Evaluation of new data science and artificial intelligence postgraduate conversion courses

Interim report

For the Office for Students

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Contents

Executive summary

This is an interim report of an evaluation being undertaken by CRAC of a programme of new data science and artificial intelligence (AI) postgraduate conversion courses. Commissioned by the Office for Students (OfS), the evaluation is based on a mixed-methods approach involving dialogue and roundtables with provider project teams, systematic collection of student data and student surveys. The report is positioned at roughly the midpoint of the three-year programme.

The programme comprises projects at 28 institutions, 17 of which are independent projects and 11 forming part of an Institute of Coding consortium headed by Coventry University. After some delays, mainly relating to Covid-19, all 36 courses originally proposed were operational by the 2021/22 academic year. To date, total enrolment on these courses (3859 students) has far exceeded the original target of 2500. The proportion of UK-domiciled students was high in 2020/21 intakes, but has fallen in the 2021/22 intakes. Almost all the scholarships available were taken up in 2020/21, but there has been slightly lower than expected take-up in 2021/22 intakes. Three-quarters of scholarships were awarded to students in the three priority categories: Black, female and disabled. There is strong evidence that the offer of these scholarships has resulted in a more diverse profile of UK-domiciled students, which was the aim of the scholarship offer.

At this interim stage, evidence remains limited in relation to the high-level programme aim which is an increased number and diversity of graduates gaining a postgraduate qualification in AI or data science and entering the UK workforce. However, over 50% of those students who have already graduated have found a new job and almost all those jobs are strongly data- or AI-focused. Students who have graduated from the courses will be surveyed again prior to the final evaluation and at that time more robust findings will be presented.

In summary, the evidence to date suggests that the programme has been successful. The evaluation is ongoing and a final report will be available in autumn 2023.

1 Introduction

This is an interim report of an evaluation being undertaken by CRAC of a programme of new postgraduate conversion courses in data science and artificial intelligence (AI), commissioned by the Office for Students (OfS). The report aims to highlight progress in the programme to date, the extent of observable outcomes and some early insights into emerging longer-term impacts, as well as reflections on the current operation of the programme.

1.1 Context

The Government's 2017 UK Digital Strategy predicted that most jobs in future will require digital skills, while high-level digital skills will be key to developing and implementing the new technologies, products and services that will comprise much of our future economy.[1] The 2017 Industrial Strategy highlighted the role of both data and artificial intelligence within the 'Grand Challenges' for the UK to position itself for future prosperity.[2] Within the broader context of industrial transformation, AI and machine learning are new industries in their own right but are also expected to underpin new ways of doing business in many sectors. AI and related technologies involve the deployment and analysis of vast datasets to identify improvements in how to undertake complex tasks and require specialised data (science) skills. The UK seeks to be at the forefront of this AI and data revolution, potentially creating thousands of jobs and driving growth.

The Office for Artificial Intelligence (OAI) has been leading efforts to provide the skills and workforce necessary for the UK to harness AI and big data. It suggests the UK needs more highly skilled workers with deep AI and data expertise, a more diverse workforce in these areas, and better data and digital skills in the wider workforce to enable effective use of these technologies.[3] Internationally, demand is already being seen from industry for more people with advanced data science and AI skills; in the UK, demand for these skills has been reported already to be outstripping supply. Experts in AI and techniques like machine learning are in particularly short supply.[4]

The recent 'AI roadmap' by the UK AI Council provided recommendations to support UK strategic intentions including the following two relating to skills and diversity:[5]

- *"Scale up and commit to an ongoing 10-year programme of high-level AI skill building. This would include… industry-led Masters and level 7 apprenticeships."*
- *"Make data-led decisions about where to invest and ensure that underrepresented groups are given equal opportunity and included in all programmes."*

[1] *UK digital strategy*, Department for Digital, Culture, Media & Sport, 2017
[2] *Industrial strategy: Building a Britain fit for the future*, HM Government, 2017
[3] *Industrial Strategy: Artificial Intelligence Sector Deal*, HM Government 2018
[4] *Growing the artificial intelligence industry in the UK*, DCMS and BEIS, 2017
[5] *AI Roadmap*, UK AI Council, 2021

1.2 Funding for new postgraduate conversion courses

Traditionally, a main strategic response to graduate-level skill shortages has been to try to increase the number of people in post-compulsory education who study the relevant subjects, including at first-degree level, and who could potentially enter employment in the field. However, this is a slow response and increasingly seen as insufficient, not least because the majority of those who will be in the workforce in 20 years' time are already working. The introduction of new skills through new first-degree graduates entering the labour force can only dent the demand. Consequently, fulfilment of the demand for high-level skills in sectors reliant on data science or AI is likely to require not only more new graduates but also the upskilling and/or re-skilling of those already in the workforce. One response to increase the supply of talent is through conversion courses that either re-skill recent graduates from other disciplines or up-skill those in the existing workforce.

Some courses at MSc level already provide 'conversion' to fields like engineering by targeting graduates with first degrees in subjects such as maths and physics.[6] In 2015 the Higher Education Funding Council for England (HEFCE), Department for Business, Energy & Industrial Strategy (BEIS) and Department for Digital, Culture, Media and Sport (DCMS) funded the development of 45 pilot conversion courses at Master's level in engineering, data science, cybersecurity and computing, to explore whether such courses could enable graduates with a much wider range of degrees (including non-STEM[7] first degrees), to enter engineering or computing careers. CRAC's evaluation of the scheme demonstrated that courses in data science were particularly successful in this respect and also popular.[8]

In 2019, on behalf of DCMS and OAI, the OfS announced a new programme of postgraduate conversion courses in data science and AI to help address the shortage of specialists in these areas.[9] In the ensuing funding competition to support development of conversion courses in data science and AI technologies, 28 universities (including 11 in a consortium) won funding to develop and deliver new conversion courses. Collectively they had a target of producing 2500 data science and/or AI postgraduates in the academic years 2020/21 to 2022/23. This was underpinned by a further fund enabling 1000 scholarships (of £10,000 each) to be made available with the target of increasing the diversity of participating graduates. These scholarships were specifically prioritised for black, female and disabled students (the three foremost priority groups) along with the following UK under-represented groups:

- Students from POLAR Q1 and Q2;
- Care-experienced students;
- Estranged students;
- Gypsy, Roma and Traveller students;
- Refugees;
- Children from military families, veterans and partners of military personnel.

[6] *Transition to Engineering,* HEFCE, 2015
[7] STEM refers to science, technology, engineering and mathematics subjects.
[8] *Evaluation of a scheme to develop pilot engineering and computing conversion master's courses*, Office for Students, 2019
[9] https://www.officeforstudents.org.uk/media/982b4270-90b7-40a2-a01f-f80981b67f6b/ai-and-data-science-pg-funding-guidance.pdf

1.3 Aims of the evaluation

CRAC has been tasked by OfS to evaluate the 2019 programme. At the highest level, the aim of the evaluation is to assess whether the targets set out above (more graduates entering the workforce and a more diverse profile amongst those graduates) have been achieved. In more detail, there is a range of formative and summative objectives:

- Understanding the approaches funded institutions have taken to develop and deliver provision, and whether some work particularly well, generally or for specific student types;
- Identifying the number and profile of course participants and, where possible, whether once completed they progress into or within the desired labour market;
- Understanding the effectiveness of scholarships to widen the diversity of participation;
- Supporting the sharing of practice, knowledge and learning between institutions and more widely so that effective innovation is captured and shared;
- To provide recommendations for the sector and institutions about future provision of conversion courses and their contribution to workforce development.

1.4 Evaluation approach and methodology

A mixed-methods approach was implemented for the evaluation, broadly comprising:

- Regular dialogues with funded project teams to monitor course development, identify challenges and establish and implement data collection by each institution;
- Systematic collection of data about students enrolled on courses and obtaining scholarships, including key student profile characteristics (collated by CRAC);
- A pattern of programme-wide surveys of students during and following completion of courses, implemented in waves to target all the main course intakes;
- Eliciting and sharing learning through dialogues with each provider and programme round-tables/workshops.

