Learning aims:
A preliminary exploration to monitor A/AS level reform

Research Report

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Table of contents

Summary

AS and A levels are currently undergoing reform. The first new specifications were taught from September 2015, the second tranche from September 2016, and the final tranche will be reformed for first teaching from September 2017. Reformed A levels no longer have a modular assessment structure, and instead have fully linear assessment. AS levels have been 'decoupled' from A levels to form a standalone qualification.

Previous work by Sutch, Zanini, and Benton (2015) has argued that the A/AS reform, in combination with other reforms such as the tightening of funding for post-16 education, is likely to have an impact on subject uptake. Changes to subject uptake are particularly significant for awarding bodies and higher education institutions, but also have wider social and economic consequences. However, since the A/AS level reform has phased implementation, and A level entries will only be known as students approach the end of two years of study, it will be very difficult to know the effects of the reform on subject uptake until, perhaps, 2020.

Post-16 Learning Aims (PLAMS) data is administrative data held by the Department for Education (DfE) on the qualifications that Key Stage 5 candidates plan to enter. It has not previously been used by the Research Division, but may be a way to monitor changes in A/AS level uptake before entries and results data become available. The research reported here investigated the use of PLAMS data for monitoring the impact of A/AS level reform on uptake by subject. The research had three aims:

1. Evaluate the use of PLAMS data for monitoring the impact of A/AS reform
2. Offer recommendations on uses of PLAMS data more generally
3. Provide preliminary insights into the effects of the current A/AS level reforms

With respect to the use of PLAMS data, we found that in pre-reform years, learning aims recorded in PLAMS accurately predicted the AS levels that individual Year 12 students took the following summer. In the first year of reform (2015/16), learning aims recorded in PLAMS accurately predicted decreases in AS entries by subject at cohort level, even though PLAMS is not representative of the whole student population. In all years examined, PLAMS data accurately predicted the relative proportions of AS level entries in reformed subjects. Given that PLAMS data is available ahead of entries, this could potentially be used in order to give early warning of changes in individual subject uptake. We concluded that PLAMS data is not accurate at the level of identifying particular specifications (e.g., to differentiate between AS levels in the same subject), due to inaccuracy in QAN code recording.

In terms of the impact of the current reforms, we found no evidence of an overall move away from AS and A levels, and no evidence of a move away from reformed subjects. Furthermore, many Year 12 students, in the 2015/16 cohort at least, were still planning to take AS levels in reformed subjects, even though they could have studied for the A level only. The number of AS level aims in reformed subjects was lower than in previous years, as we would expect, but still outnumbered the number of A level aims. The reduction in AS

level aims and entries varied across reformed subjects, suggesting that subject-specific factors may be influencing student and school decisions regarding reformed AS levels.

Analysis of student characteristics showed that Year 12 students studying for AS and A levels in reformed subjects in 2015/16 were broadly comparable to the students choosing these subjects in the previous cohort. The analysis of student characteristics also confirmed that a relatively high proportion of the students affected first by the A/AS level reform (due to subject choices) are female and less able candidates, as suggested by previous research.

We conclude that despite some limitations, there is a potential role for using PLAMS data to monitor the impact of A/AS reform. However, the phased introduction of the reform means that the Key Stage 5 system will remain in a state of ongoing change for some time. In light of this complexity, it may be more fruitful to investigate the consequences of A/AS reform through an alternative strand of research that focuses on the reasons behind student and school choices.

Introduction

AS and A levels are currently undergoing reform. The first new specifications were taught from September 2015, the second tranche from September 2016, and the final tranche will be reformed for first teaching from September 2017. Although recent research shows that A levels in their current form are good preparation for university (e.g. Vidal Rodeiro & Zanini, 2015), the overall aim of the reform is to make the qualification more rigorous and to better prepare students for higher education. In a letter to Ofqual to set out the rationale for the reform, Michael Gove, as Secretary of State for Education, wrote (Gove, 2013):

> I believe that the primary purpose of A levels is to prepare students for degree-level study. […] Current A levels do not always provide the solid foundation that students need to prepare them for degree-level study and for vocational education. The modular nature of the qualification and repeated assessment windows have contributed to many students not developing deep understanding or the necessary skills to make connections between topics. […] I have concluded that the case for a fully linear A level is compelling.

In the previous system, A levels consisted of a number of separately-assessed units which could be resat, half of which constituted the AS qualification. It is therefore straightforward that the return to linear assessment for A level at the end of a two-year course could not leave AS qualifications unaltered. AS levels were 'decoupled' from the A levels to become a standalone qualification, as expressed by Gove (2013):

> The AS is regarded as a valuable qualification, and a useful means of securing breadth within an A level programme. I have concluded that it should be retained, but that its design should be reconsidered in order to establish it as a high quality standalone qualification.[1]

Although the current reforms will also update A level content, the change from modular to linear assessment is the principal change. As Gove's statement suggests, a linear assessment structure is believed to offer distinct benefits to teaching and learning, that will help make A levels "the solid foundation that students need". These benefits are increased time for teaching due to fewer assessment windows, and greater incentives, as well as time, for "deep understanding" instead of only short-term learning.

Heinrich & Stringer, writing in 2012, concluded that despite a "good deal of rhetoric about 'resit culture' and 'dumbing down'" in modular qualifications, the "scant evidence for either is less than compelling" (p. 22). Even if not extensive, published research does however support some of the concerns expressed. Hayward and McNicholl (2007) weighed the research evidence on students' learning in modular A levels and concluded there was "strong evidence" of negative effects from modularization, including "rushed and superficial" learning, teaching to the test, and too much time lost to examinations (p. 341). Research specifically on the effects of resits in modular A levels (Scott, 2012) has identified negative outcomes that linear assessment could avoid, including classroom disruption caused by

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[1] Gove additionally specified that he "would like the AS level to be as intellectually demanding as an A level, covering half of the content" (Gove, 2013), but the reformed AS levels have in fact been set at the same level of demand as pre-reform AS levels, i.e. between that of GCSE and A level.

teaching resitting students alongside non-resitting students, tactical or "beating the system" approaches to exam preparation (p. 442), and the negative effects of students sitting exams with insufficient maturity and subject knowledge. Research into the credibility of A levels has identified perceptions among education professionals that modular assessment makes higher A level grades easier to achieve, and – supporting Michael Gove's statement – encourages students to "compartmentalise knowledge and information, rather than viewing the whole" (Simpson & Baird, 2013, p. 29).

The reform currently underway is the largest change to A levels since the introduction of Curriculum 2000. The intended consequences, as noted, are A levels that provide "deep understanding", "skills to make connections between topics", and a "solid foundation" for degree-level study and vocational education (Gove, 2013). There may, however, be additional consequences. Ofqual has noted that "the move to linear assessment is not uncontroversial" (Ofqual, 2015c), and in addition to highlighting problems with the existing modular system, research has also pointed to potential 'side-effects' of the switch back to a linear system. Evaluating the benefits of the move to linear assessment is an important research topic to be addressed elsewhere, but is not the purpose of the current report. The current report is concerned with monitoring an important area of potential 'side-effects' of the reform, namely subject uptake.

Subject uptake and A/AS level reform
After the introduction of Curriculum 2000, the most common combination of post-16 qualifications became 3 A levels and 1 AS (Bell, Malacova, & Shannon, 2005). The 'fourth AS', the subject studied in Year 12 but not carried through to A2 to be studied in Year 13, led to increased breadth compared to previous patterns of uptake, a benefit noted by Gove (2013). We do not yet know what combination of A levels and decoupled AS levels will become the 'typical' combination, but recent work carried out by the Research Division (Sutch et al., 2015) has argued that the current A/AS reform, in combination with other reforms such as the tightening of funding for post-16 education, is likely to have an impact on subject uptake.

In the first place, the overall uptake of AS levels is expected to decrease, since decoupled AS levels will be optional instead of required qualifications for A level students. Secondly, lower uptake of AS levels will likely mean a greater number of students making (final) A level choices at the end of Year 11, and their subject choices may differ in the absence of the information gained by a year of AS level study. Thirdly, the phased implementation of the reform across subjects could see students act upon their dislike of linear specifications (National Union of Students, 2014; OCR, 2014) by opting for subjects that are still modular during the two-year transition period. Finally, subject choice could also be influenced if schools and colleges converge upon a different 'typical' model in different subject areas (e.g. typically offering the AS level in mathematics, but not in English). This may occur if co-teachability, university admissions requirements, or the gains to student learning from AS study vary across subjects.

A particular reason to monitor subject uptake during the transition period is that some subgroups of students are likely to be affected by A/AS reform sooner, due to the subjects

they are more likely to choose being the first to be reformed. Sutch et al. (2015) found that female students and pupils from more deprived socioeconomic backgrounds are among those more likely to be affected by the reform sooner, and these are the subgroups of students who have reported being least comfortable with the reform (OCR, 2014).

Monitoring subject uptake for potential changes is important to awarding bodies and higher education institutions, but also relevant to a wider audience. For awarding bodies, changes to subject uptake could alter the viability of qualifications, change the priorities of development work, and change the characteristics of cohorts entered for particular subjects. Checking the composition of the cohorts of new A/AS examinees will be important since it may inform the grading process. If, in fact, a new cohort is significantly different from the previous cohorts in a way that affects its average attainment, the comparable outcomes approach used to carry forward standards may not be applicable. An article featured by the TES (Wiggins, 2016a), proposes that the uncertainty around qualifications and subjects uptake may lead boards to raise fees and cut subjects in order to remain financially viable.

Universities could find courses no longer viable if changes in subject uptake result in a reduced number of applicants with the appropriate qualifications. Recent research (Sutch, Zanini, & Vidal Rodeiro, 2016) has confirmed that subjects taken at A level are important predictors of university attendance, both in terms of degree course and HE institution. In addition, with the previously-available information on candidates' attainment contained in AS grades no longer available for all candidates, selecting the most suitable candidates is likely to become more difficult. There are concerns that universities will respond with increasing use of entrance tests, which could present a further barrier to disadvantaged applicants (Weale, 2016).

More broadly, it should be noted that changes in subject uptake have implications for society and the economy. Some disciplines, such as Modern Foreign Languages and STEM (Science, Technology, Engineering and Mathematics) have been identified as pressing policy priorities (CBI, 2011; UKCES, 2011; Wiggins, 2016b). A move from key subjects due to A/AS reform would hinder the effort spent in trying to increase their uptake, and is an adverse effect that all parties would want early warning of. According to a survey carried out by UCAS (2015, 2016) a drop in AS uptake in Chemistry, Physics and Biology is likely from June 2016.

Purpose of current report
As pointed out by Sutch et al. (2015), the phased implementation of the reform alongside the shift to linear exams will make very difficult to know the effects of the reform on subject uptake until, perhaps, 2020. A partial picture may be gained sooner by examining entries, but until that point, schools' and candidates' intentions are the only source of information that can be examined in order to gain insights into the impact of the reform. The UCAS (2015, 2016) survey provided a first preliminary overview of the possible short-term effects of the reform. In addition to indications of uptake for individual subjects, it revealed that three-quarters of schools were still planning to offer AS levels of some sort in June 2016. The findings also suggested that independent schools were already moving towards a

three A level model or making plans to offer alternative qualifications to A/AS, such as Pre-U.

An alternative source of information to survey data that might help shed light on the effects of the A/AS level reform before 2020 is the administrative data held by the Department for Education (DfE) on the Post-16 Learning Aims (PLAMS) of pupils. This data contains information on the qualifications that Key Stage 5 candidates plan to enter at the beginning of the school year. PLAMS data is collected via the PLAMS module of the annual School Census, completed by schools for funding reasons (though not all of them have to provide this information), and forms part of the National Pupil Database (NPD).

PLAMS data has not previously been used by the Research Division, but appears to offer potential for monitoring changes in A/AS uptake, since it records data on students' choices ahead of exam entries and results. This report therefore investigates the use of PLAMS data for monitoring the impact of A/AS level reform on the uptake of A and AS levels by subject. It has three aims:

1. Evaluate the use of PLAMS data for monitoring the impact of A/AS reform
2. Offer recommendations on uses of PLAMS data more generally
3. Provide preliminary insights into the effects of the current AS/A level reforms.

The specific research questions used for the project were as follows:

1. What is the accuracy of predictions based on PLAMS?
2. What are candidates in Year 12 planning to enter?
3. Are students taking the new A/AS qualifications comparable to those taking the old A/AS qualifications?
4. What are the short-term effects of the reform on candidates' intentions to take the new AS qualifications?

