Academic Attainment of Students with Disabilities in Distance Education

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Abstract

This investigation compared attainment in 196,405 students with and without disabilities who were taking courses by distance learning with the Open University in the United Kingdom in 2009. When the effects of demographic variables were statistically controlled, students with mental health difficulties showed poorer course completion than nondisabled students; students with restricted mobility showed poorer course completion and lower pass rates than nondisabled students; students with unseen or other disabilities showed lower pass rates than nondisabled students; and students with dyslexia or other specific learning difficulties showed lower pass rates and poorer grades than nondisabled students. In addition, the presence of additional disabilities led to poorer attainment in different respects in students who were blind or partially sighted, students who were deaf or hard of hearing, students with impaired speech, and students with unseen disabilities. Accommodations to support disabled students in distance education need to be focused on different groups of students with particular disabilities.

Keywords: Academic attainment; disabilities; distance education

In recent years, there has been an increase in the interest shown by researchers into the experiences of students with disabilities in higher education (Adams & Brown, 2006; Fuller et al., 2009; Konur, 2006; Riddell, Tinklin, & Wilson, 2005). Nevertheless, little is known about the eventual academic attainment of such students. At a local level, the number of students with disabilities within a single mainstream institution may be relatively small. As a consequence, comparisons with the attainment of nondisabled students may not be reliable or can only be undertaken by adopting the dubious strategy of treating students with disabilities as a single group (Foreman, Dempsey, Robinson, & Manning, 2001; Fuller et al., 2009, p. 169). At a national level, information may simply not be available about students' achievement. In the United States, for example, students may graduate with bachelors' degrees *cum laude, magna cum laude*, and *summa cum laude,* but the criteria vary widely across different universities and national data on the award of these honors to different student groups are not collected.

In the United Kingdom, in contrast, the same broad framework for classifying first degrees is used by all universities, a system of external examiners seeks to ensure comparability in standards between different institutions, and statistics on the qualifications that they award are compiled by a national agency. Most first degrees in the United Kingdom are awarded with honors, which are usually classified as first, second, or third class, and the second class is normally categorized into an upper and a lower division. A degree that is awarded with either first-class or upper second-class honors is often described as a "good" degree, and this is often used as a gross measure of attainment within and across institutions.

Institutions of higher education in the United Kingdom ask their students to declare disabilities that might necessitate additional support in their studies, their accommodation, or their daily living. Most commonly, this declaration is made by potential students on prepared application forms and confirmed by them on their subsequent admission. Richardson (2001) noted that this way of identifying one's disability embodies a medical perspective that ascribes its consequences to deficiencies of the students. In contrast, a social perspective would ascribe the consequences of disability to the students' context. Potential students would be asked whether they might encounter

difficulties in higher education, either as a result of the environment in which they would have to live and study or as a result of the negative attitudes of other people whom they might encounter (Abberley, 1996; Finkelstein, 1991).

Richardson (2009a) investigated all students who had been awarded first degrees by campus-based institutions of higher education in the United Kingdom in 2004–2005. He found that the presence and nature of a disability explained only 0.1% of the variation in whether or not they obtained good degrees. Graduates with dyslexia and graduates with multiple disabilities were less likely to obtain good degrees than were graduates with no known disability, but this was mainly due to the confounded effects of demographic and institutional variables. Graduates with an unseen disability (such as diabetes, epilepsy, or asthma) were the only group to show significantly poorer attainment when the effects of these variables had been statistically controlled. Richardson concluded that, in overall terms, disablement per se did not play a significant role in predicting academic attainment in campus-based higher education.

Nevertheless, recent years have seen considerable growth in online and other forms of distance education, both in the United States and in other countries (Allen & Seaman, 2011). In the United Kingdom, the Open University was created in 1969 to provide degree programs by distance education. Originally, nearly all of its courses were delivered by correspondence materials, combined with television and radio broadcasts, video and audio recordings, tutorial support at a local level, and (in some cases) residential schools. Nowadays, the University makes extensive use of computer-based support such as CD-ROMs, dedicated websites, and computer-mediated conferencing. Some courses are delivered entirely online.

Many people with disabilities turn to distance education to avoid the problems of access that are posed by campus-based institutions. Indeed, for many people with severe disabilities or chronic illness, distance learning may be the only practical means of access to higher education (Newell & Debenham, 2009). The Open University has a particular commitment to promoting equal opportunities in education, including equal opportunities for people with disabilities. In recent years, this has led to the "Securing Greater Accessibility" project, which aims to ensure that the Open University complies with U.K. equality legislation by making learning resources accessible to all. This legislation requires that institutions should make adjustments to their programs and their facilities in anticipation of admitting students with disabilities rather than simply trying to accommodate their disabilities once they have enrolled.

Richardson (2009b) investigated the role of disability as a factor in the attainment of 2,351 distance-learning students who had been awarded first degrees by the Open University in 2002–2003. In contrast to the pattern of results that he had found in campus-based graduates, graduates with dyslexia or other specific learning difficulties, graduates who were deaf or hard of hearing, and graduates with multiple disabilities were also less likely to obtain good degrees than were graduates with no disability. Richardson concluded that distance education posed specific challenges for students with these disabilities. Even so, at the Open University and at most other U.K. institutions, a student's class of degree is determined by the distribution of grades that they have obtained on individual course units. Consequently, factors responsible for variations in the proportion of good degrees are likely to have affected attainment at the course level.

The studies by Richardson (2009a, 2009b) were concerned with the level of attainment in students who graduated, whereas disablement may have other effects on academic performance. Accordingly, Richardson (2010) examined the completion rate, the pass rate, and the grades obtained by all 132,588 students who had taken undergraduate courses with the Open University in 2003. Students with mental health difficulties showed poorer course completion than nondisabled students. Those with restricted mobility and those with other disabilities showed lower pass rates and poorer grades than nondisabled students. Students with multiple disabilities showed poorer course completion, lower pass rates, and poorer grades than nondisabled students. Richardson argued that accommodations intended to support students with disabilities in distance education needed to be focused on different groups of students with particular disabilities.