This interim report is positioned at roughly the midpoint of the three-year programme, based on data from three main course intakes in 2020/21 and two to date in 2021/22. A total of 680 cleaned and useable responses to waves of the student survey were obtained, although not all respondents answered all questions (the same survey instrument was used, so responses could be combined from different waves), and 100 cleaned responses to the first survey of students completing courses (covering only the autumn 2020 intake to date). Among these, there were respondents from 25 of the 28 funded institutions. It is worth noting that students who had been awarded scholarships were over-represented in student survey responses (which presumably reflects that those benefiting from a scheme scholarship have been particularly positively disposed to engage with the evaluation).

2 Progress to date: courses and students

2.1 Course launches

The programme comprises projects in a total of 28 institutions, 17 as independent projects and 11 within an Institute of Coding (IoC) consortium headed by Coventry University. Encountering delays relating to the Covid-19 pandemic, 17 of the institutions launched new courses in autumn 2020, while a further eight delayed launch to January 2021 (although six implemented more than one intake that academic year). The remaining institutions launched their first courses in autumn 2021, so all 28 funded institutions have now delivered provision.

All but two of the 28 institutions had an intake in autumn 2021, marking an overall return to the conventional academic cycle, albeit two institutions preferred a single annual intake in January. The success of the courses has led several institutions to sustain additional intakes at other times in the academic year.

The programme now comprises all the 36 courses originally proposed, although additional variants exist (with different modes/durations or with/without an integrated placement). Broadly, we classify 17 courses as data science (DS), nine as primarily in artificial intelligence (AI), and the remaining 10 combining these two subject areas (DS & AI).

2.2 Enrolments and scholarships: headline numbers

Launch period	**All enrolments**			**All scholarships**		
	Target	Total	% of UK domicile	Target	Total	% of UK domicile
Autumn 2020	605	780	61%	220	139	88%
January 2021		535	52%		71	70%
Total 2020/21 intakes		*1385*	*56%*		*218*	*82%*
Autumn 2021	835	1786	37%	350	258	71%
January 2022		688	12%		34	35%
Total 2021/22 intakes		*2474*	*30%*		*292*	*67%*
Cumulative total	1440	3859	39%	570	510	73%

Table 2.1 Numbers of enrolments and scholarships awarded, to February 2022, based on student data templates[10]

Overall, to February 2022, data received from funded institutions suggests a total of 3859 students have enrolled on courses in the programme to date (Table 2.1), which is already well above the original target for the total programme of 2500. The number within intakes during academic year 2020/21 was over double the projections made in the project proposals, while in 2021/22 to date the enrolment is almost three times the number projected. Yet more students will have enrolled by the time of publication of this report as a result of further intakes in spring 2022 (i.e. also starting within the 2021/22 academic year).

[10] Totals for 2020/21 year include small intakes in spring 2021, which are not shown separately.

Initially, the proportion of UK-domiciled students was very high and UK students comprised the majority of intakes in 2020/21, but this has fallen for intakes in 2021/22 as the number of international applicants and enrolments has grown rapidly. The low proportion in the January 2022 intake is somewhat anomalous. While specific non-UK domicile data is only available from survey respondents, these suggest that courses have drawn students from 57 different countries to date, mostly from outside the EU, but most prominently from Nigeria and India (who account for over one third of all enrolments).

Also listed within Table 2.1 are the numbers of scholarships awarded to date. There was almost full use of the targeted scholarship allocations (a total of 220) in the 2020/21 intakes, while data to February 2022 suggests a further 292 have been awarded so far in the October 2021 and January 2022 intakes. Although further scholarships are allocated for spring 2022 intakes, it is almost certain that the 2021/22 target of 350 will not be reached. Projects report that small numbers of students with scholarships withdraw or defer to a subsequent intake, so take up of the total possible allocation is unlikely to be feasible in practice.

On the basis of intakes starting during 2021/22, course cohort sizes are healthy and, in many cases, large (compared with typical STEM Master's provision). Mean cohort sizes this year have been just over 40 students for DS courses, over 70 for combined DS & AI courses, and around 30 for AI courses. These are high for the second annual intake of a recently introduced Master's course. In practice, there have been some very large cohorts, with one institution enrolling over 200 students in a single intake and several over 100. No institution enrolled fewer than 10 students in a single intake (although enrolments to certain variants of particular courses could be lower).

2.3 Profile of students

2.3.1 Profile of scholarship students

Results presented here focus on UK-domiciled students, who are the group of most interest in terms of the overall programme, which seeks to increase the diversity of graduates in the AI and data workforce in the UK (as UK domiciles are the most likely to be eligible to and in practice enter it). Award of scholarships to international students has not been prohibited within the programme, but most institutions – understanding the desired focus of the programme on UK graduates – have either restricted scholarship eligibility to UK students or else found ways to prioritise them within their selection process.

Table 2.2 summarises the key profile characteristics of the 369 UK-domiciled students awarded scholarships in the programme to date for whom there is full profile data, remembering that the priority eligibility criteria were Black, female and disabled students. Almost three quarters of UK-domiciled awardees have been women (74%), 38% of a Black background (and a further 19% another ethnic minority background), while just over one quarter (26%) have a declared disability. The proportions of Black, female and disabled UK-domiciled scholarship awardees have all been slightly lower in 2021/22 intakes than in the 2020/21 intakes.

Around one quarter (26%) of UK-domiciled awardees were identified within one or more of the other under-represented groups eligible for a scholarship, which were based on similar personal characteristics to those used to characterise Widening Participation students at undergraduate level (broadly). We do not consider these data to be fully reliable as several

institutions report they are not able to identify such characteristics robustly amongst postgraduate students.

Overall, these results show that many scholarship awardees were eligible on the basis of more than one of the eligibility criteria.

Launch period	**UK-domiciled scholarship students**				
	Total	Female	Black	Ethnic minority	Disabled
Autumn 2020	124	74%	40%	56%	30%
January 2021	50	80%	40%	56%	26%
Total 2020/21 intakes	*174*	*77%*	*40%*	*56%*	*29%*
Autumn 2021	183	69%	34%	56%	23%
January 2022	12	92%	33%	58%	33%
Total 2021/22 intakes	*195*	*71%*	*34%*	*56%*	*24%*
Cumulative total	369	74%	38%	57%	26%

Table 2.2 Key profile characteristics of UK-domiciled students awarded scholarships (cumulative to February 2022)

The focus of this analysis has deliberately been on those of UK domicile, who potentially have the strongest chance of entering the UK labour market in the data and AI sectors. However, it is worth noting that a proportion of scholarships is being awarded to international students. In the first year of the programme, 18% of scholarships were awarded to international students, who mostly qualified through their gender and/or Black background. In the intakes during academic year 2021/22 to date, the proportion has been 33%, suggesting a falling trend in the proportion of scholarships awarded to UK students.

Amongst the 128 scholarship awards to date to international students, the vast majority have gone to students from outside the EU (only 1 in 10 have gone to EU students). We believe this reflects high numbers of applicants for courses from countries such as Nigeria and India, many of whom potentially could be eligible for a scholarship at many institutions and were attracted to apply by the mention of scholarships.

Inspection of the scholarship data suggest that the majority of institutions have prioritised UK students in their scholarship award-making, while a small but increasing number have awarded more scholarships in the 2021/22 year to overseas than UK students. Overall, the picture is that there is more demand for scholarships than supply, but some institutions do not have enough UK-domiciled eligible applicants (hence the apparent overall drift towards a greater proportion of international students over time). It will be interesting during the remainder of the evaluation to monitor how this continues to evolve.

