The impact of A Level subject choice and students' background characteristics on Higher Education participation

Carmen Vidal Rodeiro Research Division

Introduction

Researchers investigating progression to higher education (HE) have suggested that student and school characteristics (e.g., gender, prior academic attainment, social background, type of school) are important factors affecting HE participation and the type of HE institution attended (Chowdry, Crawford, Dearden, Goodman, & Vignoles, 2013; Boliver, 2013; Vidal Rodeiro, Sutch, & Zanini, 2015; Montacute & Cullinane, 2018). This could be in part because certain types of qualifications and/or subjects that are good preparation for HE tend to be taken by young people with higher academic attainment, which is related to social background and to the choices available in their schools (Vidal Rodeiro, 2007; Dilnot, 2016; Gill, 2017).

Over the past few years, policy makers and the general public in England have become increasingly concerned about the extent to which different qualifications and subjects prepare young people for careers or further study. Despite policy efforts and claims of "equivalence", multiple studies have identified ways in which the progression of young people differs depending on the qualifications and/or subjects studied, even after controlling for their background characteristics (Smith, Joslin, & Jameson, 2015; Vidal Rodeiro et al., 2015; Hupkau, McNally, Ruiz-Valenzuela, & Ventura, 2017; Dilnot, 2018; Vidal Rodeiro & Williamson, 2018).

In England, the principal measure of academic attainment for 18 year-old pre-university students is the A Level. Although increasing numbers of university entrants hold other types of qualifications (e.g., applied and technical qualifications) alongside or instead of A Levels, in 2015 73 per cent of the 18 year-olds applying to UK HE institutions did so with just A Levels (UCAS, 2016). In recent years, over 80 different subjects have been offered at A Level. Students can decide which and how many of those subjects they wish to study depending on, for example: their career aspirations, their academic ability, the provision at their school/college or the advice given to them. Students aiming for university typically study three or four subjects at A Level.

Choosing A Levels, however, is not straightforward. There is, for example, a disparity in the attitudes of HE admissions staff towards some subjects, which can lead to low A Level take-up in them. There are also prejudices, amongst the general public and other stakeholders, about the value or usefulness of certain subjects for certain areas of HE study. In addition, whilst many HE courses are open to different A Level subjects and combinations of A Level subjects, others require specific A Levels. Furthermore, some institutions have their own lists of "preferred" subjects. The Russell Group (a self-selected group of research intensive and highly selective institutions) had, from 2011 to 2017, published an annual guide to A Level choice known as *Informed Choices* (Russell Group, 2017). In this guide, they advised students to study at least two from a

list of "facilitating subjects", which would leave their options open for a variety of courses. However, they acknowledged that this advice would not apply to all students, and those who were definitely intending to study certain specialist courses such as Music would be best served otherwise. Recently, the Russell Group has re-launched their informed choices guide. The new guidance, the *Informed Choices interactive website* (http://www.informedchoices.ac.uk/), supports less advantaged students, who may not always receive the same level of advice as their better-off peers. This new tool allows students to see not only the subjects that are recommended for specific degrees, but also to test combinations of A Levels to see which degrees they open up. Outside the Russell Group, there is less information available to prospective applicants to guide subject choices.

A great deal of the research carried out into progression to HE in England in recent years has focused on the ability of traditional (academic) versus non-traditional (vocational) qualifications to support students' progression (e.g., Hayward & Hoelscher, 2011; Chowdry et al., 2013; Vidal Rodeiro et al., 2015; McCoy & Adamson, 2016; Hupkau et al., 2016). However, little work on the role of A Level subject choice in access to HE (and different types of HE) or on how students' backgrounds interact with A Level choices to influence HE participation has been published to date. Amongst this small body of research, Vidal Rodeiro and Sutch (2013) investigated, using data from UCAS, the proportions of students who held each A Level subject when applying for a place at university. The outcomes of that research provided some evidence about the usefulness of specific A Level subjects or combinations of A Level subjects as currency for university study. In a more recent study, Sutch, Zanini, and Vidal Rodeiro (2016) examined how students' choice of A Level subjects and attainment influenced their HE destinations. The statistical analyses carried out in their research revealed that there was a relationship between A Level subject specialism and the type of university attended. Dilnot (2018) examined the relationship between league table score of university attended and A Level subject choices. She found that holding more "facilitating" A Levels was associated with attending a higher ranked university, even when A Level performance, prior attainment at General Certificate of Secondary Education (GCSE), and school type were accounted for.

As progression to HE continues to be a matter of interest not just from a research point of view but also for students, HE institutions, awarding bodies and policy makers, a better understanding of how A Level subjects are used to access HE (and different types of HE institutions) is important. The main aims of this research were, therefore, to investigate:

1. the proportions of students who hold different A Level subjects (or combinations of A Level subjects) when enrolling for a degree at a HE institution; and

2. how students' backgrounds interact with the choice of A Level subjects to influence the type of HE institution attended.

This article highlights some of the key findings from a wider research project looking at how useful A Level subjects are for gaining admission to HE. The research is described in detail in Vidal Rodeiro (2019).

Data and methodology

This study followed a cohort of Year 13 students in English schools/colleges through the first year of their HE studies using data from two sources. National Pupil Database (NPD) extracts provided information on A Level subjects and attainment, prior attainment (e.g., GCSEs) and students' characteristics such as gender, school type and income-related deprivation. Data from the Higher Education Statistics Agency (HESA), including HE institution and subject of HE course for all full-time first-year undergraduates, was linked to the NPD.

The students in this research were 17 or 18 years old at the beginning of the academic year 2015/16 and achieved at least one A Level, graded A*-E. All A Levels achieved by these students, independently of the year in which students certificated, were included in the analyses. Note that AS levels were not considered. The size of this A Level cohort was 276,703.

Just under 160,000 students in the A Level cohort appeared in the HESA student records for the academic year 2016/17. The A Level students who were not in the HESA data might not have applied to study in a HE institution, they might not have been offered a place at a HE institution, or they might have taken a gap year. For example, in 2017, the HE acceptance rate for A Level students was 89% and for students taking a combination of A Levels and Business and Technology Education Council (BTEC) qualification, it was 87% (UCAS, 2017a). Furthermore, 21,820 students aged 17 or 18 deferred (i.e., applied for a course and then took a year out before going to university) their university entry (UCAS, 2017b). This corresponded to 7.9% of the acceptances in that age group. It is also worth noting at this point that the linking between NPD and HESA data was done by name, date of birth and postcode, so some A Level students might have been lost in the matching process.

