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Employability skills initiatives in higher education: what effects do they have on graduate labour market outcomes?

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The present paper makes use of detailed information gathered at university department level, combined with graduate survey data, to assess the impact of different kinds of employability skills initiative on graduate labour market performance. We find that structured work experience and employer involvement in degree course design and delivery have clear positive effects on the ability of graduates to secure employment in ‘graduate-level’ jobs. However, a measure of departmental involvement in explicit teaching and assessment of employability skills is not significantly related to labour market performance.

Keywords: graduate; employability skills; labour markets

1. Introduction

The expansion of higher education (HE) participation in many OECD countries in recent decades has led to increasing interest by researchers and policy-makers in the ‘education-to-work’ transition of new graduates and the extent to which they are readily ‘employable’ (Teichler 2000; Lindberg 2007). These issues attract particular attention in the United Kingdom, a country that experienced a very rapid transition from elite to mass HE in the late 1980s and early 1990s.¹ Among other things, UK universities have come under intense pressure to equip graduates with more than just the academic skills traditionally represented by a subject discipline and a class of degree. A number of reports issued by employers’ associations and HE organisations have urged universities to make more explicit efforts to develop the ‘key’, ‘core’, ‘transferable’ and/or ‘generic’ skills needed in many types of high-level employment (Association of Graduate Recruiters 1995; Council for Industry and Higher Education 1996; Universities UK 2002; Confederation of British Industry 1994, 2003).

From the perspective of employers, ‘employability’ often seems to refer to ‘work-readiness’; that is, possession of the skills, knowledge, attitudes and commercial understanding that will enable new graduates to make productive contributions to organisational objectives soon after commencing employment. Indeed, studies of employer demand for graduates in engineering and science disciplines have found that appropriate work experience and evidence of commercial understanding rank highly as selection criteria because of commercial pressures to seek graduates who will not require long ‘learning curves’ when they start employment (Mason 1998, 1999).

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However, in an extended discussion of the employability concept, Hillage and Pollard (1998, 11) put more emphasis on individuals possessing the capability 'to move self-sufficiently within the labour market to realise potential through sustainable employment'. In a similar vein, Harvey and Morey (2003) highlight the skills graduates need in order to manage their own careers and those that will enable them to continue learning throughout their working lives.

These broader conceptions of employability partly reflect the influence of the 1997 Dearing Report, which identified a set of key skills that were 'relevant throughout life, not simply in employment' (National Committee of Inquiry into Higher Education 1997, para. 9.18). Dearing defined these skills as *Communication, Numeracy, IT and Learning how to learn* at a higher level, and recommended that provision of such skills should become a central aim for higher education.

These recommendations have been backed up by a number of government-funded initiatives and programmes designed to encourage the development of such skills within HE and, more generally, to enhance the employability of graduates; for example, the Enterprise in Higher Education Initiative and HE 'Development Projects' covering areas such as Key Skills, Careers Guidance and Work Experience.²

Within HE, the generic skills needed to enhance graduate employability (whether defined in terms of immediate work-readiness or longer-term career prospects) are now typically seen as including the skills emphasised by Dearing and also *Literacy, Problem-solving skills* and *Team-working skills*. In addition, the employability skills agenda is commonly defined to include '*Understanding of the world of work*', which typically refers to knowledge about the ways in which organisations work, what their objectives are and how people in those organisations do their jobs (Coopers and Lybrand 1998).

University responses to this agenda typically include modifications to existing course content (sometimes in response to employer suggestions), the introduction of new courses and teaching methods, and expanded provision of opportunities for work experience – all intended to enhance the development of employability skills and/or to ensure that the acquisition of such skills is made more explicit. In some cases university departments have sought to 'embed' the desired skills within courses; in other departments, students are offered 'stand-alone' skills courses that are effectively 'bolted on' to traditional academic programmes (Coopers and Lybrand 1998). In fact, many university departments now use a mix of embedded and stand-alone teaching methods in their efforts to develop employability skills.

As further evidence of the growing importance attached to graduate employability, the Higher Education Funding Council for England (HEFCE) has developed measures of university performance that include indicators of graduate labour market outcomes; for example, the probability of new graduates finding employment after a specified time interval (HEFCE 2001, 2002, 2003).

In this paper we report on a new empirical investigation of the impact of different kinds of HE employability skills initiative on similar measures of graduates' labour market performance. In particular, we make use of detailed information gathered at university department level to develop innovative measures of the extent to which departments engage in teaching and assessment of employability skills, and the extent of employer involvement in course design and delivery as well as measures of student participation in work experience through sandwich courses and related programmes. The study is based on research visits to a total of 34 departments in eight different universities between January and April 2001 and on an analysis of

First Destination Survey data for some 3589 graduates from the sample departments in the year 2000.

The article is ordered as follows. Section 2 describes the extent and nature of employability skills teaching in sample departments and the new measures used to capture this activity. Section 3 considers theoretical reasons why employability skills development might be expected to contribute to improved matches between graduate job-seekers and employers. Section 4 outlines the empirical models used to explore the links between employability skills development and graduate labour market outcomes. Section 5 presents the main findings of this analysis. Section 6 draws some conclusions.

2. Employability skills teaching in sample departments

In order to gather in-depth information on employability skills teaching and learning in a cross-section of subjects and universities, semi-structured interviews were held with 60 academic staff and 10 careers staff in 34 departments in eight universities comprising four pre-1992 (Old Universities) and four post-1992 (New Universities) (Table 1). These departments covered five subject areas – Biological Sciences, Business Studies, Computer Science/Studies, Design Studies, and History – which were selected in order to obtain a mix of traditional academic subjects, recently established and/or rapidly growing vocational subjects and courses where First Destinations data point to a wide range of experiences of initial entry to employment. As shown in Table 1, the Biological Sciences, Business Studies and Computing departments were spread across a mix of Old and New Universities. By contrast, the sample History departments were all in Old Universities while the Design departments were all in New Universities.

The interviews sought respondents' views on definitions of employability; learning, teaching and assessment of employment-related skills and knowledge; employer involvement with programmes of study; student work experience; and other employability initiatives. The findings revealed wide differences between departments and between subjects in the ways that teaching staff sought to provide employability skills-enhancing experiences. Some differences of approach between pre-1992 and post-1992 universities could be discerned but, in the three subjects that were offered in both categories of institution, there was no clear distinction between Old and New Universities.

In Biological Sciences, all respondents acknowledged their responsibility for producing graduates who were employable both within the Biological Sciences field and outside it. Most Biological Science departments had been quick off the mark in adapting courses to focus more on teaching communications, presentation and other generic skills. Conversely, while the History respondents reported a similar awareness of the wide range of occupations entered by their graduates, they still tended to focus on equipping their graduates with the skills they saw as essential for a good historian in the belief that these skills themselves were transferable into diverse occupations (e.g. the skills involved in information processing and the development of coherent and convincing arguments).

On the whole, respondents in the Computer Studies, Business Studies and Design departments were more likely to see their subjects as vocationally orientated. However, there were variations in how this influenced the delivery of employability skills teaching. For example, the Design courses all explicitly sought to equip students with employability skills, in part because many of their graduates enter a very competitive

Table 1. Sample university departments analysed by subject area and by type of university.

Code	Biological Sciences	Business and Management Studies	Computer Science/Studies	Design History	University description
Old A	X	X	X	X	A large pre-1992 civic university in the Midlands
Old B	X	X	X	X	A former college of advanced technology in the south of England that became a technological university in 1964
Old C	X	X	X	X	A large pre-1992 civic university in the north of England
Old D			X	X	Old D, Old E and Old F comprise two medium-sized colleges and one large college of a southern university
Old E	X			X	
Old F	X		X	X	
New A	X		X		X A medium sized post-1992 university in the north of England, focused very much on serving a local community
New B	X	X	X		X A very large post-1992 university located in the north of England
New C	X	X	X		X A medium sized post-1992 university in the Midlands
New D	X	X	X		X A large post-1992 university in the south of England
Total	9	6	9	6	4

economic environment with many small enterprises in which graduates are required to have a range of management and business skills as well as technical proficiency in design (Blackwell and Harvey 1999). In Business Studies departments, specialist subject knowledge and theoretical knowledge were seen as intrinsically related to the development of the generic skills needed for general management roles.