2.3.2 Overall student profile and effect of scholarships

To date, 37% of all enrolled students have been female (38% in 2020/21 intakes, 36% in 2021/22 intakes). Regarding disability, another of the targeted aspects of profile, the proportion of all students reporting a disabled status was lower (7%) in 2021/22 intakes than

in 2020/21 (12%), although the proportion amongst UK students was higher (17%) than international students (3%).

In parallel with HESA practice (which does not collect the ethnicity of international students), this report focuses on the ethnicity of UK students, not of all students. Amongst UK students, in the 2021/22 intakes, 21% were of Black background and in total 46% were of an ethnic minority background. These were only fractionally lower than the proportions observed in the first year of the programme.

The biggest change in profile has been in relation to domicile, as mentioned earlier, with 30% of students in the 2021/22 year to date being of UK domicile which is substantially lower than the 2020/21 intakes when UK students were (just) in the majority at 56%. It is thought that this shift reflects maturation of the courses. The institutions launched this provision quickly in 2020/21, which limited the marketing possible, and many are known to have promoted courses initially into the UK market, whereas with time these courses have been included in their full global marketing efforts so awareness amongst overseas students will have increased. The first courses were also launched in the context of the pandemic, when perceptions were that the UK graduate labour market was weak – which could also have increased interest amongst recent UK graduates.

It should also be noted that the domicile of students intersects with certain other characteristics, particularly disability – as proportionally fewer international students (3%) report they are disabled than UK students (17%) in the 2021/22 intakes. This intersection is observed in the falling overall proportion of disabled students with time as the proportion who are international rises. Interestingly, these proportions are very similar to those amongst all those entering taught postgraduate (PGT) Master's courses in 2019/20.[11]

A key question for the evaluation is whether the profile of all students on these new courses is different from that observed for pre-existing, broadly similar provision – and whether that difference is caused by the offer of scholarships or other reasons. One benchmark is the proportion of female students on taught Master's provision across engineering, technology and computer science – which was 28% in 2019/20, the most recent data. At 37%, the proportion on the conversion courses to date is somewhat higher. Amongst UK students, again, the proportion of ethnic minority students on these courses (46%) appears to be higher than within that broad benchmark group (38%). These comparisons give a rough idea that the conversion courses do appear to be 'more diverse' in these respects.

A more specific insight can be gained by comparing the profile of students with and without scholarships, again focusing on UK students (amongst whom most scholarships are awarded). Figure 2.1 illustrates very clearly that the proportions of UK students with the key targeted characteristics are markedly higher than amongst students without scholarships. This undoubtedly results in higher proportions in the overall cohort, although remembering that most scholarships go to UK students and so the effect on the overall cohort is somewhat less, and potentially less so with time as the proportion of international students rises. Nonetheless, this is evidence that the presence of scholarships appears to be having the desired effect of diversifying the student cohort in terms of the targeted characteristics.

[11] 2.6% of non-UK 2019/20 PGT entrants reported a disability and 17.1% of UK entrants. https://www.officeforstudents.org.uk/data-and-analysis/equality-diversity-and-student-characteristics-data/official-statistics/

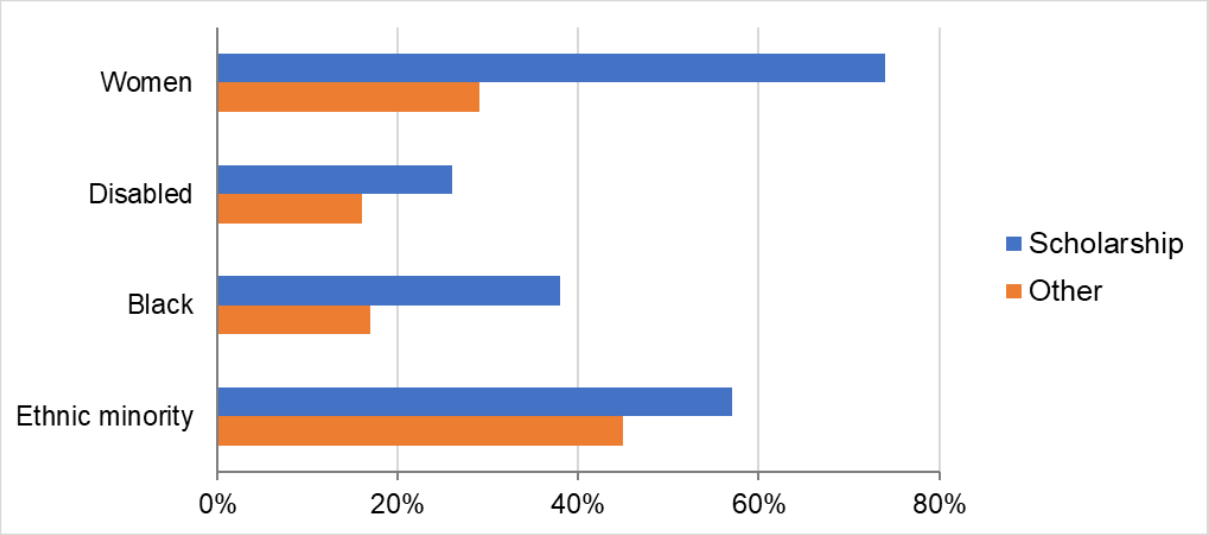

Figure 2.1 Proportion of UK students to date with certain key characteristics, with and without scholarships (*N*s: scholarship students 369; others 1131)

2.3.3 Students' first degree subjects

Analysis of students' prior degree subjects is important to assess the extent to which the courses are being taken up by students without a prior degree in a closely related subject area (i.e. 'converter' or non-cognate students) as opposed to those with a cognate first degree. In reporting of student profiles, institutions are asked to classify each student's first-degree subject into one of the following groups:

- Cognate: same broad subject area as conversion course (e.g. computer science, AI, data science);
- 'Core-STEM': e.g. physics, engineering, mathematics, statistics, IT;
- 'Far-STEM': other STEM subjects (e.g. biology, geology, psychology, medicine);
- 'Non-STEM': any other subject (including economics, business, arts etc.);
- None: no first degree held.

To date, 43 students (about 1%) have been reported as not having a first degree, split roughly evenly between the two programme years, and these were omitted from the analysis that follows. We assume these students were admitted on the basis of relevant experience or a professional qualification gained during employment.

Overall, according to this classification, around one quarter of all students have been cognate (although this was higher at 30% in 2021/22 intakes than in 2020/21, 18%). This means that three quarters of students have been converters to some extent. Over 40% have had either a non-STEM or a far-STEM background, for whom we consider the extent of 'conversion' to be substantial, as the mathematical content of their first degree will in most cases have been limited (or non-existent).

Figure 2.2 illustrates the first-degree subject groups for students in each of the two years of intakes, overall and for a variety of sub-groups of interest. From these results, we interpret a number of trends. First, overall and across all these sub-groups, there is a consistent trend for a somewhat higher proportion of cognate students starting courses in 2021/22 than

2020/21, although in all cases the majority are converter students to some extent. Second, the proportion of cognate students is higher amongst international students than UK students, which is not a surprise – and perhaps partly the result of some national promotion of the courses specifically as a conversion opportunity in 2020/21 in the UK.

There is also a consistent difference to date between scholarship and other students (shown here for UK domiciles), with more of the scholarship students being converter students – as many as two thirds of whom were from non-STEM or far-STEM backgrounds in the first year of the programme. This difference presumably reflects that institutions have prioritised converter students to some extent in their scholarship award-making, which was not an overt requirement of the programme, and are continuing to do so.

