

Disability Inclusion in Australian Engineering Education

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CONTEXT

It is a universal human right for those with a disability to have equitable access to higher education (UN General Assembly, 2006). However in Australia and many other countries the participation and completion rates of people with disability in higher education remain significantly lower than for people without disability.

PURPOSE

To consider the current state in Australia of inclusion in higher education for people of working age with a disability and review the current level of inclusion in STEM higher education at one of Australia's public universities.

APPROACH

A survey and analysis of available statistical data for higher education and engineering education was performed focusing on disability and inclusion of students with disability.

RESULTS

This paper presents the statistical status of disability inclusion of higher education in Australia (for public universities) and of STEM inclusion at one of Australia's public universities.

CONCLUSION

Disability inclusion in higher education is gaining increasing attention in Australia and internationally. For almost 70 years there has existed an underlying universal human rights obligation for the majority UN member nations to ethically ensure education access and inclusion for all. It is only within the last 25 years in Australia that this principle has been specifically embodied in legislation and including higher education.

Gaps in research on disability inclusion in Australia and internationally ensure difficulty in precision when attempting to determine the actual prevalence rates of student disability and identifying the major barriers to higher education access and engagement for persons with disability.

KEYWORDS

Disability, inclusion, STEM, Australia

Introduction

It has been almost seventy years since the United Nations proclaimed its Universal Declaration of Human Rights (UN General Assembly, 1948) in which Article 26(1) states that, “Everyone has a right to education,” and,

“Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.”

This all-inclusive statement makes no specific reference to the relative physical and/or mental abilities of all assessed as being of equal merit to be considered on an equitable basis and for many member nations of the UN, including Australia, the existence of corresponding policies, legislation, standards, regulations, and resourcing to action these committed principles to uphold the rights of persons with disabilities (physical and/or mental) is much more recent. In Australia, the binding legislation for (all) education providers has been in existence for only twenty five years as Commonwealth legislation, namely the Disability Discrimination Act 1992 (DDA) (Department of Education and Training, 2017b) and its corresponding Commonwealth regulatory standards, Disability Standards for Education (Standards) which were first issued in 2005 (Department of Education and Training, 2017c).

More recently, in 2006, the United Nations adopted the Convention on the Rights of Persons with Disabilities (CRPD). This currently has 160 signatories including Australia (UN General Assembly, 2006). The CRPD’s stated purpose (ibid) is to:

“...promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for this inherent dignity.”

Article 24 of the CRPD addresses education and the obligation of all signatories to ensure that persons with disabilities are not excluded from “the general education system” although the scope of the convention is limited to primary and secondary education for children. In Australia the DDA and its accompanying Standards are inclusive of post-secondary (higher) education, specifically addressing the right of people with disability to be protected against discrimination in education (Department of Education and Training, 2017b):

“...enrolling or studying in a course at a private school or public school, college, or university.”

The Standards define the obligations of education providers in Australia to provide reasonable adjustments where necessary to include individual students with disability where “adjustment” is defined as (Department of Education and Training, 2017c):

“...a measure or action taken to assist a student with disability to participate in education and training on the same basis as other students.”

And “reasonable adjustment” is defined as (Ibid):

“...if it achieves this purpose while taking into account the student’s learning needs and balancing the interests of all parties affected, including those of the student with disability, the education provider, staff, and other students.”

There exists no requirement for adjustments or changes to accommodate the needs of any individual student with disability if this poses “unjustifiable hardship” on the education provider (Department of Education and Training, 2017c).

In 2011 the Council of Australian Governments (COAG) ratified and issued the National Disability Strategy 2010-2020 (Department of Social Services, 2011) and in 2012 the Australian Government announced the creation of the National Disability Insurance Scheme (NDIS) which is currently being rolled out nationwide (Gillard, 2012)

In Australia, the legislative and regulatory environment for persons with disabilities appears to invoke stakeholder theory (assessment of the respective impacts on all relevant stakeholders) to determine what is deemed reasonable as obligatory adjustment or change

by any provider of services (including education services) so as to be inclusive of persons with disability.

Disability in Australia

Disability is defined in Australia by the DDA and it includes total or partial loss of bodily (physical) or mental functions as well any disorder, illness, or disease that affects a person's learning, perception of reality, emotions, judgement, or behaviour (Department of Education and Training, 2017b).