Different combinations of A Level subjects were used in the analyses carried out in this research. A Levels were classified as "facilitating" and "non-facilitating" as suggested by the Russell Group in their previous guidance (Russell Group, 2017). In addition, A Levels were classified using content-based groups (e.g., Applied; Expressive; Humanities; Languages; STEM [Science, Technology, Engineering and Mathematics]) as shown in Bramley (2014).

Different classifications of the HE institutions were also used:

- HE institutions were considered in two groups: Russell Group[1] and "Other" universities (newer universities and colleges, which are usually recruiting institutions or universities with former "polytechnic" status). Some analysis focused on Oxford and Cambridge specifically.

- The Complete University Guide (https://www.thecomplete universityguide.co.uk/league-tables/rankings) produces the most comprehensive independent rankings of the HE institutions in the UK. In this research, the overall ranking and the rankings by student

---

1. A full list of universities can be obtained from the HESA website (https://www.hesa.ac.uk/) and the members of the Russell Group can be identified in the group's website (https://www.russellgroup.ac.uk/). The Russell Group includes Oxford and Cambridge universities.

satisfaction, research quality and graduate prospects were considered to group the HE institutions. Each of the measures was used to divide institutions into three approximately equally sized groups: low, medium or high ranking.

Data on students' characteristics, prior attainment at school (in Year 11) and performance at A Level was obtained from the NPD. In particular:

- *Prior attainment* was measured by the average GCSE and equivalent point score per entry (GCSE grades were converted into points as follows: A*=58; A=52; B=46; C=40; D=34; E=28; F=22; G=16).

- *A Level performance* was measured by the A Level points in the best (up to) three A Levels (A Level grades were converted into points as follows: A*=60; A=50; B=40; C=30; D=20; E=10).

- *Schools* were classified in two groups: independent schools and state-maintained centres (the latter includes academies, comprehensive schools, grammar schools, secondary modern schools, sixth form colleges and further education centres).

- The *income related level of deprivation* that a student experiences was inferred using the Income Deprivation Affecting Children Index (IDACI), which measures the proportion of children in the immediate neighbourhood living in low-income families.

Together with descriptive statistics, which can show the popularity of A Level subjects in relation to HE participation, multilevel logistic regressions were used to study the likelihood of students with different A Level specialisms (two or more A Levels in a subject area) to study in specific HE institutions once their characteristics (e.g., gender, prior/ concurrent attainment, previous institution type, socio-economic background) had been accounted for.

Results

Uptake of A Level subjects

The most popular A Levels amongst university students were Mathematics, Psychology, Biology, History, Chemistry and English Literature. However, these subjects were represented in different proportions in HE and, particularly, in different institutions. For example, Mathematics was taken by 31% of the university students, by 48% of the students in Russell Group universities and by 67% of the students in Oxford/Cambridge.

Students in Russell Group institutions and in Oxford/Cambridge in particular, held A Levels in STEM subjects and in Modern Foreign Languages in higher proportions than students in other universities. In particular, around 60% of the students who obtained an A Level in French enrolled in a Russell Group university (almost 10% were at Oxford/Cambridge). Similarly, almost 75% of those with an A Level in Further Mathematics enrolled in an institution in the Russell Group (14% in Oxford/Cambridge).

There was also variation in the uptake of Applied subjects (e.g., Design & Technology, Art & Design, Business Studies, ICT, Media Studies) and Humanities (e.g., Psychology, Sociology) between different types of HE institutions. Overall, lower proportions of students in Russell Group institutions and in Oxford/Cambridge held A Levels in Applied and Humanities subjects than students in other institutions. There was also variation on the popularity of the A Level subjects by the different university rankings. For example, STEM subjects were more popular

amongst students in institutions of high research quality and high graduation prospects than in institutions with lower rankings in these areas. However, Biology and Chemistry were more popular amongst students in institutions with low student satisfaction than in institutions rated high by their students. The opposite patterns were found in subjects such as Physical Education or Law.

Uptake of individual A Level subjects by degree subject area was also investigated. The subject of study at university was provided in a list of 19 broad degree areas, which related to the principal subject of the student's qualification aim (see https://www.hesa.ac.uk/support/documentation/jacs/hesa-codes for details). Results from these analyses, show, for example, that Mathematics was taken by 99% of the students accepted to pursue a degree in Mathematical Sciences, 29% of the students accepted to subjects allied to Medicine degrees and by 10% of the students accepted to study Languages. On the other hand, Business Studies was taken by only 38% of the students accepted to study a degree in Business and Administrative Studies, and French or Spanish were taken only by 14% and 11%, respectively, of the students enrolled in a Language degree. The Languages degree area includes courses, among others, in Linguistics, Literature, English, American Studies, Celtic Languages, Literature and Culture, Latin, Ancient Greek, Classics or Languages Studies. Therefore, it is possible that a student enrolled in a Language degree without an A Level in French or Spanish.

For more details on the uptake of individual A Level subjects and combinations of individual A Level subjects, overall and broken down by type of HE institution and degree subject area, see Vidal Rodeiro (2019).

Just over 72 per cent of the A Level cohort had three or more A Levels, but this proportion was higher among students who were accepted onto a university course (79 per cent). Note that some students may have held other qualifications in addition to A Levels, such as BTECs, Cambridge Technicals, or Extended Project qualifications.

The number of A Level subjects held by students varied across the different types of HE institutions (see Table 1). For example, students at Oxford/Cambridge held, on average, the highest number of A Levels and students attending low ranking institutions the lowest. Similar patterns were found for A Levels in facilitating subjects. For example, students attending Oxford/Cambridge and Russell Group institutions held, on average, the highest number of facilitating subjects and those attending institutions with a low research quality ranking, or institutions with low graduation prospects, held the lowest.

A Level students were assigned to an A Level specialism using the A Level taxonomy described in Bramley (2014). Students were considered specialists in one area if two or more of their A Levels were in the same subject area. If a student had two A Levels in at least two categories, they were assigned to a "Multi" category; if they did not have at least two A Levels in any single category, they were assigned to a "None" category. More details about how the students were assigned to specialisms are available in Sutch et al. (2016).