Nevertheless, there are two problems with these findings. One is that they are 10 years old and the total student population of the Open University has increased considerably in the intervening period. The other is that students who had more than one disability were consigned to a single, catch-all category of "multiple disabilities." This may not be problematic in studies of graduates from campus-based institutions, where such students constitute only around 5% of all graduates with disabilities (Richardson, 2009a). However, it is highly problematic for the Open University, where students with multiple disabilities constitute 33% of all graduates with disabilities (Richardson, 2009b) and 55% of all students with disabilities (Richardson, 2010).

The present study was carried out to compare the completion rate, the pass rate, and the grades obtained by students with and without disabilities who were taking courses with the Open University in 2009. Richardson (2009a, 2009b, 2010) showed that students with and without disabilities differ in terms of age, gender, prior qualifications, and socioeconomic circumstances. Consequently, comparisons between students with and without disabilities need to control for the effects of these demographic variables. There were two research questions. First, when the effects of demographic variables have been statistically controlled, do students with particular disabilities differ in their academic attainment from nondisabled students? Second, when the effects of demographic variables have been statistically controlled, do students with and without particular disabilities differ in their academic attainment?

Method

Most of the Open University's courses are worth 30 or 60 credit points, on the basis that full-time study would consist of courses worth 120 credit points in any calendar year. Students may register for two or more courses at a time up to a maximum load of 120 credit points. In 2009, 196,405 students had registered for undergraduate courses, an increase of 48% on the number who had registered for undergraduate courses in 2003. Information concerning their demographic characteristics (including disabilities), course registrations, and attainment was retrieved from the University's administrative records. Of the 196,405 students, 139,358 (or 71.0%) had registered for a single course, 30,086 (or 15.3%) had registered for two courses, and 26,961 (or 13.7%) had registered for three or more courses.

The students had been asked at registration to declare whether they had a disability or additional requirements. Those who did so declare were followed up by phone to establish the nature of their disabilities and the accommodations or other support that they might require. Of the 196,405 students, 13,437 (or 6.8%) had declared that they had one or more disabilities. The overall proportion of undergraduate students with one or more disabilities is slightly lower than in 2003 (7.7%: Richardson, 2010) but is similar to that in part-time students at campus-based institutions in the United Kingdom (Department for Innovation, Universities and Skills, 2009, p. 21). Information about the nature of these students' disabilities was recorded using the checklist shown in Table 1. The list includes symptoms and medical conditions as well as disabilities in a narrow sense, and it is probably for this reason that 7,381 (or 54.9%) of these students had been recorded as having more than one disability (close to the proportion reported for 2003). Table 1 shows the prevalence of each disability among all 196,405 students, among the 13,437 students with disabilities, and among the 6,056 students who were recorded as having just one disability.

Riddell et al. (2005, p. 26) noted that the distribution of particular disabilities at the Open University is different from that in the rest of U.K. higher education. In particular, the Open University has a relatively low proportion of students with dyslexia or other specific learning difficulties but a relatively high proportion of students with multiple disabilities. The latter may be because, as noted earlier, for many people with multiple disabilities resulting from chronic illness, distance learning is the only practical means of access to higher education. Even so, dyslexia or other specific learning difficulties were the most common condition among students who had been recorded as having just one disability. In contrast, fatigue or pain were the most common disability overall but were usually reported in combination with additional disabilities. The most common combinations were restricted mobility and fatigue or pain (3,364 students), restricted manual skills and fatigue or pain (2,099 students), mental health difficulties and fatigue or pain (1,939 students), and restricted mobility and restricted manual skills (1,862 students).

Results

To answer the first research question, "disability" was represented as a single variable with the 14 categories shown in Table 2. Those students who had more than one disability were assigned to a single category of "multiple disabilities" and statistical tests compared the students with each of the 13 kinds of disability with the nondisabled students on relevant variables. These results can be directly compared with those obtained by Richardson (2010).

Demographic Characteristics

Table 2 shows the age distributions of the students in the various disability categories. Relevant data were missing for five students. A chi-squared test showed that these were significantly different from each other, $\chi^2(52, N = 196{,}400) = 2766.07$, $p < .001$. An analysis of variance using Dunnett's post hoc tests showed that the students with dyslexia or other specific learning difficulties and the students with autistic spectrum disorder were significantly younger than the nondisabled students. This was due to the increased prevalence of these disabilities in the lowest age band. Similar trends have been noted in previous research in both

Table 1

Prevalence of Specific Disabilities in Open University Students

		Among all students	Among all students with disabilities	Among those indicating just one disability
	n	(%)	(%)	(%)
Blind or partially sighted	1,470	0.7	10.9	5.6
Deaf or hard of hearing	1,065	0.5	7.9	4.5
Restricted mobility	4,287	2.2	31.9	4.2
Restricted manual skills (difficulty handling items)	2,820	1.4	21.0	4.4
Impaired speech	548	0.3	4.1	0.2
Dyslexia or other specific learning difficulties	2,960	1.5	22.0	30.5
Mental health difficulties	4,350	2.2	32.4	26.2
Personal care support	1,132	0.6	8.4	0.1
Fatigue or pain	5,935	3.0	44.2	8.3
Unseen disabilities (e.g. diabetes, epilepsy or asthma)	1,933	1.0	14.4	3.1
Autistic spectrum disorder	188	0.1	1.4	0.9
Other disabilities	2,435	1.2	18.1	11.9

the United States (Horn & Berktold, 1999, p. 11) and the United Kingdom (Richardson, 2010; Richardson & Wydell, 2003). These trends probably reflect the increased identification of children and young people with dyslexia or other specific learning difficulties and of children and young people with autistic spectrum disorder over the last 30 years.

The students with mental health difficulties and the small number of students receiving personal care support were not significantly different in age from the nondisabled students. All of the other groups were significantly older than the nondisabled students. The oldest groups were the students who were deaf or hard of hearing, the students with restricted mobility, the students with impaired speech, the students who were blind or partially sighted, and the students with restricted manual skills. The latter disabilities commonly result from accidents or illnesses in adulthood or from the degenerative processes associated with aging, and so it is not surprising that they are more common in people who study later in life (Richardson, 2009a, 2010).