By contrast, a relatively low emphasis on employability skills in several Computer Science departments was attributed to high labour market demand for Information Technology graduates at the time of the interviews. Most of the Computing departments actively sought to combine specialist knowledge teaching with the development of generic skills, but it was reported that the easy routes into employment for Computer Science graduates led to some resistance from students to engaging with broader employability skills.

In all subjects except History, a majority of respondents were able to provide examples of recently introduced approaches to teaching, learning and assessment that were intended to enhance employability, although the extent to which these

were deployed varied between universities. Nearly all of the departments visited stated that their principal intention was to embed key skills in the curriculum rather than address them through stand-alone courses. Examples of such embedding included a greater emphasis on oral presentations, the use of more 'real world' examples in teaching, more group working and the introduction of more final-year projects (intended to develop independent learning skills). There were also examples of changes in assessment practices (such as increased weighting in assessment for problem-solving and numeracy skills and lower weighting for theoretical knowledge). Where stand-alone generic skills courses did exist in some departments, these were often seen as necessary to fill gaps in students' skills in areas such as mathematics and grammar.

The incidence of structured work experience as part of degree courses varied widely by subject. In History departments there was little or no such provision. By contrast, the provision and take up of work experience for Business Studies students was relatively high in both Old and New Universities. The four Design departments also all reported considerable opportunities for students to take part in work experience placements. In Biology only one of the three Old University departments made provision for work experience, whereas in three of the four New University departments it was widespread. In a majority of Computer Science departments the most common form of work experience for students was course-related part-time and summer paid work.

Employer involvement in course design and delivery took forms such as commenting on the relevance of course content to future employment prospects, providing material and ideas for student projects, and giving guest lectures. In some cases this employer involvement occurred through formal membership of course advisory panels; in other cases, it largely depended on personal contacts between employer representatives and university staff. Employer involvement of some kind was widespread and often integral in Design Studies, variable in Computer Studies departments and almost non-existent in History. In the two other subjects there were marked differences between institutions in contacts with employers but not on any clear Old–New University lines. This partly reflected location. For example, some Biological Sciences departments had ready access to nearby employers who regularly recruited Biology graduates; others did not.

In order to quantify the differences between departments in involvement in employability skills development, each department was ranked on a four-point scale on six different measures:

- (1) the emphasis given to teaching and learning of the following employability skills: Communication, Numeracy, Literacy, Information Technology, Problem-solving, Understanding world of work, Team-working;
- (2) the emphasis given to employability skills in undergraduate assessment;
- (3) the relative importance of employability skills compared with subject knowledge and theoretical understanding;
- (4) the extent and impact of employability skills-related innovations in courses in the 10 years prior to our visits;
- (5) the extent and impact of employer involvement in course planning, design, teaching and assessment; and
- (6) the proportion of students undertaking work placements as part of their studies and/or engaging with industry-based project work of different kinds.

Measures (1)–(3) were based on departmental respondents' replies to written question-sheets in which they were invited to classify the importance of employability skills in teaching, learning and assessment on a four-point scale. Measures (4)–(6) were based on responses to interview questions and data provided by departments. The results of these rankings are shown in Table 2. We now go on to incorporate these measures into our analysis of the links between employability skills initiatives in HE and graduate labour market outcomes.

3. Theoretical framework

As described above, employability skills teaching is explicitly aimed at enhancing graduates' skill sets in ways that should increase their attractiveness to potential employers. This is an underlying rationale for the inclusion of graduate labour market outcomes in measures of university performance developed by HEFCE (discussed in Section 1). 'Success' in the graduate labour market is typically defined as graduates securing employment in jobs that make appropriate use of the skills and knowledge developed in the course of their university studies.

In matching theory, labour market 'failure' on the part of individual graduates – unemployment or underutilisation of graduate-level skills in employment – reflects mismatches between graduates and employers that may come about for a number of reasons. For example, Coles and Smith (1998) emphasise that, in a random matching model, mismatches between job-seekers and employers may arise because of imperfect information, resulting in time and search costs for prospective partners to obtain information about better matches. They also propose an alternative 'stock-flow matching' model in which, after an initial round of match-making, agents may simply wait for appropriate partners to enter the market in a later time period. Other strands of matching theory emphasise the role of institutional and labour market rigidities in contributing to mismatches between job-seekers and employers; for example, the higher incidence of under-utilisation of skills among female graduates who combine part-time employment with care of young children (Green, McIntosh and Vignoles 2002).

In a recent investigation of labour market mismatches in the Netherlands, Allen and van der Velden (2001) find that 'education–job mismatches' (individuals holding jobs for which their formal qualifications are higher or lower than required) do not correspond closely with 'skill–job mismatches' (individuals holding jobs for which their skills are above or below those required). One possible explanation for this is that, within given educational qualification categories such as degree holders, there may be unmeasured differences in skills between individuals, and individuals deemed by employers to be relatively low-skilled may be less likely than others in their qualification group to be offered jobs that require their level of formal qualification.

Recent UK evidence in support of this hypothesis of 'heterogeneous skills within qualification levels' has been presented by Green and McIntosh (2002), who find that less than one-half of people identified in the 2001 Skills Survey as over-qualified (in terms of formal certification) for their jobs were also over-skilled (i.e. in their own evaluation, not making much use of their skills and abilities in their present jobs).

Another proposition advanced by Allen and van der Velden is that the selection criteria used by employers when screening job applicants may include factors such as work experience, gender and social background, which are distributed unevenly within educational qualification categories. This is another potential line of explanation why

Table 2. Measures of employability skills teaching in sample departments.

Department	University									
	Old A	Old B	Old C	Old D	Old E	Old F	New A	New B	New C	New D
(A) Importance of employability skills in undergraduate teaching and learning ^a										
Biology	3.2	4.0	3.6		3.4	3.4	3.1	4.0	3.8	3.8
Business Studies	3.9	3.6	3.4					3.7	3.4	3.8
Computing Studies	2.4	3.5	3.3	3.1		3.4	4.0	3.7	3.4	3.4
Design Studies							3.8	3.4	3.6	4.0
History	3.6	3.6	2.9	3.0	2.7	3.1				
(B) Importance of employability skills in undergraduate assessment ^b										
Biology	2.9	3.0	2.9		3.6	2.6	2.7	4.0	3.4	3.0
Business Studies	3.6	2.9	2.9					3.6	3.6	3.1
Computing Studies	1.5	3.5	3.1	2.8		3.6	3.9	3.1	3.1	2.5
Design Studies							2.6	2.9	2.9	3.6
History	3.4	3.0	2.7	2.7	2.3	2.3				
(C) Relative importance of employability skills compared with subject knowledge/theoretical understanding ^c										
Biology	1.0	4.0	4.0		1.0	1.0	1.0	2.0	4.0	2.0
Business Studies	4.0	4.0	1.0					4.0	2.0	3.0
Computing Studies	1.0	3.0	1.0			2.0	2.0	3.0	2.0	1.0
Design Studies							1.0	2.0	2.0	2.0
History	2.0	1.0	1.0	1.0	1.0	1.0				
(D) Major employability skills-related innovations in courses in past 10 years ^d										
Biology	2.0	4.0	4.0		4.0	3.0	3.0	3.0	3.0	3.0
Business Studies	3.0	4.0	1.0					4.0	4.0	3.0
Computing Studies	1.0	3.0	3.0	3.0		4.0	3.0	4.0	3.0	2.0
Design Studies							3.0	4.0	3.0	3.0
History	2.0	2.0	1.0	1.0	1.0	1.0				
(E) Student involvement in work experience ^e										
Biology	1.0	4.0	1.0		1.0	1.5	3.0	3.0	3.0	1.0
Business Studies	3.0	4.0	1.0					4.0	4.0	4.0
Computing Studies	1.0	4.0	3.0	2.0		1.0	2.0	2.0	4.0	4.0
Design Studies							4.0	4.0	4.0	3.0
History	1.0	1.0	1.0	1.0	1.0	1.0				
(F) Employer involvement in course provision ^f										
Biology	1.0	4.0	3.0		1.5	1.0	3.0	1.0	4.0	1.0
Business Studies	2.0	2.0	2.0					3.0	3.0	3.0
Computing Studies	4.0	2.0	2.0	1.0		1.0	2.0	2.0	2.0	4.0

Table 2. (Continued).