Figure 1 below shows that there were higher percentages of students specialising in Humanities, Languages or STEM subjects at A Level in the group of students that enrolled in HE than in the A Level cohort. A similar pattern can be seen for students with multiple specialisms but, for the remaining specialisms (Applied, Expressive, none), the pattern was the opposite.

Just under 45% of students in Russell Group institutions were specialists in STEM. This compares with 54% in Oxford/Cambridge and with only 14% or 19% in low or medium ranked HE institutions,

Table 1: Average number of A Levels and A Levels in facilitating subjects, by type of HE institution (N = number of students in the group*)

		A Levels (average)	A Levels in facilitating subjects (average)
A Level cohort (N=276,705)		2.70	1.34
University students (N=159,790)		2.83	1.48
Non-University students (N=116,910)		2.50	1.14
Oxford/Cambridge (N=3,920)		3.52	2.95
Russell Group (N=51,867)		3.15	2.16
Other: Non-Russell Group (N=107,925)		2.68	1.16
Overall HE ranking	Low (N=29,670)	2.53	0.90
	Medium (N=49,830)	2.64	1.06
	High (N=77,565)	3.08	1.99
Student satisfaction ranking	Low (N=41,095)	2.77	1.42
	Medium (N=60,340)	2.84	1.48
	High (N=55,630)	2.88	1.55
Research quality ranking	Low (N=29,680)	2.54	0.87
	Medium (N=57,670)	2.68	1.15
	High (N=69,320)	3.10	2.04
Graduation prospects ranking	Low (N=34,720)	2.55	0.88
	Medium (N=49,985)	2.71	1.19
	High (N=72,360)	3.06	1.99

* Following HESA's statistical disclosure control policy, counts were rounded to the nearest multiple of 5.
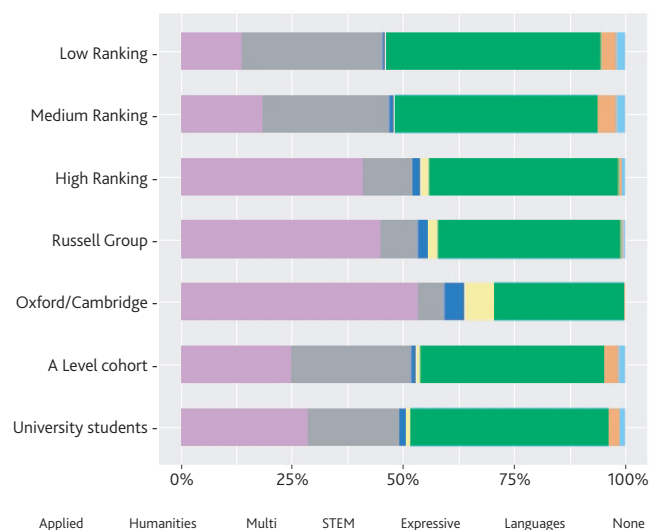
Figure 1: A Level specialists, by type of HE institution

respectively. The percentage of students with multiple specialisms was higher at Oxford/Cambridge than at other institutions, including institutions in the Russell Group, and just over 30% of the students in low-ranking universities did not have an A Level specialism.

The percentage of specialists in Humanities decreased with the increasing ranking of the HE institutions. Conversely, the percentages of specialists in STEM and Language subjects increased with the increasing ranking of the HE institutions (e.g., for STEM, the percentage increased from 14% in low-ranking institutions to 41% in high-ranking ones).

It is worth noting that the above patterns of A Level uptake might be

influenced by the type of degrees (and entry requirements) offered at the different types of HE institutions. Students with A Levels in less academic or Applied subjects could be, for example, more attracted to the latter types of degrees and therefore their university choices could be determined by their degree choices.

Factors affecting enrolment in HE

Multilevel logistic regression analyses were carried out in order to look at the relationship between enrolment in HE and A Level specialism, controlling for background variables including performance at A Level and students' characteristics.

Two different sets of regression models were considered: whilst the first set of models looked at enrolment in HE amongst the national A Level cohort (the outcome variable being an indicator of enrolment at any HE institution), the second set of models focused on students who had already enrolled in HE and investigated the likelihood of enrolling at a specific type of HE institution (the outcome variables being: enrolment at an institution of the Russell Group; enrolment at Oxford/Cambridge).

For each set of models, we pursued the following approach. As a first step, a model including only the main effects of the specialism at A Level was considered. The outcomes of this model (Model A) show the effects of each of the different A Level specialisms (STEM, Humanities, Languages, etc.) on the probability of enrolling in HE, controlling for student and school characteristics. To investigate whether some of the background characteristics (in particular, gender and school type) interact with A Level subject specialism to influence the type of HE attended, a model including interaction terms between specialism, and gender and between specialism and school type was also considered (Model B).

**Table 2: Enrolment in HE ~ regression analyses**

Variable			Model A	Model B
			Estimate (Standard Error)	Estimate (Standard Error)
Intercept			-1.416 (0.054)†	-1.423 (0.054) †
Gender	Male [Female]		-0.087 (0.009) †	-0.113 (0.016) †
Type of school	Independent [State]		-0.736 (0.031) †	-0.644 (0.041) †
Prior attainment			0.020 (0.001) †	0.020 (0.001) †
Number of A Levels	2 3 4 5+ [1]		0.198 (0.018) † 0.255 (0.021) † 0.474 (0.030) † 0.364 (0.070) †	0.193 (0.018) † 0.248 (0.021) † 0.468 (0.031) † 0.363 (0.070) †
Number of A Levels in facilitating subjects	1 2 3 4+ [0]		0.065 (0.012) † 0.090 (0.016) † 0.140 (0.021) † 0.070 (0.043)	0.064 (0.012) † 0.089 (0.016) † 0.147 (0.021) † 0.089 (0.043)
A Level performance			0.024 (0.000) †	0.024 (0.000) †
A Level specialism	Applied Expressive Humanities Languages Multi STEM [None]		-0.060 (0.036) -0.298 (0.026) † 0.165 (0.013) † 0.121 (0.048) † 0.066 (0.045) 0.146 (0.018) †	0.005 (0.061) -0.424 (0.032) † 0.190 (0.017) † 0.113 (0.069) 0.150 (0.066) † 0.070 (0.023) †
Type of school * A Level specialism	Independent	Applied Expressive Humanities Languages Multi STEM [None]		-0.230 (0.110) † 0.379 (0.085) † -0.065 (0.037) -0.135 (0.097) -0.623 (0.117) † -0.207 (0.039) †
Gender * A Level specialism	Male	Applied Expressive Humanities Languages Multi STEM [None]		-0.046 (0.072) 0.344 (0.055) † -0.057 (0.021) † 0.069 (0.097) 0.006 (0.084) 0.171 (0.024) †

† Statistically significant at the 0.05 level.