The DDA intentionally seeks to be broad in defining disability to include physical, sensory, neurological, and learning types of disability and so it is not surprising that the documented prevalence of disability in Australia continues to increase as definitions and diagnoses of particular disabilities are enhanced and updated. For example, the recent reclassification and redefinition of Autism and Asperger's Syndrome as Autism Spectrum Disorder (ASD) (American Psychiatric Association, 2013) has led to a subsequent increase in the identification of persons (all ages) with ASD.

According to the Australian Bureau of Statistics (ABS), in 2015, the Australian population (all ages) totalled 23.4 million and of these 4.3 million (18.3%) reported living with a disability. Of the persons with (at least one) disability, 78.5% reported a physical condition (most commonly a back-related problem) and 21.5% reported mental and behavioural disorders. A further 22.1% of the Australian population reported in 2015 a long-term health condition that resulted in no disability leaving 59.5% of the Australian population in 2015 reporting neither disability nor long-term health condition. (Australian Bureau of Statistics, 2016a).

For comparison, in the United States in 2012, the USA population (all ages) totalled 313.9 million and of these 39.7 million (12.6%) reported living with a disability (National Science Foundation, 2017).

The data for Australia was produced by the ABS Survey of Disability, Ageing, and Carers (SDAC) and is aligned with the World Health Organisation's definition of disability such that the ABD survey defines disability as (Australian Bureau of Statistics, 2016a):

"...any limitation, restriction or impairment which restricts everyday activities and has lasted, or is likely to last, for at least six months."

The SDAC defines four levels of disability severity for core activities (Ibid):

- Profound limitation: greatest need for help or who are unable to do an activity
- Severe limitation: sometimes need help and/or have difficulty
- Moderate limitation: need no help but have difficulty
- Mild limitation: need no help and have no difficulty but use aids or have limitations

In 2015 in Australia, 1.4 million of the 4.3 million people with disability had a profound or severe limitation (nearly half of whom were aged over 65 years). The prevalence of disability in the Australian population was slightly higher for females (18.6%) than males (18.0%) with this gender imbalance more pronounced in older age groups. (Ibid).

There were 164,000 people in Australia reported by the 2015 SDAC as having Autism (a 42% increase from 115,400 in 2012) and of these 64.2% have a profound or severe core activity limitation.

Due to changes in how autism is clinically diagnosed since 2013 (American Psychiatric Association, 2013) it is expected that the reported prevalence of Autism in Australia will further increase in future as more Australians are identified with this disorder. There is a

significant imbalance in the gender rates for Autism with males having a prevalence rate of 1.1% compared to females with 0.3%.

The SDAC defines six broad disability groups where a group may include only a single disability or include a number of similar disabilities. The six disability groups are (Australian Bureau of Statistics, 2016a):

- Sensory
- Intellectual
- Physical
- Psychosocial
- Head injury, stroke or acquired brain injury
- Other

Just over 50% of the 4.3 million people with disability in Australia in 2015 reported using aids or equipment with 25.9% using communication aids for speaking, reading, writing, hearing, email, or internet activities. Hearing aids were the most common type of communication aid used by 17.7% of people with disability (Ibid).

Within the 2015 resident population in Australia of 23.4 million, there were 15.4 million (65.9%) aged 15 to 64 years (working age population). Of this working age population, 2.2 million (14%) reported a disability of which 538,000 (25.9% with a disability) had profound or severe core activity limitation (3.5% of the total working age population) (Ibid).

For comparison, in 2012 within the resident population in the United States of 313.9 million, there were 195.5 million (62.3%) aged 18 to 64 years. Of this population group, 20.5 million (10.5%) reported a disability (National Science Foundation, 2017). This age group does not include ages 15 to 17 years however the reported disability rate for the age group 15 to 64 years in the United States in 2012 was 13.1%, for the age group 18 to 34 years was 6.0%, and for the age group 5 to 17 years was 5.4% so an exact age grouping of 15 to 64 years for this data is likely to show a lower reported disability rate than for the age group 18 to 64 years.

In 2015 only 53.4% of the working age population with disability were part of the Australian labour force (employed or seeking work) compared to 83.2% of the working age population reporting no disability. The unemployment rate for those with disability was almost double at 10% compared with 5.3% for those without disability. Nearly half (46.6%) of the working age population with disability was not in the labour force compared to 16.8% for those without disability (Australian Bureau of Statistics, 2016a).