Of the 196,405 students, 77,579 (or 39.5%) were men and 118,826 (or 60.5%) were women. Table 3 shows the percentages of women in the various disability categories. A chi-square test showed that these were significantly different from each other, $\chi^2(13, N = 196{,}405) = 410.55$, $p < .001$. Further tests showed that the students who were blind or partially sighted, the students with restricted mobility, the students with dyslexia or other specific learning difficulties, and the students receiving personal care support had similar gender distributions to the nondisabled students. However, the proportion of women was significantly lower in the students with speech impairment and the students with autistic spectrum disorder, whereas the proportion of women was significantly higher in the students who were deaf or hard of hearing, the students with restricted manual skills, the students with mental health difficulties, the students who had fatigue or pain, the students with unseen disabilities, the students with other disabilities, and the students with multiple disabilities. Similar trends were noted by Richardson (2010).

The Open University accepts applicants over the minimum age of 16 into most of its courses without imposing formal entrance requirements. The students were classified into three groups based on their highest educational qualifications before joining the University: low, below the normal entry requirement at other

Table 2

Percentage Frequency Distribution by Age of Students with Different Disabilities

	n	Under 30 years	30–39 years	40–49 years	50–59 years	60 years and over
No declared disability	182,963	33.1	29.5	22.5	9.7	5.3
Blind or partially sighted	340	18.5	19.1	21.2	18.5	22.6
Deaf or hard of hearing	275	11.6	17.8	23.3	20.7	26.5
Restricted mobility	255	11.0	20.8	28.2	16.5	23.5
Restricted manual skills	266	16.5	18.8	27.4	16.2	21.1
Impaired speech	15	26.7	20.0	6.7	0.0	46.7
Dyslexia or other SLDs	1,849	40.2	29.3	22.1	5.9	2.5
Mental health difficulties	1,588	30.0	34.5	22.2	10.9	2.3
Personal care support	8	12.5	25.0	37.5	12.5	12.5
Fatigue or pain	503	22.5	25.8	24.3	15.5	11.9
Unseen disabilities	185	26.5	30.8	23.2	10.3	9.2
Autistic spectrum disorder	52	67.3	19.2	9.6	1.9	1.9
Other disabilities	720	25.1	27.2	22.6	12.8	12.2
Multiple disabilities	7,381	19.1	24.1	27.8	18.0	11.1

Note. SLD, specific learning disability.

U.K. universities; medium, equivalent to the normal entry requirement at other U.K. universities; and high, beyond the normal entry requirement at other U.K. universities. Of the 196,405 students, 56,001 (or 29.9%) had low prior qualifications, 54,073 (or 28.9%) had medium prior qualifications, and 77,260 (or 41.2%) had high prior qualifications. Relevant data were missing for 9,071 students.

Table 3 shows the distributions of prior qualifications for the students in the various disability categories. A chi-square test showed that these were significantly different from each other, $\chi^2(26, N = 187{,}334) = 254.29$, $p < .001$. Further tests showed that the students who were deaf or hard of hearing, the students with restricted mobility, the students with restricted manual skills, the students with impaired speech, the students receiving personal care support, the students with fatigue or pain, the students with unseen disabilities, and the students with autistic spectrum disorder had similar prior qualifications to those of the nondisabled students. The students who were blind or partially sighted had significantly higher prior qualifications, whereas the students with dyslexia or other specific learning difficulties, the students with mental health difficulties, the students with other disabilities, and the students with multiple disabilities had significantly lower prior qualifications. This may reflect poorer attainment of students with disabilities in secondary education or the limited opportunities for people with disabilities to gain postsecondary qualifications in the past (Richardson, 2009a, 2010).

On the basis of their personal circumstances, Open University students could apply for financial assistance towards the cost of their registration fees and study materials. The award of such assistance may be taken as a rough proxy for lower socioeconomic circumstances. Of the 196,405 students, 54,294 (or 27.6%) were receiving such assistance. Table 3 shows the percentages of students receiving such assistance in the various disability categories. A chi-square test showed that these were significantly different from each other, $\chi^2(13, N = 196{,}405) = 5937.30$, $p < .001$. Further tests showed that the students who were deaf or hard of hearing, the students with impaired speech, and the students receiving personal care support did not differ significantly from the nondisabled students in terms

Table 3

Percentage of Women, Percentage Frequency Distribution by Prior Qualifications and Percentage of Students Receiving Financial Support in Students with Different Disabilities

		Prior Qualifications			
	Percentage of women	Low	Medium	High	Percentage with financial support
No declared disability	60.0	29.6	28.9	41.5	25.7
Blind or partially sighted	60.0	24.8	27.2	48.0	42.4
Deaf or hard of hearing	66.5	23.5	30.6	45.9	29.5
Restricted mobility	58.8	30.5	27.3	42.2	43.5
Restricted manual skills	70.7	28.1	25.9	46.0	34.6
Impaired speech	26.7	26.7	20.0	53.3	26.7
Dyslexia or other SLDs	62.0	31.4	30.2	38.4	37.7
Mental health difficulties	63.9	35.7	32.3	32.1	63.5
Personal care support	62.5	50.0	0.0	50.0	37.5
Fatigue or pain	78.9	28.1	30.6	41.3	40.6
Unseen disabilities	69.2	29.4	31.1	39.4	43.8
Autistic spectrum disorder	32.7	36.7	26.5	36.7	48.1
Other disabilities	73.8	29.1	33.3	37.7	39.4
Multiple disabilities	68.8	36.6	26.9	36.6	61.7

Note. SLD, specific learning disability.

of receiving assistance. However, all the other groups of students with disabilities were significantly more likely to be receiving assistance than were the nondisabled students. More than half the students with mental health difficulties and more than half the students with multiple disabilities were receiving assistance.