PLAMS data

A short description of PLAMS and its coverage

PLAMS data constitutes part of the National Pupil Database (NPD), but it is only provided by the DfE if requested. PLAMS is a module of the Autumn School Census where schools are required to list pupils' learning aims for administrative reasons. The PLAMS data is used by the Education Funding Agency (EFA) to calculate funding for schools[2]. This is a crucial aspect of PLAMS as it affects its coverage and therefore its usability. The PLAMS User Guide (DfE, 2013) states that this module:

> is only required from secondary schools with sixth forms, including middle deemed secondary schools, CTCs and academies (including free schools). This module is not required from special schools, pupil referral units (PRUs), alternative provision academies (including alternative provision free schools) or secondary schools without sixth forms.

Clearly, many school types will not be covered by PLAMS. School type is not a variable in PLAMS, but for candidates in PLAMS it can be retrieved from the NPD. Table 1 compares the school type distributions for the NPD results in June 2015 (including both A and AS) and for the PLAMS learning aims of Year 12 candidates in autumn 2014. The frequencies are not comparable due to the different scope of the two datasets, but the percentages are. These figures confirm that PLAMS data are not representative of the school/college population: sixth form colleges, further education colleges and the independent sector are essentially unrepresented. Findings therefore only apply to comprehensive and grammar schools with sixth forms.

Table 1: NPD and PLAMS 2014/15, coverage by school type

School type	NPD June 2015 (AS/A level students)		PLAMS Autumn 2014 (all Year 12 students)	
	N	**%**	**N**	**%**
Comprehensive	335229	41.30	168599	83.44
Selective	49166	6.06	24487	12.12
Modern	11773	1.45	5693	2.82
Other maintained	6572	0.81	2994	1.48
Independent	62000	7.64	33	0.02
Sixth Form College	142353	17.54	43	0.02
Other FE College	203942	25.13	215	0.11
Missing	619	0.08	3	0.00
Total	*811654*		*202070*	

Whilst PLAMS data are not representative of the school/college population, at a school level the coverage is very good, since, as noted, schools which are obliged to complete the PLAMS module of the census are required to do so to receive funding. Year 12 students

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[2] Note that college funding is dealt with separately.

recorded in PLAMS data form a subset of Year 12 students who appear in the National Pupil Database for that same year.

Schools required to complete the PLAMS module of the school census must record learning aims for both the current and previous academic years. To complete the PLAMS module in autumn 2015, schools were instructed to include the following (DfE, 2016b, p. 79):

- All learning aims studied in 2015/16 by students in Year 12 or above (regardless of age), who were on roll at the school at any time between 1 August 2015 and census day
- All learning aims studied in 2014/15 by students who were in Year 12 or above at that time (regardless of age), and on roll at the school at any point between 1 August 2014 and 31 July 2015.

The second of these categories may include learning aims for students who have already left the school.

Variables available
PLAMS data contains one record per learning aim, for all learning aims included within scope. In most cases, a single student has multiple learning aims, and hence is associated with multiple records in PLAMS. For each learning aim, the following information is recorded:

- Pupil identification code
- Qualification identification code
- Subject mapping code and description
- Date when the learning aim will start/started
- Date when the learning aim is planned to end
- Current status of the learning aim:
    o Live
    o Completed
    o Withdrawn
    o Transferred (e.g. from one subject to another, in same qualification)
- Date of actual completion, for completed aims

The full list of variables in the PLAMS data extracts used in this project can be found in Appendix A, Table A1. The NPD data tables[3] can be consulted in order to see the complete list of all variables that can be requested.

Every learning aim in PLAMS is stored with a qualification identifier, the variable QAN, to identify which qualification the "learning aim" is intended to achieve. QAN codes are defined by Ofqual and are available for all qualifications with section 96 approval (i.e., regulated by Ofqual and approved for teaching to young people). Although section 96 is the "more definitive" source of QAN data, for the purposes of completing the PLAMS module

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[3] https://www.gov.uk/government/publications/national-pupil-database-user-guide-and-supporting-information

schools are instructed to use the Department for Education's QAN Web Site[4] (QWS) data. The QWS data is derived from the section 96 database, but additionally includes each qualification's discount code[5] (DfE, 2013, p. 9). In the majority of cases, a single QAN code corresponds to a unique qualification, but where this is not the case, the QAN code and discount code together uniquely identify the qualification. This applies in cases where a single qualification has multiple possible pathways. A level Art & Design, for example, has specialisms such as Photography, Graphics, Fine Art and Textiles within one QAN code. Schools are required to provide both QAN and discount code for each learning aim, when completing the PLAMS module.

In order to interpret learning aims recorded in PLAMS, additional details of the qualifications specified by QAN and discount codes are required, and this information is available from the QWS. For each possible QAN and discount code combination, the following relevant information is available:

Table 2: Relevant information provided by QAN and discount code combination

Variable	Description	Example
QAN	Qualification identifier	6014743X
AB	Awarding body code	110 (=OCR)
QualType	Code for qualification type	AA (=A level)
QualificationTitle	Full name of qualification	OCR Level 3 Advanced GCE in Physics A
DiscCode	Discount code	1210
QualShortTitle	Specific subject	Physics A
QualificationDescription	Name of qualification type	GCE A level
NQF	Level of qualification	3
DiscountFamily	Family of qualifications	GEN (=General)
QualCode	Normal code for type of qualification, as in NPD	111 (=A level)
EffectiveFrom[6]	Date from which QAN record is effective	01/09/2007

The qualification information in Table 2 was matched into the PLAMS data extracts using QAN code, or a combined identifier of QAN and discount code where QAN alone did not uniquely identify a qualification.

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[4] https://collectdata.education.gov.uk/qwsweb/(S(5acqgjztyz3uptrerdtjmg45))/Main.aspx
[5] Discount codes are assigned on the basis of subject area. "The purpose of a discount code is to group qualifications with similar content together and compare them to the other qualifications with that code." (DfE, 2016a, p. 5) In most cases, therefore, the discount code is the same as the mapping code. The practice of "Discounting" is to ensure that "where a pupil has taken two or more qualifications with an overlap in curriculum, the performance tables only give credit once for teaching a single course of study." (DfE, 2016a, p. 3)
[6] The date until which a QAN record is active is also available ("EffectiveTo"), but this is set to 31/12/9999 for all current QAN codes (including legacy AS and A levels), and therefore cannot help to distinguish reformed and legacy versions.

Identifying versions of AS and A level learning aims

For the present research project, we wished to know whether learning aims corresponded to reformed or legacy versions of AS and A levels. Although the QAN information listed by the DfE unfortunately does not include an identifier for this purpose, reformed AS and A levels do have different QAN codes to their legacy counterparts (as is clear from examining awarding body specifications).

Using the QAN date information shown in Table 2, together with the published reform timetables of AS and A levels (DfE, 2015a; Ofqual, 2015a), we classified QAN codes of AS and A levels into reform and legacy versions using the following logic:

1. If subject reformed for first teaching in September 2015 and EffectiveFrom date before 2014, then QAN is for a legacy qualification
2. If subject reformed for first teaching in September 2015 and EffectiveFrom date after 2014, then QAN is for a reformed qualification
3. If subject NOT reformed for first teaching in September 2015 (i.e. will be reformed later, or not at all), then QAN is for a legacy qualification

To check the reliability of this classification, we cross-tabulated QAN codes by subject and "EffectiveFrom" date. This confirmed that:

- The only AS/A levels with an EffectiveFrom date after 2014 are in subjects reformed for first teaching in September 2015
- AS/A levels in subjects reformed for first teaching in September 2015 had no QAN codes with EffectiveFrom dates between 2007 and 2015, i.e. those not new in 2015 were active from before 2007 and thus necessarily legacy qualifications.

Specific notes on the recording of AS and A level aims in 2015/16

The autumn 2015 school census is the first to include learning aims for reformed AS and A levels. The reformed A level is a two year linear course, whilst the AS level remains a one year course. We expect to see these differences reflected in the learning aims of Year 12 students in 2015/16, but in order to interpret the learning aims data correctly, it is important to note carefully how reformed A level learning aims will be recorded.

The DfE's school census guidance for autumn 2015 explains that schools should record reformed A level learning aims differently depending on whether or not the student is also planning to take the AS level (DfE, 2016b, pp. 91-94), even though the reformed AS and A levels are now independent qualifications. This is most clearly explained using visual examples of how to record reformed AS and A level learning aims, as shown in Figure 1. More complex cases, where a student withdraws or transfers between learning aims, have been excluded.

Example A: Learner starts intending to do only an AS-level. They complete the AS level as planned and do no further study in this subject in Year 13.

	Year 12	Year 13	Notes
Current system	AS level subject 1		
From 1 Aug 2015	AS level subject 1		No change to current approach

Example B: Learner starts intending to do only an AS-level. Following the AS results they decide to take the A level in Year 13.

	Year 12	Year 13	Notes
Current system	AS level subject 1	A level subject 1	
From 1 Aug 2015	AS level subject 1	A level subject 1	No change to current approach

Example C: Learner starts intending to do only an A-level, and does not enter for the AS level. They complete the A-level as planned.

	Year 12	Year 13	Notes
Current system	AS level subject 1	A level subject 1	
From 1 Aug 2015	A level subject 1		Recorded as a two-year aim

Example D: Learner starts intending to do both an AS-level and an A level. They complete both learning aims as planned.

	Year 12	Year 13	Notes
Current system	AS level subject 1	A level subject 1	
From 1 Aug 2015	AS level subject 1	A level subject 1	No change to current approach

Example E: Learner starts intending to do only an A-level, but during Year 12 decides to enter for the AS level as well.

	Year 12		Year 13	Notes
Current system	AS level subject 1		A level subject 1	
From 1 Aug 2015	A level subject 1			The A-level learning aim in Year 12 is closed and transferred to an AS level, with a new A level aim recorded in Year 13.
		AS level subject 1	A level subject 1	

Figure 1: Recording reformed A level learning aims in 2015/16. Adapted from DfE (2016b, pp. 92-93).

Figure 1 shows that there is only one case (Example C) in which a student intending to take a two year reformed A level is recorded as having a two year learning aim. For the purposes of the present research, a particularly important case is Example D, where a student aims to complete a two year reformed A level, but also aims to complete a reformed AS level. The DfE's instructions mean that students in this situation will <u>not</u> appear to have an A level aim in Year 12, even though they do intend to complete the two year A level course.

Although it is not explicitly stated, the principle underlying the guidance appears to be that students should not have multiple 'live' AS/A level learning aims in the same subject at the same time.

The first consequence of the above guidance will be to limit the increase in the number of Year 12 A level aims between 2014/15 and 2015/16, that would otherwise have been expected given the reforms. A second potential consequence might be an increase in errors in the recording of A level learning aims. For AS and A level aims in 2015/16, change has occurred simultaneously in three ways: change in QAN codes (but only for reformed qualifications), change in learning aim length (but only for reformed A levels, and only in certain situations) and change in recording instructions. From this combination, we might expect a higher rate of errors in recording learning aims than in previous years.

Uses of PLAMS

The most visible use of PLAMS data is in the DfE's reporting of participation and retention rates in post-16 education, such as the statistical first release *Interim retention measure for school sixth forms: 2013-2014* (DfE, 2015b). In this example, PLAMS data is used to establish the number of post-16 students aiming to complete different types of qualification (e.g. AS level, Applied A level), and the completion rates[7] of the different types.

Research use of PLAMS data appears to be rare. Since research literature was sparse, we carried out a search of requests to use PLAMS data in order to more successfully identify where PLAMS data was being used. The DfE publishes lists of third party NPD requests, and we searched the list of requests made between 1st April 2012 and 31st March 2016, for all applications seeking data on learning aims. The search revealed seven data requests, relating to five distinct projects, namely:

1. A quantitative evaluation of the new 16-19 bursary fund, to be carried out by the Institute of Fiscal Studies (IFS), commissioned by the DfE. Learning aims will be used to provide the measure of participation.
2. An exploration of the factors leading to school drop-out during Years 12 and 13, to be carried out by MIME Consulting Limited, with London Councils and the Institute of Education. Learning aims will be used to classify drop-out students by type of post-16 course, to assess drop-out at different points in school 6th forms, and to

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[7] "A qualification is counted as complete when a student has continued studying to the end of the course. Students don't necessarily have to be entered for, or pass, exams." (DfE, 2015b, p. 3) The interim retention measure is therefore not the same as a qualification success measure (which takes into account whether the qualification was achieved or not).

assess post-16 outcomes of learners more generally (without relying on assessment outcomes, which would only include awarded qualifications).