Disability Inclusion in Australian Higher Education

In 2015 of the 2.2 million resident population with a disability in Australia, 41% had achieved Year 12 or equivalent education (up from 35.6% in 2012) as compared to 62.8% (up from 59.8% in 2012) for the resident population without disability. Only 17% of the working age population with a disability had completed a Bachelor Degree or above in higher education compared to 30.1% of working age people without disability (Australian Bureau of Statistics, 2016b)

In Australia, people with disabilities other than Autism are 2.3 times more likely, and people without disability are 4.4 times more likely, to have a Bachelor degree or above than people with Autism (Australian Bureau of Statistics, 2016a). The ABS estimates that in May 2016 a total of 3.1m (19.7%) of the 15.7 million working age population in Australia was enrolled in formal study. Of this 1.3 million (43% of those enrolled in study) were enrolled in a course in higher education (Ibid).

According to data from the Department of Education and Training's (DET's) for the first half of 2016 (1 January to 30 June), of the reported 1.25 million students enrolled at some time during this period in higher education 1.15 million (up from 1.12 million in first half of 2015) were enrolled within the 38 public "Table A" universities (Note that Table A includes the Bachelor Institute of Indigenous Tertiary Education, Darwin, which accounts for only 15 students in this dataset). The total undergraduate enrolment (including Diploma courses and other undergraduate award courses) at Australian public universities in the first half of 2016 was 825,000 with female representation at 55.7% (Department of Education and Training, 2017a).

But of the 1 million plus students engaged in higher education in Australia, what is the reported prevalence rate of disability, i.e., how many students with disability are reported and, more importantly, receiving education provider-based support as students? The National Centre for Student Equity in Higher Education (NCSEHE) has analysed data from DET and reports that the national student with disability (as reported) rate in 2015 was 6.2% (Koshy, 2016).

However this rate must be treated with caution as it has been computed only for one level of course across the Table A public universities. Koshy analysed only the Bachelors Pass course level ignoring all course levels below (including Associate Degree, Advanced Diploma, Diploma, etc.) and all course levels above (including Bachelor's Honours, Bachelor's Graduate Entry, and all postgraduate levels). According to DET data for the first half of 2016, the Bachelor's Pass course level accounts for 708,807 students (61.8% of all levels – undergraduate and postgraduate reported by DET). While this is the most significant level (by student numbers) in Australian higher education the sole use of it eliminates consideration of almost 40% of all higher education students in Table A public universities and almost 45% of all higher education students in Australia (all education providers) (Department of Education and Training, 2017a).

The course levels reported by DET cover Australian Qualifications (AQF) levels 5 through 10 (Australian Qualifications Framework, 2017) whereas Koshy's data on student equity enrolments and ratios, computed from DET data, covers only AQF Level 7 (Bachelor Degree) courses. This of particular relevance to accredited professional undergraduate courses such as for engineering where in Australia they are at AQF Level 8 (Bachelor Honours Degree).

Students with disability data (Koshy, 2016), although limited to AQF 7 (Bachelor Degree) courses at the Table A public universities in Australia shows that at least for over half of all higher education students in Australia the reported rate of students with disability has been increasing year-over-year from 4.4% in 2008 to 6.2% in 2015.

In 2011, the Department of Industry, Innovation, Science, Research, and Tertiary Education (DIISTRE) published a participation rate across all Table A public universities of 4.77% for domestic students with disability higher education in Australia in 2011 with an increase year-over-year of this rate from 4.01% in 2006 to 4.77% in 2011 (Department of Industry Innovation Science Research and Tertiary Education (DIISTRE), 2011).

Consulting firm KPMG performed an analysis of unpublished DET data and determined that students with disability accounted for 5.1% of all students in higher education in 2013 (increasing from 3.7% in 2004) (KPMG, 2015).

How does the reported rate of student disability in Australia compare internationally? Of the 23 million undergraduates students in the United States in 2012 there were almost 2.6 million (11%) students with disability. (National Science Foundation, 2017).

The data for students in the United States also reveals that the reported rate of disability for graduate students was lower than for undergraduate students at 7% and that for both undergraduate and graduate students the likelihood of students with disability enrolling in a

science or engineering course was about the same as for students without disability (one in four for undergraduate and one in five for graduate). (Ibid).

