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Disability and learning outcomes: How much does the disability really matter?

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About the research

Disability and learning outcomes: How much does the disability really matter? by Tom Karmel and Nhi Nguyen, NCVER

In 2005, the National Centre for Vocational Education Research (NCVER) produced a statistical compendium examining vocational education and training (VET) students with a disability as a whole group; it also compared different disability groups, focusing on their participation levels, achievements and outcomes from VET in 2003 (Cavallaro et al. 2005).

The report found that, on the whole, educational achievements and outcomes from VET are relatively poor for students reporting a disability, but there is considerable variability between types of disability.

In addition, educational achievement prior to commencing VET was found to have some bearing on students' results in VET. Generally, students reporting a disability in VET have lower prior education and poorer outcomes from VET than all other VET students. This implies that the poor educational performance of students reporting a disability may be due to their educationally disadvantaged position rather than their disability.

This paper, *Disability and leaning outcomes: How much does the disability really matter?* by Tom Karmel and Nhi Nguyen, seeks to highlight the direct effect of the disability by controlling for the background characteristics (notably educational background, but also age, level of study and field of study) in a simple statistical model.

Key messages

- The study finds that with disabilities such as hearing/deaf, intellectual, acquired brain impairment and vision, the actual disability explains little, once we take into account other student characteristics such as age, sex, educational background and course studied.
- By contrast, both student characteristics and the disability itself directly impact on the low completion rates of those with a physical or mental illness or a medical condition.

Overall, the significant point to emerge is that it is not helpful to treat students with a disability as one group. The different disability groups have students with different background characteristics, and the direct effect of the disability on academic performance differs between groups.

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Introduction

In 2005, the National Centre for Vocational Education Research (NCVER) produced a statistical compendium examining vocational education and training (VET) students with a disability as a whole group; the compendium also compared different disability groups, focusing on their participation levels, achievements and outcomes from VET in 2003 (Cavallaro et al. 2005).

The report found that, on the whole, educational achievements and outcomes from VET are relatively poor for students reporting a disability, but there is considerable variability between types of disability.

In addition, educational achievement prior to commencing VET was found to have some bearing on students' results in VET. Generally, students reporting a disability in VET have lower prior education and poorer outcomes from VET than all other VET students. This implies that the poor educational performance of students reporting a disability may be due to their educationally disadvantaged position rather than their disability.

Cavallaro et al. (2005) acknowledged the need for a better understanding of how prior education impacts on learning outcomes for students reporting a disability. This paper seeks to throw light on the relative importance of educational background for students reporting a disability and on their educational outcomes.[1]

Background

In 2003, there were some 91 400 students reporting a disability, representing around 5.3% of all students in the NCVER students and courses collection. Around 20% of the general population reports some form of disability (ABS 2003). As can be seen from table 1, the largest group consisted of students reporting a physical disability. The figure shows a fair spread of students across the other disability categories. Students reporting a disability have generally low educational attainment levels, with almost half having only completed Year 10 or lower.

[1] We measure this by using module completion rate. The module completion rate is calculated as a proportion of successful completion of a VET module/subject (Pass + Recognition of prior learning + Non-assessable satisfactorily completed divided by Pass + Fail + Withdraw + RPL + NA satisfactorily completed and NA not satisfactorily completed). These calculations are based on the population derived for this analysis and may differ slightly from the published figures in the disability compendium.

Table 1 Students by disability, 2003

Disability type	No. reporting a disability	%	% with Yr 10 or lower
Hearing/deaf	10 593	11.53	50.3
Physical	18 149	19.75	49.8
Intellectual	8 871	9.65	45.9
Learning	12 352	13.44	59.9
Mental illness	7 668	8.34	47.7
Acquired brain impairment (ABI)	1 858	2.02	46.4
Vision	13 778	14.99	44.0
Medical condition	15 394	16.75	48.8
Other	12 878	14.01	48.8
Unspecified	7 008	7.63	28.9
Total students with disabilities	**91 902**[a]	**100.00**	**47.1**

Note: (a) Students can have more than one disability type; therefore, the base used for the total number of students with disabilities is the total number reporting a disability.

Source: National VET Provider Collection, unpublished data 2008.

Table 2 shows the relative module completion rates for students by disability type. Overall, the module completion rate is almost eight percentage points lower than for students not reporting a disability. However, there is considerable variation by type of disability, with students with a mental illness having the poorest module outcomes, with a module completion rate of 63.5% compared with 80.2% for students not reporting a disability. Students with hearing or visual disability, two of the better performing groups, had module completion rates almost five percentage points lower than that for students without a disability.