Department	University									
	Old A	Old B	Old C	Old D	Old E	Old F	New A	New B	New C	New D
Design Studies							4.0	4.0	4.0	3.0
History	1.0	2.0	1.0	1.0	1.0	1.0				

Notes: ^a Employability skills defined as: Communication, Numeracy, Literacy, Information Technology, Problem-solving, Understanding world of work, and Team-working. The emphasis given to teaching and learning of each of these skills was ranked by departmental interviewees on the following four-point scale: 4 = very important; 3 = fairly important; 2 = not very important; 1 = not at all important.

^b The emphasis given to assessment of employability skills was ranked by departmental interviewees on the following four-point scale: 4 = very important; 3 = fairly important; 2 = not very important; 1 = not at all important.

^c Defined as the difference between the score given to employability skills and the score given to subject knowledge/theoretical understanding, where these two dimensions of teaching were ranked by interviewees on a four-point scale. These differences were then in turn allocated to another four-point scale as follows: 4 = average score for employability skills 0.5 points or more above average score for subject knowledge/theoretical understanding; 3 = 0.15–0.49 point differential; 2 = –0.14 to +0.14 point differential; 1 = average score for employability skills falls 0.15 or more points below average score for subject knowledge/theoretical understanding.

^d Scores: 4 = wide-ranging efforts to change traditional course content and teaching; 3 = moderate efforts to change traditional course content and teaching; 2 = some minor efforts to change traditional course content and teaching; 1 = no evidence of efforts to change traditional course content and teaching methods.

^e Scores: 4 = average 50% or more of undergraduate students undertake work placements as part of their studies; 3 = average 10–49% of students undertake work placements as part of their studies; 2 = less than 10% of students undertake work placements as part of their studies; some involvement with industry-based project work of different kinds; 1 = less than 10% of students undertake work placements as part of their studies; no involvement with industry-based project work of any kind.

^f Scores: 4 = some employer involvement in course planning/design, teaching and assessment; 3 = some employer involvement in course planning/design and teaching but not assessment; 2 = some employer involvement in course planning/design but not teaching or assessment; 1 = no employer involvement in course planning/design, teaching or assessment.

individuals with similar levels of formal certification may encounter varying degrees of success in securing employment in jobs that make use of their graduate-level skills and knowledge.

Matching theory, together with the literature on overeducation and under-utilisation of skills, therefore points to several reasons why the teaching, learning and assessment of employability skills might be expected (all else being equal) to contribute to superior labour market outcomes for graduates in possession of those skills.

Assume that some university departments make concerted efforts to develop employability skills in the ways described in Section 2 while others do not. Graduates from the first type of department will be referred to as ‘ES graduates’, in contrast to ‘Non-ES graduates’ from the second type of department.

Firstly, the quality of employer–graduate matches in the labour market (and the speed with which such matches are achieved) should be improved for ES graduates relative to non-ES graduates by the better information that ES graduates acquire about alternative job prospects as a result of their exposure to different employment conditions during industrial placements and/or to course content that is explicitly related to practical applications of subject matter in employment. The latter source of information is especially likely to be enhanced for ES graduates from departments where employers have been involved in the design and delivery of courses.

Secondly, employers' information about job applicants is likely to be improved by their involvement in providing student work placements or by their relationships with certain university departments, which are built up in the course of contributing to course design and delivery. Even employers who do not have direct links with any university departments will be able to obtain references for ES graduates that have been supplied by other employers who do provide placements. In addition, the job applications made by ES graduates may contain information about the development of problem-solving, team-working and other skills ostensibly valued by employers, which may increase their chances of being called to interviews where they will have a chance to demonstrate their suitability for the jobs in question.

Thirdly, the uneven spread of employability skills teaching can be expected to increase the heterogeneity of skills among graduates in ways that will favour ES graduates in terms of securing jobs that formally require possession of a degree. All else being equal, we can expect employers to favour job applicants who can demonstrate practical skills and commercial understanding gained during work placements and the high-quality communication and other generic skills that employability skills teaching sets out to develop.

In this context, we derive the following hypotheses regarding the expected impact of employability skills teaching on graduate labour market outcomes:

- H1: The probability of graduates finding employment within a short time after graduating will, all else being equal, be positively related to the extent to which employability skills development featured in their undergraduate programmes, as measured by:
 - (A): the provision of work experience placements for students
 - (B): employer involvement in course design and delivery
 - (C): the emphasis placed on teaching, learning and assessment of employability skills by their departments.
- H2: The probability of graduates taking up employment in jobs where their skills and knowledge are well utilised will, all else being equal, be positively related to the same three variables (A), (B) and (C).

4. Empirical models

Previous efforts to evaluate UK universities' efforts in developing graduate employability skills have made use of available data from the annual First Destinations Survey of full-time undergraduate leavers from UK universities, which is carried out by the Careers Service at each university and captures information on students' employment outcomes roughly six months after graduation. The performance indicators developed to date have typically focused on graduates' success in finding employment after graduation and in their being employed in a job deemed, by specified criteria, to be of 'graduate quality'.

For example, in a study of 1993 leavers from pre-1992 universities, Smith, McKnight and Naylor (2000) find that the probability of student-leavers being employed six months after graduation is positively related to the class of degree and is also strongly influenced by the subject studied, measures of prior educational attainment (such as A-level point scores), age at graduation and social class background. Most of these factors are also found to strongly affect the probability of student-leavers in employment being in a 'graduate occupation', although age at graduation has only a weakly significant effect for female graduates and has no significant effect for males.

The definition of a ‘graduate occupation’ by Smith, McKnight and Naylor includes both ‘traditional graduate’ occupations (such as doctors, lawyers and teachers) and ‘graduate track’ occupations (e.g. technician-level and skilled caring jobs) that require high levels of education, that are increasingly filled by graduates and that often constitute entry routes to higher level positions. The residual category of ‘non-graduate’ occupations then covers jobs that clearly do not require high-level qualifications and that are unlikely to make use of graduate-level skills and knowledge (McKnight 1999). This classification has subsequently been further developed by Elias and Purcell (2004), who distinguish four categories of graduate occupation that either require university degrees or offer scope for use of degree-level skills and knowledge along with a large residual category of non-graduate occupations (principally in clerical, personal service, sales, skilled trade, labouring and related occupations).

Six months after graduation is a very early stage in graduates’ careers, and the *Moving On* survey of 1995 graduates (Elias et al. 1999) found that the likelihood of being employed in a non-graduate occupation declines over the first few years after graduation as some individual graduates manage to secure graduate-level employment after first accepting a period of lower-level employment. However, an initial period of under-employment was found to have lingering negative effects on those graduates’ salary and career development, suggesting that data on employment status six months after graduation may in fact be useful indicators of future labour market prospects.