3. A review of craft-related education, to be carried out by Trends Business Research Limited (TBR) on behalf of the Crafts Council. Learning aims data will be used to calculate participation in particular forms of craft education.

4. The Skills Funding Agency's Learner Destinations study (multiple versions), carried out by GfK (e.g. GfK NOP, 2014). Learning aims data will be used to provide measures of participation in post-16 destinations.

5. A University of Sheffield study on the provision of HE options in England. Learning aims data will enable students who are *not* progressing into HE or training to be identified.

All seven data requests were approved by the DfE, and research outputs could be identified for four of the five projects. Additional searching for recent research making use of PLAMS data identified two further studies: a 2015 report on achievement and retention in post-16 education, carried out for the Local Government Association (Centre for Economic and Social Inclusion, 2015), and a study of labour market returns to qualifications in FE by the Department for Business, Innovation and Skills (Bibby, Buscha, Cerqua, Thomson, & Urwin, 2014).

In the majority of studies noted above, PLAMS data has been used to measure participation in post-16 education, in contrast to the measures of post-16 attainment that the NPD's examination results data provides. Several of the studies are concerned with high-level trends in rates of participation (Britton, Chowdry, & Dearden, 2014; Crafts Council, 2014; GfK NOP, 2014), and several again are interested in examining drop-out or non-completion on specific courses during post-16 education (Bibby et al., 2014; Centre for Economic and Social Inclusion, 2015). For both of the latter two studies, completion or non-completion of learning aims was assessed using indicators provided in the learning aims data itself. From the published outputs, it does not appear that any of these studies compared learning aims at the beginning of KS5 with awarding body entry data or attainment data for individual students, as the present study seeks to do. The research most obviously relevant to the present project is the Local Government Association's 2015 report on achievement and retention in post-16 education (Centre for Economic and Social Inclusion, 2015), which includes analysis of AS and A level completion at individual subject level.

Several of the reports incorporating PLAMS data point towards potential problems or limitations of the data. The authors of the Local Government Association report note that "Establishing a clear trend in terms of withdrawal rates post-16 is difficult due to some quality issues with the PLAMS data relating to learning completion status in certain years. For example, in 2011, just over 11% of learning aims (around 234,000 records), had no completion status recorded." (Centre for Economic and Social Inclusion, 2015, p. 7). The DfE itself has found problems matching learning aims data to awarding body data, and these problems motivated a change in the methodology used for the DfE's statistics on post-16 learning. Previously, the DfE published qualification success rates based on matching the learning aims in the autumn school census to awarding body data, but

difficulties in matching meant that "the percentage of aims not matched to awarding body data differed greatly between schools; the data were therefore not sufficiently robust to enable comparisons to be made" (DfE, 2014, p. 2). Aside from duplicate learning aim records in the census data, the reason posited for the non-matching was "Schools reporting non-regulated, incorrect or outdated Qualification Numbers [QAN codes]", emphasising that the accuracy of learning aims data is dependent on the accuracy of schools' census completion (DfE, 2014, p. 4). These previously-identified issues with PLAMS data are of varying relevance to the present project, but they serve as useful cautions.

Methodology

Restriction of the sample

The present research project focuses on the learning aims of students in 2015/16, as this was the year of first teaching for the first tranche of reformed AS and A levels. The learning aims of particular interest are the AS and A level aims of students at the start of their KS5 education, i.e. in national curriculum Year 12 in the year 2015/16. To examine recent trends, we also analyse the learning aims of Year 12 students in 2013/14 and 2014/15. The PLAMS extract for a given year contains the learning aims of students in various year groups[8], and contains the learning aims for both the current and previous academic years, as previously noted. The PLAMS data extract from each year (2013/14, 2014/15 and 2015/16) was therefore restricted to the learning aims of interest for this project by including only the following:

- Students in actual national curriculum Year 12;
- Learning aims starting in the same academic year as the census, i.e. from the 2015/16 PLAMS data (collected in autumn 2015), only including learning aims starting in academic year 2015/16;
- Learning aims marked as 'live' (i.e. learner has not already completed the aim, withdrawn the aim, or transferred onto a different aim).

As an example, Table 3 and Table 4 show how these restrictions were applied to the 2015/16 PLAMS data. Table 3 shows all learning aims in the 2015/16 PLAMS data, classified by student year group and start year. There are 3.3 million learning aims in total, of which 1.6 million have a start year of 2015/16. Among Year 12 students, 96.4% of learning aims are for 2015/16. This makes sense, since learning aims are only reported for students in Year 12 or above: students currently in Year 12 would only have learning aims from previous years if they have repeated Year 12. Among students in Year 13, there is a more even split between learning aims for 2015/16 (42.6%) and learning aims from 2014/15, when they were in Year 12 (57.3%).

Table 3: All learning aims in 2015/16 PLAMS data (679,000 students)

Student's year group	Start year of learning aim						Total
	2013/14		2014/15		2015/16		
	N	row %	N	row %	N	row %	
Year 12	82	0.01	35662	3.62	949077	96.37	984822
Year 13	2122	0.15	799131	57.30	593415	42.55	1394675
Year 14	359	2.91	6840	55.43	5141	41.66	12340
unknown	53664	6.03	809733	91.03	25834	2.90	889551
All	*56227*	*1.71*	*1651372*	*50.33*	*1573467*	*47.95*	*3281395*

Note: rows and columns with fewer than 10 learning aims have been excluded.

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[8] Schools are instructed to include the aims of all students in Year 12 or above.

Table 3 shows that for many learning aims in PLAMS 2015/16, the student's year group is unknown. The impact on the current research is however fairly low, since the focus of the present research is on learning aims starting in 2015/16, of which only 1.6% belong to students with an unknown year group.

Table 4 shows the 2015/16 PLAMS learning aims with two restrictions applied: learning aims that are 'live', and for students whose year group is known. Learning aims from previous years that have been successfully completed no longer show as 'live' in the PLAMS data, so it makes sense that the live learning aims are dominated by those from the current academic year. The 905,794 live learning aims of Year 12 students in 2015/16 (highlighted) are the learning aims analysed in this research. For the vast majority of students, Year 12 is their first year of KS5 study, so the 2015/16 learning aims make up 99.8% of the learning aims of current Year 12 students.

Table 4: Live learning aims of students in 2015/16 PLAMS data with known year group (437,000 students)

Student's year group	Start year of learning aim						Total
	2013/14		2014/15		2015/16		
	N	row %	N	row %	N	row %	
Year 12	61	0.01	1450	0.16	**905794**	99.83	907305
Year 13	271	0.04	56933	9.29	555507	90.66	612711
Year 14	106	1.76	1004	16.65	4921	81.60	6031
All	*438*	*0.03*	*59387*	*3.89*	*1466222*	*96.08*	*1526047*

Note: rows and columns with fewer than 10 learning aims have been excluded.

For the majority of the analysis, we imposed an additional set of restrictions for reasons of comparability among the learning aims. Specifically, we focused on learning aims at the standard level for KS5 study (national curriculum level 3), and learning aims likely to be a main learning aim, rather than an additional or recreational learning aim. We therefore excluded the following aims:

- Learning aims for qualifications above level 3 (0.03% of Year 12 aims in 2015);
- Learning aims for qualifications below level 3 (9%);
- Learning aims for which we could not identify a qualification or basic description (0.05%);
- Learning aims for qualifications in General Studies and Critical Thinking (2%);
- Learning aims for graded arts qualifications (e.g. Grade 5 piano performance) (0.01%).

Analysis techniques

The above restrictions were applied to the three cohorts of PLAMS data available in order to explore what Year 12 students were planning to enter in terms of combinations of qualifications and subjects. Although a broad set of academic and vocational qualifications are available to post-16 candidates, the analyses were mainly aimed at checking potential effects of the reform on A and AS qualifications. For this reason candidates were classified with respect to the combination of qualifications they were planning to enter and four mutually exclusive categories were considered:

- candidates planning to take A and/or AS levels only;
- candidates planning to take at least one A/AS and any other academic qualification;
- candidates planning to take at least one A/AS and any other qualification, including at least one vocational qualification;
- candidates taking other qualifications only.

To the same end of checking the potential effects of the AS and A level reform, students were further classified according to whether or not they had any AS level learning aims, whether or not they had any A level learning aims, and by number of AS and A level learning aims.

AS and A level subjects were classified into two different categories, those reformed for first teaching from September 2015 and those not yet reformed. We used the information contained in PLAMS (specifically, QAN code) to further classify learning aims in AS and A level subjects by particular specification.

For OCR we were able to retrieve the actual number of AS entries to the 2016 Summer series. This provided a first way to check the predictive accuracy of the information contained in PLAMS. However, in order to provide an overall assessment of the accuracy of students' plans reported in PLAMS, for 2013/14 and 2014/15 candidates' learning aims in PLAMS were linked to actual results recorded in the KS5 extracts of the NPD for the following June examination session. Accuracy was then analysed by overall number of A/AS qualifications taken and by specific aims/subjects taken.

The NPD was also used to investigate the characteristics of candidates planning to take AS levels in reformed subjects compared with those taking non-reformed subjects. For this purpose, instead of linking students in PLAMS to their KS5 results the following summer, each cohort of Year 12 candidates included in PLAMS was linked to the results they achieved at GCSE the previous summer (using the KS4 extracts of the NPD). In this way, for each candidate in PLAMS, it was possible to retrieve the following individual characteristics: gender, ethnicity, language spoken at home, a measure of socio-economic background (the IDACI score), attainment at KS2, attainment at GCSE (in point score: A*=7, A=6, …), number of GCSEs taken. It was also possible to retrieve information about Key Stage 4 school: whether the school was independent or state maintained and the average GCSE attainment of the school.

On the basis of the above characteristics, two comparisons were performed. The first one aimed at understanding whether the group of Year 12 candidates planning to sit reformed subjects (or at least one) was different from the group of candidates planning to take only

non-reformed subjects. This could provide useful evidence to clarify whether certain subgroups of candidates might be affected by the reform sooner than others. The second comparison focused on changes over time, and aimed to check whether any relevant difference in the composition of candidates taking reformed subjects arose between 2014/15 and 2015/16.

The two comparisons were performed in two different ways: *i)* analysing the breakdown of the two groups of students by each variable considered and *ii)* with a multivariate analysis aimed at considering all the variables together. In the latter case a logistic regression analysis was performed for candidates planning to enter at least one A/AS level. In the first of the two comparisons, the analysis was restricted to candidates in PLAMS 2015/16 and the dependent variable was the probability of planning to enter at least one AS/A level in a reformed subject. In the second comparison, designed to check for relevant differences in the composition of candidates choosing reformed subjects, the analysis was restricted to candidates planning to enter at least one AS/A level in a reformed subject and the dependent variable was the probability of being in Year 12 in 2015/16 rather than in 2014/15.

In order to present the results of the regression analysis, the predicted probability of taking at least one reformed A/AS subject in 2015/16 and, conditioning on taking at least one reformed subject, being in Year 12 in 2015/16 rather than in 2014/15, was computed as:

$$\hat{e}_i = \widehat{e(X)}_i = Pr(\widehat{Y_i = 1}|\ X_i) = \frac{e^{\hat{\beta}_0 + \hat{\beta}_1 X_{1i} + \hat{\beta}_2 X_{2i} + \cdots + \hat{\beta}_k X_{ki}}}{1 + e^{\hat{\beta}_0 + \hat{\beta}_1 X_{1i} + \hat{\beta}_2 X_{2i} + \cdots + \hat{\beta}_k X_{ki}}}\ ;$$

where *X* are individual and school-level characteristics of each candidate. The predicted probability of the logistic regression provides an estimate for *e(X)*, the *propensity score.* It has been shown that, when all the characteristics affecting *Y* are observed and included in the regression specification, the propensity score contains all the information needed to compare the two groups of candidates defined by the dependent variable (Rosenbaum & Rubin, 1983). For this reason, a simple comparison of the distribution of the propensity score for the two groups under scrutiny will be presented as a summary of the results of the regression analysis.

Results

What were the aims of Year 12 students in 2015/16 and recent years?
The most common learning aims of Year 12 students in 2015/16 were AS and A levels, which together constituted 75% of learning aims (Table 5). The proportion accounted for by AS levels was substantially lower than in 2013/14 or 2014/15, and the proportion accounted for by A levels was substantially higher, as anticipated given the teaching of reformed A levels from September 2015. The proportion accounted for by AS and A levels together, however, remained stable, as did the proportions of learning aims in most other qualifications. The proportion of learning aims in Applied A/AS levels declined from 2013/14 to 2015/16, reflecting a longer-term trend in these qualifications (see for example Gill, 2016). The proportion accounted for by the EPQ, in contrast, increased overall, due to a large increase between 2014/15 and 2015/16.