Enrolment at any HE institution

Table 2 shows the effects of the A Level specialism on the probability of enrolling at any HE institution, after taking into account students' background characteristics such as their gender, prior attainment, prior institution, their A Level uptake (number of subjects) and their A Level performance.

Model A in Table 2 shows that the A Level specialism was a significant predictor of attending HE, even after controlling for students' characteristics and taking into account school effects. In particular, students who specialised in Expressive subjects were significantly less likely to enrol in HE than students with no specialism. On the contrary, students specialising in Humanities, Languages, STEM and those with a multiple specialism were significantly more likely to enrol at a HE institution than students with no specialism. Figure 2 shows that specialists in Humanities at A Level had the highest probabilities of attending HE, followed by STEM specialists. Students specialising in Expressive A Levels were the least likely to enrol in HE.
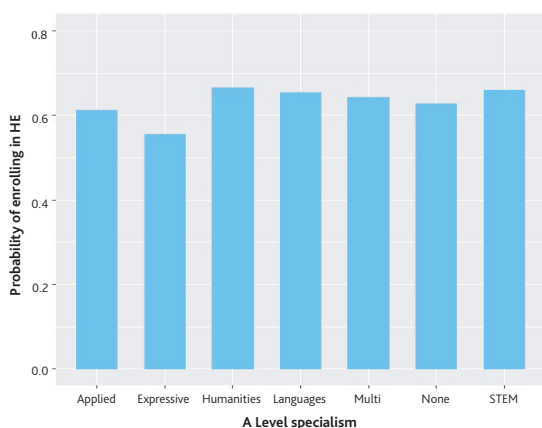
Figure 2: Probability of enrolling in HE, by A Level specialism (the calculated probabilities are for female students, attending a state school, taking three A Levels, one in a facilitating subject, and having average prior attainment and average A Level performance)

A brief summary of the effects of the background variables included in Model A on enrolment in HE, is provided below.

Gender: Male students were significantly less likely to enrol in HE than female students with the same attainment at GCSE and uptake/performance at A Level.

Type of school: Students with similar prior attainment and A Level uptake/performance from independent schools were less likely to enrol in HE in the year following completion of Key Stage 5 than students from state schools. Note that previous research (e.g., Crawford & Cribb, 2012)

showed that gap-year takers were more likely to come from families of higher socio-economic status, including having university-educated parents and higher household incomes. Also, they were more likely to come from schools with relatively few students on free school meals and higher average academic performance, or from independent schools. Crawford and Cribb (2012) showed, for example, that nearly 20 per cent of gap year takers come from independent schools.

Prior attainment: Prior attainment at school was a significant predictor of enrolment at a HE institution. In particular, the probability of enrolment in HE increased with increasing prior attainment.

Number of A Levels: The probability of attending a HE institution increased significantly with the number of A Levels achieved. Students having two A Levels were slightly more likely to be in HE than those with just one, after controlling for all other variables. This likelihood increased further for students having three and four or more A Levels.

Number of A Levels in facilitating subjects: As above, the likelihood of enrolling in HE increased significantly for students having one, two or three A Levels in these subjects (compared to students with none). The effect of having four or more was not significantly different to the effect of having just three.

A Level performance: Overall achievement at A Level was a significant predictor of enrolment in a HE institution. In particular, the higher the average A Level score, the higher the probability of enrolment, suggesting that A Levels are good preparation for university.

Note that the *level of deprivation* was missing for around 40,000 students (approximately 15 per cent of the A Level cohort). Furthermore, there was high collinearity between missing level of deprivation and type of school (75 per cent of the students with missing data were in independent schools). An alternative model with the level of deprivation included was fitted. However, the effect of the different school types and, more importantly in this research, the effect of the A Level specialism were very similar to those in Model A. As a result, the level of deprivation was not considered in the rest of this article.

Model B, also shown in Table 2, investigated whether gender and type of school interact with A Level specialism to influence enrolment in HE.

Regarding gender, Model B shows that the interaction between gender and A Level specialism was significantly associated with enrolment in HE. Table 3 shows how the probabilities of enrolling in HE by students with each of the A Level specialisms varied by gender. For example, male students specialising in STEM and Expressive subjects were more likely than female students specialising in the same areas to enrol in HE. On the contrary, female students were more likely to enrol in HE than male students if they were specialists in Applied, Humanities

Table 3: Enrolment in HE ~ probability for students with each A Level specialism, by gender*and by type of school**

Background characteristics		A Level specialism						
		Applied	Expressive	Humanities	Languages	Multi	STEM	None
Gender	Female	0.63	0.52	0.67	0.65	0.66	0.64	0.63
	Male	0.59	0.58	0.63	0.64	0.64	0.66	0.60
Type of school	Independent	0.41	0.46	0.50	0.46	0.35	0.43	0.47
	State	0.63	0.52	0.67	0.65	0.66	0.64	0.63

* These probabilities are for students in state schools, who achieved three A Levels (one in a facilitating subject) and with average attainment at Key Stage 4 and at A Level. Note that, although the probabilities are slightly different, the patterns (in terms of differences between male and female students) were the same for students in independent schools.

** These probabilities are for female students, who achieved three A Levels (one in a facilitating subject) and with average attainment at Key Stage 4 and at A Level. Note that, although the probabilities are slightly different, the patterns (in terms of the differences between students in independent and state schools) were the same for male students.

or Language A Level subjects. Female students were also more likely to enrol in HE if they had multiple specialisms or did not specialise at all.

Regarding type of school, Model B also shows that the interaction between type of school and A Level specialism was significantly associated with enrolment in HE. In particular, Table 3 shows how the probabilities of enrolling in HE by students with each of the A Level specialisms varied by type of school. Although students in independent schools had a lower probability of enrolling in HE overall, the differences between these probabilities varied by A Level specialism: the smallest difference was between students specialising in Expressive A Level subjects (followed by those with no specialism) and the highest difference was between students with multiple specialisms or a specialist in STEM.

Enrolment at different types of HE institutions

Regression models similar to the ones reported in Table 2 were fitted for enrolment at an institution of the Russell Group and enrolment at Oxford/Cambridge. The results are briefly described below and full details of the regression models are available in Table 4. Note that the analyses reported in this section were restricted to students with three or more A Levels.