Later work in a similar vein by the HEFCE (2001) developed benchmarks for institutional performance with regard to graduate employability using a multi-level model that relates employment indicators for individual graduates in 1999–2000 to a number of potentially relevant student-level and institution-level characteristics. This work combined data from the First Destinations Survey of student-leavers with data from the Combined Student Module Record held by the Higher Education Statistics Agency, supplementary files supplied by the Universities and Colleges Admissions Service, and the Labour Force Survey.

For the present study we make use of an augmented version of the HEFCE dataset to test the two sets of hypotheses derived above in relation to June 2000 graduates from the 34 departments we had visited. This is done by modelling the probabilities that graduates are (1) employed as compared with being unemployed and (2) employed in a ‘graduate quality’ job as:

$$\Pr(Emp_i = 1 | X_i) = f(X_i \beta) \quad (1)$$

$$\Pr(GradJob_i = 1 | X_i) = f(X_i \beta) \quad (2)$$

where:

$$Emp_i \begin{cases} = 1 & \text{if the graduate is employed six month after graduation} \\ = 0 & \text{if the graduate is unemployed six months after graduation} \end{cases}$$

$$GradJob_i \begin{cases} = 1 & \text{if the graduate is employed in a graduate occupation six month after graduation} \\ = 0 & \text{if the graduate is employed in a non - graduate occupation six month after graduation} \end{cases}$$

and X_i is a vector of individual, department-level and university-level characteristics that might be expected to influence labour market outcomes. The definitions of graduate and non-graduate occupations are taken from Elias and Purcell (2004) as described above.

The individual characteristics include gender, age on entry, ethnic group, degree classification, subject of study, whether he/she participated in a sandwich training placement and whether his/her parents reside in a 'low HE participation' neighbourhood. We thus control for a number of indicators that Allen and van der Velden (2001) suggest may be used as selection criteria by employers when screening applications from job-seekers. In addition, data are available for some but not all graduates on school-leaving examination performance (A-level scores) – a commonly used proxy measure of individual cognitive ability – and indicators of parental social class. In view of the large numbers of missing values on these variables, we exclude them from our main analyses but subsequently include them in alternative models as sensitivity tests of our results.³

The university-level characteristics relate, firstly, to whether the institution is an Old University or a New University and, secondly, to indicators of labour market pressure in each university's locality; for example, in Equation (1) the local unemployment rate among 20–29 year olds and, in Equation (2), the percentage of local jobs classified as 'graduate jobs'.

The department-level characteristics comprise three different measures of the extent to which employability skills feature in undergraduate programmes:

- departmental involvement in teaching, learning and assessment of employability skills (derived from Tables 2, parts A–D);
- student participation in work experience (Table 2, part E); and
- employer involvement in course design and delivery (Table 2, part F).

The decision to group the four indicators of teaching, learning and assessment of employability skills and major course innovations relating to such skills was made following a factor analysis that extracted a single factor with an eigenvalue in excess of unity, which explained 71% of the total variation of the four variables. Given that our departmental data were gathered during research visits in 2001, it was necessary to review interview data in order to ensure that so far as possible the employability skills teaching measures reflected teaching and learning practices during the period 1996/97–2000 when most 2000 graduates were attending university. This led to appropriate downward adjustments being made for 10 out of the 34 departments that had only recently introduced certain innovations in respect of employability skills teaching, and it was these adjusted measures of involvement in employability skills development that were included in the statistical analysis (see Table 3 for descriptive statistics of the adjusted and unadjusted employability skills measures).

In total, data were available for 4676 graduates in the five selected subject areas from the 34 departments in year 2000 that completed First Destinations returns. In our analyses we focus on the 3589 graduates among this group who were either employed or unemployed at the time of the 2000 First Destinations Survey (Table 4). Definitions and descriptive statistics for individual-level and university-level characteristics are presented in Tables 5 and 6.

5. Employability skills development and graduate labour market outcomes

5.1. Sandwich course selection issues

Preliminary analysis of the factors determining the probability that individual graduates from the 34 departments are employed as against being unemployed finds a

Table 3. Summary measures of employability skills teaching in sample departments.

	Distribution of scores (%)		
	Departmental involvement in teaching, learning and assessment of employability skills ^a	Student participation in work experience ^b	Employer involvement in course design and delivery ^c
Initial employability skills scores			
<2.0	8	34	26
2.0–2.99	43	8	22
3.0–3.49	29	15	27
3.5 or more	21	43	25
Total	100	100	100
Adjusted employability skills scores ^d			
<2.0	10	34	26
2.0–2.99	49	8	22
3.0–3.49	27	15	27
3.5 or more	13	43	25
Total	100	100	100

Notes: ^aArithmetic mean of scores relating to importance of employability skills in undergraduate teaching and learning; importance of employability skills in undergraduate assessment; relative importance of employability skills compared with subject knowledge/theoretical understanding; and major employability skills-related innovations in courses in past 10 years (see Table 2, parts A–D for detailed definitions of these indicators).

^bAs defined in Table 2, part E.

^cAs defined in Table 2, part F.

^dScores adjusted to ensure that, so far as possible, they apply to the teaching and learning experiences of graduates leaving university in 2000 (see text for fuller explanation).

strong positive correlation between employment and participation in employment-based ‘sandwich’ training placements (Table 7, column 1).⁴ The same applies to the relationship between sandwich participation and employment in a graduate-level job (Table 7, column 2). These correlations are consistent with other research findings of a strong impact of sandwich participation on labour market performance. For example, McKnight (2002) suggests that the effects of this kind of training may be quite durable: she finds a 4.6% salary premium attached to sandwich participation some 3.5 years after graduation, after controlling for degree discipline and a range of personal and university characteristics.

Table 4. Employment status of 1999/2000 graduates from selected university departments who completed First Destinations returns.

	Number	Percentage
Employed	3284	70.2
Unemployed	305	6.5
Further study or training	712	15.2
Not available for employment	371	7.9
Overseas student returning overseas	4	0.1
Total	4676	100

Table 5. Definitions of variables.

Individual characteristics:	
Employment status	= 1 if employed, 0 if unemployed
Graduate job	= 1 if employed in graduate occupation, 0 if employed in non-graduate occupation
Male	= 1 if male
Age	
Ethnic group	= 1 if non-white
A-level score	
Degree class	= 1 if First Class honours or 2.1 degree
Low-participation neighbourhood	= 1 if from low HE participation neighbourhood
Social class	= 1 if parents in social classes III _m , IV or V
Sandwich training placement	= 1 if went on sandwich training placement during undergraduate studies
Subject dummies: reference category = Biological Sciences	
Computer Studies	= 1 if graduated in Computer Studies/Science
Business Studies	= 1 if graduated in Business Studies
History	= 1 if graduated in History
Design Studies	= 1 if graduated in Design Studies
University-level characteristics	
Old University	= 1 if attended Old University
Local unemployment rate	= unemployment rate among 20–29 year olds in university's locality
Graduate jobs in locality	= percentage of jobs in institution's locality that are classified as graduate jobs
Department-level characteristics^a	
Teaching, learning and assessment of employability skills dummies (reference category: scores < 2.0)	
Teaching, learning and assessment of employability skills_2.0–2.9	= Teaching, learning and assessment of employability skills in department assessed as 2.0–2.9 on one to four point scale
Teaching, learning and assessment of employability skills_3+	= Teaching, learning and assessment of employability skills in department assessed as three or more on one to four point scale
Work experience provision dummy (reference category: scores < 3.0)	
Work experience provision_3+	= Student participation in work experience assessed as three or more on one to four point scale
Employer involvement in courses dummy (reference category: scores < 3.0)	
Employer involvement in courses_3+	= Employer involvement in course design, teaching and assessment assessed as three or more on one to four point scale

Note: ^aSee Tables 2 and 3 for details of the department-level scoring system.