Table 5: Learning aims of Year 12 students, by qualification type and year

Qualification group	Academic year					
	2013/14		2014/15		2015/16	
	N	col %	N	col %	N	col %
AS level[9]	716512	73.28	701964	73.17	584430	64.52
Above L3	815	0.08	864	0.09	314	0.03
A level[9]	14280	1.46	12637	1.32	94795	10.47
Applied A/AS[9]	32687	3.34	29198	3.04	22660	2.50
Below L3	82070	8.39	91121	9.50	82787	9.14
Diploma	300	0.03	388	0.04	86	0.01
EPQ	11302	1.16	11276	1.18	13121	1.45
Graded Arts	120	0.01	271	0.03	126	0.01
IB	10282	1.05	5374	0.56	5601	0.62
No Qual Data	777	0.08	428	0.04	431	0.05
Other GQ[10]	319	0.03	765	0.08	3451	0.38
Other VQ[11]	107246	10.97	103653	10.80	96028	10.60
Pre U	1040	0.11	1403	0.15	1964	0.22
Total	*977750*		*959342*		*905794*	

Note: qualifications excluded from further analysis (see page 17) have been shaded grey. Learning aims in General Studies and Critical Thinking (20,265 aims) were also excluded from further analysis.

Table 6 shows that in 2015/16, the majority of all Year 12 students (66.2%) had at least one AS level learning aim and no A level aim, and a further 17.2% had at least one AS and one A level aim. As we would expect from the AS and A level reform, the proportions of students with each possible combination of AS and A level aims are different from those of

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[9] AS levels and A levels were counted separately from Applied AS and A levels.
[10] Including Advanced Extension Awards, and level 3 Free Standing Maths Qualifications.
[11] Including BTEC, Cambridge Technicals and OCR Nationals at level 3.

previous years. For students starting Key Stage 5 in 2013/14 and 2014/15, when A levels could not be taken without achieving an AS level, the proportion of Year 12 students with at least one AS level learning aim and no A level aims was around 85%, for example. The proportion of Year 12 students aiming to take an A level without any AS levels was less than 1% in both 2013/14 and 2014/15, whereas after the introduction of the first reformed AS and A levels, it is now approximately 5%. The proportion of Year 12 students with neither AS nor A level aims has remained very similar since 2013/14; although the number of Year 12 students studying for AS and A levels in 2015/16 is lower than in previous years, they represent the same proportion of their cohort as AS and A level students in recent years.

Table 6: Presence of AS and A level aims, all Year 12 students

AS / A level aims	2013/14		2014/15		2015/16	
	N	%	N	%	N	%
No AS and no A levels	27671	11.56	26587	11.29	26836	11.66
At least one AS; no A levels	202013	84.39	200001	84.95	152380	66.22
At least one A level; no AS	1497	0.63	1824	0.77	11328	4.92
At least one AS and at least one A level	8205	3.43	7026	2.98	39583	17.20
Total	*239386*		*235438*		*230127*	

Year 12 students were classified according to the combination of qualifications in their learning aims (Table 7). After excluding non-Level 3 qualifications, the most common qualification pathway in each year was a combination of AS and A levels. The next most common was AS and A levels combined with mixed or vocational qualifications. The proportion of students on each pathway remained very stable between 2013/14 and 2015/16. The greatest change was in students combining AS and A levels with other qualifications: in 2015/16, a higher proportion of students combined AS/A levels with other academic qualifications than in previous years, and a lower proportion combined AS/A levels with mixed or vocational qualifications.

Table 7: Year 12 students by qualification pathway

Pathway	2013/14		2014/15		2015/16	
	N	%	N	%	N	%
AS/A levels only	137237	57.33	136307	57.90	134607	58.49
AS/A + other academic	8205	3.43	8883	3.77	12236	5.32
AS/A + mixed/vocational	66273	27.68	63661	27.04	56448	24.53
Other	27671	11.56	26587	11.29	26836	11.66
Total	*239386*		*235438*		*230127*	

In each year, approximately 30% of Year 12 students studied AS/A levels in combination with other qualifications. Table 8 lists the number and proportion of Year 12 students studying the most frequently chosen learning aim combinations involving AS/A levels[12].

Table 8: Most popular combinations[13] involving AS/A levels, Year 12 students

Learning aim combination	2013/14		2014/15		2015/16	
	N	%	N	%	N	%
AS/A levels only	137237	57.34	136307	57.90	134607	58.50
AS/A + Other VQ	39298	16.41	38888	16.52	36147	15.71
AS/A + Applied A/AS	17635	7.36	15864	6.74	12586	5.46
AS/A + EPQ	7616	3.18	7842	3.34	9592	4.17
AS/A + Applied A/AS + Other VQ	6020	2.52	5635	2.39	3908	1.69
AS/A + EPQ + Other VQ	1723	0.72	1618	0.68	1680	0.73
AS/A + Other GQ	108	0.05	322	0.14	1618	0.70
AS/A + Other GQ + Other VQ	84	0.04	163	0.07	767	0.33
AS/A + Pre U	321	0.14	533	0.22	750	0.33
AS/A + Applied A/AS + EPQ	841	0.36	738	0.31	725	0.32

Table 8 shows that the order of the most popular six combinations has not changed since 2013/14. The most notable change among these combinations is the decrease in the proportion of students combining AS/A levels with vocational qualifications. The proportion choosing AS/A level + Other VQ, whilst it still remains the second most popular combination, decreased from 16.4% to 15.7% between 2013/14 and 2015/16. The proportion choosing AS/A level + Applied AS/A level, the third most popular combination, decreased steadily from 7.4% in 2013/14 to only 5.5% in 2015/16, presumably reflecting both the longer-term decline of Applied AS/A levels and the fact that the AS and A reform is reducing their provision.

The proportion of Year 12 students choosing AS/A level + EPQ, in contrast, increased from 3.2% in 2013/14 to 4.2% in 2015/16. Table 8 shows that in 2015/16, an additional 1750 students chose to study AS/A level + EPQ. This means that the increase for this learning aim combination alone accounts for more than half of the increase in the number of Year 12 students on an AS/A level + Other GQ pathway (an additional 3353 students between 2014/15 and 2015/16, see Table 7).

Amongst the 11.7% of Year 12 students with no AS or A level aims in 2015/16 (the 'Other' students shown in Table 7), the majority (80.3%) were studying qualifications in the 'Other VQ' category only.

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[12] For a list of the top 30 learning aim combinations overall (including combinations without AS/A levels), see Appendix B, Table B1.
[13] Those studied by at least 500 students in 2015/16.

Amongst students with only AS and A level aims in 2015/16, the majority (74.7%) had AS level aims and no A level aims[14]. This proportion is, however, much lower than the corresponding proportion in 2013/14 and 2014/15 (Table 9): before the first teaching of reformed AS and A levels, approximately 95% of Year 12 students on an AS/A level pathway had AS level aims only.

Table 9: AS and A level aims, Year 12 students taking AS/A levels only

Aims	2013/14		2014/15		2015/16	
	N	%	N	%	N	%
At least one AS; no A levels	130337	94.97	130211	95.53	100604	74.74
At least one AS and at least one A level	6429	4.68	5295	3.88	29473	21.90
At least one A level; no AS	471	0.34	801	0.59	4530	3.37
Total	*137237*		*136307*		*134607*	

Despite the increased proportion of Year 12 students with an A level aim, the most common combination of AS and A levels for Year 12 students on the AS/A level only pathway in 2015/16 was four AS levels and no A levels[15], as it was in 2013/14 and 2014/15. The proportion of AS/A level students studying this combination in 2015/16 (53.68%, see Table 10) was however lower than in 2013/14 and 2014/15 (71.2% and 73.1% respectively, see Appendix C, page 46, Table C1 and Table C2). The corresponding increases were split amongst the combinations involving one or more A levels (again, see Table C1 and Table C2).

Table 10: Percentage of students by number of A/AS levels, Year 12 students on A/AS level pathway, 2015/16

Number of A levels	Number of AS levels						
	0	1	2	3	4	5	6 or more
0	.	0.74	1.63	16.34	53.68	2.24	0.10
1	0.14	0.36	3.17	4.69	0.56	0.03	0.01
2 or more	3.23	7.51	4.89	0.32	0.34	0.01	0.00

To set these changes in context, Table 11 shows the average number of learning aims and AS/A level learning aims per student, for each year. The table shows that the average number of aims per student decreased slightly for Year 12 students on all pathways, across the three years examined. The same data are shown in Figure 2, to better illustrate the details of the overall decrease. For students with no AS/A level learning aims (the 'Other' pathway), the majority of the decrease in average learning aims per student occurred between 2013/14 and 2014/15. For students with AS/A level aims (all remaining pathways),

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[14] Note that following DfE guidance, Year 12 students intending to complete a reformed A level course as well as the reformed AS level in the same subject should **not** have been recorded as having an A level aim, even though they are intending to complete the two year A level (see page 11).
[15] Again, this will underestimate the proportion of Year 12 students with a reformed A level learning aim.

the larger decrease occurred between 2014/15 and 2015/16, coinciding with the introduction of reformed AS and A levels in September 2015.

Table 11: Average number of learning aims per Year 12 student, by pathway

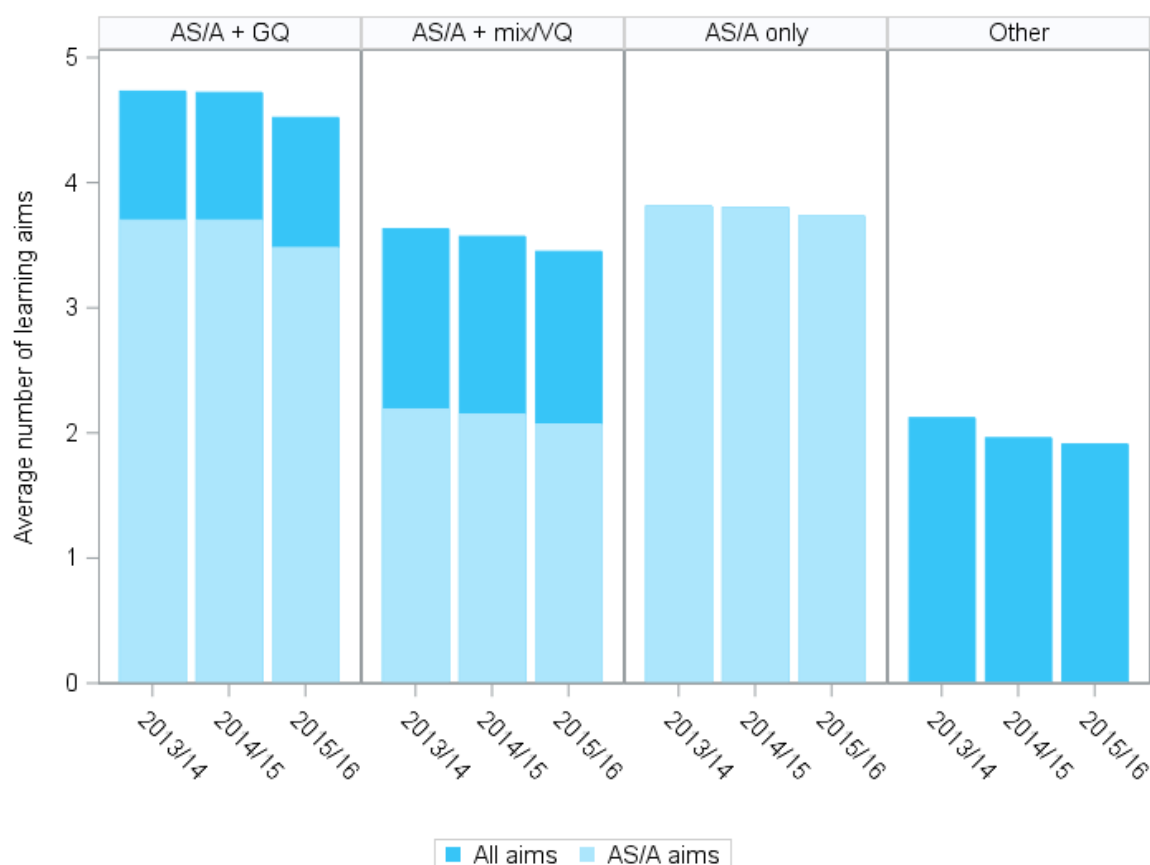| Pathway	2013/14		2014/15		2015/16	
	AS/A	All	AS/A	All	AS/A	All
AS/A levels only	3.81	3.81	3.80	3.80	3.73	3.73
AS/A + other academic	3.70	4.73	3.70	4.72	3.48	4.52
AS/A + mixed/vocational	2.19	3.63	2.15	3.57	2.07	3.45
Other	0	2.12	0	1.96	0	1.91
All Year 12 students	*2.92*	*3.60*	*2.92*	*3.57*	*2.87*	*3.49*

Figure 2: Average number of learning aims per Year 12 student, by year and pathway

Details of the AS and A levels aims of Year 12 students in 2015/16

Table 12 shows the frequency of the most popular AS and A level aims by subject[16]. The frequencies of AS and A level aims are shown combined to allow for the fact that students in Year 12 with both an AS and A level aim in a reformed subject will only have the AS aim recorded in the school census. The subjects reformed for first teaching in 2015/16 have been highlighted.