Table 2 Module completion rates for students reporting a disability, by disability type, 2003

Disability type	Module completion rate (%)
Hearing/deaf	75.4
Physical	72.1
Intellectual	74.3
Learning	69.4
Mental illness	63.5
Acquired brain impairment (ABI)	72.1
Vision	75.1
Medical condition	70.0
Other	69.5
Unspecified	81.0
All students reporting a disability	72.5
Other students[(a)]	80.2

Note: (a) Figure includes students for whom disability status is 'not known'.

Source: National VET Provider Collection, 2003 unpublished data.

Now we also know that educational background is related to the module completion rate. As can be seen from table 3, those with post-school qualifications have a higher module completion rate than students who have only completed Year 12 or lower.

Table 3 Module completion rates by highest educational background for all students, 2003

Educational attainment level	Module completion rate (%)
Bachelor degree and above	81.5
Advanced diploma	79.5
Diploma	80.3
AQF Certificate IV	80.7
AQF Certificate III	80.9
AQF Certificate II	77.8
AQF Certificate I	77.7
Year 12	76.0
Year 11	77.8
Year 10	76.7
Year 9 or lower	71.7
Other	80.3
Unknown	85.9
No prior education	71.0

Source: National VET Provider Collection, 2003 unpublished data.

We know that students with a disability tend to have relatively poor educational backgrounds, so the question is how important is disability in addition to educational background.

The simple approach we take to isolate the effect of disability as well as educational background is to run a simple additive regression model, in which disability and educational background are entered in the model separately. We also control for other characteristics: qualification being undertaken, age, field of education and gender.

Findings

The model results are shown in appendix A. As expected there is a relationship between educational background and the module completion rate. Those students with no prior education are least likely to successfully complete modules, followed by students with only up to Year 9 schooling. At the other end of the spectrum those with degrees, diplomas and certificate IV perform the best.

However, our primary interest is the disability variables. All the parameter estimates for the disability categories are negative, with the exception of the intellectual disability category. The easiest way to understand the results is to report two sets of module completion rates, and this is done in table 4. From table 2 we have the original module completion rate (column 1, from table 2). From the model we can calculate the adjusted module completion rate. This is the rate for each disability type, assuming that the students in the disability group have the same characteristics (apart from the possession of a disability) as the whole student population. The direct effect of the disability is given by column 3 (the coefficients of the disability dummy variables in table A1). Finally, the difference between the adjusted rate and the original module completion rate gives the indirect impact of the disability (column 4, from table 4); that is, the effect of the student characteristics of the disability group in question.

Table 4 Students by disability and module completion rates (%), 2003

Disability type	Original module completion rate	Adjusted module completion rate	Direct effect of disability on module completion rate (percentage points)[(b)]	Effect of student characteristics on module completion rate (percentage points)[(c)]
Hearing/deaf	75.4	78.2	-1.7	-2.8
Physical	72.1	76.4	-3.5	-4.4
Intellectual	74.3	81.2	1.2	-6.9
Learning	69.4	77.9	-2.1	-8.5
Mental illness	63.5	70.2	-9.8	-6.7
Acquired brain impairment (ABI)	72.1	79.1	-0.8	-7.0
Vision	75.1	79.5	-0.4	-4.4
Medical condition	70.0	75.0	-5.0	-5.0
Other	69.5	75.2	-4.8	-5.7
Unspecified	81.0	80.3	0.3	0.7
Other students[(a)]	80.2	79.9		0.2

Notes: (a) Figure includes students for whom disability flag is 'not known'.
(b) Difference between the adjusted module completion rate for a particular disability and the overall adjusted completion rate for students not reporting a disability (80.0%).
(c) Column 1 minus column 2.

Source: National VET Provider Collection, 2003 unpublished data.

To aid explanation, take the hearing/deaf disability category. The original module completion rate for this group is 75.4%, and this compares with an overall module completion rate of 80.0%. If we assume that the hearing/deaf disability students have the same characteristics as the whole student population control (with respect to age, previous education, level of qualification being undertaken, field of study), then the completion rate for hearing/deaf disability students would be 78.2%. So we see that the hearing/deaf disability group has characteristics other than their disability that are associated with relatively low completion rates. The difference between the original and the adjusted rates (-2.8 percentage points) represents the effect of the student characteristics of the hearing/deaf disability group on their completion rate. The direct effect of their being in the hearing/deaf disability group is taken from the relevant coefficient in the regression (-0.017 or -1.7 percentage points).

Another way of thinking about these estimates is to observe that the difference between the original module completion rate and the overall completion rate can be split into the direct effect of the disability and the effect of the student characteristics of the group; that is, 75.4%-80.0% = -4.6% = -1.7%-2.8%[2]. Those readers interested in a formal derivation are directed to appendix C.

Returning to the results shown in table 4. Essentially, these results imply that we can divide the disability types into two categories.

The first applies to the types of disability for which the explanation behind poor completion rates lies in the (non-disability) characteristics of the student and what they are studying, rather than their disability. These students include:

- ✧ hearing/deaf
- ✧ intellectual
- ✧ learning
- ✧ acquired brain impairment
- ✧ vision
- ✧ unspecified disability.