Completion Rates, Pass Rates, and Grades

Out of the 280,413 course registrations at the Open University in 2009, 180,561 (or 64.4%) led to successful completion. Table 4 shows the completion rates for the students in the various disability categories. A chi-square test showed that these were significantly different from each other, $\chi^2(13, N = 280{,}413) = 419.15$, $p < .001$. Further tests showed the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with impaired speech, the students receiving personal care support, the students with fatigue or pain, the students with unseen disabilities, and the students with other disabilities obtained completion rates that were not significantly different from that of the nondisabled students.
- The students with restricted manual skills, the students with dyslexia or other specific learning difficulties, and the students with autistic spectrum disorder were significantly more likely to complete their courses than were the nondisabled students.
- However, the students with restricted mobility, the students with mental health difficulties, and the students with multiple disabilities were significantly less likely to complete their courses.

Of the 180,561 completions, 167,836 (or 93.0%) led to passes. Table 4 shows the pass rates for the students in the various disability categories. A chi-square test showed that these were significantly different from each other, $\chi^2(13, N = 180{,}561) = 357.42$, $p < .001$. Further tests showed the following:

Table 4

Percentage of Students Completing their Courses, Percentage of Completed Students Passing their Courses, and Percentage of Passed Students Obtaining Good Grades in Students with Different Disabilities

	Percentage completed	Percentage passed	Percentage good grades
No declared disability	64.7	93.2	49.6
Blind or partially sighted	64.3	90.4*	47.5
Deaf or hard of hearing	68.4	93.6	49.2
Restricted mobility	58.5*	86.3*	44.4
Restricted manual skills	70.4*	92.0	52.0
Impaired speech	52.4	81.8	33.3
Dyslexia or other SLDs	68.4*	86.9*	40.6*
Mental health difficulties	54.4*	90.1*	46.5
Personal care support	75.0	77.8	25.0
Fatigue or pain	68.0	93.5	57.5*
Unseen disabilities	63.5	88.8*	57.7
Autistic spectrum disorder	80.0*	93.1	69.6
Other disabilities	64.6	90.7*	46.2
Multiple disabilities	57.3*	88.7*	41.5*

Note. SLD, specific learning disability.
*Percentages significantly different ($p < .05$) from those of the nondisabled students.

- The students who were deaf or hard of hearing, the students with restricted manual skills, the students with impaired speech, the students receiving personal care support, the students with fatigue or pain, and the students with autistic spectrum disorder obtained pass rates that were not significantly different from that of the nondisabled students.
- However, the students who were blind or partially sighted, the students with restricted mobility, the students with dyslexia or other specific learning difficulties, the students with mental health difficulties, the students with unseen disabilities, the students with other disabilities, and the students with multiple disabilities were significantly less likely to pass their courses than were the nondisabled students (although the pass rate was greater than 85% in each case).

Although some courses were assessed simply on a pass/fail basis, on many courses the passing students were awarded grades between 1 (distinction) and 4 (bare pass). When determining the class of honors degrees, the boundary between Grades 2 and 3 maps onto that between upper and lower second-class honors. Consequently, Grades 1 and 2 can be regarded as "good" grades that would merit the award of a good degree. Out of the 76,151 registrations that led to a grade, 37,487 (or 49.2%) led to a good grade. Table 4 shows the distributions of grades and the percentages of good grades for the students in the various disability categories. A chi-square test showed that these percentages were significantly different from each other, $\chi^2(13, N = 76{,}151) = 116.22$, $p < .001$. Further tests showed the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with restricted mobility, the students with restricted manual skills, the students with impaired speech, the students with mental health difficulties, the students receiving personal care support, the students with unseen disabilities, the students with autistic spectrum disorder, and the students with other disabilities were not significantly

Table 5

Odds Ratios of Completion, Passing and Obtaining a Good Grade in Students with Different Disabilities, Both Unadjusted and Adjusted for the Effects of Age, Gender, Prior Qualifications and Financial Assistance

	Unadjusted			Adjusted		
	Complete	Pass	Good grades	Complete	Pass	Good grades
Blind or partially sighted	0.98	0.68*	0.92	0.98	0.69	0.92
Deaf or hard of hearing	1.18	1.05	0.98	1.09	1.02	0.92
Restricted mobility	0.77*	0.46*	0.81	0.80*	0.50*	0.80
Restricted manual skills	1.30*	0.83	1.10	1.23	0.79	1.10
Impaired speech	0.60	0.33	0.51	0.61	0.38	0.55
Dyslexia or other SLDs	1.18*	0.48*	0.69*	1.24*	0.53*	0.74*
Mental health difficulties	0.65*	0.66*	0.88	0.72*	0.86	1.09
Personal care support	1.63	0.25	0.34	2.00	0.41	0.52
Fatigue or pain	1.16	1.05	1.37*	1.19*	1.14	1.49*
Unseen disabilities	0.95	0.58*	1.38	0.98	0.58*	1.37
Autistic spectrum disorder	2.18*	0.97	2.32	2.30*	1.42	2.64*
Other disabilities	0.99	0.70*	0.87	1.00	0.72*	0.98
Multiple disabilities	0.73*	0.57*	0.72*	0.81*	0.69*	0.83*

Note. Data show the odds ratio of each outcome in students with each disability compared with students with no declared disability. SLD, specific learning difficulty.
*Odds ratios significantly different ($p < .05$) from one.

different from the nondisabled students in their likelihood of obtaining good grades.

- The students with fatigue or pain were significantly more likely to obtain good grades than were the nondisabled students.
- However, the students with dyslexia or other specific learning difficulties and the students with multiple disabilities were significantly less likely to obtain good grades than were the nondisabled students.

Controlling for the Effects of Demographic Characteristics

The analyses that have been described thus far have shown that students who are recorded as falling into the different disability categories vary with regard to the likelihood of completing their courses, passing their courses, or obtaining good grades on their courses. In other words, simply at a descriptive level, disablement plays a statistically significant role in predicting completion and attainment. However, students who fall into the different disability categories also vary with regard to age, gender, prior qualifications, and socioeconomic circumstances. It follows that the apparent variation in the completion and attainment of students with disabilities is confounded with variations in their completion and attainment related to these demographic characteristics. Hierarchical logistic regression analyses were carried out to control for possible effects of age, gender, prior qualifications, and financial assistance on completion and attainment in students with disabilities and students with no declared disability.