Table 12: Year 12 AS and A level aims, top 20 subjects, 2015/16

Subject	N	%
Mathematics	70407	10.65
Psychology	56486	8.55
Biology	54360	8.23
Chemistry	45379	6.87
History	40408	6.11
English Literature	38285	5.79
Physics	34558	5.23
Sociology	31278	4.73
Geography	31022	4.69
Economics	22869	3.46
Business Studies	22799	3.45
Religious Studies	22420	3.39
Media/Film/TV Studies	17198	2.60
English Language	16247	2.46
Government & Politics	12032	1.82
Mathematics (Further)	11804	1.79
Physical Education/Sports Studies	10689	1.62
D&T Product Design	10379	1.57
Art & Design	9237	1.40
Drama & Theatre Studies	8947	1.35

Table 13 classifies AS and A level aims by the reform status of the subject studied: those subjects reformed for first teaching in September 2015, and all other subjects. This breakdown of AS and A level aims shows that in 2015/16, 61.9% of AS and A level aims were in subjects reformed for first teaching in September 2015. Importantly, the proportion of AS and A level aims in this subject group is the same as it was in 2013/14 and 2014/15. Thus, although the total frequency of learning aims in reformed subjects was lower in 2015/16 than in preceding years, it does not appear that this was due to students choosing learning aims in non-reformed subjects instead.

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[16] See Appendix C, Table C3 for a full list.

Table 13: Year 12 AS and A level aims by subject reform status, 2015/16

		2013/14		2014/15		2015/16	
		N	**col. %**	**N**	**col. %**	**N**	**col. %**
Subject not reformed	A level	6534	0.93	5772	0.84	7859	1.19
	AS level	263557	37.71	257477	37.42	244194	36.95
	All	270091	38.65	263249	38.25	252053	38.14
Subject reformed for September 2015	A level	6580	0.94	6073	0.88	86337	13.06
	AS level	422229	60.41	418823	60.86	322511	48.80
	All	428809	61.35	424896	61.75	408848	61.86
All subjects		*698900*		*688145*		*660901*	

Within the breakdown of reformed subject AS and A levels, Table 13 shows a large increase in A level aims among Year 12 students (from ~6000 to ~86,000), and large reduction in AS level aims (from ~420,000 to ~320,000). The reduction in AS level aims in reformed subjects was 22.7%, close to the 22% decrease in Year 12 AS level entries in reformed subjects reported by Ofqual, despite the restricted coverage of the PLAMS learning aims (Ofqual, 2016, p. 6). The reduction in AS level aims makes sense in light of the decoupling of AS levels from A levels, but what is interesting to note is that AS levels in reformed subjects still make up 48.8% of all AS and A level aims for Year 12 students in the 2015/16 cohort. These are the AS levels that can be considered in some sense 'optional' now decoupled from A levels; students in the 2015/16 cohort intending to study a reformed subject at A level could instead aim to study (only) the A level. However, the evidence here is that students in the 2015/16 cohort are still planning to take AS levels in the reformed subjects, in large numbers.

Table 14 shows the same classification of AS and A level aims as in Table 13, additionally broken down by qualification version (legacy or reformed, identified from the QAN code). This breakdown indicates that 35% of AS and A level aims in reformed subjects were in legacy qualifications, a finding which cannot be true: whilst Year 12 students who had previously taken a (legacy) AS level would be permitted to re-take that legacy AS level in 2015/16, new learning aims in reformed subjects[17] ought to have been in reformed versions of the qualification, according to the timetable of qualification reform published by Ofqual (2015b).

Table 15 shows a recalculation of Table 14, this time excluding the learning aims of students with a prior AS or A level (~22,000 learning aims) in order to try to remove re-takes of previously studied legacy qualifications. It also excludes learning aims in Economics & Business, and Human Biology, although as Table 12 shows, the number of learning aims contributed by these subjects is tiny.

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[17] Except Economics & Business, and Human Biology, for which awarding bodies were permitted to offer legacy versions for a further year (i.e. 2015/16) in centres already offering the course.

Table 14: AS and A level aims by reform status and version, 2015/16

		Qualification version		
		Legacy	Reformed	
		%	%	N
Subject not reformed	A level	100.00	.	7858
	AS level	100.00	.	244005
	All	100.00	.	251863
Subject reformed for September 2015	A level	11.42	88.58	86337
	AS level	41.48	58.52	322511
	All	35.14	64.86	408848
All		*59.87*	*40.13*	*660901*

Table 15:   AS and A levels by reform status and version (students with no prior AS/A levels, Economics & Business, and Human Biology excluded)

		Qualification version		
		Legacy	Reformed	
		%	%	N
Subject not reformed	A level	100.00	.	6859
	AS level	100.00	.	237022
	All	100.00	.	243881
Subject reformed for September 2015	A level	10.05	89.95	82477
	AS level	41.34	58.66	311938
	All	34.80	65.20	394415
All		*59.71*	*40.29*	*638296*

The total number of AS and A level learning aims in Table 15 is (clearly) lower, but the proportions of legacy and reformed qualifications in reformed subjects differ very little from the proportions in Table 14. In particular, 34.8% of learning aims in reformed subjects are still in legacy qualifications. This is problematic, as it indicates that even after having removed those which we can legitimately account for (i.e. re-sits, and subjects with special permission to extend legacy entries), a large number of legacy qualification learning aims remain. Given that such a volume of learning aims in legacy qualifications cannot be otherwise accounted for, the likeliest explanation for the split between legacy and reformed versions of AS levels shown in Table 14 seems to be mistakes in the recording of QAN codes for AS learning aims. For example, a school recording a student's AS learning aim

using the previous year's QAN code, even though the student would in fact be taking a reformed AS level qualification (with a different QAN code).

The accuracy of predictions based on PLAMS

The accuracy of PLAMS data in terms of recording the precise versions of AS level learning aims has been discussed above. In short, we do not think that the versions of AS level learning aims in 2015/16 PLAMS data (identified in the QAN codes used to record the aims) are reliable. However, the perhaps more interesting question is to examine the predictive accuracy of PLAMS learning aims in terms of the number and subjects of the AS levels that students plan to take.

To examine the predictive accuracy of PLAMS data with regard to these aspects, we compared data on AS levels from PLAMS 2014/15 (learning aims collected in autumn 2014) with entries and results from the following summer (June 2015). We examined accuracy in four ways. First, we calculated the number of AS level learning aims per student in PLAMS 2014/15, and the number of AS level results per candidate in the 2015 NPD results, and matched these frequency counts by unique pupil identifier. Year 12 students recorded in PLAMS 2014/15 form a subset of candidates in NPD data from 2015, therefore all were matched.

Table 16 shows the extent of agreement between number of AS level aims and number of AS level results, for each year.

Table 16: Year 12 students by discrepancy in AS level aims and results, by year

Difference between number of AS levels aims and number of AS level results	2013/14		2014/15	
	N	%	N	%
None (identical)	179804	75.11	178914	75.99
Difference of 1	44702	18.67	41800	17.75
Difference of 2 or more	14880	6.22	14724	6.25
Total	*239386*		*235438*	

Figure 3 and Table 17 show the frequency of Year 12 students in 2014/15 PLAMS data by number of AS learning aims and number of AS results. For these students, number of AS learning aims and number of AS results the following summer were highly correlated ($r=0.85$), and were in exact agreement for 76% of students. When the analysis was repeated to compare PLAMS 2013/14 with NPD 2014, results were very similar, with a correlation of 0.85 once again.
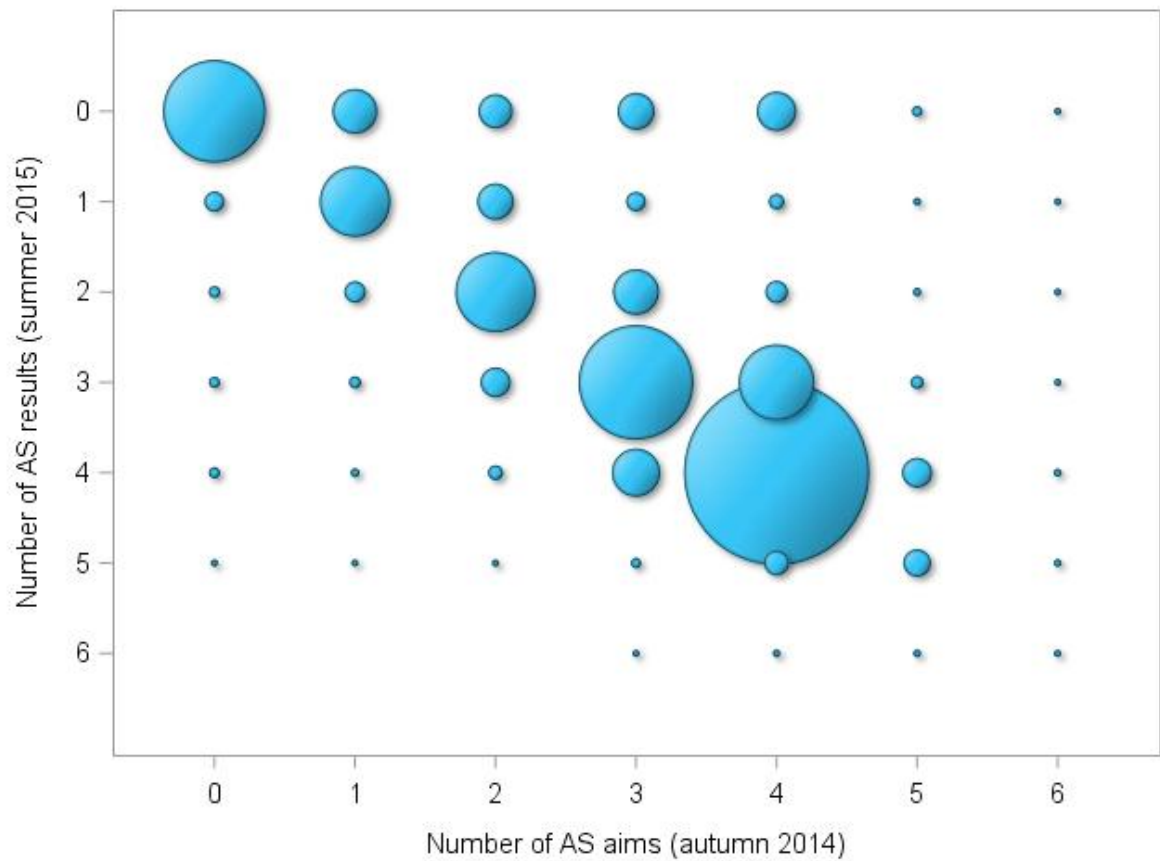
Figure 3: Comparison of AS level aims and results, Y12 students in PLAMS 2014/15 (n=235,409)

Table 17: Comparison of AS level aims and results, Y12 students in PLAMS 2014/15

Number of AS level results	Number of AS level aims							
	0	1	2	3	4	5	6	Total
0	26893	5028	2854	3381	3860	146	1	42163
1	916	12681	3268	848	493	15	2	18223
2	226	1046	16404	5272	1152	44	3	24147
3	188	252	2172	33522	14616	313	3	51066
4	184	66	447	5827	87565	2163	26	96278
5	4	4	8	146	1451	1843	17	3473
6	0	0	0	9	20	24	6	59
Total	*28411*	*19077*	*25153*	*49005*	*109157*	*4548*	*58*	*235409*

Note: rows and columns with fewer than 10 learning aims/results have been excluded.