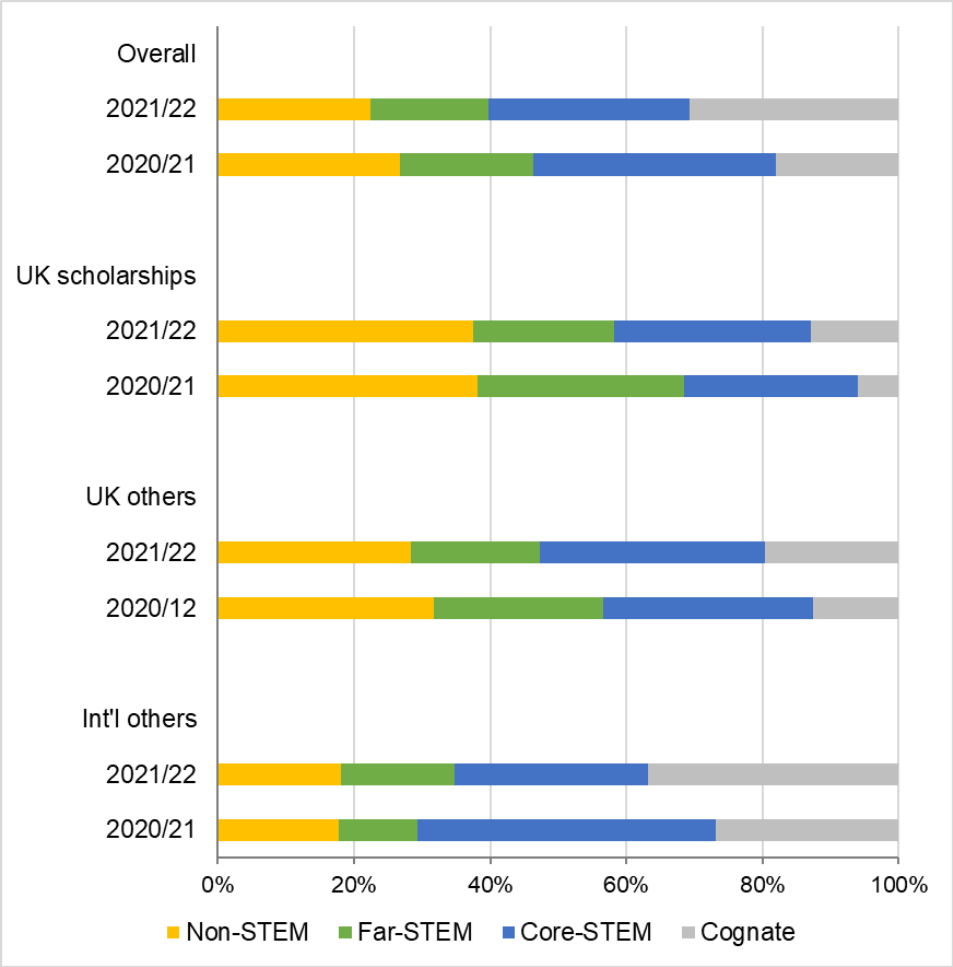

Figure 2.2 Students' discipline of first degree, categorised in relation to 'distance' from data science, AI or computer science, overall and for key groups, by intake year

A small number of institutions also provided the specific first degree subject of every student, demonstrating that courses were drawing students from across the entire width of disciplines. Analysis of these data by the subject area of the conversion course suggested that somewhat fewer of those studying AI courses tended to be from non-STEM or far-STEM backgrounds (and more from a core-STEM first degree) than of those studying DS or combined courses.

Our interpretation of these trends is that, as provision matures, many intakes are progressively shifting towards a more 'conventional' student profile (as seen for many STEM MSc courses), becoming more international and with somewhat fewer converter students among the international students in particular. Nonetheless, the existence of scholarships appears to continue having an effect in retaining some focus on converter students, in addition to enhancing the diversity profile in relation to targeted protected characteristics. Anecdotally, there is some evidence that mixed cohorts (in terms of subject background) may be beneficial to converter students in terms of the extent of student peer support available.[12] It is also likely that mixed cohorts – in terms of domicile and subject background – will result in larger course cohort sizes and ensure sustainability of provision (whereas a course limited only to UK converter students might be too small for viability).

2.4.4 Student age and prior circumstances

Data on student age is not provided by institutions as part of their student data reporting, but it is collected through the student surveys. Figure 2.3 shows the age of student participants, in age ranges, for all intakes to date. The most common age range has been 25-29 years, particularly amongst international students. The age profile of international students is somewhat more tightly clustered than for UK students, with almost 80% of the former aged between 25 and 40, whereas UK students are less tightly clustered with only 53% in these age ranges. That difference is accounted for by both a higher proportion (30%) of UK students being aged under 25 (while only 10% of international students are in that range), but also slightly more of the UK students (15%) being aged 40 or over. What is perhaps important in the context of conversion courses is that the courses are drawing students with a wide range of ages.

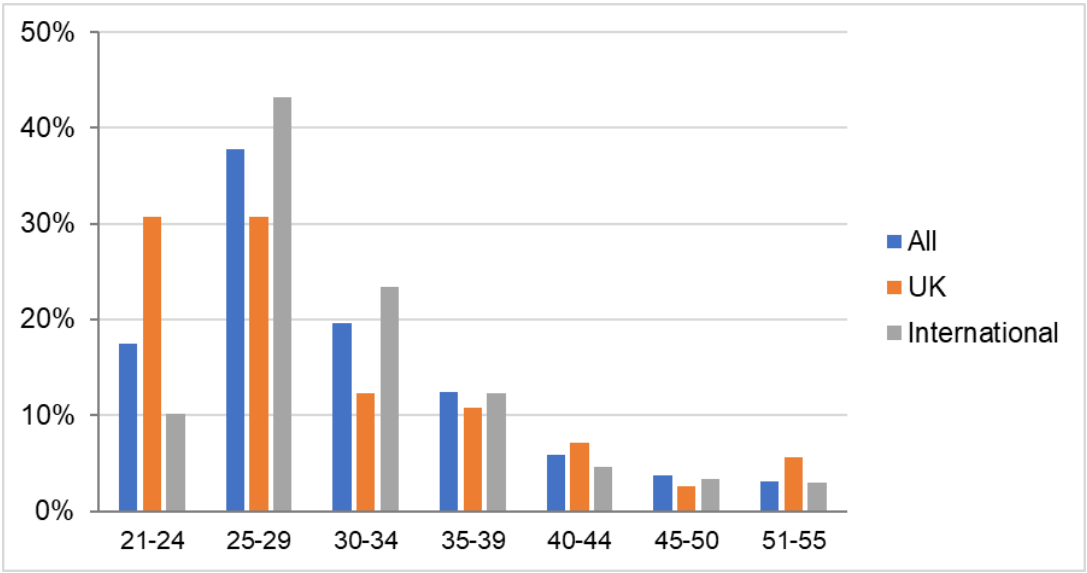

Figure 2.3 Age profile of survey respondents, shown as age in years, with nationality (*N*s: UK = 195; International = 360)[13]

[12] *Evaluation of a scheme to develop pilot engineering and computing conversion master's courses*, Office for Students, 2019

[13] Not all survey respondents provided age data

More understanding of how the conversion course fits into students' career trajectories is obtained from Figure 2.4, which shows the circumstances of enrolled students prior to enrolment. Overall, the largest proportion (48% to date) reported that they were in full-time work in a long-term job (i.e. a 'career job') the year before they started the course, and around two thirds in total had been working in some way. Just over one in five (21% to date) progressed directly from another higher education (HE) programme (in almost all cases a first degree). This confirms the inference from student age that the conversion courses are being taken by many individuals who have been in the workplace, not just students progressing directly from a first degree. This is important in terms of the courses providing opportunities for up-skilling or re-skilling of those already in the workforce, where they can support progression or potential career change.

Some differences between the two years are evident – fewer of the 2020/21 intake students had been employed long-term (37%), while higher proportions had been in HE or unemployed the year before their course started. It could be that the weak graduate labour market during the pandemic encouraged some students to enrol on a course in 2020/21. An overall rise in postgraduate study is regularly seen during periods of economic recession, as graduates take refuge in HE to avoid or counter an adverse labour market.