Table 6. Descriptive statistics.

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Employed and unemployed graduates					
Employment status	3589	0.92	0.28	0	1
Male	3589	0.53	0.50	0	1
Age	3589	23.61	3.64	20.5	67.1
Ethnic minority	3476	0.12	0.32	0	1
A-level score	2599	19.06	6.43	2.5	29.5
Degree class	3589	0.56	0.50	0	1
Biological Sciences	3589	0.31	0.46	0	1
Computer Studies	3589	0.24	0.42	0	1
Business Studies	3589	0.20	0.40	0	1
History	3589	0.08	0.27	0	1
Design Studies	3589	0.17	0.38	0	1
Low-participation neighbourhood	3553	0.10	0.31	0	1
Social class	2994	0.21	0.41	0	1
Sandwich training placement	3589	0.25	0.43	0	1
Old University	3589	0.41	0.49	0	1
Local unemployment rate	3589	7.86	1.24	5.7	9.5
Teaching, learning and assessment of employability skills	3589	2.79	0.59	1.5	3.8
Work experience provision	3589	2.67	1.31	1	4
Employer involvement in courses	3589	2.52	1.11	1	4
Employed graduates only					
Graduate job	3284	0.67	0.47	0	1
Male	3284	0.52	0.50	0	1
Age	3284	23.56	3.55	20.5	67.1
Ethnic minority	3179	0.12	0.32	0	1
A-level score	2413	19.10	6.42	2.5	29.5
Degree class	3284	0.57	0.50	0	1
Biological Sciences	3284	0.32	0.46	0	1
Computer Studies	3284	0.24	0.42	0	1
Business Studies	3284	0.21	0.41	0	1
History	3284	0.08	0.27	0	1
Design Studies	3284	0.16	0.37	0	1
Low-participation neighbourhood	3249	0.10	0.30	0	1
Social class	2711	0.21	0.41	0	1
Sandwich training placement	3284	0.26	0.44	0	1
Old University	3284	0.42	0.49	0	1
Graduate jobs in locality	3284	27.79	5.91	22.5	39.2
Teaching, learning and assessment of employability skills	3284	2.79	0.59	1.5	3.8
Work experience provision	3284	2.67	1.32	1	4
Employer involvement in courses	3284	2.50	1.11	1	4

Table 7. Investigating the potential problem of sandwich course selection bias.

Dependent variable	Column 1		Column 2		Column 3		Column 4		Column 5	
Estimation method	Employment		Graduate job		Sandwich participation		Employment		Graduate job quality	
Male	Univariate probit		Univariate probit		Univariate probit		Bivariate probit		Bivariate probit	
	-0.297***		0.239***		0.379***		-0.218***		0.085	
	(0.063)		(0.047)		(0.048)		(0.082)		(0.213)	
Age	-0.023***		0.003		0.033***		-0.014*		-0.010	
	(0.007)		(0.007)		(0.006)		(0.009)		(0.016)	
Ethnic group	-0.134		0.072		0.156**					
	(0.091)		(0.074)		(0.071)					
Low-participation neighbourhood	-0.188**		-0.060		0.021		-0.176*		-0.075	
	(0.092)		(0.077)		(0.076)		(0.092)		(0.072)	
Sandwich training placement	0.456***		0.547***				-0.329		1.460*	
	(0.082)		(0.058)				(0.583)		(0.825)	
Constant	2.021***		0.126		-1.685***		1.892***		0.238	
	(0.175)		(0.163)		(0.149)		(0.198)		(0.214)	
Observations	3441		3145		3441		3441		3145	
Log likelihood	-977.58		-1925.63		-1886.22		-2864.47		-3677.93	
Wald chi-square	60.12		131.74		99.94		151.63		315.72	
Pseudo R^2	0.031		0.035		0.026					
Rho										
Wald test of rho = 0 (p value)							0.425		-0.604	
							0.194		0.497	

Notes: *Significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors presented in parentheses. Bivariate probits reported in columns 4 and 5 include a second equation with sandwich participation regressed on gender, age, ethnic group and residence in low-participation neighbourhood. See text for explanation of why ethnic category is excluded from the first equations reported in columns 4 and 5. Rho is the correlation coefficient between the residuals of the two equations in each bivariate probit. Other bivariate probits including ethnic category in the first equations (not reported here) yielded similar results for the Wald test of the null hypothesis that rho = 0.

However, the nature of these training placements raises a clear problem of potential selection bias. Students entering sandwich courses know in advance that they will undertake a fixed period of structured employment-based training as part of their degree course. It seems likely that students choosing these courses are strongly motivated by the opportunity to gain early work experience and contacts with employers that will help them gain employment following graduation. Hence the apparent correlation between sandwich participation and measures of labour market success may be partly due to unobserved characteristics of the students concerned as well as to skills and knowledge gained in the course of the training placements.

In order to assess the magnitude of any such selection bias, we estimate bivariate probit versions of the employment and graduate job models in which, in the second equation in each case, sandwich participation is regressed on individual-level characteristics of students prior to HE entry (gender, age, ethnicity and residence in low-participation neighbourhoods). To help identify the effects of sandwich participation on labour market outcomes, the variable denoting membership of an ethnic minority group is omitted from the main equation in each case because it has the desirable properties of being significantly related to sandwich participation (Table 7, column 3) but not to either employment status or job quality (columns 1 and 2). In each bivariate probit model, the correlation coefficient (ρ) between the residuals of the two probits turns out to be not significantly different from zero (Table 7, columns 4 and 5). These findings suggest that there is very little bias arising from the prior selection decision by students entering sandwich courses. Similar conclusions emerge when the models presented in Table 7 are amended to include A-level scores and parental social class as independent regressors and then re-estimated on the reduced sample of graduates for whom this information is available (Appendix 1, Table A1).

Accordingly, in order to test the hypotheses set out above, our strategy in the case of the employment Equation (1) is to estimate single-equation probits throughout. In the case of the graduate job quality Equation (2), a Heckman probit is required in order for the job quality outcome to be conditioned on whether the graduate has found employment in the first place.

5.2. *Employment outcomes*

In the base specification of the employment Equation (1), the probability of being employed is found to be significantly positively related to holding a First Class or Upper Second degree and to sandwich participation, and significantly negatively related to being male, coming from a relatively low-participation neighbourhood and studying design (as compared with graduates in the reference subject category, Biological Sciences) (Table 8, column 1). This result for design graduates reflects the markedly different early employment patterns of graduates in that subject who tend to take longer to develop a career; for example, needing to establish a portfolio and make useful contacts in order to win contracts for freelance and commissioned work (Blackwell and Harvey 1999).

These findings are all broadly consistent with those of Smith, McKnight and Naylor (2000) and the HEFCE study based on 1999/2000 graduates in a full range of degree subjects (HEFCE 2001) and point to the suitability of the base specification for testing Hypotheses H1A–H1C by entering our department-level measures of employability skills development as independent variables. Two of these are employment skills teaching dummies, respectively representing scores of 2.0–2.9 and three or more

on the four-point scale described in Tables 2 and 3 (so that the reference category is scores below 2.0). The other two new variables are dummies indicating scores of three or more on, respectively, student participation in work experience and employer involvement in course design and delivery.

The initial results in Table 8, column 2 suggest that none of the three departmental-level measures are significantly associated with the probability of graduates finding employment. Given the unsurprisingly high correlation between individual-level sandwich participation and the departmental work experience variable (Table 9), it was considered appropriate to omit the latter variable in Table 8, column 3, but this has no impact on the significance levels attached to the remaining employability skills measures. Similar results are obtained in Table 8, column 4, which includes two variables interacting the employment skills variables with the employer involvement variable, and in alternative specifications (based on a reduced sample) including A-level scores and parental social class as independent regressors (Appendix 1, Table A2, columns 1 and 2). We conclude that these results provide no support for either Hypothesis H1B or H1C. However, Hypothesis H1A receives support from the strong association between employment and sandwich participation, which is estimated, all else being equal, to increase the probability of finding employment by five percentage points as compared with those not undertaking sandwich training (Table 8, columns 5 and 6).