The results are reported in terms of odds ratios, which can be explained as follows. If the probability of the members of Group 1 exhibiting a particular outcome is p (e.g., .60), then the odds of this are $p/(1 - p)$ (i.e., .60/.40 or 1.50). If the probability of the members of Group 2 exhibiting that outcome is q (e.g., .70), then the odds of this are $q/(1 - q)$ (i.e., .70/.30 = 2.33). The odds ratio is the ratio between these odds (i.e., $[p/(1 - p)]/[q/(1 - q)]$, which equals $[p(1 - q)]/[q(1 - p)]$). In this case, the ratio between the odds is 1.50/2.33 = 0.64. In other words, the odds of the members of Group 1 exhibiting the relevant outcome

are 64% of the odds of the members of Group 2 exhibiting that outcome. Odds ratios vary from 0 (if $p = 0$ or $q = 1$) to infinity (if $p = 1$ or $q = 0$). An odds ratio of 1 means that there is no difference in the odds of the groups' members exhibiting the outcome (when $p = q$). Whether an odds ratio is significantly different from 1 depends on the odds ratio itself and on the number of members in each group.

Table 5 shows the odds ratios comparing the students with different disabilities and the nondisabled students in terms of the completion rate, the pass rate, and the proportion of good grades. The numbers in the three left-hand columns are unadjusted and correspond to the data in Table 4. For instance, the odds of students who were blind or partially sighted obtaining good grades for their course were 8% (i.e., [1 − 0.92] x 100) less than the odds of nondisabled students obtaining good grades. The numbers in the three right-hand columns are adjusted for the possible effects of age, gender, prior qualifications, and financial assistance (all treated as categorical variables). For instance, the odds of students who were blind or partially sighted obtaining good grades for their courses were still 8% less than the odds of nondisabled students obtaining good grades when these other characteristics had been taken into account.

In the case of the completion rates, the combined effects of age, gender, prior qualifications, and financial assistance were highly significant, $\chi^2(8, N = 269{,}423) = 5035.19$, $p < .001$. Students aged less than 30 were less likely to complete their courses than were older students, $\chi^2(4, N = 269{,}423) = 274.51$, $p < .001$; women were more likely to complete their courses than were men, $\chi^2(1, N = 269{,}423) = 36.77$, $p < .001$; students with medium or high prior qualifications were more likely to complete their courses than were students with low qualifications, $\chi^2(2, N = 269{,}423) = 2683.11$, $p < .001$; and students who had financial assistance were less likely to complete their courses than were students who did not, $\chi^2(1, N = 269{,}423) = 1010.30$, $p < .001$.

However, the completion rates for the students in the various disability categories were still significantly different from each other even when these effects had been controlled, $\chi^2(13, N = 269{,}423) = 226.61$, $p < .001$. Table 5 shows the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with restricted manual skills, the students with impaired speech, the students receiving personal care support, the students with unseen disabilities and the students with other disabilities did not differ significantly from the nondisabled students in their completion rates.
- The students with dyslexia or other specific learning difficulties, the students with fatigue or pain, and the students with autistic spectrum disorder were significantly more likely to complete their courses than were the nondisabled students.
- The students with restricted mobility, the students with mental health difficulties, and the students with multiple disabilities were significantly less likely to complete their courses than were the nondisabled students.

In the case of the pass rates, the combined effects of age, gender, prior qualifications, and financial assistance were highly significant, $\chi^2(8, N = 175{,}090) = 1754.93$, $p < .001$. Students aged less than 30 were less likely to pass their courses than were older students, $\chi^2(4, N = 175{,}090) = 76.76$, $p < .001$; women were more likely to pass their courses than were men, $\chi^2(1, N = 175{,}090) = 40.48$, $p < .001$; students with medium or high prior qualifications were more likely to pass their courses than were students with low qualifications, $\chi^2(2, N = 175{,}090) = 356.15$, $p < .001$; and students who had financial assistance were less likely to pass their courses than were students who did not, $\chi^2(1, N = 175{,}090) = 975.46$, $p < .001$.

However, the pass rates for the students in the various disability categories were still significantly different from each other even when these effects had been controlled, $\chi^2(13, N = 175{,}090) = 159.86$, $p < .001$. Table 5 shows the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with restricted manual skills, the students with impaired speech, the students with mental health difficulties, the students receiving personal care support, the students with fatigue or pain, and the students with autistic spectrum disorder did not differ significantly from the nondisabled students in their pass rates.
- However, the students with restricted mobility, the students with dyslexia or other specific learning difficulties, the students with unseen disabilities, the students with other disabilities, and the students with multiple disabilities were significantly less likely to pass their courses than were the nondisabled students.

Table 6

Odds Ratios of Completion, Passing and Obtaining a Good Grade in Students with Different Disabilities, Both Unadjusted and Adjusted for the Effects of Age, Gender, Prior Qualifications and Financial Assistance

	Unadjusted			Adjusted		
	Complete	Pass	Good grades	Complete	Pass	Good grades
Blind or partially sighted	0.87*	0.73*	0.95	0.87*	0.71*	0.96
Deaf or hard of hearing	1.14*	0.86	0.87	1.13*	0.86	0.80*
Restricted mobility	0.81*	0.72*	0.79*	0.87*	0.78*	0.84*
Restricted manual skills	1.09*	0.97	1.08	1.08	0.95	1.05
Impaired speech	1.04	1.12	0.66*	1.03	1.24	0.64*
Dyslexia or other SLDs	1.03	0.51*	0.65*	1.09*	0.56*	0.69*
Mental health difficulties	0.63*	0.77*	0.81*	0.69*	0.94	0.95
Personal care support	0.88*	0.82	0.94	0.92	0.87	1.01
Fatigue or pain	0.98	1.22*	1.05	0.98	1.30*	1.11
Unseen disabilities	0.87*	0.67*	0.84*	0.90*	0.68*	0.83*
Autistic spectrum disorder	1.25	0.98	1.55	1.34*	1.07	1.77*
Other disabilities	1.10*	0.83*	0.89	1.08*	0.83*	0.93

Note. Data show the odds ratio of each outcome in students with each disability compared with students with no declared disability. SLD, specific learning difficulty.
*Odds ratios significantly different ($p < .05$) from one.