A Level specialism was a significant predictor of attending a university of the Russell Group, even after controlling for students' characteristics and school effects such as the type of secondary school. Similarly to the results for enrolling in HE institutions in general (described in the previous section), students specialised in Expressive subjects were significantly less likely to enrol at a Russell Group institution than students with no specialism. On the contrary, students specialising in Applied subjects, Humanities, Languages, STEM and those with a multiple specialism were more likely to enrol at a Russell Group institution than students with no specialism. In particular, after accounting for other student and school characteristics, specialists in Languages at A Level had the highest probabilities of attending institutions in the Russell Group, followed by Humanities specialists. Students specialising in Expressive A Levels were the least likely to enrol at HE in Russell Group institutions (see Figure 3[a]).

The A Level specialism effect was slightly different for students enrolling at Oxford/Cambridge. In particular, students with no specialism were more likely to enrol in Oxford/Cambridge than students specialising in STEM or Expressive subjects, and more likely than students with multiple specialisms. Figure 3(b) shows that specialists in Languages at A Level had the highest probabilities of attending

**Table 4: Enrolment at different types of HE institutions ~ regression analyses***

Variable			Russell Group		Oxford/Cambridge	
			Model A	Model B	Model A	Model B
			Estimate (Standard Error)	Estimate (Standard Error)	Estimate (Standard Error)	Estimate (Standard Error)
Intercept			-11.256 (0.119) †	-11.196 (0.123) †	-35.021 (0.638) †	-34.589 (0.639) †
Gender	Male [Female]		0.120 (0.018) †	-0.021 (0.057)	0.225 (0.047) †	-0.417 (0.228)
Type of school	Independent [State]		0.568 (0.036) †	0.561 (0.076) †	-0.096 (0.057)	-0.370 (0.208)
Number of A Levels	4 5+ [3]		0.017 (0.031) 0.212 (0.103) †	0.023 (0.031) 0.221 (0.103) †	0.198 (0.062) † 0.219 (0.114)	0.177 (0.062) † 0.222 (0.114)
A Level specialism	Applied Expressive Humanities Languages Multi STEM [None]		0.276 (0.079) † -1.203 (0.089) † 0.532 (0.030) † 0.840 (0.081) † 0.347 (0.072) † 0.165 (0.034) †	0.324 (0.124) † -1.217 (0.110) † 0.445 (0.041) † 0.981 (0.107) † 0.342 (0.095) † 0.130 (0.045) †	-0.483 (0.941) -1.488 (0.679) † 0.281 (0.106) † 0.455 (0.143) † -0.548 (0.153) † -1.277 (0.112) †	-1.086 (1.578) -1.673 (0.895) 0.023 (0.140) 0.103 (0.205) -0.977 (0.215) † -1.617 (0.145) †
Type of school * A Level specialism	Independent	Applied Expressive Humanities Languages Multi STEM [None]		-0.724 (0.276) † -0.294 (0.225) 0.211 (0.079) † -0.301 (0.178) 0.284 (0.260) -0.242 (0.081) †		-0.199 (4.877) -0.065 (1.443) 0.114 (0.221) 0.256 (0.283) 0.442 (0.312) 0.373 (0.215)
Gender * A Level specialism	Male	Applied Expressive Humanities Languages Multi STEM [None]		0.081 (0.159) 0.191 (0.198) 0.147 (0.062) † -0.234 (0.170) -0.037 (0.136) 0.154 (0.062) †		0.919 (2.046) 0.730 (1.423) 0.622 (0.240) † 1.025 (0.306) † 0.648 (0.311) † 0.673 (0.235) †

* The effects of *prior attainment*, *A Level performance* and the *number of A Levels in facilitating subjects* are not shown in this table as they are very similar to those reported in Table 2. Full results from the regression analyses can be found in Vidal Rodeiro (2019).

† Statistically significant at the 0.05 level.
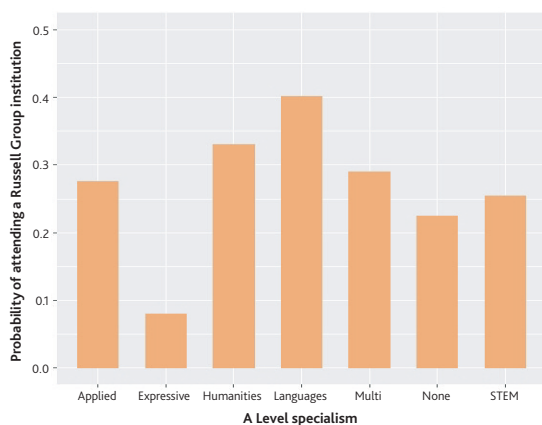
(a) Russell Group
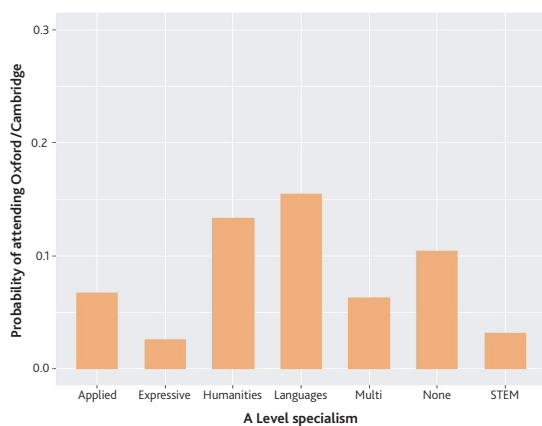
(b) Oxford/Cambridge

Figure 3: Probability of enrolling at different types of institution, by A Level specialism. The calculated probabilities in Figure 3(a) are for female students, attending a state school, taking three A Levels (two in facilitating subjects), and having average prior attainment and average A Level performance. The calculated probabilities in Figure 3(b) are for female students, attending a state school, taking three A Levels (two in facilitating subjects), and having prior attainment at the 90% percentile and A Level performance at the 90% percentile.

Oxford/Cambridge, followed by Humanities specialists and students with no specialism. Students specialising in Expressive A Levels were the least likely to enrol at Oxford/Cambridge, followed by those with a specialism in STEM or Applied subjects.

As in the previous section, a brief summary of the effects of the background variables included in Model A on enrolment at different types of HE institutions is provided below.