The second approach to examining accuracy was to match individual AS level learning aims from PLAMS with individual AS level results from the NPD, matching by unique pupil identifier and mapping (subject) code of the AS level. Using this method, 83% of AS level learning aims in PLAMS 2014/15 could be matched to a corresponding result in the NPD 2015 results. Table 18 shows the proportion of aims matched for 2013/14 (PLAMS 2013/14 to NPD 2014) and 2014/15 (PLAMS 2014/15 to NPD 2015). We expect that the unmatched learning aims and results include a number of AS level aims where the student changed course (i.e. from one subject to another), and also learning aims that were not completed for other reasons, such as students dropping out of school/college altogether.

Table 18: Matching of AS level aims and results, Y12 students

Status of AS level aim/result	2013/14		2014/15	
	N	%	N	%
Aim in PLAMS matched to NPD result	600393	83.5	590091	83.2
Aim in PLAMS only (not matched to a result in NPD)	85414	11.9	86242	12.2
Result in NPD only (not matched to an aim in PLAMS)	33084	4.6	32909	4.6
Total	*718891*		*709242*	

The third approach to examining accuracy was to compare PLAMS learning aims with actual entries the following summer, for OCR AS levels. We compared learning aims and entries per subject as proportions (rather than absolute values), and found that the PLAMS data matched patterns of entries very closely.

The fourth approach to examining the accuracy of PLAMS with regard to AS levels was to compare the reduction in AS level entries predicted by PLAMS with the actual decrease in entries that occurred in summer 2016. Table 19 shows all Year 12 learning aims for AS levels in reformed subjects, for 2014/15 and 2015/16, and the percentage decrease between these two years. It then also shows the percentage reduction in Year 12 AS level entries for these subjects, as reported by Ofqual (2016, p. 7). Despite the fact that the PLAMS data covers only a subset of Year 12 students, whereas the Ofqual data should include all Year 12 students in England, these results show accurate predictions of the actual decrease in entries for the Year 12 cohort overall. The results show variation across reformed subjects in the decrease in AS level uptake that occurred between 2014/15 and 2015/16, with arts and humanities subjects showing larger decreases than STEM subjects. This variation may indicate that schools and students are making decisions about reformed AS levels based on subject-specific considerations, such as, for example, degree of coherence between AS and A level syllabi, co-teachability, and beliefs about student progression from GCSE. Further research would be required in order to investigate these possibilities, and to investigate the interaction of A/AS reform and subject-level requirements more generally.

Table 19: Reformed subject AS level aims and entries, Year 12 students

AS level	Learning aims in PLAMS			Actual entries
	2014/15	2015/16	% change	% change
Art and design	31727	22185	-30.1%	-26%
Biology	53891	43141	-19.9%	-19%
Business Studies	21303	18458	-13.4%	-14%
Chemistry	45274	35779	-21.0%	-20%
Computing	6722	5994	-10.8%	-10%
Economics	20887	18054	-13.6%	-19%
English Language & Literature	9854	5557	-43.6%	-32%
English Language	17215	13549	-21.3%	-24%
English Literature	40299	29658	-26.4%	-28%
History	43438	31313	-27.9%	-29%
Physics	35151	27148	-22.8%	-19%
Psychology	59603	45672	-23.4%	-22%
Sociology	31059	25551	-17.7%	-16%
Total	*416423*	*322059*	*-22.7%*	*-22%*

Are those planning to take A/AS in reformed subjects different from those planning to take non-reformed subjects?

Considering that only some subjects have already been reformed, a possible effect of the reform could be to affect only some subgroups of candidates. Following the classification of candidates presented in the previous section and based on the A/AS subjects they are planning to take, it is possible to distinguish candidates taking all non-reformed subjects, candidates taking a mixture of reformed and non-reformed subjects and those taking all reformed subjects. Table 20 shows that the majority of candidates in Year 12 in 2015/16 were actually planning to take a mixed programme of study. Figures are broken down by combination of qualifications and show that, among Year 12 candidates in PLAMS 2015/16 taking only A/AS levels, 85% were planning to study a mix of reformed and non-reformed A/AS levels, and only 2% were planning to take all non-reformed subjects. Among candidates planning to take a combination of A/AS and other qualifications, by contrast, over 17% were planning to take all of their A/AS levels in non-reformed subjects, and 33% were planning to take only reformed A/AS levels. Since students studying A/AS levels combined with other qualifications took fewer A/AS levels on average (see Table 11), it is not surprising that a higher proportion of these students had all of their A/AS subjects fall into one or other category. The distribution for 2015/16 results is very similar to the distribution derived from PLAMS 2013/14 and 2014/15[18].

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[18] These are not included in the report, but are available upon request.

A preliminary investigation revealed no differences between candidates taking A/AS levels only and those also taking other qualifications. Thus, from now on, analysis presented below will not be stratified by pathway (combination of A/AS with other qualifications).

Table 20: Year 12 students by qualification pathway, 2015/16

| Subjects at A/AS | Pathway | | | | All | |
| | A/AS only | | A/AS and other qualifications | | | |
	N	%	N	%	N	%
Non-reformed	2673	1.99	11697	17.03	14370	7.07
Mixed	115024	85.45	34652	50.45	149676	73.63
All reformed	16910	12.56	22335	32.52	39245	19.30
Total	*134607*		*68684*		*203291*	

Note: Students taking no A/AS levels at all are not represented in this table as they are not affected by the reform. Other qualifications include both academic and non-academic qualifications.

Table 21 shows the composition of the cohort of Year 12 candidates planning to study for at least one A/AS in the school year 2015/16, by programme of study, that is whether they are taking reformed subjects or not. The composition of candidates is analysed with respect to a set of characteristics retrieved from the KS4 extracts of the NPD for this cohort, i.e. the KS4 NPD of the previous year, 2014/15, when the students of interest were in Year 11. It should be noted that for around 6% of candidates in PLAMS, no record was found in the NPD.

Statistics displayed in Table 21 suggest that the composition of the group of candidates taking all non-reformed subjects is different from those planning to take a mixed or fully reformed programme of study. This is particularly evident with respect to gender, with female students much less likely to take non-reformed subjects only (38.26% female) rather than take at least one reformed subject (54.78% female). Similar results arise for attainment, in terms of both KS2 and GCSE results, with more able candidates less likely to take only non-reformed subjects, as well as number of GCSEs taken, with candidates taking more GCSEs more likely to be studying at least one reformed subject in Year 12. In addition, the school attended and in particular the performance measured by the average GCSE point score differ among the different groups considered, with candidates from high performing schools more likely to be intending to study reformed subjects.

Table 21: Year 12 students taking at least one AS/A level, characteristics by programme of study

	Percentage of students with each characteristic			
	Non-reformed subjects	**Reformed subjects**		
		Mixed	**All reformed**	**At least one**
Gender: female	38.26	51.66	67.09	54.78
Ethnicity: non-white	23.27	26.09	25.48	25.97
Language at home: non-English	17.48	17.65	17.18	17.55
IDACI score: high	40.35	30.98	40.03	32.82
IDACI score: medium	32.93	33.49	32.88	33.37
KS2 average attainment: high	16.58	46.02	26.09	42.02
KS2 average attainment: medium	26.44	29.24	29.44	29.28
GCSE average point score: high	7.18	40.01	16.47	35.24
GCSE average point score: medium	18.53	34.87	32.57	34.40
Average N of GCSE taken	7.37	8.42	7.78	8.29
School type at KS4: independent	1.20	2.18	1.63	2.07
School average GCSE: high	7.18	40.01	16.47	35.24
School average GCSE: medium	18.53	34.87	32.57	34.40

Note: The last column referred to, "At least one reformed subject", represents the weighted average of the "mixed" and "all reformed" columns.

Some differences are apparent between candidates taking a mixed programme of study and those taking all reformed subjects. However, considering the small proportion of students represented by the latter group, and relatively small differences between the two groups in comparison to the differences with the non-reformed subject candidates, it appears reasonable to restrict the comparison to the dichotomous split between candidates taking all non-reformed subjects and those taking at least one reformed subject.

Table 22 shows the results of the logistic regression model for the probability of planning to take at least one A/AS level in a reformed subject. In contrast to the previous table where associations were calculated for one variable at a time, the regression analysis allows us to look at the effect of a specific variable, when the other variables included in the model are accounted for.

The regression analysis confirms that candidates planning to take at least one reformed subject tend to be those with high probability of performing well at KS5, namely those with higher prior attainment and who had attended better schools. Also apparent are the roles of gender, with girls more likely to take reformed subjects, and ethnicity, with candidates from a non-white background more likely to be affected by the reform sooner.

Table 22: Logistic regression estimates for the probability of taking at least one reformed subject

	Coefficient	S.E.	P-value
Intercept	-3.6795	0.0904	<.0001
Gender: female	0.5938	0.0197	<.0001
Ethnicity: non-white	0.1923	0.0292	<.0001
Language at home: non-English	-0.0653	0.0328	0.0467
IDACI score: missing	0.1098	0.1701	0.5186
IDACI score: high	-0.0255	0.0266	0.3373
IDACI score: medium	-0.0122	0.0253	0.6286
KS2 average attainment: missing	0.1317	0.0241	<.0001
KS2 average attainment: high	0.3809	0.0336	<.0001
KS2 average attainment: medium	0.2279	0.0276	<.0001
Average GCSE point score	0.9956	0.0138	<.0001
Average N of GCSE taken	0.1180	0.0056	<.0001
School type at KS4: independent	0.1965	0.1898	0.3005
School average GCSE point score	0.0853	0.0196	<.0001

Using the results from the logistic regression we calculated students' estimated propensity to be studying at least one reformed subject. The propensity score for each student (whatever subjects they were actually studying) is their predicted individual probability of studying at least one reformed subject, based on the characteristics included in the logistic regression model, i.e. those listed in Table 22. As explained in the description of analysis techniques (pages 18-19), to the extent that these characteristics include all the characteristics affecting the decision to study a reformed subject, the propensity score contains all the information required to compare students grouped by this variable. We therefore use comparison of propensity score distributions to answer the question "Do students studying at least one reformed subject differ from those studying only non-reformed subjects?"

Figure 4 shows the distributions of estimated propensity to be studying at least one reformed subject, for students who actually studied at least one reformed subject (in red), and for students who studied no reformed subjects (blue). Whilst the distributions for the two groups in Figure 4 are not completely different, there is not full overlap. Specifically, the range of propensity scores for candidates taking no reformed subjects (blue) extends below the range for reformed subject candidates. Since students with estimated propensities below around 0.6 have no counterparts in the reformed subject group, we can conclude that the two groups of students do differ, i.e. the group studying at least one reformed subject is not directly comparable with the group studying no reformed subjects.
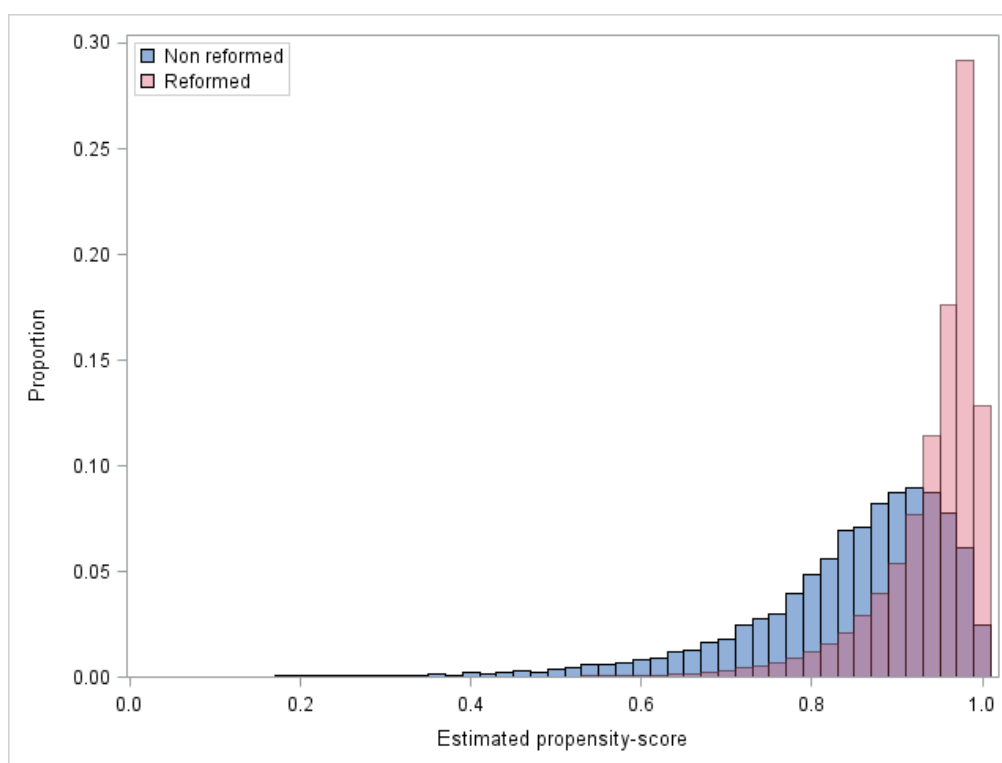
Figure 4: Distribution of propensity to be studying at least one reformed subject, 2015/16, grouped by actual subject choices: at least one reformed subject (red) or non-reformed subjects only (blue)

Are Year 12 candidates in school year 2015/16 and planning to take reformed subjects different from those planning to take the same subjects in the previous cohort?