With regard to obtaining good grades, the combined effects of age, gender, prior qualifications, and financial assistance were highly significant, $\chi^2(8, N = 74{,}962) = 2033.54$, $p < .001$. Students aged less than 30 were less likely to obtain good grades than were older students, $\chi^2(4, N = 74{,}962) = 143.86$, $p < .001$; students with medium or high prior qualifications were more likely to obtain good grades than were students with low qualifications, $\chi^2(2, N = 74{,}962) = 938.86$, $p < .001$; and students who had financial assistance were less likely to obtain good grades than were students who did not, $\chi^2(1, N = 74{,}962) = 455.23$, $p < .001$. Nevertheless, there was no significant gender difference in terms of good grades, $\chi^2(1, N = 74{,}962) = 0.01$, $p = .92$.

However, the proportions of good grades for the students in the various disability categories were still significantly different from each other even when these effects had been controlled, $\chi^2(13, N = 74{,}962) = 59.13$, $p < .001$. Table 5 shows the following:

- The students who were blind or partially sighted, the students who were deaf or hard of hearing, the students with restricted mobility, the students with restricted manual skills, the students with impaired speech, the students with mental health difficulties, the students receiving personal care support, the students with unseen disabilities and the students with other disabilities did not differ significantly from the nondisabled students in their proportions of good grades.
- The students with fatigue or pain and the students with autistic spectrum disorder were significantly more likely to obtain good grades than were the nondisabled students.
- However, the students with dyslexia or other specific learning difficulties and the students with multiple disabilities were significantly less likely to obtain good grades than were the nondisabled students.

Comparing Students With and Without Particular Disabilities

To answer the second research question, "disability" was represented as 12 dichotomous variables corresponding to the 12 disabilities listed in Table 1. The students with more than one disability were disaggregated across their constituent disabilities, and logistic regression analyses were carried out to compare the students with and without each of the disabilities on the relevant variables. This might well yield different results from the previous analysis, because the group of students with a particular disability now includes students who have additional disabilities.

Table 6 shows the odds ratios comparing the students with and without different disabilities in terms of the completion rate, the pass rate, and the proportion of good grades. The numbers in the three left-hand columns are unadjusted. For instance, the odds of students who were blind or partially sighted completing their courses were 13% (i.e., [1 − 0.87] x 100) less than the odds of students who were not blind or partially sighted completing their courses. The numbers in the three right-hand columns are adjusted for the possible effects of age, gender, prior qualifications, and financial assistance (all treated as categorical variables). For instance, the odds of students who were blind or partially sighted completing their courses were still 13% less than the odds of students who were not blind or partially sighted completing their courses when these other characteristics had been taken into account. In the latter analyses, the effects of age, gender, prior qualifications, and financial assistance were identical to those described in the previous section, and so it is unnecessary to report them here.

In the unadjusted data, the 12 disabilities were significantly related to the completion rate, $\chi^2(12, N = 280{,}413) = 573.98$, $p < .001$. Table 6 shows the following:

- The students with impaired speech were not significantly different from the students without impaired speech; the students with dyslexia or other specific learning difficulties were not significantly different from the students without dyslexia or other specific learning difficulties; the students with fatigue or pain were not significantly different from the students without fatigue or pain; and the students with autistic spectrum disorder were not significantly different from the students without autistic spectrum disorder.
- The students who were deaf or hard of hearing were more likely to complete their courses than were the students who were not deaf or hard of hearing; the students with restricted manual skills were more likely to complete their courses than were the students without restricted manual skills; and the students with other disabilities were more likely to complete their courses than were the students without other disabilities.
- However, the students who were blind or partially sighted were less likely to complete their courses than were the students who were not blind or partially sighted; the students with restricted mobility were less likely to complete their courses than were the students without restricted mobility; the students with mental health difficulties were less likely to complete their courses than were the students without mental health difficulties; the students receiving personal care support were less likely to complete their courses than were the students not receiving personal care support; and the students with unseen disabilities were less likely to complete their courses than were the students without unseen disabilities.

The 12 disabilities were still significantly related to the completion rate even when the effects of age, gender, prior qualifications, and financial assistance were controlled, $\chi^2(12, N = 269{,}423) = 315.69$, $p < .001$. Table 6 shows the following:

- The students with restricted manual skills were not significantly different from the students without restricted manual skills; the students with impaired speech were not significantly different from the students without impaired speech; the students receiving personal care support were not significantly different from the students not receiving personal care support; and the students with fatigue or pain were not significantly different from the students without fatigue or pain.
- The students who were deaf or hard of hearing were more likely to complete their courses than were the students who were not deaf or hard of hearing; the students with dyslexia or other specific learning difficulties were more likely to complete their courses than were the students without dyslexia or other specific learning difficulties; the students with autistic spectrum disorder were more likely to complete their courses than were the students without autistic spectrum disorder; and the students with other disabilities were more likely to complete their courses than were the

students without other disabilities.
- However, the students who were blind or partially sighted were less likely to complete their courses than were the students who were not blind or partially sighted; the students with restricted mobility were less likely to complete their courses than were the students without restricted mobility; the students with mental health difficulties were less likely to complete their courses than were the students without mental health difficulties; and the students with unseen disabilities were less likely to complete their courses than were the students without unseen disabilities.

In the unadjusted data, the 12 disabilities were significantly related to the pass rate, $\chi^2(12, N = 180{,}561) = 323.61$, $p < .001$. Table 6 shows the following:

- The students who were deaf or hard of hearing were not significantly different from the students who were not deaf or hard of hearing; the students with restricted manual skills were not significantly different from the students without restricted manual skills; the students with impaired speech were not significantly different from the students without impaired speech; the students receiving personal care support were not significantly different from the students not receiving personal care support; and the students with autistic spectrum disorder were not significantly different from the students without autistic spectrum disorder.
- The students with fatigue or pain were more likely to pass their courses than were the students without fatigue or pain.
- However, the students who were blind or partially sighted were less likely to pass their courses than were the students who were not blind or partially sighted; the students with restricted mobility were less likely to pass their courses than were the students without restricted mobility; the students with dyslexia or specific learning difficulties were less likely to pass their courses than were the students without dyslexia or specific learning difficulties; the students with mental health difficulties were less likely to pass their courses than were the students without mental health difficulties; the students with unseen disabilities were less likely to pass their courses than were the students without unseen disabilities; and the students with other disabilities were less likely to pass their courses than were the students without other disabilities.