5.3. *Job quality outcomes*

The Heckman probit regressions presented in Table 10 test Hypotheses H2A–H2C by modelling the probability that employed graduates from the 34 departments are in graduate-level occupations, as defined above, conditional on their having found employment in the first place. The base specification is similar to that in Table 8 except that the measure of unemployment of 20–29 year olds in each university's locality is replaced with a measure showing the percentage of jobs that are of graduate level in each locality. Table 10, column 1 shows that the coefficients on the degree class and sandwich variables are positive and significant, as are the coefficients on the Computing and Business Studies subject variables (as compared with the reference category of Biological Sciences). Interestingly, in contrast to the previous analysis of factors determining the probability of being employed rather than unemployed, the coefficient on the male variable is now significantly positive rather than negative, suggesting that, all else being equal, male graduates are more likely than females to remain unemployed rather than accept a job below graduate level.

When the departmental-level employability skills measures are added to Table 10, column 2, the coefficient on the employer involvement in courses variable is positive and significant ($p < 0.001$) while the coefficients on the departmental work experience and employability skills teaching variables are not significantly different from zero. When the departmental work experience variable is dropped in Table 10, column 3 to reduce overlap with the individual-level sandwich variable, the employer involvement measure remains positive and significant ($p = 0.01$) while the employability skills variables remain insignificant.

In order to test the possibility that positive effects of employability skills teaching occur primarily in departments where such teaching is linked to a high level of employer involvement in course design and delivery, variables interacting the employment skills indicators with the employer involvement variable are included in

Table 8. Probit regressions of the determinants of graduates' employment status.

	Column 1	Column 2	Column 3	Column 4	Marginal effects for coefficients in column 3	Marginal effects for coefficients in column 4
Male	-0.298*** (0.070)	-0.284*** (0.071)	-0.285*** (0.071)	-0.285*** (0.072)	-0.040 (0.010)	-0.040 (0.010)
Age	-0.018*** (0.007)	-0.017*** (0.007)	-0.017*** (0.007)	-0.016*** (0.007)	-0.002 (0.001)	-0.002 (0.001)
Ethnic group	-0.148* (0.086)	-0.147 (0.090)	-0.138 (0.087)	-0.133 (0.090)		
Degree class	0.166*** (0.067)	0.180*** (0.068)	0.178*** (0.067)	0.179*** (0.068)	0.026 (0.010)	0.026 (0.010)
Computer Studies	-0.004 (0.134)	-0.011 (0.134)	0.001 (0.141)	-0.040 (0.158)		
Business Studies	0.125 (0.138)	0.117 (0.147)	0.175 (0.123)	0.146 (0.131)		
History	0.101 (0.116)	0.174 (0.218)	0.191 (0.212)	0.239 (0.227)		
Design Studies	-0.312* (0.170)	-0.410*** (0.191)	-0.384*** (0.188)	-0.399* (0.221)	-0.065 (0.036)	-0.068 (0.044)
Low-participation neighbourhood	-0.159* (0.083)	-0.162*** (0.080)	-0.162*** (0.080)	-0.163*** (0.079)	-0.025 (0.013)	-0.025 (0.013)
Old University	0.024 (0.122)	0.060 (0.119)	0.058 (0.121)	0.048 (0.124)		
Local unemployment rate	-0.055 (0.037)	-0.052 (0.042)	-0.052 (0.041)	-0.048 (0.041)		
Sandwich training placement	0.408*** (0.086)	0.380*** (0.095)	0.398*** (0.090)	0.405*** (0.091)	0.049 (0.011)	0.050 (0.011)

Table 8. (Continued).

	Column 1	Column 2	Column 3	Column 4	Marginal effects for coefficients in column 3	Marginal effects for coefficients in column 4
Teaching, learning and assessment of employability skills_2.0–2.9		0.190 (0.198)	0.212 (0.185)	0.280 (0.216)		
Teaching, learning and assessment of employability skills_3+		0.062 (0.205)	0.075 (0.195)	0.166 (0.211)		
Work experience provision_3+		0.078 (0.152)				
Employer involvement in courses_3+		0.069 (0.188)	0.111 (0.162)	0.341 (0.239)		
Teaching, learning and assessment of employability skills_2.0–2.9* Employer involvement_3+				–0.223 (0.346)		
Teaching, learning and assessment of employability skills_3+ * Employer involvement_3+				–0.296 (0.377)		
Constant	2.285*** (0.390)	2.081*** (0.398)	2.055*** (0.388)	1.958*** (0.421)		
Observations	3441	3441	3441	3441		
Log likelihood	–958.10	–954.50	–954.75	–954.33		
Pseudo R ²	0.051	0.054	0.054	0.054		
Wald chi-square	134.89	153.94	165.82	204.64		

Notes: *Significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors in parentheses are corrected for clustering of observations at the departmental level. The dependent variable = 1 if the graduate is employed six months after graduation and = 0 if he/she is unemployed. The reference category for subject dummy variables is Biological Sciences. Marginal effects for statistically significant coefficients in columns 3 and 4 are evaluated at the mean values of other independent variables.

Table 9. Correlations between sandwich, Old University and employability skills variables.

	Sandwich	Old University	Teaching, learning and assessment of employability skills	Work experience provision	Employer involvement in courses
Sandwich	1.000				
Old University	-0.285	1.000			
Teaching, learning and assessment of employability skills	0.214	-0.248	1.000		
Work experience provision	0.410	-0.541	0.345	1.000	
Employer involvement in courses	0.162	-0.457	0.276	0.664	1.000

Note: $n = 3589$.

Table 10, column 4. Such interactions might be expected to enhance the value of employability skills teaching by helping students develop useful contacts with employers and a better understanding of their requirements; for example, through projects based on ‘real world’ problems. The results show that the coefficients on these interacted coefficients are positively signed but they fall short of statistical significance.

A sensitivity test based on alternative models including A-level scores and parental social class as independent regressors broadly supports these findings. The coefficient on one of the two interacted variables (indicating an employability skills teaching score of 2.0–2.9 combined with an employer involvement score of three or more) does turn out to be significantly positive (Appendix 1, Table A3, column 2). However, it is notable that the coefficient on the interacted variable associated with a *higher* employability skills teaching score of three or more in the same equation is not significantly different from zero. In a hierarchical likelihood ratio test of Appendix 1, A3, column 2 versus column 1, the coefficients on the two interacted variables in column 2 are found to be jointly non-significant ($p = 1.000$).

In short, therefore, our findings provide support for Hypotheses H2A and H2B but not for Hypothesis H2C. After controlling for gender, age, degree class, degree subject and a range of other potential influences, sandwich participation and employer involvement in course design and delivery are positively associated with an occupation-based measure of the quality of initial employment found by graduates. However, there is no evidence of a significant effect of the efforts devoted by university departments to the teaching, learning and assessment of employability skills.

6. Summary and assessment

In recent years considerable resources have been devoted to efforts to develop graduate employability skills in UK universities. In this article we assess the impact of different kinds of HE employability skills initiative on measures of graduates’ labour market performance. Making use of detailed information gathered at university department level, we distinguish between three different mechanisms by which it is hoped to improve employability skills: the teaching and assessment of such skills by departments; employer involvement in course design and delivery; and

Table 10. Heckman probit regressions of the determinants of graduate job quality.