However, for the 2021/22 intakes, over half the students were in long-term work before the course, which may reflect a somewhat healthier labour market.

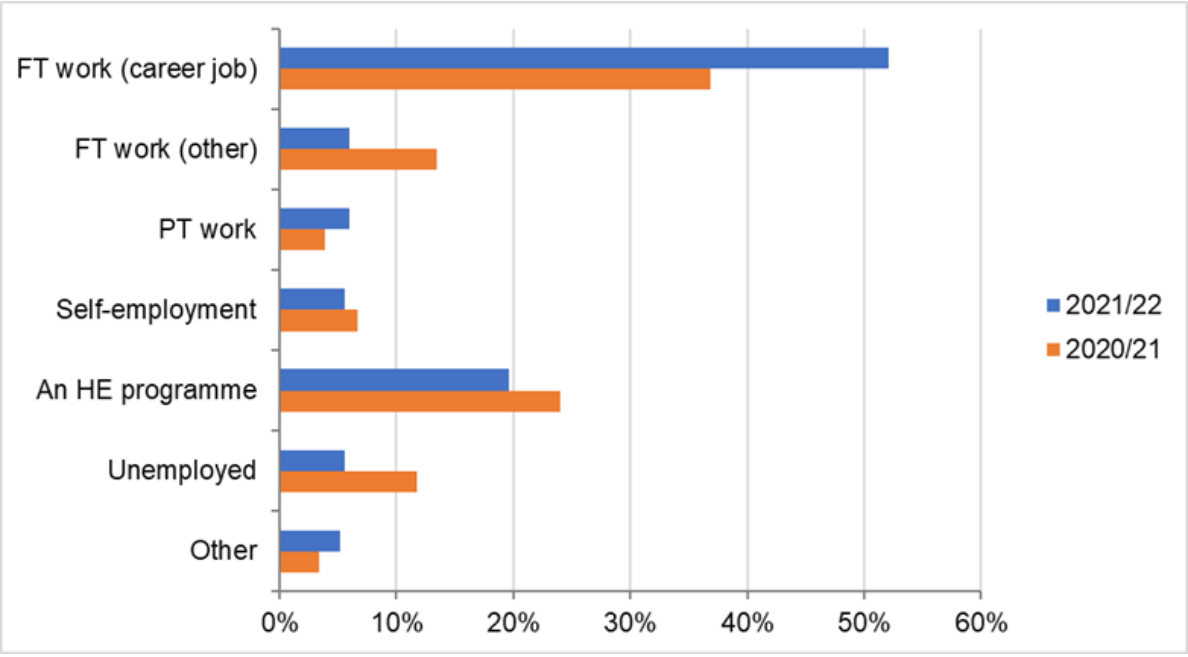

Figure 2.4 Circumstances of students prior to enrolling on a course (2020/21: *N*=179; 2021/22: *N*=484)

Analysis of the year of first degree graduation shows that consistently 22% of students obtained their first degree the year before they commenced the conversion course (and 36% either that year or the previous year). This reconfirms that such students – those who have progressed almost immediately from a prior degree – are currently the minority (within the student survey response sample, at least, and we infer amongst all students across the intakes). Altogether, this range of results suggests that the courses are drawing students

with a wide range of ages and years of graduation, both from the UK and overseas, including from long-term prior employment.

The nature of prior employment was investigated for those who had been working full-time in a long-term job prior to entering a course. The largest proportion had been working in IT/communications (32%), but others were well distributed across different industrial sectors, including engineering/manufacturing, finance/banking/professional services, as well as the public sector including health and social care and also education (Table 2.3).

Sector	**N**
IT/communications	32%
Engineering/manufacturing	17%
Finance/banking	16%
Public sector/third sector/health	15%
Education	12%
Other	8%

Table 2.3 Nature of prior employment of students who were working full-time in a long-term job prior to starting their course (*N*=312)

Analysis of these preliminary data is consistent with the strategic ambition of the conversion courses programme: i.e. to offer an opportunity for a wide range of graduates in the workplace to re-skill (which could potentially enable a change in career direction), as well as for recent graduates from a variety of backgrounds yet to enter the labour market.

2.3.5 Mode of study

Across all intakes to date, 17% of students have studied or are studying on a part-time basis. The proportion among 2020/21 intakes was much higher at around 30% than among intakes in the current year (at around 10%).

Figure 2.5 illustrates how this varies between UK and international students, as well as by year within the programme. Part-time study is far more common among UK-domiciled students, although there has also been a fall in the proportion since the first year of the programme, irrespective of domicile.

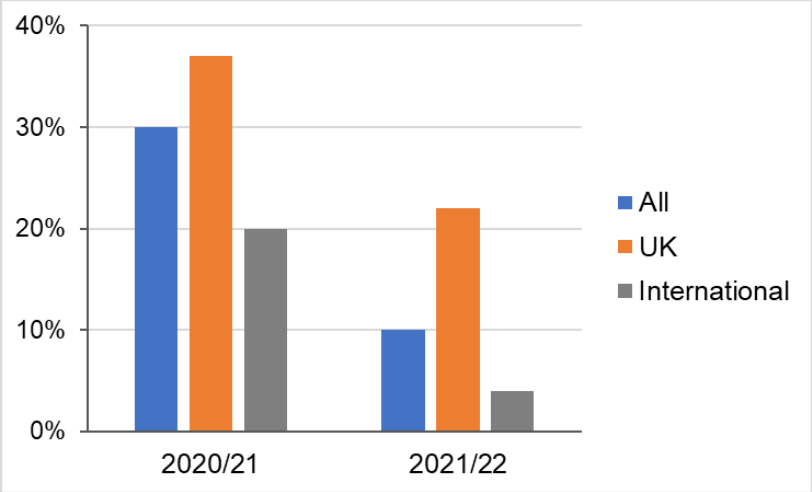

Figure 2.5 Proportion of students studying part-time, with domicile (from student enrolment data)

While dialogues with course leaders revealed that some institutions opened their courses only to full-time students when they first launched in 2020/21, deferring intended part-time variants until the second year of the programme because they were under time pressure to launch new courses, any effect of this on the overall number of part-time students has clearly been outweighed by other factors, which we believe include:

- The overall shift with time towards more international students, of whom far fewer study part-time, which clearly reduces the overall number of part-time students;
- In the first year, some of the largest student intakes were at institutions only offering part-time study (Bath and Birkbeck), raising the overall number of part-time students. In the 2021/22 intakes, there are many large cohorts dominated by full-time, international students;
- In 2020/21, many courses were entirely delivered remotely. It may be that it was physically more possible for individuals in the workplace also to study on a part-time basis because their study was remote, including those outside the UK. By contrast, almost all courses starting in the 2021/22 academic year require at least some physical presence on campus, which could limit the range of students who can participate.

From a relatively limited number of survey responses from part-time students (*N*=64), three quarters report that they continue to work in an existing job while studying, although only a handful obtain either financial support or time off from their employer to do so. This presumably reflects that most are studying for independent career reasons rather than being invited to do so by their existing employer.

3 Student experiences and outcomes

3.1 Motivations for study

Responses to questions in the student surveys to date have revealed consistent results, indicating a wide variety of motivations or rationales for taking a conversion course. Figure 3.1 shows that the top three career- or subject-related motivations in terms of popularity were the following: interest in the subject; to enable entry to a career they desire in this area; and recognition that there is strong demand for graduates of this type. These motivations were rated strongly by half or more of respondents and of some importance to all but a very small minority. Over 40% were strongly motivated by the opportunity the course could offer for a change in career direction, while just over one quarter thought it could accelerate progress in their existing direction. The common presence of these two motivations reflects the large number of students who have come from the workplace.