[2] The discrepancy is due to rounding.

It must be qualified that this interpretation does not exclude the effect of a student's disability on their poor completion rates. The point here is that it is the non-disability characteristics that are directly attributable to poor completion rates for students in the above disability groups. The disability itself may affect these characteristics—such as low prior educational attainment levels—but it is not the disability itself that directly affects poor completion rates in vocational education and training.

The other category applies to the types of disability for which poor completion rates can be attributed to the disability, over and above the effect of the other characteristics of the affected students. By contrast with the first group, poor performance of students in the second category can be traced back to both the direct impact of the disability and the impact of the other characteristics, and they include:

- ✧ physical
- ✧ mental illness
- ✧ medical condition
- ✧ other disability.

Discussion

So what are the implications of these findings? Importantly, it must be acknowledged that the analysis we have undertaken is at an aggregate level and it does not necessarily assist in understanding the support needs of individual students. However, what it does show is that in commenting on the poor performance of students with a disability, and in designing systems to help these groups, we need to recognise a number of points.

First, there is significant variation in educational performance between types of disability, and therefore it is not helpful to treat students with a disability as one group.

Second, for some types of disability—hearing/deaf, intellectual, learning, acquired brain impairment, vision, unspecified disability—the actual disability explains little in a statistical sense once we take into account the other characteristics of the students (age, sex, educational background, course studied). This suggests that the learning support offered to students in these categories to address their special requirements is doing a good job. Perhaps additional support offered should be addressing the impacts of non-disability characteristics and, as such, be the same as that offered to students in general who tend to struggle because of these factors (for example, early school leavers).

Finally, for other types of disability the actual disability does appear to directly contribute to poor educational performance (in addition to other characteristics which by themselves lead to poor performance). Thus this group of students—those with a physical disability or mental illness—would appear to need special assistance relating to this disability. It is interesting to see those reporting a 'physical' disability included in this second category. A physical disability—much like hearing/deaf, intellectual, learning, and vision—is recognisable and more easily identifiable than something like mental illness. As such, support for these students can be more easily catered for. On the other hand, perhaps a physical disability or mental illness chiefly affects attendance and drop-out rates, resulting in poor completion of courses and subjects (Miller & Nguyen 2008).

Overall, the main point to emerge is that it is not helpful to treat students with a disability as one group. The different disability groups have students with different background characteristics, and the direct effect of the disability on academic performance differs between groups.

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Cavallaro, T, Foley, P, Saunders, J & Bowman, K 2005, *People with a disability in vocational education and training: A statistical compendium*, NCVER, Adelaide.

Miller, C & Nguyen, N 2008, *Who's supporting us? TAFE staff perspectives on supporting students with mental illness*, NCVER, Adelaide.

Appendix A: Regression results

Data

Data used in this analysis are from the National VET Provider Collection on students undertaking study in 2003. The 2003 'publication scope' was used to categorise all disability groups for this analysis and this should be noted for any future comparison. Only table 1 in the paper uses the current (2006) scope to define disability groups.

Table A1 Regression results dependent variable is the module completion rate

Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Intercept	1	0.816	0.009	88.0	<.0001
Prior education level					
Bachelor or above	1	0.096	0.009	10.5	<.0001
Advanced diploma	1	0.078	0.009	8.2	<.0001
Diploma	1	0.096	0.009	10.4	<.0001
Certificate IV	1	0.115	0.009	12.4	<.0001
Certificate III	1	0.093	0.009	10.1	<.0001
Certificate II	1	0.088	0.009	9.5	<.0001
Certificate I	1	0.078	0.009	8.3	<.0001
Year 12	1	0.063	0.009	6.8	<.0001
Year 11	1	0.064	0.009	7.0	<.0001
Year 10	1	0.048	0.009	5.3	<.0001
Year 9 or lower	1	0.012	0.009	1.3	0.194
Unspecified	1	0.079	0.009	8.6	<.0001
Unknown	1	0.088	0.009	9.7	<.0001
No prior education	-				
Disability					
Hearing/deaf	1	-0.017	0.003	-5.1	<.0001
Physical	1	-0.035	0.003	-13.4	<.0001
Intellectual	1	0.012	0.004	3.3	0.001
Learning	1	-0.021	0.003	-6.5	<.0001
Mental illness	1	-0.098	0.004	-24.6	<.0001
Acquired brain impairment (ABI)	1	-0.008	0.008	-1.0	0.325
Vision	1	-0.004	0.003	-1.4	0.175
Medical condition	1	-0.050	0.003	-17.6	<.0001
Other	1	-0.048	0.003	-15.5	<.0001
Unspecified	1	0.003	0.004	0.8	0.424
No disability	-				