Regarding the cohort composition of those taking reformed subjects, the second question of interest is whether there has been a shift of candidates taking these subjects. Focussing on those taking at least one AS/A level in a subject that has been reformed for first teaching from September 2015, it is possible to compare candidates in PLAMS 2015/16 with those in PLAMS 2014/15 and look at their composition.

Table 23 shows the composition of the two cohorts with respect to the same characteristics considered in the single cohort analysis. It is straightforward to see that, in this case, the two groups are much more similar: those taking a reformed subject in 2014/15 resemble those taking a reformed subject in 2015/16 more closely than the different groups within the 2015/16 cohort, as shown in Table 21, resemble each other. The only variable which appears to differ substantially between the two groups is attainment at KS2[19]. Students taking reformed subjects in 2015/16 were less likely to have high or medium KS2 attainment, but much more likely to be missing KS2 attainment data, when compared with students taking reformed subjects in 2014/15. When the 2014/15 and 2015/16 groups are

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[19] Students were classified into four groups by KS2 attainment: high attaining (top third of cohort, after ranking by mean KS2 level), medium attaining (middle third), low attaining (lowest third), or missing (mean KS2 level not available). The "missing" category was included in the logistic regression since the proportion of missing KS2 data for the 2015/16 Year 12 cohort is large (33%) and in particular, much larger than for the 2014/15 cohort (12%), due to the boycott of Key Stage 2 Sats tests in May 2010.

compared taking into account the missing KS2 data, we conclude that the differences in proportions of students by KS2 attainment category actually represent no meaningful difference in level of prior attainment. This is consistent with the comparison by prior attainment at GCSE level, where no difference is apparent.

Table 23: Characteristics of candidates taking reformed subjects by cohort

	Year 12 in 2014/15	Year 12 in 2015/16
Gender: female	54.78	54.78
Ethnicity: non-white	25.11	25.97
Language at home: non-English	17.37	17.55
IDACI score: high	29.57	30.02
IDACI score: medium	30.35	30.53
KS2 average attainment: high	33.40	28.04
KS2 average attainment: medium	27.62	19.54
KS2 average attainment: missing	11.94	33.27
GCSE average point score: high	35.31	35.24
GCSE average point score: medium	34.58	34.40
Average N of GCSE taken	8.08	8.29
School type at KS4: independent	2.14	2.07
School average GCSE: high	35.31	35.24
School average GCSE: medium	34.58	34.40

The difference in the composition of KS2 attainment categories is confirmed by the regression analysis for the probability of being in Year 12 in the school year 2015/16 rather than in 2014/15, the results of which are displayed in Table 24: most clearly, students with missing KS2 attainment data were much more likely to be in the 2015/16 Year 12 cohort than the 2014/15 cohort. The regression analysis also reveals that socio-economic deprivation and the language spoken at home are different in the two cohorts, as is number of GCSE taken in Year 11. It is important to observe that the average GCSE point score does not seem to be related to the cohort a candidate fell in, supporting the conclusion that the two groups do not differ in terms of prior attainment.

The overall similarity of the two cohorts is confirmed by the almost perfect overlap of the propensity-score distributions for the 2014/15 and 2015/16 cohorts shown in Figure 5. Though differences between the shapes of two distributions are apparent, there is common support for both (i.e., the range of estimated propensities shown by each group is the same), indicating that the two cohorts of students taking reformed subjects are fundamentally comparable. Although the different proportions of students with particular propensity scores varies (specifically, a shift towards more students with higher propensities to take reformed subjects in 2015/16), and needs to be accounted for in comparison, the common support makes such comparison possible.

Table 24: Logistic regression estimates for the probability of taking at least one reformed subject in 2015/16 rather than in 2014/15

|	Coefficient	S.E.	P-value
Intercept	-0.9111	0.0319	<.0001
Gender: female	0.0064	0.0072	0.3707
Ethnicity: non-white	0.0101	0.0107	0.3464
Language at home: non-English	-0.1757	0.0125	<.0001
IDACI score: missing	-0.4919	0.0747	<.0001
IDACI score: high	0.0253	0.0098	0.0099
IDACI score: medium	0.0229	0.0088	0.0089
KS2 average attainment: missing	2.0473	0.0136	<.0001
KS2 average attainment: high	0.0896	0.0108	<.0001
KS2 average attainment: medium	-0.0540	0.0101	<.0001
Average GCSE point score	-0.0035	0.0049	0.4700
Average N of GCSE taken	0.0722	0.0021	<.0001
School type at KS4: independent	0.1299	0.0788	0.0994
School average GCSE point score	0.0053	0.0063	0.4053
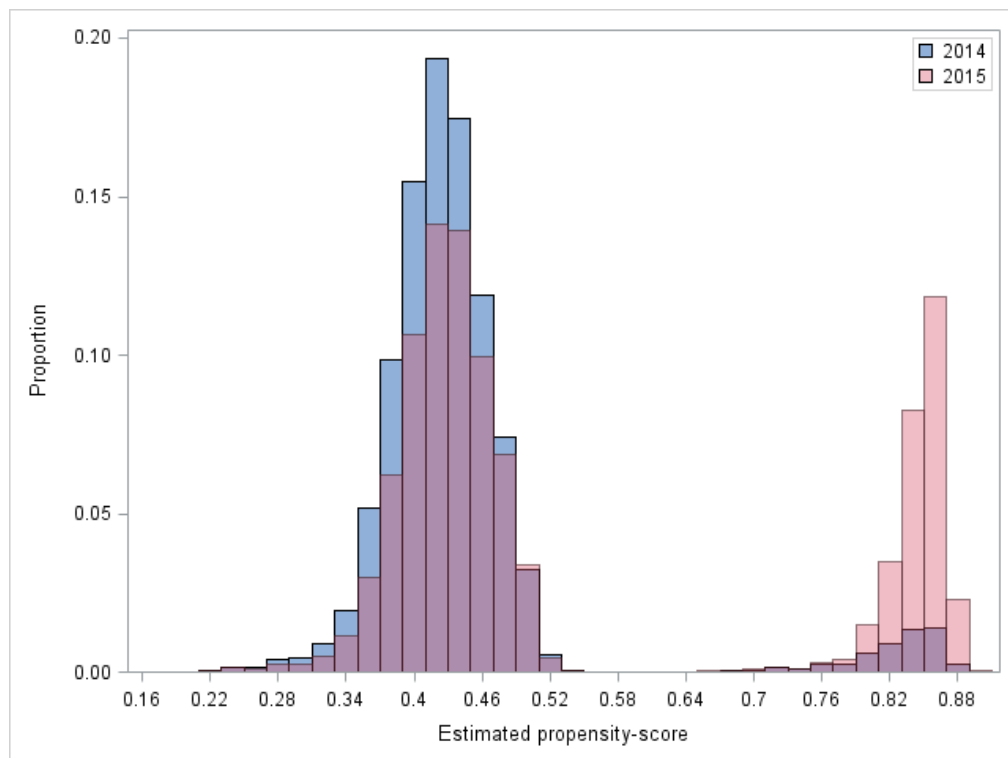
Figure 5: Distributions of Year 12 students' propensity to take at least one A/AS in a reformed subject in 2015/16 rather than 2014/15, by actual cohort (2014/15 and 2015/16)

Conclusions/discussion

The decoupling of AS from A levels and the move to a linear form of assessment are both currently ongoing; reformed AS and A levels in the first tranche of subjects have been taught since September 2015 (with first AS level examinations in June 2016, and first A level examinations due in June 2017), and in the second tranche of subjects from September 2016. The overall aim of this report was to investigate whether it was possible to use PLAMS to anticipate potential effects of the current A/AS reform.

The description of the data revealed issues related to its coverage with most of the independent sector as well as sixth form colleges and further education colleges not covered by PLAMS. Other issues arose from how the data are collected. In particular, schools and colleges have been instructed by the DfE to record the learning aims of reformed AS and A levels in a manner that obscures certain details, and the precise qualifications associated with learning aims are identified by qualification (QAN) codes supplied by the student's school or college. The result of the first point is that a Year 12 student aiming to take AS levels in subjects X and Y, and an A level in subject X, is recorded as having the same learning aims as a student aiming to take AS levels in X and Y, and an A level in subject Y, even though the AS and A levels are now independent qualifications. The result of the second point is that the reliability of qualification details is uncertain and entirely dependent on schools' accuracy. Our analysis of the 2015/16 PLAMS data revealed very large proportions of legacy qualifications that could not be explained by legitimate exceptions to the current reforms, and we conclude that this is likely due to error in recording the precise codes of AS and A levels (for example, using the previous year's QAN code), a source of error previously noted by the DfE itself (DfE, 2014).

The review of the uses of PLAMS revealed various limitations of the data identified by previous users. In addition to coverage limitations, issues include incomplete records, inaccuracy in recording qualification details, and patchy matching with awarding body data. Notwithstanding, PLAMS data has been used in order to measure rates of participation in various forms of education. Despite its limitations, it has provided information about learners previously difficult to identify and research, namely, those not completing or progressing from learning, who therefore do not appear in results data or HESA data.

The first aim of the analysis of the PLAMS data was to describe what candidates currently in the system are planning to enter. This analysis showed that AS and A levels remain the most common learning aims of Year 12 students. Specifically, the proportion of Year 12 learning aims in 2015/16 made up of AS and A levels remained the same as in 2013/14 and 2014/15, indicating no overall move away from AS and A levels. Furthermore, the proportion in reformed subjects (AS + A level considered together) remained the same as in 2013/14 and 2014/15, suggesting no overall move away from choosing to study reformed subjects. The analysis showed a reduction in the proportion of students studying for AS levels only, as expected in light of the AS/A level reform, but also showed that Year 12 students, at least in the 2015/16 cohort, are still planning to take AS levels in reformed subjects in large numbers.

The second aim of the analysis of PLAMS was to check whether candidates taking the new reformed subjects were different, with respect to a number of observable characteristics, from those planning to enter non-reformed subjects and from those planning to take the same subject a year before. In the former case, findings showed that the two groups of candidates are actually different and confirm some previous results claiming that female and less able candidates are more likely to be affected by the reform sooner. In the latter case, it emerged that, although differences are present over time, those candidates in Year 12 in the school year 2015/2016 and planning to take reformed subjects are overall quite similar to those in the previous cohort who studied these subjects. This is a reassuring result: if the two cohorts were different some issues might have occurred in the application of the comparable outcomes approach used to maintain standards.

Within the limitations of PLAMS, it is possible to conclude that:

- Many Year 12 students, in the 2015/16 cohort at least, were still planning to take AS levels in reformed subjects, even though they could have studied for the A level only. The number of AS level aims in reformed subjects was lower than in previous years, but still outnumbered the number of A level aims.
- The reduction in AS level entries varied across reformed subjects, suggesting that subject-specific factors may be influencing student and school decisions regarding reformed AS levels.
- A relatively high proportion of the students affected first by the AS/A level reform are female and less able candidates, as suggested by previous research.
- The Year 12 students studying for AS and A levels in reformed subjects appear to be broadly comparable to the students choosing these subjects in the previous cohort.

With respect to the utility of the PLAMS data itself:

- The students captured in the PLAMS data are not representative of the student population. This places limits on the specific predictions that can be made about changes to uptake.
- In pre-reform years, the learning aims recorded in PLAMS accurately predicted the number of AS levels a Year 12 student would be entered for the following summer, and the subjects of those AS levels.
- In the first year of reform (2015/16), learning aims recorded in PLAMS accurately predicted the decreases in Year 12 AS level entries for reformed subjects, at cohort level.
- It remains to be seen whether the accuracy at individual level will persist after the introduction of the AS/A level reforms, or whether the multiple changes to the qualifications and the recording of those qualifications as learning aims might reduce the correlation between aims and entries (either through recording error, or an increase in students changing their mind). If the latter, we would expect the correlation to eventually stabilise after the AS/A level reforms have been fully implemented.