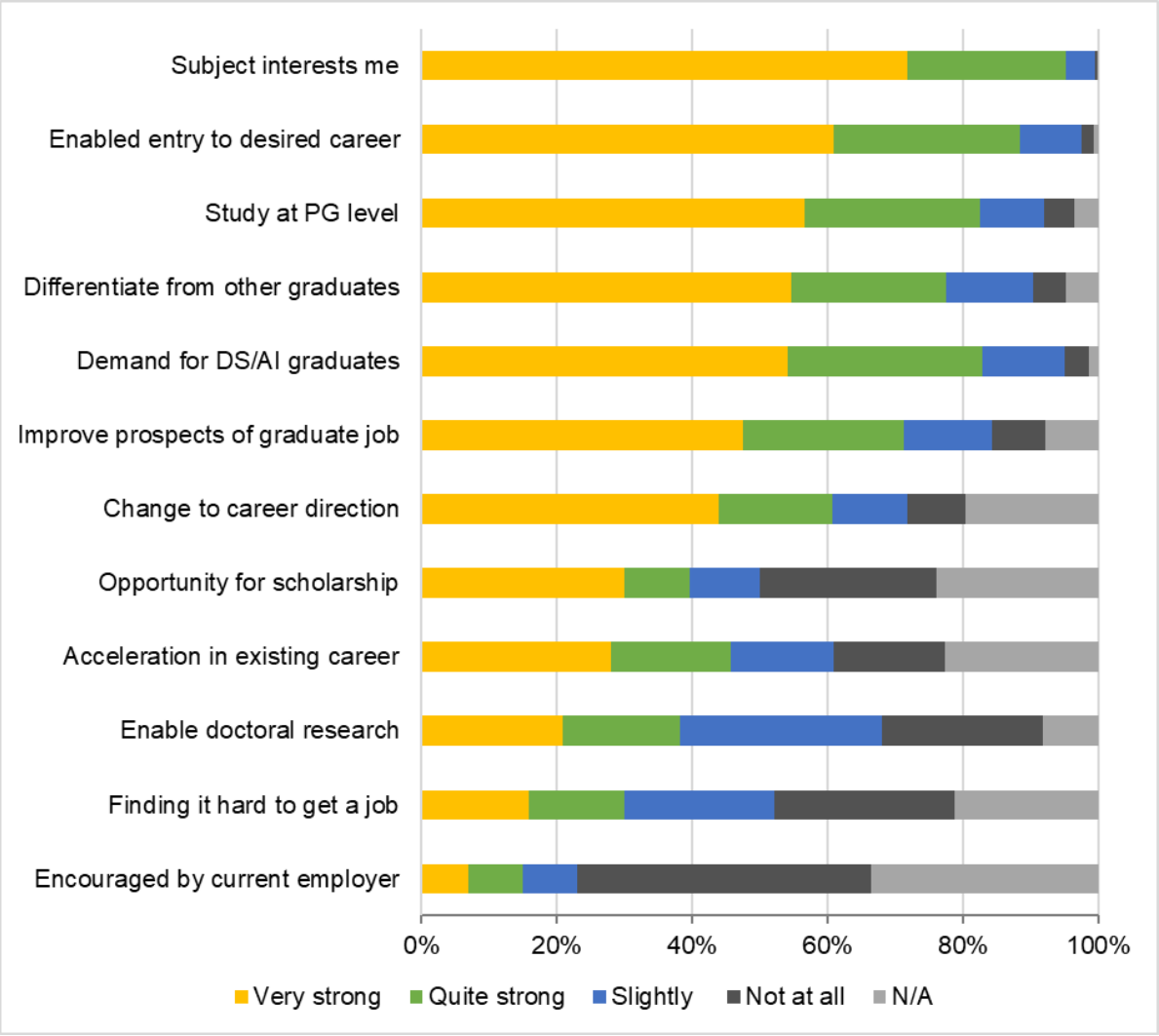

Figure 3.1 Motivations for taking a conversion course, for survey respondents to date (*N*s = 610-630)

A range of other motivations appear to be at play to varying degrees, including potential differentiation in a competitive graduate labour market and improving job prospects. These are likely to be more important for graduates newly or recently emerging from a first degree. Only a low proportion appear to have been encouraged by their employer to undertake the course.

Survey results reveal that almost half the student survey respondents applied for at least one other postgraduate (PG) course in the UK when they applied for the conversion course upon which they enrolled. Of those who had applied for other PG courses, around two thirds had applied for other conversion MSc courses in these subject areas. From this we infer that 35% of survey respondents applied for more than one course within the programme.

Of those who applied for more than one course, reasons for selection of their particular course included, most commonly, particular features of its content (48%), the university's reputation (48%) and that it was a more convenient location (35%). Around one third (32%) stated that lower fees were a rationale for selection, although relatively few appeared to have previously studied at the same institution (which would in many cases have meant lower fees).

3.2 Study funding

Insights into how students have funded their studies, and the wider experience of funding, are already emerging from the student survey results. However, a more robust picture will develop over time as more responses are obtained. To date, students with scholarships have been over-represented in survey responses, so these interim results should be treated with some caution as response numbers were modest for some groups.

In addition to the 36% of survey respondents who obtained a scholarship, a further 27% had applied for one but unsuccessfully, confirming that there is competition for scholarships. Interestingly, 42% of those who obtained a scholarship stated that they would not have enrolled without it, while a further 26% were unsure. This means that nearly one third of survey respondents with a scholarship may have enrolled on their course even without a scholarship.

Preliminary analysis of UK student survey respondents suggests around half of those with a scholarship had also taken out a PG/Master's loan to assist in paying their fees and/or living costs. Almost all the remainder (of scholarship awardees) depended solely on their own funds and/or financial support from their family to pay costs beyond those covered by the £10,000 scholarship – only a handful reported employer financial support. Of the UK respondents who did not have a scholarship, two thirds had taken out a PG/Master's loan, but all were drawing on their own or family funds to cover living costs. Again, only a very low proportion (under 10%) of these non-scholarship respondents were receiving any financial support from their employer for the course.

3.3 Study experiences

We were particularly interested to investigate the challenges that non-cognate students face when embarking on a conversion course, and how these are handled in practice. Challenges might include concerns about whether they would be able to cope with the level of maths required or about having to learn programming.

To date, the number of students who have completed a course is limited (hence there is a limited number of responses to our single survey of them), so insights into experiences are very preliminary. However, the results to date suggest that fears around the level of maths and learning programming are not especially widespread amongst the students that did enrol, nor did these aspects of study become too challenging (for most) in practice. More inherent challenges of PG study, such as finding the time and/or motivation for self-study, particularly for those still working, appear to be just as or even more significant. There is some suggestion from early results from students near the start of their courses that more of the cognate students, on average, are somewhat more confident about completing their course successfully than converter students, but not dramatically so. On the other hand, on the basis of dialogues with course leaders to date, there is some evidence that converter students tend to have particularly high levels of enthusiasm and determination, which helps to carry them through some of the challenges they encounter.

In the final evaluation report on this programme we will report as robustly as possible on student experiences, in particular to assess how converter students have fared, and consider whether certain approaches to provision and support have worked better than others.

Another area that will be investigated in some detail is experience in relation to placements in industry, given the programme's intention to ensure that course content is industry-relevant and that study leads to employable graduates. This is an area where the Covid-19 pandemic is known to have had strong impact. Dialogues with course leaders have revealed that securing placements (whether by students themselves or arranged by course staff) was a major challenge in the first year of provision, with employer engagement strongly reduced during the pandemic. It is hoped that results from future surveys will provide further information on participation in placements and/or projects with industry as well as students' experiences of them.