Research in the United States to investigate the popular belief that students with ASD were more likely to enrol in STEM courses in higher education was affirmative with the findings that the STEM participation rate was significantly higher for young adults with ASD (34.31%) as compared to the general (Neurotypical or non-ASD) population (22.80%) (Wei, Yu, Shattuck, McCracken, & Blackorby, 2013). This research study also indicated that with increasing early diagnosis of children with ASD that their postsecondary (higher education) enrolment rate may continue to increase.

In United Kingdom higher education, in 2014/15 there were 2.3 million students and 83,000 (3.6%) were reported as students with disability (Taylor, Turnbull, Bleasdale, Francis, & Forsyth, 2016).

Of the public universities in Australia, Deakin University accounted for 45,600 students (4.0%) during the first half of 2016. Deakin's Faculty of Science, Engineering, and Built Environment contains courses that align to four DET broad fields of education: Natural and Physical Sciences, Information Technology, Engineering and Related Technologies, and Architecture and Building. In the first half of 2016, the Table A public universities in Australia had a total 284,021 students enrolled collectively in these four fields of education (Department of Education and Training, 2017a).

An analysis of internal enrolment data shows that on 1st October 2017, the total enrolment (all course levels) in the Faculty of Science, Engineering and Built Environment (SEBE) was over 7,600 students. Combining the DET 2016 data and the Deakin 2017 data gives an indicative (only) result of approximately 2.7% of students across these four fields of education across Australia were enrolled in SEBE courses at Deakin (with an obvious caution on the inexactness of this figure).

Of the 7,600 students enrolled in SEBE courses at Deakin, as of 1 October 2017 there were 198 students (2.6%) registered with Deakin's centralised Disability Resource Centre for formal support and assistance with their studies as a student with disability. This reported rate of students with disability in SEBE (for 2017) is significantly lower than the national rate of 6.2% (for 2016) reported by Koshy - at less than half.

As is the default policy with most education providers, at Deakin it is up to the student to seek assistance with support services and nominate themselves as a student with disability. One contributing factor causing lower-than-expected student with disability rates (as measured by prevalence rates of disability in the general population) in Australia is likely to be the perceived social stigma of being identified as 'disabled' and especially if the disability is one of mental health (Fuller et al., 2009; Kimball, Wells, Ostiguy, Manly, & Lauterbach, 2016; Simpson & Ferguson, 2014).

The significantly lower reporting rate within SEBE courses at Deakin indicates that students are either unaware, poorly informed, or reluctant to seek assistance for their disability from the centralised resource centre. This is a common problem in higher education where the onus is on the student to identify themselves as a student with disability in order to receive support and appropriate adjustments to assist their learning (Borland & James, 1999; Fossey, Chaffey, et al., 2017).

According to the NCSEHE a contributing factor for lower participation by students in disability support resources offered by education providers is a lack of awareness of the availability of these resources by students and how their specific needs could be met (Cunninghame, Costello, & Trinidad, 2016).

A common problem in researching disability, not only in students but in the general population, is the plethora of definitions – especially for data collection and reporting purposes. This issue exists not only across various institutions, national and internationally, but also between government departments (Gale & Parker, 2013).

An example of this disparity in data and statistics for disability is national rate of reported disability in Australia for those aged 15 to 64 years (working age population). In 2011 DIISTRE published a reference value of 8% disability rate for this population group (Department of Industry Innovation Science Research and Tertiary Education (DIISTRE), 2011). This rate is significantly lower than the ABS published rate for this population group in 2015 of 14% (Australian Bureau of Statistics, 2016a).

This problem is also evident when seeking to compare student disability data as recorded and reported within education providers and as recorded and reported nationally and internationally. For example, at Deakin University a total of 13 distinct disability groups are used to record student disabilities. One of the significant groups accounting for 27% of all student with disability registrations at SEBE has a very broad title of “Medical Condition” and so it prevents direct comparison to other grouping schemes – such as the six broad disability groups used in the SDAC.

From the SEBE data however the dominant disability group is “Mental Health or Psychiatric” with a prevalence rate of over 40% of registered students with disability. This rate appears to correspond with a rate for mental health disability of almost 40% of students with a reported disability at another Australian public university, Latrobe University (Simpson & Ferguson, 2014). Simpson & Ferguson also report that the number of students reporting a mental health disability at Latrobe has doubled over recent years.

