didn't take a computing GCSE, or roughly 9 minutes a week per class. This suggests that the majority of students in KS4 had no computing provision in any given week in 2017/18. The computing lesson time given to non-qualification computing students is likely to be substantially lower when you take into account other computing courses at KS4 such as ECDL and the OCR nationals.

Table 7: KS4 computing hours

Computing GCSEs				
Subject	Students	Class size	Weekly hours	Total GCSE hours
CS	136087	18.9	2h30m	18,001
ICT	101918	20.5	2h30m	12,429

Census hours	Total GCSE hours	Non-GCSE hours
35,400	30,430	4,970

non-CS/ICT GCSE			
Students	Class size	Non-GCSE hours	Weekly
849,995	25	4,970	9m

Sources

- Number of GCSE CS and ICT students in 2017 and 2018:
<https://www.jcq.org.uk/examination-results/gcse/2018/main-results-tables/gcse-full-course-results-summary-2018>
- Number of hours of GCSE computing taught each week from discussions with teachers and facebook poll of 206 computing teachers:
<https://www.facebook.com/groups/ict.computing/> 20th February 2018
- Number of students in KS3 in 2012 and 2017 and in KS4 in 2017 and 2018:
<https://www.gov.uk/government/statistics/national-pupil-projections-july-2018>
- Class size for computing GCSEs calculated from national pupil database 2017 data, assuming that 30 students is the upper limit of class size for any school
- Class sizes for KS3 computing and KS4 non-gcse computing from discussions with teachers.
- School demographic data and KS4 performance data for 2017 and 2018:
<https://www.compare-school-performance.service.gov.uk>
- Number of hours taught from school workforce census. Sampling between 75 and 79% of the workforce in any given year:
 - <https://www.gov.uk/government/statistics/school-workforce-in-england-november-2017>
 - <https://www.gov.uk/government/statistics/school-workforce-in-england-november-2016>
 - <https://www.gov.uk/government/statistics/school-workforce-in-england-november-2015>
 - <https://www.gov.uk/government/statistics/school-workforce-in-england-november-2014>
 - <https://www.gov.uk/government/statistics/school-workforce-in-england-november-2013>
 - <https://www.gov.uk/government/statistics/school-workforce-in-england-november-2012>