3.4 Course completion

To date, robust data about student completion (or not) has only been available for around 560 students who started full-time courses in autumn 2020 (and part-time students on the PGCert course at Birkbeck starting in January 2021). These early data support the views of course leaders that most students, overall, did complete their courses successfully, albeit a minority had either to defer or resit an assessment meaning they took somewhat longer to complete than originally anticipated (which is not unusual in the context of taught PG study). Quantitative assessment of these outcomes awaits submission of further data from institutions as provision within the programme progresses. Nonetheless, on the basis of the limited data so far, and qualitative insights from course leaders, there is no evidence to suggest that completion rates are of concern, overall, and that most students are graduating from their courses successfully.

3.5 Intended and actual next career steps

A crucial area for the evaluation is what graduates from these courses go on to do in their careers. This is being investigated in a broad 'before and after' approach using the surveys. In the 'before' student surveys, which are undertaken 6-8 weeks after the start of the course, respondents are asked to indicate their current medium- to long-term career aspirations (the

type of role they would ideally seek and the type of organisation and/or sector in which to work). Surveys of those completing courses then ask about current intentions or actual career steps taken.

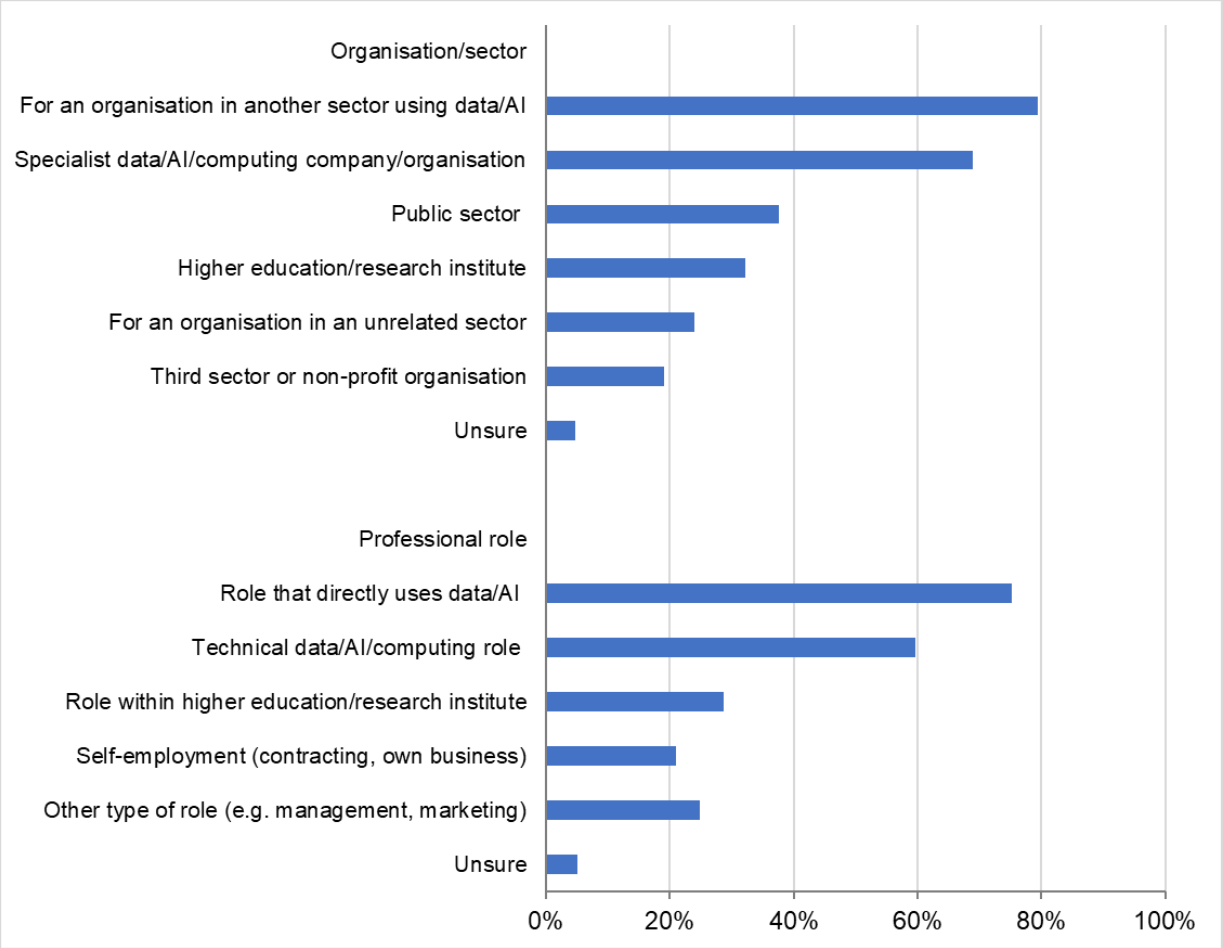

Figure 3.2 Medium- to long-term career aspirations of respondents at start of course, in terms of role and organisation/sector (*N*=585; multiple responses allowed)

Noting that respondents could select multiple options, Figure 3.2 shows that around three quarters of students at the start of the course said they wanted to work in a role that directly makes use of data science or AI and about 60% in a technical role working with data or AI. Aspirations about the type of organisation were similar, with the most popular setting being one where they could apply their data or AI skills in another sector, although many also would be happy to work in a specialist data/AI organisation. Quite substantial proportions are also interested in other settings where they could make use of their data or AI skills, such as the public or third sector. Work in HE or a research setting also looks relatively popular, presumably reflecting the personal enthusiasm these students had for their subject as they started their course.

Viewed overall, these results suggest that many of the students entered their courses with the medium-term goal of seeking the sorts of employment outcome that the conversion course programme has been funded to achieve.

In this report we can share for the first time early results about the actual or intended next steps of those who have completed their course, obtained in 'after' surveys completed by course graduates 2-3 months after completion. While these are currently only available for a small sample of students (as few have yet to complete their course), the results also appear to be positive when viewed in relation to the aims of the programme (Figure 3.3). Of the 97 respondents providing this information, 58 had either started a new job (50) or had a new job offer (8), while nine had started a doctorate. A further 21 respondents were currently looking for a new job. Interestingly only five remained in their existing job (although the number of part-time students in this sample was low, which could go some way to explaining this low number).

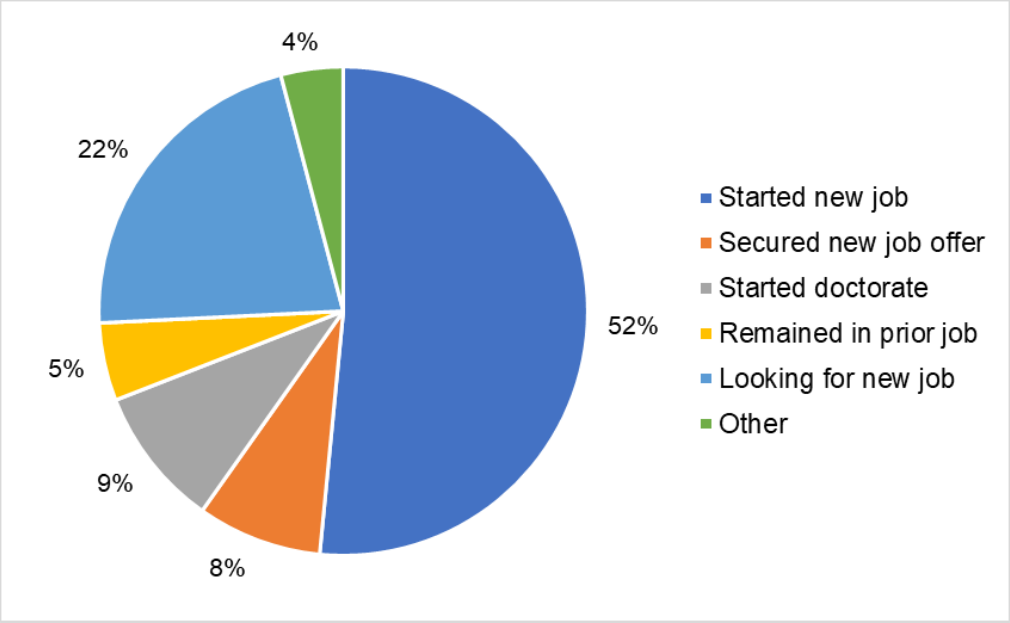

Figure 3.3 Current employment position of course graduates (*N*=97)