Gender: Contrary to the effect on enrolment in HE, male students were significantly more likely than female students with the same prior attainment and same background characteristics to enrol at institutions in the Russell Group or at Oxford/Cambridge.

Type of school: Students with similar prior attainment and A Level uptake/performance from independent schools were more likely to enrol at institutions in the Russell Group. Note that the effect of school type on enrolling at Russell Group institutions (generally prestigious and highly ranked) was the opposite to the effect of school type on attending HE in general. There was, however, not an effect of school type on the probability of attending Oxford/Cambridge.

Number of A Levels: The probability of attending a more prestigious group of universities, such as the Russell Group or Oxford/Cambridge, increased significantly with the number of A Levels achieved.

In particular, students having four A Levels were slightly more likely to be in this type of HE institution than those with just three (the baseline in these analyses), after controlling for all other student characteristics. This likelihood increased for students having five or more A Levels. However, having four A Levels did not have a significant effect on the probability of attending a Russell Group institution, relative to having three.

The effect of *prior attainment*, *A Level performance* and the *number of A Levels in facilitating subjects* on the probability of enrolment at Russell Group institutions or at Oxford/Cambridge was the same as the effect on enrolment in HE.

In this section, we also investigated whether gender and type of school interact with A Level specialism to influence the type of HE institution attended. A summary of the results (in the form of probabilities of enrolment) is given in Table 5.

The probabilities of enrolling in different types of HE institutions by students with each of the A Level specialisms varied by gender. For example, the probability of attending an institution in the Russell Group and the probability of attending Oxford/Cambridge for a specialist in STEM was very similar for males and females. However, female students were more likely to enrol in Russell Group institutions than male students if they specialised in Language subjects at A Level, and the opposite was found for enrolment at Oxford/Cambridge.

Regarding type of school, its interaction with A Level specialism was also significantly associated with the type of HE institution attended. In particular, Table 5 shows that, all else being equal, STEM specialists were more likely to attend Russell Group institutions if they took their A Levels at an independent school than if they did so at a state school. However, for these students, the probability of attending Oxford/Cambridge did not vary by the type of school attended. The smallest difference in the probabilities of enrolment at Russell Group institutions between students from independent and state schools was between specialists in Expressive A Level subjects (followed by those with an specialism in Applied subjects) and the highest difference was between students with no specialism or specialists in Humanities. Differences in the probabilities of enrolment in Oxford/Cambridge between both groups of students were fairly small for all specialisms.

Conclusions and discussion

The process of application and admission to universities in the UK places a relatively strong weight on the type of A Level subjects achieved by students. As a result, A Level choice is a key factor influencing progression from secondary education to HE. This research aimed to provide quantitative evidence to show how different A Level subjects (and combinations of A Level subjects) are used by students to access HE and, in particular, different types of HE institutions. The key results are discussed below.

Uptake of A Level subjects

A Level subjects were represented in different proportions in HE and particularly in the different institution types, suggesting that subject choice is associated with the type of HE institution attended. The relationships observed in this research could result from a mixture of different factors. For example: subject requirements for certain degree courses; usefulness of certain subjects for certain areas of degree study;

Table 5: Enrolment at different types of HE institutions ~ probability for students with each A Level specialism, by gender* and by type of school**

Type of HE institution	Background characteristics		A Level specialism						
			Applied	Expressive	Humanities	Languages	Multi	STEM	None
Russell Group	Gender	Female	0.30	0.08	0.32	0.45	0.30	0.26	0.23
		Male	0.31	0.10	0.35	0.39	0.29	0.28	0.23
	Type of school	Independent	0.26	0.11	0.51	0.51	0.50	0.32	0.35
		State	0.30	0.08	0.32	0.45	0.30	0.26	0.23
Oxford/Cambridge	Gender	Female	0.05	0.03	0.14	0.15	0.06	0.03	0.14
		Male	0.08	0.04	0.17	0.25	0.07	0.04	0.10
	Type of school	Independent	0.03	0.02	0.11	0.14	0.06	0.03	0.10
		State	0.05	0.03	0.14	0.15	0.06	0.03	0.14

* These probabilities are for students in state schools, who achieved three A Levels (two in facilitating subjects) and with average attainment at Key Stage 4 and at A Level. Note that, although the probabilities are slightly different, the patterns (in terms of differences between male and female students) were the same for students in independent schools.

** These probabilities are for female students, who achieved three A Levels (two in facilitating subjects) and with average attainment at Key Stage 4 and at A Level. Note that, although the probabilities are slightly different, the patterns (in terms of the differences between students in independent and state schools) were the same for male students.

different prevalence of degree subject areas at different institutions; or different levels of selectivity at different HE institution types.

The number of A Level subjects held by students varied across the different types of HE institutions considered in this research. For example, students at Oxford/Cambridge held the highest number of A Level subjects and students attending low-ranking institutions the lowest. Similar patterns, also reported by Dilnot (2018), were found for A Levels in facilitating subjects.

The current study supports previous research (e.g., Vidal Rodeiro et al., 2015) showing that students with more academic backgrounds were more likely to go to universities in the Russell Group and those with more applied or vocational backgrounds were more likely to study in other types of universities. In fact, just under half of the students in Russell Group institutions were specialists in STEM and the percentages of specialists in STEM and Language subjects increased with the increasing ranking of the HE institutions. For Oxford/ Cambridge this percentage was around 55 per cent. It should be noted that one reason for this could be that STEM degrees courses are more common in high-ranking and prestigious HE institutions and the more applied/vocational degrees are overrepresented in other types of HE institutions. Students with A Levels in less academic or Applied subjects could be, for example, more attracted to the latter types of degrees and therefore their university choices are determined by their degree choices.

Factors affecting enrolment in HE

The regression analyses carried out in this research revealed that there was a relationship between A Level subject specialism and the type of university attended, and that this association holds even after controlling for other variables, such as attainment and type of school attended. In particular, students specialising in Expressive subjects were significantly less likely to enrol in HE, and to attend an institution in the Russell Group, than students with no specialism were. Conversely, students with Humanities, Languages or STEM specialisms and those with a multiple specialism were significantly more likely to enrol at a HE institution than students with no specialism. The A Level specialism effect was slightly different for students enrolling at Oxford/Cambridge. For example, students with no specialism were

more likely to enrol in in these universities than students specialising in STEM or Expressive subjects. This supports the view that careful choice of subjects post-16 is crucial to avoid students inadvertently closing their options down prematurely.