	Column 1	Column 2	Column 3	Column 4	Marginal effects for coefficients in column 3	Marginal effects for coefficients in column 4
Male	0.131** (0.062)	0.154*** (0.051)	0.155*** (0.052)	0.155*** (0.057)	0.042 (0.018)	0.042 (0.018)
Age	0.001 (0.010)	0.005 (0.008)	0.005 (0.008)	0.005 (0.009)		
Ethnic group	-0.127 (0.078)	-0.112 (0.072)	-0.114 (0.071)	-0.118 (0.073)		
Degree class	0.260*** (0.051)	0.233*** (0.052)	0.233*** (0.049)	0.238*** (0.056)	0.093 (0.017)	0.095 (0.021)
Computer Studies	0.842*** (0.153)	0.826*** (0.088)	0.821*** (0.083)	0.868*** (0.081)	0.252 (0.020)	0.267 (0.020)
Business Studies	0.264** (0.118)	0.404*** (0.146)	0.385*** (0.100)	0.417*** (0.098)	0.132 (0.028)	0.144 (0.027)
History	-0.158 (0.131)	-0.218 (0.190)	-0.221 (0.189)	-0.257 (0.209)		
Design Studies	0.115 (0.178)	-0.144* (0.073)	-0.151** (0.068)	-0.146* (0.078)	-0.076 (0.026)	-0.075 (0.031)
Low-participation neighbourhood	-0.043 (0.075)	-0.034 (0.065)	-0.034 (0.065)	-0.030 (0.068)		
Old University	0.161 (0.117)	0.161** (0.071)	0.162** (0.072)	0.177*** (0.068)	0.059 (0.024)	0.065 (0.022)
Graduate jobs in locality	0.004 (0.008)	0.005 (0.004)	0.005 (0.004)	0.004 (0.004)		
Sandwich training placement	0.331*** (0.094)	0.248** (0.109)	0.243** (0.106)	0.235*** (0.118)	0.099 (0.035)	0.097 (0.040)

Table 10. (Continued).

	Column 1	Column 2	Column 3	Column 4	Marginal effects for coefficients in column 3	Marginal effects for coefficients in column 4
Teaching, learning and assessment of employability skills_2.0–2.9		–0.024 (0.101)				
Teaching, learning and assessment of employability skills_3+		–0.119 (0.181)	–0.122 (0.177)	–0.172 (0.199)		
Work experience provision_3+		–0.246 (0.181)	–0.246 (0.179)	–0.323 (0.201)		
Employer involvement in courses_3+		0.520*** (0.087)	0.507*** (0.060)	0.214 (0.218)	0.168 (0.017)	
Teaching, learning and assessment of employability skills_2.0– 2.9* Employer involvement_3+				0.279 (0.245)		
Teaching, learning and assessment of employability skills_3+ *				0.353 (0.238)		
Employer involvement_3+						
Constant	–0.209 (0.325)	–0.169 (0.294)	–0.157 (0.286)	–0.112 (0.300)		
Observations	3145	3145	3145	3145		
Log likelihood	–2801.47	–2772.33	–2772.40	–2771.35		
Wald chi-square	229.04	818.98	924.65	3725.17		

Notes: *Significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors in parentheses are corrected for clustering of observations at the departmental level. The dependent variable = 1 if the graduate is employed in a graduate-level job six months after graduation and = 0 if he/she is employed in a non-graduate job. Heckman probit results reported in columns 1–4 are conditioned on a second equation with employment status regressed on gender, age, ethnic group, degree class, four subject dummies, residence in low-participation neighbourhood, attendance at an Old University, local unemployment rate and sandwich participation. The reference category for subject dummy variables is Biological Sciences. Marginal effects for statistically significant coefficients in columns 3 and 4 are evaluated at the mean values of other independent variables, conditional on graduates being employed rather than unemployed.

student participation in work experience through sandwich courses and related programmes.

Our findings suggest that structured work experience has clear positive effects on the ability of graduates, firstly, to find employment within six months of graduation and, secondly, to secure employment in graduate-level jobs. The latter job quality measure is also positively and significantly associated with employer involvement in degree course design and delivery.

However, there is no evidence that the emphasis given by university departments to the teaching, learning and assessment of employability skills has a significant effect on either of the labour market outcomes considered here.

The strong impact of sandwich participation on labour market performance is well known. Our finding that employer involvement in course design and delivery also has an independent positive effect on the quality of graduate employment is new and, taken together with the findings on sandwich participation, suggests that exposing students to employer priorities and decision-making during their studies has positive effects on the future matches between graduates and their initial employers following graduation.

By contrast, the lack of impact of our measure of teaching, learning and assessment of employability skills gives pause for thought about the level of resources devoted to this activity. Two caveats need to be considered here. Firstly, our measures of labour market performance are relatively narrow and hardly capture all the objectives of employability skills teaching described in Section 1. It is conceivable, for example, that efforts to develop graduates' communication and oral presentation skills during their undergraduate studies have positive effects on their later work performance that are not captured in the present analysis. Secondly, six months after graduation may be considered too soon to assess the impact of different kinds of teaching. However, as noted in Section 3, there is some evidence that employment status six months after graduation is an indicator of future labour market prospects. And it is also likely that the independent effects of any form of teaching in HE tend to be strongest in the early stages of graduate careers and then may diminish rapidly over time as graduates acquire more job-specific and occupation-specific skills and knowledge through on-the-job training and experience.

The strongly positive effects of student work experience on labour market outcomes serve as a reminder that many relevant employability skills are probably best learned in workplaces rather than in classroom settings. Future initiatives designed to develop employability skills in higher education need to be informed by comprehensive surveys of employers in order to ascertain exactly what gaps they perceive in the employability skills of newly recruited graduates and the extent to which they (employers) in fact take responsibility for providing training to plug such gaps in skills. There may be little to be gained from universities seeking to develop skills that are best acquired (or can only be acquired) *after* starting employment rather than beforehand.

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Combined Student Module Record data, and Graeme Rosenberg and John Thompson at the HEFCE for detailed comments and advice throughout the HEFCE project. Responsibility for any errors remains the authors' alone.

Notes

1. By the late 1990s graduates represented 16% of the total workforce in the UK, up from 10% 10 years earlier (Mason 2002).
2. For overviews and case studies of a number of employability skills development projects of this kind, see online (<http://www.universitiesuk.ac.uk/employability/> and <http://www.ltsn.ac.uk/genericcentre/index.asp>).
3. A-level scores are not available for 28% of graduates in the sample. The graduates for whom A-level scores are not available comprise a diverse group that breaks down as follows: 44% whose highest qualifications on entry to HE were vocational or professional in nature; 44% whose entry qualifications were not known; 9% with entry qualifications equivalent to A-level obtained in countries such as Scotland that have different certification systems from those in England and Wales; 3% with academic entry qualifications above A-level; and 1% with academic qualifications below A-level. (Note, therefore, that the presence of an A-level score in the data is only a rough indicator of having studied for A-levels. When the presence of an A-level score in the data is entered as an independent regressor in the equations reported in Tables 8 and 10 below, as suggested by a referee for this paper, the coefficients on this A-level variable are statistically non-significant and the main results discussed in the text are essentially unchanged.) Information on parental social class is missing for 17% of graduates in the sample. This is due in part to the fact that social class information is only available for graduates who entered HE through the Universities and Colleges Admission Service.
4. The term 'sandwich' is in common use in the United Kingdom to describe these training placements because they are timed to take place *in between* distinct periods of full-time study, usually Years 2 and 3 of a first degree course. Thus sandwich placements typically last for 12 months but the term is also sometimes used to describe placements lasting for three to six months.

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Appendix 1.

Table A1. Investigating the potential problem of sandwich course selection bias: alternative specification including A-level scores and parental social class as independent variables.