Disability Inclusion in Australian Engineering Education

In Australia, in the first half of 2016, there were over 1.2 million enrolled students in higher education and of these over 900,000 (72.1%) were Australian citizens. Of this total student population over 98,000 were enrolled in engineering and related technologies courses (Department of Education and Training, 2017a).

Engineering and related technologies courses (all levels) accounted for 96,286 students (8.4%) of the 1.15 million students enrolled across the 38 Table A public universities in the first half of 2016, up 4.2% from the first half of 2015 (Ibid).

Of the 7,600 students enrolled in SEBE courses at Deakin, 1,700 (22.4%) were enrolled in Engineering and Related Technologies courses and of these 1,700 students only 26 (1.5%) were registered with Deakin’s Disability Resource centre as a student with disability.

There were almost 550 postgraduate degree-by-coursework students within these totals of which only 1 student (0.2%) was registered as a student with disability and this accounts for the significantly lower disability reporting rate for this field. For undergraduate students there were 25 (2.1%) registered as a student with disability; still lower than the overall Faculty reporting rate (2.6%).

The data readily available and presented here on disability inclusion in engineering education at one Australian University only offers a slight insight into the current situation – both within this institution and nationally. What is apparent is that a gap exists in research on disability inclusion not only in engineering education but more broadly across all STEM courses in higher education and across high education in general at a national level and international level (Järkestig Berggren, Rowan, Bergbäck, & Blomberg, 2016). Like many existing studies what is uniquely presented here is limited to a single university when looking at disability inclusion in engineering education.

What may also exist as a potential barrier to increased disability inclusion in Australian engineering education is the degree of difficulty and length of most accredited undergraduate engineering courses. Aside from the University of Melbourne’s Bologna-modelled “3+2 year” Bachelor/Master course, in Australia accredited undergraduate engineering courses are 4 year’s full time duration and at AQF Level 8 (Bachelor’s Honours).

An opportunity may exist to revise existing or develop new pipeline engineering courses, typically 2 years duration at AQF Level 5 or 6, so as to be more attractive and more accommodating of students with disability. In the United States, students with disability are more likely to enrol in courses of 2 years duration (National Science Foundation, 2017). Also in the United States students who engage in research in the first 2 years of college are more likely to persist with STEM courses (Graham, Frederick, Byars-Winston, Hunter, & Handelsman, 2013). If a causal link exists here for engagement and retention then it may support the development of more inclusive pipeline engineering courses for Australian higher education.

Improving Disability Inclusion

Since 2008 a number of fields of education have lost enrolment share even though the overall higher education student enrolment in Australia continues to increase year-over-year. (Norton & Cakitaki, 2016). Of concern to many is the continual decline in enrolment share of STEM courses including engineering and information technology.

Although participation rates in STEM courses, as compared to non-STEM courses, in higher education is greater for students with ASD the overall participation rates of students with ASD, and of students with disability, remains relatively low in Australia. As such the underserved disability population, and especially those with ASD as a disability, exist as an underutilised source of skilled labour for the Australian economy.

This opportunity exists not only in Australia but also other countries including the United States which similarly has a growing shortage of STEM-skills in the work force (Thurston, Shuman, Middendorf, & Johnson, 2017; Wei et al., 2013). In the United States a 2012 report by the President's Council of Advisors on Science and Technology predicted a deficit of 1 million STEM graduates over the following decade (Graham et al., 2013). In Australia this shortfall and potential for enabling additional STEM student sources was recognised by the 2008 Bradley Review of Australian Higher Education – as highlighted by Larkin et al. (Larkin, Nihill, & Devlin, 2014).

And contrary to popular belief (i.e., assuming persons with disability are most likely to be employed in occupations involved light or sedentary work) in Australia the largest proportion of employed persons with disability (almost 20%) are working in professional occupations (Athanasou, 2014).

Through the use of Universal Design for Learning (UDL), the ability exists to provide an enhanced environment for students in higher education where individual student needs can be better accommodated so as to enable greater access, greater engagement and retention, and greater course and graduate outcomes for a greater proportion of the working age population. Existing research, although limited, indicates that a combination of reasonable adjustments and support can be effective in supporting students with disability in higher education (Fossey, Chaffey, et al., 2017).

UDL promised the ability to individualise adjustments for students so as to enable knowledge to be gained, knowledge to be demonstrated, and interaction with teachers and peer students (Burgstahler, 2015). An example of this is the use of UDL in engineering education to reduce language-related barriers for students with learning disabilities (Variawa & McCahan, 2010).