Variable	DF	Parameter estimate	Standard error	t Value	Pr > |t|
Major qualification level undertaken					
Diploma and above	1	-0.224	0.001	-179.6	<.0001
Certificate IV	1	-0.254	0.001	-206.5	<.0001
Certificate III	1	-0.172	0.001	-156.9	<.0001
Certificate II	1	-0.189	0.001	-162.3	<.0001
Certificate I	1	-0.229	0.002	-150.8	<.0001
Other education	1	-0.084	0.001	-77.7	<.0001
Non-award courses	-				
Age groups					
Under 15	1	-0.023	0.004	-6.3	<.0001
Age 15–19	1	-0.043	0.001	-30.9	<.0001
Age 20–24	1	-0.044	0.001	-31.1	<.0001
Age 25–44	1	-0.038	0.001	-29.0	<.0001
Age 45–64	1	-0.011	0.001	-7.9	<.0001
Field of education					
Natural and physical sciences	1	0.077	0.004	17.4	<.0001
Information technology	1	0.037	0.002	23.2	<.0001
Engineering and related technologies	1	0.149	0.001	125.3	<.0001
Architecture and building	1	0.148	0.001	101.9	<.0001
Agriculture, environmental and related studies	1	0.135	0.002	87.9	<.0001
Health	1	0.152	0.001	107.1	<.0001
Education	1	0.152	0.002	86.2	<.0001
Management and commerce	1	0.077	0.001	70.2	<.0001
Society and culture	1	0.079	0.001	63.3	<.0001
Creative arts	1	0.081	0.002	47.0	<.0001
Food, hospitality and personal services	1	0.151	0.001	119.7	<.0001
Mixed field programs	-				
Subject only	1	0.086	0.002	52.8	<.0001
Male	1	-0.011	0.001	-18.5	<.0001

Linear hypothesis test: Prior educational attainment has no effect on the module completion rate

Source	DF	Mean square	F value	Pr > F
Numerator	13	64.510	547.70	<.0001
Denominator	1.71E6	0.118		

Linear hypothesis test: Disability has no effect on the module completion rate

Source	DF	Mean square	F value	Pr > F
Numerator	10	20.230	171.75	<.0001
Denominator	1.71E6	0.118		

Appendix B

Table B1 Average values of independent variables in calculation of adjusted module completion rate

Variable	Average value (%)
Highest education level	
Bachelor and above	5.13
Year 10	14.18
Year 11	7.13
Year 12	18.83
Year 9	6.56
Advanced diploma	1.36
Diploma	2.51
Certificate IV	2.42
Certificate III	5.65
Certificate II	2.76
Certificate I	1.18
Unspecified	4.93
Unknown	27.27
Qualification undertaken in 2003	
Diploma and above	11.01
Certificate IV	11.57
Certificate III	23.35
Certificate II	15.39
Certificate I	5.06
Other education	18.64
Age group	
Under 15 years	0.57
15–19 years	20.79
20–24 years	16.15
25–44 years	38.54
45–64 years	18.93
Field of education	0.00
Natural and physical sciences	0.37
Information technology	4.22
Engineering and related technologies	15.21
Architecture and building	5.87
Agriculture, environmental and related studies	4.81
Health	5.98
Education	3.38
Management and commerce	21.43
Society and culture	10.68
Creative arts	3.40
Food, hospitality and personal services	9.26
Subject only	5.78
Male	51.21

Note: These figures are based on the population used in the regression analysis and, due to missing values being excluded from the analysis, these proportions may not match the publication figures.

Source: Based on figures from the National VET Provider Collection, 2003 unpublished data.

Appendix C

Decomposing module completion rates

Our interest is in working out what component of a disability group's module completion rate can be attributed to the characteristics of the group and what component can be ascribed to the disability. The approach is to use a standard decomposition, as follows.

Let $E[y_i]$ be the expected value of the completion rate for disability group *i*, and $E[\bar{y}]$ be the expected value of the completion rate for all students.

Then $E[y_i] = \alpha_i + \beta' x_i$ where α_i is the coefficient of the dummy for the disability group *i*, x_i is a vector of characteristics (age, highest level of education, level of study, field of study) for the members of disability group *i*, and β is the vector of the corresponding coefficients.

Similarly, $E[y] = \beta' x$ where x is a vector of characteristics (age, highest level of education, level of study, field of study) for the members of the whole student population.

The direct effect of the disability is given by α_i.

The adjusted completion rate for disability group *i* is given by $\widehat{E}[y_i] = \alpha_i + \beta' x$.

The indirect effect of the disability, that is, the effect of the characteristics of the members of the disability group, is given by $\beta'(x_i - x)$.

So we see that $E[y_i] - E[y] = \alpha_i + \beta' x_i - \beta' x \; = \alpha_i + \beta'(x_i - x)$.