Across all the models fitted in this work, a common result, consistent with previous research (Vidal Rodeiro & Sutch, 2013; Dilnot, 2018) emerged: the probability of attending any HE institution increased significantly with the number of A Levels achieved and with the number of A Levels in facilitating subjects. This suggests that studying A Levels in facilitating subjects may be a sensible choice for students wanting to attend prestigious and high-ranking HE institutions.

The regression analyses also showed that male students were significantly less likely than female students with the same prior attainment and same background characteristics to enrol in HE. However, if they enrolled at all, male students were significantly more likely than female students to attend institutions in the Russell Group and, in particular, Oxford/Cambridge.

As expected, and in line with previous research (e.g., HEFCE, 2003; Smith & Naylor, 2005; Crawford, 2014; Vidal Rodeiro & Zanini, 2015), A Level performance was strongly associated with participation in HE and with attendance at specific types of HE institutions. Specifically, the higher the average A Level score, the higher the probability of enrolment in HE overall and, for those who enrol, the probability of attending more prestigious institutions. Similarly, performance at Key Stage 4 was found to be an important factor for university entry, even after taking into account the performance at A Level.

Students in independent schools with the same A Level specialism and the same A Level performance were less likely to enrol in HE immediately after completing their A Levels than students in state-maintained schools. However, the probability of attending prestigious and high-ranking institutions, such those in the Russell Group, was higher for them compared to similar students in state-maintained schools. This is important from a widening participation point of view, as it supports other research findings (e.g., Sutton Trust, 2011; Chowdry et al., 2013; Sullivan, Parsons, Wiggins, Heath, & Green, 2014; Montacute & Cullinane, 2018) in providing evidence that young people from state, rather than independent, schools continue to be underrepresented at high-status universities.

However, in contrast, there was not an effect of school type (independent vs. state) on the probability of attending Oxford/Cambridge.

Further regression analyses showed that, when prior schooling and other background characteristics were accounted for, the likelihood of enrolling in HE by students with each of the A Level specialisms varied, indeed, by gender and type of school. For example, male students specialising in STEM and Expressive subjects were more likely than female students specialising in the same areas to enrol in HE. On the contrary, female students with any other specialism, or no specialism at all, were more likely to enrol in HE than male students. Although these patterns were fairly similar for the likelihood of enrolling in different types of HE institutions, there were some differences. In particular, female students were less likely to enrol in Oxford/Cambridge than male students if they specialised in Language subjects at A Level or if they had multiple specialisms. Regarding type of school, its interaction with A Level specialism was also significantly associated with HE enrolment. For example, STEM specialists were more likely to attend Russell Group institutions if they took their A Levels in an independent school than if they did so in a state school. However, for this group of students, the probability of attending Oxford/Cambridge did not vary by the type of school.

As discussed above, this research showed that a clear relationship between A Level specialism and the type of HE institution attended exists and that this relationship varied by gender and school type. However, the multilevel logistic regression, as any regression technique, can only ascertain relationships, but never be sure about the underlying causal mechanism. Therefore, caution must be taken when interpreting the results of the regression analyses presented in this work. Furthermore, the existing literature on transitions from school to different education and employment destinations (e.g., Chowdry et al., 2013; Boliver, 2013; Smith et al., 2015; Hupkau et al., 2017; Montacute & Cullinane, 2018) shows that there is a very complex set of factors that can influence progression and, therefore, HE participation. Although the most relevant factors identified in the literature were accounted for in this research, others (e.g., aspirations, career goals) can be difficult or impossible to measure and cannot be included in quantitative research studies such as this one.

The above results confirm that, although careful choice of A Level subjects/specialisms is crucial for enrolling in HE and, in particular, for enrolling in specific HE institutions, background characteristics such as gender and school type are still part of the explanation for differential participation in HE in the UK. While the access gap between students from different backgrounds has narrowed somewhat in recent years due to widening participation activities, the gap in the most selective institutions remains (Boliver, Crawford, Powell, & Craige, 2017). Contextualising admissions (i.e., taking into account a student's background when making decisions) might be one way to make progress towards narrowing the gap. Some HE institutions had already changed their admissions requirements for state school students and for students from disadvantaged backgrounds (Ogg, Zimdars, & Heath, 2009; Boliver et al., 2017) and continue with this practice. However, there is still scope to improve the use of contextual data in the admission processes to widen access and to reduce the differences in participation between students with different backgrounds, particularly at prestigious and highly selective institutions.

References

Boliver, V. (2013). How fair is access to more prestigious UK universities? *The British Journal of Sociology, 64*, 344–364.

Boliver, V., Crawford, C., Powell, M., & Craige, W. (2017). *Admissions in context: The use of contextual information by leading universities*. London: The Sutton Trust.

Bramley, T. (2014). Multivariate representations of subject difficulty. *Research Matters: A Cambridge Assessment Publication, 18*, 42–48.

Chowdry, H., Crawford, C., Dearden, L., Goodman, A., & Vignoles, A. (2013). Widening participation in higher education: analysis using linked administrative data. *Journal of the Royal Statistical Society: Series A (Statistics in Society), 176*, 431–457.

Crawford, C. (2014). *The link between secondary school characteristics and university participation and outcomes*. London: Department for Education.

Crawford, C., & Cribb, J. (2012). *Gap year takers: update, trends and long-term outcomes*. Research Report DFE-RR252. London: Department for Education.

Dilnot, C. (2016). How does the choice of A-level subjects vary with students' socio-economic status in English state schools? *British Educational Research Journal, 42*, 1081–1106.

Dilnot, C. (2018). The relationship between A-level subject choice and league table score of university attended: the 'facilitating', the 'less suitable' and the counter-intuitive. *Oxford Review of Education, 44*(1), 118–137.

Gill, T. (2017). *Provision of GCE A level subjects 2016*. Statistics Report Series No. 117. Cambridge: Cambridge Assessment.

Hayward, G., & Hoelscher, M. (2011). The use of large-scale administrative data sets to monitor progression from vocational education and training into higher education in the UK: possibilities and methodological challenges. *Research in Comparative and International Education, 6*(3), 316–329.

HEFCE. (2003). *Schooling effects on higher education achievement*. Bristol: Higher Education Funding Council for England.

Hupkau, C., McNally, S., Ruiz-Valenzuela, J., & Ventura, G. (2017). Post-compulsory education in England: Choices and implications. *National Institute Economic Review, 240*(1), R42–R57.