But UDL in STEM higher education presents many as-yet unsolved issues as identified by Moon et al. (Moon, Todd, Morton, & Ivey, 2012) including:

- Major gaps exist in research on how STEM can accommodate students with disability
- Lack of research in the application of UDL to higher education

- How to make “team-based” (such as project-based learning) and “hands-on” learning (such as laboratory-based learning tasks) more inclusive
- How to make work-integrated learning, especially course-mandated work integrated learning more inclusive

The traditional academic, as associated with non-constructivist objectivist teaching methods, is under increasing threat primarily due to increasing demands for greater authenticity in learning and assessment tasks (Cavenett, 2017). With increasing awareness of types and prevalence of disability in the general population an increasing need exists for improved for disability inclusion in education at all levels including higher education.

An in-depth study of students at a small Australian University reports that students with disability feel that there is a lack of understanding by academics of the pressures they are under and their grades did not reflect their true abilities (Ryan, 2007). This adds to the complexity involved – of increasing authenticity in learning and assessment while simultaneously improving inclusion.

Adequately supporting students with disability in higher education requires individualised (reasonable) adjustments to the learning environment, learning tasks, and assessment and with this there exists a need to further explore more effective and less complex processes to enable this (Brett, 2016; Fossey et al., 2015).

However some of these adjustments are occurring “naturally” as more education providers shift to online and blended learning methods exploiting contemporary communication and information technologies. With almost 26% of the Australian population using aids for communication, the underlying adjustment technologies and learning methods either already exist, e.g., electronic forms of study materials that are compatible with various types of communication aids, or can be reasonably enhanced to provide the necessary individual adjustment. Online learning, for example, does and can provide for inclusion of students with severe or profound psychosocial or intellectual disability (Boyd, 2014).

Improving disability inclusion in higher education requires the need for academics to include principles of universal design in the development and provision of course curricula and learning experiences (Järkestig Berggren et al., 2016). Effective academic-student relationships demand skill, knowledge, and capability on behalf of the academic. The academic must be capable of coping with being a person of trust for the student: the current observation is that students often reveal their disability directly to teachers with whom they have an existing relationship rather than to an education provider’s centralised disability support service (Fossey et al., 2015).

And the adjustment needed is not only with the learning and assessment, as controlled by the academic staff, but also adjustment by universities to enable and support the academic staff for developing and implementing more inclusive practices (Smith, 2010). This may include appropriate training and development of academic staff so they are capable of designing and enabling reasonable adjustments for individual students with disability (Asghar, Sladeczek, Mercier, & Beaudoin, 2017; Fossey, Bigby, et al., 2017).

Conclusion

Data on the prevalence of disability within higher education students in Australia, and internationally, indicates that students with disability are underrepresented and there exists a need to improve disability inclusion in higher education. However there also is evidence that student disability is underreported, in Australia, and internationally due to a number of inhibiting factors including student reluctance to identify themselves as having a disability and an associated perceived social stigma.

Gaps in the research on the actual prevalence rates of student disability in higher education exist and this coupled with the variance in definitions of disability and how it is recorded and reported makes it difficult to perform any detailed comparative analysis of national and international student disability data. Assessment of available data and research supports a conclusion that actual prevalence rates of student disability in higher education in Australia significantly higher than reported. And that students with disability are reluctant to seek, or unaware of the availability and value of, disability support from within higher education providers and also that there exists significant barriers to higher education access for a significant proportion of the population with disability.

In Australia and other countries including the United States there is a sustained trend of a decline in enrolments in STEM courses in higher education coupled with an increasing shortage of STEM-skills in the work force. Increased disability inclusion in higher education offers a way to tap into an underutilised source of STEM students to boost the supply of STEM-skilled graduates.

To increase disability inclusion in higher education a multiple stakeholder supportive environment will need to provide reasonable adjustment on an individual student basis to outcomes-based effective (and authentic) learning and assessment to be possible for all students (including students with disability).

There exists in Australia, and internationally, an underutilised source of STEM students that can boost the supply of STEM-skilled graduates to work forces, such as Australia's, experiencing an increasing shortage of STEM-skilled professionals. To significantly increase disability inclusion in higher education will require significant change involving multiple stakeholders.

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