The 12 disabilities were still significantly related to the pass rate even when the effects of age, gender, prior qualifications, and financial assistance were controlled, $\chi^2(12, N = 175{,}090) = 193.77$, $p < .001$. Table 6 shows the following:

- The students who were deaf or hard of hearing were not significantly different from the students who were not deaf or hard of hearing; the students with restricted manual skills were not significantly different from the students without restricted manual skills; the students with impaired speech were not significantly different from the students without impaired speech; the students with mental health difficulties were not significantly different from the students without mental health difficulties; the students receiving personal care support were not significantly different from the students not receiving personal care support; and the students with autistic spectrum disorder were not significantly different from the students without autistic spectrum disorder.
- The students with fatigue or pain were more likely to pass their courses than were the students without fatigue or pain.
- However, the students who were blind or partially sighted were less likely to pass their courses than were the students who were not blind or partially sighted; the students with restricted mobility were less likely to pass their courses than were the students without restricted mobility; the students with dyslexia or other specific learning difficulties were less likely to pass their courses than were the students without dyslexia or other specific learning difficulties; the students with unseen disabilities were less likely to pass their courses than were the students without unseen disabilities; and the students with other disabilities were less likely to pass their courses than were the students without other disabilities.

In the unadjusted data, the 12 disabilities were significantly related to the likelihood of obtaining good grades, $\chi^2(12, N = 76{,}151) = 144.48$, $p < .001$. Table 6 shows the following:

- The students who were blind or partially sighted were not significantly different from the students who were not blind or partially

sighted; the students who were deaf or hard of hearing were not significantly different from the students who were not deaf or hard of hearing; the students with restricted manual skills were not significantly different from the students without restricted manual skills; the students receiving personal care support were not significantly different from the students not receiving personal care support; the students with fatigue or pain were not significantly different from the students without fatigue or pain; the students with autistic spectrum disorder were not significantly different from the students without autistic spectrum disorder; and the students with other disabilities were not significantly different from the students without other disabilities.

- However, the students with restricted mobility were less likely to obtain good grades than were the students without restricted mobility; the students with impaired speech were less likely to obtain good grades than were the students with impaired speech; the students with dyslexia or other specific learning difficulties were less likely to obtain good grades than were the students without dyslexia or other specific learning difficulties; the students with mental health difficulties were less likely to obtain good grades than were the students without mental health difficulties; and the students with unseen disabilities were less likely to obtain good grades than were the students without unseen disabilities.

The 12 disabilities were still significantly related to the likelihood of obtaining good grades even when the effects of age, gender, prior qualifications, and financial assistance were controlled, $\chi^2(12, N = 74{,}962) = 78.31$, $p < .001$. Table 6 shows the following:

- The students who were blind or partially sighted were not significantly different from the students who were not blind or partially sighted; the students with restricted manual skills were not significantly different from the students without restricted manual skills; the students with mental health difficulties were not significantly different from the students without mental health difficulties; the students receiving personal care support were not significantly different from the students not receiving personal care support; the students with fatigue or pain were not significantly different from the students without fatigue or pain; and the students with other disabilities were not significantly different from the students without other disabilities.
- The students with autistic spectrum disorder were more likely to obtain good grades than were the students without autistic spectrum disorder.
- However, the students who were deaf or hard of hearing were less likely to obtain good grades than were the students who were not deaf or hard of hearing; the students with restricted mobility were less likely to obtain good grades than were the students without restricted mobility; the students with impaired speech were less likely to obtain good grades than were the students without impaired speech; the students with dyslexia or other specific learning difficulties were less likely to obtain good grades than were the students without dyslexia or other specific learning difficulties; and the students with unseen disabilities were less likely to obtain good grades than were the students without unseen disabilities.

Discussion

These results have demonstrated that the presence or absence of different disabilities is confounded with variations in attainment related to a student's age, gender, prior qualifications and socioeconomic circumstances. In general, older students did better than younger students, women did better than men, students with higher prior qualifications did better than students with lower prior qualifications, and students not receiving financial assistance did better than students who received financial assistance. These trends need to be taken into account when evaluating academic attainment in students with disabilities.

Accordingly, the first research question was as follows: When the effects of demographic variables have been statistically controlled, do students with particular disabilities differ in their academic attainment from nondisabled students? The right-hand side of Table 5 shows that some groups of students with disabilities showed poorer attainment than nondisabled students even when the effect of these variables had been taken into account. Students with restricted mobility and those with mental health difficulties were less likely to complete their courses than were nondisabled students. Students with restricted mobility, those with dyslexia or other specific learning difficulties, those with unseen disabilities, and those with other disabilities were less likely to pass their courses than were nondisabled stu-

dents. Students with dyslexia or other specific learning difficulties were less likely to obtain good grades on their courses than were nondisabled students.

The second research question was as follows: When the effects of demographic variables have been statistically controlled, do students with and without particular disabilities differ in their academic attainment? The right-hand side of Table 6 confirms the trends just noted when comparing students with and without particular disabilities. However, it includes some additional trends attributable to the inclusion of students with multiple disabilities. Table 5 shows that the completion rate, the pass rate, and the chances of obtaining good grades were lower in students with multiple disabilities, and it is therefore not surprising that (in distance education but not in campus-based education) these students were less likely to obtain good degrees than are nondisabled students (Richardson, 2009a, 2009b). Nevertheless, Table 6 enables one to unpack the notion of "multiple disabilities" to identify those situations in which the presence of additional disabilities makes a difference:

- For students who are blind or partially sighted, the presence of additional disabilities leads to a poorer completion rate and a poorer pass rate, although it appears to make no difference to their likelihood of obtaining a good grade.
- For students who are deaf or hard of hearing and for students with impaired speech, the presence of additional disabilities makes it less likely that they will obtain a good grade, although it appears to make no difference to their completion rate or their pass rate.
- For students with unseen disabilities, the presence of additional disabilities leads to a poorer completion rate and makes it less likely that they will obtain a good grade, although it appears to make no difference to their pass rate.
- Finally, students with fatigue or pain and students with autistic spectrum disorder tend to be more likely to complete their courses and more likely to obtain good grades than nondisabled students, but the presence of additional disabilities tends to hold them back in both regards.