McCoy, T., & Adamson, D. (2016). Building a house on sand? Are vocational education and training qualifications an (in)equitable stepping-stone to success in higher education? In G. Steventon, D. Cureton and L. Clouder (Eds.), *Student Attainment in Higher Education: Issues, controversies and debates* (pp.161–173). Abingdon: Routledge.

Montacute, R., & Cullinane, C. (2018). *Access to advantage: the influence of schools and place on admissions to top universities*. London: Sutton Trust.

Ogg, T., Zimdars, A., & Heath, A. (2009). Schooling effects on degree performance: a comparison of the predictive validity of aptitude testing and secondary school grades at Oxford University. *British Educational Research Journal, 35*(5). 781–807.

Russell Group. (2017). *Informed Choices: a Russell Group guide to making decisions about post-16 education*. London: Russell Group.

Smith, S., Joslin, H., & Jameson, J. (2015). *Progression of College Students in England to Higher Education* (BIS Research Paper Number 239). London: Department for Business, Innovation and Skills.

Smith, J., & Naylor, R. A. (2005). Schooling effects on subsequent university performance: evidence for the UK university population. *Economics of Education Review, 24*, 549–562.

Sullivan, A., Parsons, S., Wiggins, R., Heath, A., & Green, F. (2014). Social origins, school type and higher education destinations. *Oxford Review of Education, 40*, 739–763.

Sutch, T., Zanini, N., & Vidal Rodeiro, C.L. (2016). The effect of specialism and attainment in secondary school on the choice of Higher Education institution and field of study. *Research Matters: A Cambridge Assessment Publication, 21*, 2–11.

Sutton Trust. (2011). *Degrees of success: University chances by individual school*. London: Sutton Trust.

UCAS. (2016). *Applicants and acceptances by groups of applicants 2015*. Cheltenham: Universities and Colleges Admissions Service.

UCAS. (2017a). *End of Cycle Report 2017: qualifications and competition*. Cheltenham: Universities and Colleges Admissions Service.

UCAS. (2017b). *End of Cycle 2017 Data Resources: acceptances by deferred and age*. Cheltenham: Universities and Colleges Admissions Service.

Vidal Rodeiro, C.L. (2007). *A level subject choice in England: patterns of uptake and factors affecting subject preferences*. Research Report. Cambridge: Cambridge Assessment.

Vidal Rodeiro, C.L. (2019). *Popularity of A level subjects among university students*. Cambridge Assessment Research Report. Cambridge: Cambridge Assessment.

Vidal Rodeiro, C.L., & Sutch, T. (2013). *Popularity of A level subjects among UK university students*. Statistical Report Series no.52. Cambridge: Cambridge Assessment.

Vidal Rodeiro, C.L., Sutch, T., & Zanini, N. (2015). Progressing to Higher Education in the UK: the effect of prior learning on institution and field of study. *Research Matters: A Cambridge Assessment Publication, 20*, 13–21.

Vidal Rodeiro, C.L., & Williamson, J. (2018). Meaningful destinations: using national data to investigate how different education pathways support young people's progression in England. *Research Papers in Education*.

Vidal Rodeiro, C.L., & Zanini, N. (2015). *The role of the A* grade at A level as a predictor of university performance in the United Kingdom*. Oxford Review of Education, 41(5), 647–670.

Studying English and Mathematics at Level 2 post-16: issues and challenges

Jo Ireland Research Division

Introduction

Alison Wolf stated in her *Review of Vocational Education* (2011) that despite General Certificate of Secondary Education (GCSE) Mathematics and English being key to employment and education prospects, less than 50 per cent of students achieved grades A*-C in both qualifications. The review recommended that English and Mathematics should form a required component of post-16 study programmes for those without GCSE grades A*-C in these subjects, working either directly towards GCSE or other qualifications which provide "significant progress" towards GCSE success.

This recommendation proved to be the catalyst for a number of revisions to Government policy. This article looks at these post-16 policy changes and the subsequent challenges and issues faced by students, teachers and providers of English and Mathematics at Level 2. It covers GCSE resits and Functional Skills. In addition, it aims to shed light on what support is needed by students and teachers, and whether those support needs differ according to the qualification in question.

The majority of published commentary in this area relates to learners in Further Education (FE) colleges who are resitting GCSE English and/or Mathematics. There is little work on those in other settings (e.g., sixth form colleges), or those taking other qualifications in English and Mathematics post-16. There is also more research relating to Mathematics than to English, although many of the findings may apply to both subjects.

Policy changes and effects

In 2014, the Government introduced the requirement that students in England aged 16–18 who have not achieved at least a grade C/4[1] in GCSE English or Mathematics should continue to study these subjects as part of their programme of study (Education and Skills Funding Agency, 2019). Furthermore, from 2015, it was decided that those students who have achieved a "near pass" (grade D/3) in English[2] and/or Mathematics must study a GCSE course. Those who achieved grade E/2 or below must study for a GCSE or an approved stepping-stone qualification (Education and Skills Funding Agency, 2019).

For the academic year 2019/20, students with a GCSE grade 2 or below in English and/or Mathematics can study for a Level 2 Functional Skills qualification or a GCSE grade 9 to 4. If these students achieve a pass grade for Level 2 Functional Skills, then they are no longer required to work towards the GCSE. Those with a GCSE grade 3 are still required to study for GCSE grade 9 to 4 (Education and Skills Funding Agency, 2019).

These Government requirements have led to significant increases in entries for students aged 17 and older taking GCSE English Language and GCSE Mathematics since 2014 (FFT Education Datalab, 2018). In 2014/15, around half of all post-16 students who did not achieve a pass grade in English or Mathematics were enrolled in FE colleges (Department for Education, 2016). Interestingly, sixth form colleges and sixth forms in schools achieve higher pass rates compared to FE colleges, possibly due to their higher entrance criteria and differences in teacher characteristics (Higton et al., 2017).

Although much of the research in this area concentrates on FE colleges, there are other settings to consider. (Creese, Litster, & Mallows, n.d.) addressed the impact of the Government requirements on

---

1. In 2017, the 9-1 grading scale was introduced for GCSEs in England, replacing the A*-G scale. Grade 4 is equivalent to grade C (Ofqual, 2017).
2. Students achieving C/4 or higher in English Literature are not required to study English post-16 (Education and Skills Funding Agency, 2019).