- From our analysis of learning aim QAN codes, we conclude that PLAMS 2015/16 data is not accurate at the level of identifying specific qualifications (i.e. the new specification AS level Biology, as opposed to the pre-reform AS level in Biology), due to inaccuracy in QAN code recording previously highlighted by the DfE itself.
- Since QAN code is also the source of awarding body information, we also conclude that PLAMS data is not suitable for identifying changes in school/college choice of awarding body.
- In all years examined, PLAMS data could accurately predict the distribution of AS level entries in reformed subjects (i.e. the relative proportions of entries in these subjects). Given that PLAMS data is available ahead of entries, this could potentially be used in order to give early warning of changes in individual subject uptake.

Overall, we can conclude that a degree of caution is necessary to analyse and interpret PLAMS data, though it is potentially useful in specific areas. Extending analysis to the individualised Learner Record (ILR) provided by the DfE would partially address the issue of coverage (by extending coverage to FE and sixth form colleges), but independent schools would remain a problem, and other issues, especially those related to errors in data collection, would also remain.

In terms of monitoring the effects of the current AS and A level reforms, there is a potential role for PLAMS data in 2016/17. The present study was only able to examine the impact of reform on AS levels, since students in 2015/16 – the first to experience reformed AS and A levels at all – will not take A levels until 2016/17, and their two-year learning aims were not necessarily recorded as such[20]. The learning aims of Year 13 students in PLAMS 2016/17 would be a way to gain a first look at the impact of the reforms on A level uptake. As noted in the introduction to this report, changes to AS and A level uptake are significant for awarding bodies, higher education institutions and wider society; it is, therefore, considered important to monitor changes even though we cannot know the full impact of A/AS level reform for several years.

The utility of the PLAMS 2016/17 data for this purpose is conditional on several points. First, in order for it to provide valuable information, we would need to obtain PLAMS 2016/17 data before actual A level entry data becomes available: if not, it would be simpler to just use this entry data. Second, we would need the accuracy of Year 13 learning aims in reformed subjects to be comparable to that of Year 12 AS level learning aims in recent years, and we do not yet know if this assumption is reasonable – the degree of agreement between AS level aims and entries does not necessarily bear on the degree of agreement between reformed A level aims and entries. It could be the case, for example, that students in 2016/17 do not make their A level subject decisions until after the autumn census in which their learning aims are collected; the PLAMS data would then show A level intentions for all of a student's AS level subjects. Previous research has examined how students (and schools) currently make A level decisions, but we do not yet know how current reforms may affect the decision-making process and timing.

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[20] See discussion on page 11.

Two further limitations, of coverage and accuracy at specification level, also remain. With regard to coverage, we would argue that whilst PLAMS does not provide information on colleges or independent schools, an accurate description of learning aims in school sixth forms is itself a worthwhile goal. With regard to accuracy at specification level, we would not recommend attempting to use learning aims to track choices of awarding body and specification at A level. The 2016/17 learning aims could still, however, as they did for AS levels in 2015/16, provide useful information about A level uptake at subject level.

The current Key Stage 5 system cannot yet be considered stable, and due to the phased introduction of reformed AS and A levels, it is not likely to be for several years. In light of this ongoing change, it may be that an alternative strand of research, focusing on understanding the reasons behind student and school choices, may be more enlightening. A survey on post-16 candidates' intentions and reasoning, for example, may be more revealing of the consequences of the A/AS reform, although collecting reliable data for a representative sample of the population of interest may be expensive.

In terms of the potential of PLAMS data for other research uses, an obvious application would be in examining dropout or student attrition. The present study focused on predictions from learning aims, and considered discrepancies between aims and results only amongst 'live' aims (where discrepancies were small). The project did, however, demonstrate successful matching of learning aims with NPD data. Analysis of the differences between students' aims overall (not just 'live' aims) and results would appear to be a good source of evidence about student dropout at Key Stage 5. The data would be limited in the ways previously noted, by coverage and by accuracy at a very granular level, but within these limitations could provide strong evidence about the students who leave courses of study, and about differences between qualification types and subjects in terms of their dropout rates.

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Appendix A: Variables in PLAMS data extracts

Table A1: Variables contained in PLAMS

Variable	Description	Example	Completed for all records?
AcademicYear	Academic year of the learning aim record	2015/16	Yes
PupilMatchingRefAnonymous	Pupil identifier (18 digits)	CC*****************	Yes
NCYearActual	Pupil's National Curriculum year[21]	13	No – only if available[22]
QAN	Qualification identifier	50022696	Yes
Mapping	Subject identifier[23]	1010	Yes
Mapping_Description	Subject description	Biology	Yes – but missing for 2-3% records
LearningStartDate	Start date of the learning aim	01SEP2014	Yes
Month_start	Start month of the aim	9	Yes
Year_start	Start year of the aim	2014	Yes
LearningPlannedEndDate	Planned end date of the learning aim	20JUL2015	Yes
Month_pl_end	Planned end month	7	Yes
Year_pl_end	Planned end year	2015	Yes
LearningActualEndDate	Actual end date of the learning aim, if completed	20JUL2015	Yes - blank if aim not yet completed
Month_ac_end	Actual month end	7	Yes - blank if aim not yet completed
Year_ac_end	Actual year end	2015	Yes - blank if aim not yet completed
LearningAimStatus	Code indicating continuation, completion, withdrawal or transferral of learning aim	2 (=completed)	Yes
CoreAim	Indicator variable	0	Yes – less than 1% missing
PartnerUKPRN	Centre identifier, if learning taking place at an organisation other than pupil's normal school	.	Yes – blank if N/A
LearningAimWithdrawalReason	Code for withdrawal reason, if applicable	3 (=learner injury/illness)	Yes – blank if N/A

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[21] Actual rather than calculated from birth date. This variable was only provided when specifically requested.

[22] Available for all on-roll students. For off-roll students, the best estimate of year group is from their year group in the previous academic year.

[23] Derived from QAN provided by the school, or QAN + discount code where QAN does not uniquely identify a qualification.

Appendix B: Combinations of learning aims for Year 12 students

Table B1: Learning aim combinations of Year 12 students, by year

Learning aim combination	2013/14		2014/15		2015/16	
	N	%	N	%	N	%
AS/A levels only	137237	57.34	136307	57.90	134607	58.50
AS/A + Other VQ	39298	16.41	38888	16.52	36147	15.71
Other VQ	21937	9.16	21237	9.02	21549	9.36
AS/A + Applied A/AS	17635	7.36	15864	6.74	12586	5.46
AS/A + EPQ	7616	3.18	7842	3.34	9592	4.17
AS/A + Applied A/AS + Other VQ	6020	2.52	5635	2.39	3908	1.69
Applied A/AS + Other VQ	2558	1.07	2340	0.99	1845	0.80
AS/A + EPQ + Other VQ	1723	0.72	1618	0.68	1680	0.73
AS/A + Other GQ	108	0.05	322	0.14	1618	0.70
IB	1364	0.57	1404	0.60	1451	0.63
AS/A + Other GQ + Other VQ	84	0.04	163	0.07	767	0.33
AS/A + Pre U	321	0.14	533	0.22	750	0.33
AS/A + Applied A/AS + EPQ	841	0.36	738	0.31	725	0.32
EPQ + Other VQ	511	0.21	485	0.21	567	0.25
Other GQ + Other VQ	39	0.02	124	0.05	511	0.22
Applied A/AS	712	0.30	546	0.23	462	0.20
AS/A + Applied A/AS + Other GQ	23	0.01	41	0.02	208	0.09
AS/A + IB	155	0.06	173	0.07	209	0.09
AS/A + Applied A/AS + EPQ + Other VQ	295	0.12	241	0.10	180	0.08

Note: table includes all combinations chosen by at least 100 students in 2015/16.

Appendix C: Trends from 2013-2015

Table C1: Number of AS and A levels, Year 12 students on AS/A level pathway 2013/14

Number of A levels	% Year 12 students on AS/A level pathway						
	Number of AS levels						
	0	1	2	3	4	5	6 or more
0	.	1.01	1.96	16.62	71.19	4.02	0.17
1	0.07	0.16	0.90	2.09	0.69	0.07	0.00
2 or more	0.27	0.15	0.20	0.11	0.24	0.08	.

Table C2: Number of AS and A levels, Year 12 students on AS/A level pathway 2014/15

Number of A levels	% Year 12 students on AS/A level pathway						
	Number of AS levels						
	0	1	2	3	4	5	6 or more
0	.	0.71	1.41	17.06	73.14	3.16	0.05
1	0.09	0.10	0.74	2.11	0.52	0.02	0.00
2 or more	0.49	0.16	0.11	0.08	0.04	0.00	0.00

Table C3 is the full version of Table 12, which showed only the top 20 subjects. Subjects reformed for first teaching in September 2015 have been highlighted.

Table C3: Year 12 AS and A level aims, by subject, 2015/16

Subject	Frequency	Percent
Mathematics	70407	10.65
Psychology	56486	8.55
Biology	54360	8.23
Chemistry	45379	6.87
History	40408	6.11
English Literature	38285	5.79
Physics	34558	5.23
Sociology	31278	4.73
Geography	31022	4.69
Economics	22869	3.46
Religious Studies	22420	3.39
Business Studies: Single	17590	2.66
Media/Film/TV Studies	17198	2.60
English Language	16247	2.46

Subject	Frequency	Percent
Government & Politics	12032	1.82
Mathematics (Further)	11804	1.79
Physical Education/Sports Studies	10689	1.62
D&T Product Design	10379	1.57
Art & Design	9237	1.40
Drama & Theatre Studies	8947	1.35
Art & Design (Photography)	8472	1.28
English Language & Literature	8127	1.23
Art & Design (Fine Art)	8029	1.21
Computer Studies/Computing	7862	1.19
Law	7334	1.11
French	7321	1.11
Spanish	5896	0.89
Information & Communications Technology	5537	0.84
Business Studies	5209	0.79
Film Studies	3913	0.59
Music	3604	0.55
German	3015	0.46
Art & Design (Graphics)	1961	0.30
Classical Civilisation	1715	0.26
Mathematics (Pure)	1633	0.25
Logic/ Philosophy	1612	0.24
Art & Design (Textiles)	1563	0.24
D&T Food Technology	1503	0.23
Accounting/Finance	1428	0.22
Creative Writing	1391	0.21
D&T Textiles Technology	1318	0.20
Music Technology	1275	0.19
Dance	1183	0.18
Geology	886	0.13
Social Science: Citizenship	773	0.12
Communication Studies	580	0.09
Business Studies & Economics	466	0.07
Mathematics (Statistics)	422	0.06

Subject	Frequency	Percent
Latin	409	0.06
D&T Systems & Control	376	0.06
Electronics	347	0.05
World Development	346	0.05
Use of Mathematics	301	0.05
Ancient History	269	0.04
Art & Design (3d Studies)	236	0.04
Environmental Science	227	0.03
Italian	225	0.03
Design & Technology	194	0.03
Classics (General)	190	0.03
Home Economics: Food	181	0.03
Additional Mathematics	169	0.03
Expressive Arts & Performance Studies	152	0.02
Information Systems	118	0.02
Art & Design (Critical Studies)	112	0.02
Biology: Human	102	0.02
Physical Education	91	0.01
Turkish	90	0.01
Polish	86	0.01
Russian	78	0.01
Home Economics	76	0.01
History of Art	71	0.01
Urdu	69	0.01
Science in Society	64	0.01
Arabic	60	0.01
Mathematics (Pure & Decision)	59	0.01
Psychology (As a Science)	55	0.01
Art	53	0.01
Japanese	51	0.01
Chinese	50	0.01
Anthropology	47	0.01
Portuguese	39	0.01
Electronic Engineering (General)	37	0.01

Subject	Frequency	Percent
Modern Hebrew	36	0.01
Music Technology (Electronic)	36	0.01
Science SA	36	0.01
Economics & Business	30	0.00
Other Classical Languages	30	0.00
Computing	23	0.00
Classical Greek	18	0.00
Archaeology	16	0.00
Punjabi	13	0.00
Persian	6	0.00
Dutch	1	0.00
French Language	1	0.00
Law / Legal Studies	1	0.00
Modern Greek	1	0.00