	Column 1	Column 2	Column 3	Column 4	Column 5
Dependent variable	Employment	Graduate job	Sandwich participation	Employment	Graduate job quality
Estimation method	Univariate probit	Univariate probit	Univariate probit	Bivariate probit	Bivariate probit
Male	-0.190** (0.082)	0.216*** (0.058)	0.380*** (0.061)	-0.274** (0.113)	0.117 (0.123)
Age	-0.030 (0.019)	0.044** (0.019)	0.083*** (0.023)	-0.054* (0.030)	0.012 (0.037)
Ethnic group	-0.078 (0.128)	0.207** (0.098)	0.054 (0.098)		
A-level score	0.010 (0.006)	0.012** (0.005)	-0.052*** (0.005)	0.023 (0.016)	0.023* (0.012)
Social class	-0.131 (0.098)	0.062 (0.073)	0.005 (0.077)	-0.129 (0.097)	0.069 (0.071)
Low-participation neighbourhood	-0.002 (0.138)	-0.040 (0.101)	-0.024 (0.109)	0.007 (0.129)	-0.041 (0.096)
Sandwich training placement	0.558*** (0.122)	0.613*** (0.078)		1.291* (0.670)	1.354** (0.614)
Constant	2.033*** (0.477)	-1.031** (0.455)	-1.904*** (0.553)	2.100*** (0.504)	-0.652 (0.592)
Observations	2291	2134	2291	2291	2134
Log likelihood	-556.79	-1297.89	-1107.30	-1664.11	-2344.87
Wald chi-square	29.68	103.54	199.64	232.63	339.18
Pseudo R^2	0.027	0.039	0.094		
Rho				-0.475	-0.470
Wald test of rho = 0 (<i>p</i> value)				0.395	0.358

Notes: *Significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors in parentheses. Bivariate probits reported in columns 4 and 5 include a second equation with sandwich participation regressed on gender, age, ethnic group, A-level score, parental social class and residence in low-participation neighbourhood. See text for explanation as to why the ethnic category is excluded from the first equations reported in columns 4 and 5. Rho is the correlation coefficient between the residuals of the two equations in each bivariate probit. Other bivariate probits including ethnic category in the first equations (not reported here) yielded similar results for the Wald test of the null hypothesis that rho = 0.

Table A2. Probit regressions of the determinants of graduates' employment status: alternative specification including A-level scores and parental social class as independent variables.

	Column 1	Column 2	Marginal effects for coefficients in column 1	Marginal effects for coefficients in column 2
Male	-0.151** (0.062)	-0.157** (0.062)	-0.018 (0.008)	-0.019 (0.008)
Age	-0.025 (0.029)	-0.025 (0.029)		
Ethnic group	-0.005 (0.124)	-0.010 (0.123)		
A-level score	0.011 (0.010)	0.011 (0.010)		
Degree class	0.208** (0.091)	0.206** (0.092)	0.026 (0.012)	0.026 (0.012)
Computer Studies	-0.073 (0.161)	-0.059 (0.165)		
Business Studies	0.064 (0.157)	0.075 (0.153)		
History	0.164 (0.171)	0.175 (0.176)		
Design Studies	-0.451 (0.283)	-0.400 (0.348)		
Low-participation neighbourhood	-0.008 (0.103)	-0.009 (0.103)		
Social class	-0.122 (0.107)	-0.125 (0.107)		
Old University	-0.111 (0.159)	-0.116 (0.157)		

Table A2. (Continued).

	Column 1	Column 2	Marginal effects for coefficients in column 1	Marginal effects for coefficients in column 2
Local unemployment rate	-0.019 (0.046)	-0.021 (0.045)		
Sandwich training placement	0.473** (0.189)	0.476** (0.193)	0.047 (0.016)	0.047 (0.016)
Teaching, learning and assessment of employability skills_2.0-2.9	0.188 (0.137)	0.208 (0.161)		
Teaching, learning and assessment of employability skills_3+	0.135 (0.147)	0.130 (0.156)		
Employer involvement in courses_3+	0.274 (0.201)	0.317 (0.210)		
Teaching, learning and assessment of employability skills_2.0-2.9 * Employer involvement_3+		-0.140 (0.428)		
Teaching, learning and assessment of employability skills_3+ * Employer involvement_3+		0.019 (0.425)		
Constant	1.797** (0.869)	1.791** (0.886)		
Observations	2291	2291		
Log likelihood	-549.65	-549.45		
Wald chi-square	156.61	336.59		
Pseudo R ²	0.040	0.040		

Notes: *Significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors in parentheses are corrected for clustering of observations at the departmental level. The dependent variable = 1 if the graduate is employed six months after graduation and = 0 if he/she is unemployed. The reference category for subject dummy variables is Biological Sciences. Marginal effects for statistically significant coefficients in columns 1 and 2 are evaluated at the mean values of other independent variables.

Table A3. Heckman probit regressions of the determinants of graduate job quality: alternative specification including A-level scores and parental social class as independent variables.

	Column 1	Column 2	Marginal effects for coefficients in column 1	Marginal effects for coefficients in column 2
Male	0.129** (0.059)	0.137** (0.060)	0.041 (0.022)	0.043 (0.022)
Age	0.036* (0.019)	0.036* (0.019)	0.012 (0.007)	0.012 (0.007)
Ethnic group	-0.011 (0.089)	-0.012 (0.086)		
A-level score	0.005 (0.005)	0.005 (0.005)		
Degree class	0.331*** (0.077)	0.337*** (0.077)	0.127 (0.025)	0.128 (0.024)
Computer Studies	0.851*** (0.126)	0.857*** (0.122)	0.251 (0.026)	0.252 (0.025)
Business Studies	0.489*** (0.129)	0.490*** (0.131)	0.160 (0.036)	0.160 (0.037)
History	-0.247 (0.204)	-0.275 (0.222)		
Design Studies	-0.096 (0.131)	-0.281 (0.197)		
Low-participation neighbourhood	-0.018 (0.096)	-0.021 (0.098)		
Social class	0.100 (0.089)	0.103 (0.089)		
Old University	0.213*** (0.080)	0.217*** (0.076)	0.071 (0.027)	0.073 (0.025)

Table A3. (Continued).

	Column 1	Column 2	Marginal effects for coefficients in column 1	Marginal effects for coefficients in column 2
Graduate jobs in locality	0.006 (0.005)	0.006 (0.004)		
Sandwich training placement	0.356** (0.163)	0.350** (0.159)	0.130 (0.048)	0.126 (0.047)
Teaching, learning and assessment of employability skills_2.0–2.9	–0.158 (0.198)	–0.213 (0.217)		
Teaching, learning and assessment of employability skills_3+	–0.387* (0.200)	–0.411* (0.223)	–0.141 (0.075)	–0.149 (0.083)
Employer involvement in courses_3+	0.626*** (0.128)	0.275 (0.248)	0.194 (0.032)	
Teaching, learning and assessment of employability skills_2.0–2.9 * Employer involvement_3+		0.617** (0.293)		0.184 (0.068)
Teaching, learning and assessment of employability skills_3+		0.318 (0.288)		
Constant	–1.130** (0.504)	–1.092** (0.530)		
Observations	2291	2291		
Log likelihood	–1764.37	–1773.60		
Wald chi-square	291.67	4008.06		

Notes: *Significant at 10%; **significant at 5%; ***significant at 1%. Robust standard errors in parentheses are corrected for clustering of observations at the departmental level. The dependent variable = 1 if the graduate is employed in a graduate-level job six months after graduation and = 0 if he/she is employed in a non-graduate job. Heckman probit results reported in columns 1–4 are conditioned on a second equation with employment status regressed on gender, age, ethnic group, A-level score, social class, degree class, four subject dummies, residence in low-participation neighbourhood, attendance at an Old University, local unemployment rate and sandwich participation. The reference category for subject dummy variables is Biological Sciences. Marginal effects for statistically significant coefficients in columns 1 and 2 are evaluated at the mean values of other independent variables, conditional on graduates being employed rather than unemployed.