These results have some interesting practical implications. First, efforts to improve the completion rates of students with disabilities in distance education should focus on those with restricted mobility and those with mental health difficulties. Second, efforts to improve the pass rates of students with disabilities in distance education should focus on those with restricted mobility, unseen disabilities, and other disabilities. Provided these students have completed and passed their courses, their academic attainment seems to match that of nondisabled students. It is therefore not surprising that those who graduate are just as likely to obtain good degrees as are nondisabled students (Richardson, 2009b). Broadly speaking, these results confirm the findings that were obtained by Richardson (2010) on the basis of data collected six years earlier.

Efforts to improve the pass rates of students with disabilities should also be focused on students with dyslexia or other specific learning difficulties, but these students would benefit from efforts to improve their grades as well as their pass rates. In terms of the classes of their final degrees, they perform as well as nondisabled students in campus-based higher education (Richardson, 2009a). However, Richardson (2009b) found that they were less likely than nondisabled students to obtain good degrees in distance education. He argued that the reliance on written text in distance education posed specific challenges for students with dyslexia and that they might benefit from the provision of speech production software. The increasing adoption of online delivery should enable course designers to make use of more diverse modalities for presenting content. Conversely, however, the most obvious limitation of the present study is that the findings may well not generalize to campus-based higher education, where information can be presented in diverse modalities and where disablement seems not to play a significant role in predicting attainment (Richardson, 2009a).

It was noted earlier that the total student population of the Open University increased by 48% from 2003 to 2009. Since then, the landscape of distance education has changed again. Until 2012, the governments of the four nations of the United Kingdom subsidized the cost of taking courses with the Open University so that students were required to pay only a fraction of the true cost. In 2012, the governments of England and Northern Ireland withdrew this subsidy so that, apart from some courses in science, technology, engineering, and mathematics, students were required to pay the full cost of their courses. This policy decision led to a substantial increase in their fees, although loans are available for those studying 30 credits or more a year. It remains to be seen what impact these changes will have on the demand for distance education among students with disabilities. Nevertheless, the present findings constitute a baseline from which the University can begin to plan provision and support for students with disabilities in the years to come.

References

Abberley, P. (1996). Disabled by numbers. In R. Levitas & W. Guy (Eds.), *Interpreting official statistics* (pp. 166–184). London: Routledge.

Adams, M., & Brown, S. (Eds.). (2006). *Towards inclusive learning in higher education: Developing curricula for disabled students*. London: Routledge.

Allen, I. E., & Seaman, J. (2011). *Going the distance: Online education in the United States 2011*. Boston, MA: Babson College, Babson Survey Research Group. Retrieved from http://www.babson.edu/Academics/centers/blank-center/global-research/Documents/going-the-distance.pdf

Department for Innovation, Universities and Skills. (2009). *Disabled students and higher education* (Report 09 06). London: Author. Retrieved from http://www.bis.gov.uk/assets/BISCore/corporate/MigratedD/publications/D/DIUS_RR_09_06.pdf

Finkelstein, V. (1991). "We" are not disabled, "you" are. In S. Gregory & G. M. Hartley (Eds.), *Deconstructing deafness* (pp. 265–271). London: Pintner.

Foreman, P., Dempsey, I., Robinson, G., & Manning, E. (2001). Characteristics, academic and post-university outcomes of students with a disability at the University of Newcastle. *Higher Education Research and Development, 20*, 313–325. doi:10.1080/07294360120108386

Fuller, M., Georgeson, J., Healey, M., Hurst, A., Kelly, K., Riddell, S., . . . Weedon, E. (2009). *Improving disabled students' learning: Experiences and outcomes.* London: Routledge.

Horn, L. J., & Berktold, J. (with Bobbitt, L.). (1999). *Students with disabilities in postsecondary education: A profile of preparation, participation, and outcomes* (Report No. NCES 1999-187). Washington, DC: Department of Education, National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs99/1999187.pdf

Konur, O. (2006). Teaching disabled students in higher education. *Teaching in Higher Education, 11,* 351–363. doi:10.1080/13562510600680871

Newell, C., & Debenham, M. (2009). Disability, chronic illness and distance education. In P. L. Rogers, G. A. Berg, J. V. Boettcher, C. Howard, L. Justice, & K. D. Schenk (Eds.), *Encyclopedia of distance learning* (2nd ed., vol. 2, pp. 646–654). Hershey, PA: Information Science Reference.

Richardson, J. T. E. (2001). The representation and attainment of students with a hearing loss in higher education. *Studies in Higher Education, 26,* 183–204. doi:10.1080/03075070120052107

Richardson, J. T. E. (2009a). The academic attainment of students with disabilities in UK higher education. *Studies in Higher Education, 34*, 123–137. doi:10.1080/03075070802596996

Richardson, J. T. E. (2009b). The attainment and experiences of disabled students in distance education. *Distance Education, 30*, 87–102. doi:10.1080/01587910902845931

Richardson, J. T. E. (2010). Course completion and attainment in disabled students taking courses with the Open University UK. *Open Learning, 25,* 81–94. doi:10.1080/02680511003787263

Richardson, J. T. E., & Wydell, T. (2003). The representation and attainment of students with dyslexia in UK higher education. *Reading and Writing, 16*, 475–503. doi:10.1023/A:1024261927214

Riddell, S., Tinklin, T., & Wilson, A. (2005). *Disabled students in higher education: Perspectives on widening access and changing policy.* London: Routledge.

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Author's Note

I am grateful to my colleague James Forman for generating the data set that was analyzed in this study.