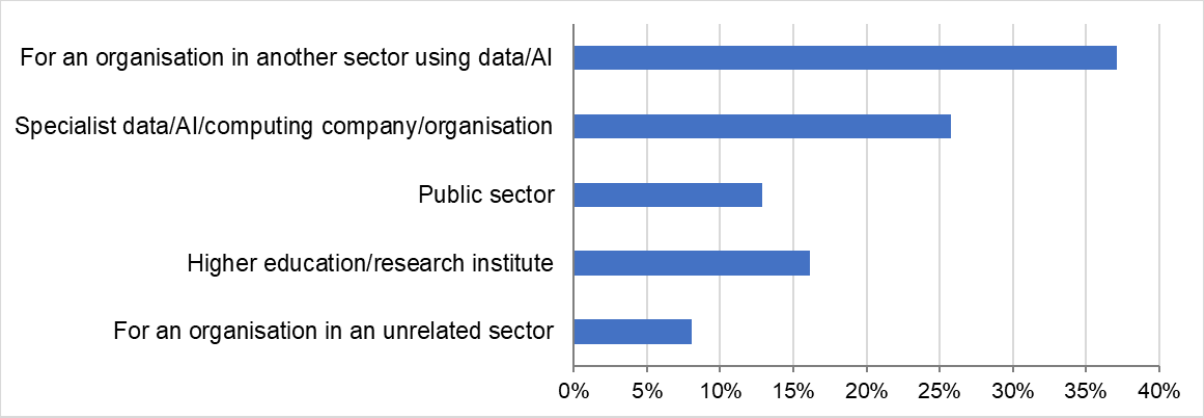

Figure 3.4 Achieved career destinations for graduates (*N*=62)

Looking at the setting for the employment of these graduates (including those with new jobs, pre-existing jobs and job offers), the distribution of organisation types (Figure 3.4) displays a strong resemblance to the aspirations of students shown in Figure 3.2. Thus, the most

common type of organisation reported is one making use of data or AI skills, followed by a specialist organisation in one of those fields.

Analysis of these jobs by industrial sector indicates a good spread, including the public sector (health and government) and a variety of private sector industries including IT itself. These early results will become more robust as the results of future surveys of students who have completed courses become available. What is also clear from the job titles given by respondents is that the vast majority of the roles achieved are strongly data-focussed. It is also worth noting that around nine out of 10 of these jobs are in the UK, which gives some early evidence of international migration into the workforce (that international students secure a job in the UK following study).

Of the 21 respondents looking for work, almost all were seeking a job either as a specialist in data or AI, or in an organisation where they would use their data or AI skills, and they all hoped to work in the UK. Of these 21, 18 were fully or moderately confident that they would secure such employment.

Together these results seem to provide quite strong evidence that those completing the courses are going on to secure the sorts of jobs that the conversion courses programme was designed to enable, albeit the results are limited in extent and based on only the first intake. As the sample sizes build up from future surveys, more refined analysis will be possible to consider issues such as migration in more detail.

Another ambition of the evaluation is to consider earnings enhancement (i.e. comparison of salary achieved after a course with prior salary). The data so far are limited to those few cases where a full-time job in the UK has been secured and where a previous salary was reported, but on that basis there is evidence of higher salaries being achieved after the course. It is hoped that sufficient data will emerge from future surveys to enable ROI (return on investment) calculations to be made for the programme as a whole.

4 Emerging findings and issues

Very broadly, at the mid-point in the programme, this interim evaluation report presents a range of evidence that suggests early outcomes from the programme are aligning well with the desired objectives.

New conversion courses in data science and AI have been developed and are being delivered in line with the proposals presented by the institutions funded through the 2019 conversion course programme. Those courses have, in total, attracted a very large number of students with a wide range of domiciles, first-degree backgrounds (including 'converter' students as intended and also cognate students) and other personal characteristics.

There is strong evidence that the offer of scholarships has resulted in a more diverse profile of UK-domiciled students in relation to the target under-represented groups (Black, female and disabled students).

Evidence in relation to the other under-represented groups targeted (albeit not uppermost as priority criteria), such as those from a Widening Participation background, is patchy, largely because institutions find it hard to collect data on these characteristics at scale. It is not feasible to compare the profile of scholarship awardees in these respects with all enrolled students, for example, so any effect of the scholarships is unclear. However, some scholarships are being awarded to students in these groups.

In programme Year 1 (courses starting within academic year 2020/21) take up of the available scholarships was as full as perhaps possible in practice (95% of targeted scholarships allocated) with 82% of those scholarships awarded to UK-domiciled students. At this point in Year 2 of the programme, 83% of targeted scholarships are known to have been allocated, although data are awaited for some later intakes in spring 2022. Two thirds of the scholarships awarded to those starting in 2021/22 intakes have gone to UK students.

With maturation of the provision, cohorts are becoming much more international. Broadly speaking, international students tend to be somewhat less diverse in relation to certain targeted characteristics (such as disability), so the overall profile is tending to become somewhat less diverse in those respects as the proportion of international students rises. Consideration of ethnic diversity is impacted by the restriction that ethnicity is reported only for UK domiciles. As the proportion of UK students appears to be falling progressively, this means the proportion of the total cohort for whom we can report ethnicity is decreasing. Nonetheless, we can see that the scholarships are having the desired effect of increasing the proportion of Black students (and other ethnic minorities, viewed together) amongst the UK-domiciled part of the cohorts.

This internationalisation observed in more recent intakes is also tending to result in lower total proportions of students who study part-time and who are converters rather than cognate. Despite that, the evidence is firmly that the courses are appealing to both conversion and cognate students in terms of first-degree subject, as well as to both mature students returning to PG study to re-skill and to fresh graduates.

The programme's long-term aim for impact is an increased number and diversity of graduates gaining a postgraduate qualification in AI or data science and entering the UK workforce to make use of their data and AI skills. This cannot yet be fully assessed, as only the first intake has been surveyed as 'graduates' and they have only recently completed their

courses. We intend to re-survey these same students in a year's time to obtain a more measured view of their employment outcomes. However, early evidence suggests most students are completing their degrees successfully and we now have the first results about actual next steps following completion of a course. The first signs are good, with most graduates securing jobs that appear to use their data and AI skills (as well as some evidence of enhanced salaries in the case of those who worked prior to taking the course). It will also be important to assess whether results from the 2020/21 intakes are somewhat atypical because they are based solely on students who enrolled and studied within a context strongly impacted by Covid-19.

The increasing internationalisation of the intakes also needs to be borne in mind when considering the programme's long-term aim of more graduates entering the UK workforce. Courses with high international enrolments may be considered highly successful by the institutions providing them, but they may contribute little to the aim of the programme if international students are either unwilling or unable to enter the UK labour market over the long-term.

In summary, these findings based on the evidence to date suggest that the programme has been successful. The evaluation is ongoing and a final report will be available in autumn 2023.

5 Glossary

Term	Description
AI	Artificial intelligence
BEIS	Department for Business, Energy and Industrial Strategy
DCMS	Department for Digital, Culture, Media and Sport
HE	Higher Education
HEFCE	Higher Education Funding Council for England
HESA	Higher Education Statistics Agency
IoC	Institute of Coding
IT	Information Technology
OAI	Office for Artificial Intelligence
OfS	Office for Students
PG	Postgraduate
PGT	Postgraduate Taught
STEM	Science, technology, engineering and mathematics