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ABSTRACT
Despite a lack of data within the public domain it is clear that persons with disabilities are severely disadvantaged in their education choices and career decisions. Figures indicate that percentages of disabled persons in HE are generally 3-4% of the overall student population (1).

The LTSN Engineering Disability Project, established May 2001, has two main objectives. Firstly, the production of booklets for the benefit of both disabled and non-disabled students and employees. Each booklet will contain case studies of disabled people who study and/or work within engineering and also academics within the discipline who support disabled people. Secondly, a study day (Loughborough University, 8 April 2002) will allow disabled and non-disabled engineers alike, to meet and discuss the relevance of recent legislation on accessibility of education and careers in engineering to disabled people.

Over the coming years UK universities must actively demonstrate that they can provide their usual range of services to disabled people. Current and intending disabled students need no longer be recipients of an institution’s good practice alone, but may begin to use the full weight of the law to force HE institutions to make reasonable adjustments in every area of the traditional student experience.

1. UNDERSTANDING DISABILITY
The idea that disability is a medical problem affecting a small proportion of the population is no longer sustainable (2). In the 1980’s government statistics reported that there were 6.5 million disabled people in Britain (3). This constituted almost 15% of the population. More recent statistics suggest that up to four out of ten adults suffer from a “long term illness or disability” (4), perhaps reflecting an increasing awareness of dyslexia. Internationally, there are around fifty million disabled people in Europe alone (5), and approximately five hundred million world-wide (6). Definitions of disability vary widely between the different organisations that produce them. However regardless of whichever definition is adhered too, there are many disabled people who, from higher education’s perspective, are a significantly large untapped market.

It is important to distinguish between two paradigms or models for disability, the “medical model of disability” and the “social model of disability”. The former is rooted in the work of an American sociologist, Talcott Parsons, and his discussion of sickness and sickness-related behaviour. Parsons argues that the normal state of being in western developed societies is “good health”, consequently sickness, and by implication, impairments, are deviations from normality.
The social model of disability came into being in the early 1980’s. Focus is placed upon the experience of illness and the social consequences which emanate from it - stigma management for example (8), rather than the environmental and social barriers faced by disabled people, and the politicisation of disability by disabled people and organisations controlled and run by them (9). Whilst the medical model did nothing for disabled people themselves, the social model enabled a fight against the discrimination which was being experienced in nearly every aspect of disabled peoples lives. The social model also allowed disabled people to fight for the civil rights which non-disabled people already enjoyed. Much of the civil rights fight and the campaign for anti discrimination legislation found its origins in the experiences of other oppressed groups – such as ethnic groups, those of varying sexual orientation etc.

The fact that there are so many disabled people within the British population and yet so few entering into higher education is worrying. Within higher education, the fact that the majority of disabled students don’t take engineering or science orientated courses has become acceptable. Why is this? If disabled people are to be encouraged to consider subjects such as engineering, then it is the responsibility of those who write the various courses to consult with disabled people and find out from them what aspects are inaccessible and why.

1.1. Disability related legislation and higher education.
A watershed was reached in 1995 for British disabled people when the first anti-discrimination legislation became law (10). However, many disabled people were bitterly disappointed that the legislation didn’t go far enough. The only thing that the 1995 legislation did as far as students within higher education was concerned was to insist that higher education establishments must periodically produce a disability statement detailing what provision (if any) they made for disabled people. Whilst education itself was not covered by the Act, other aspects concerning universities were – particularly when the university offers goods and services to disabled users (purchasers) but not students. The Act did however, cause some higher education establishments to sit up and take account of what provision they actually made for disabled people – staff members, visitors, conference delegates etc. Gradually, there was a proliferation of newly appointed Disability Officers and Advisors who were asked to advise on what steps needed to be taken to comply with the requirements with the current and forthcoming legislation. Unfortunately many such people had no previous knowledge of disability issues and merely were given half a day off from their usual duties to perform this function.

Disabled people have had to wait a further six years for legislation to be introduced to increase the rights of disabled students in compulsory and post-compulsory education. For the first time, effective September 2002, there will be a law (11) which says that a university cannot reject a prospective student purely on the basis that they are a disabled person – although this is currently quite legal.

In future, no university academic department will be able turn down a prospective student solely because of disability and so “reasonable adjustments” will have to be made to accommodate the student. If so many provisions were needed that a student would follow an entirely different curriculum from other students upon the same degree course this would be considered unreasonable. In this case the Universities & Colleges Application Service (UCAS) would allow the applicant a further choice of institutions to consider. Academic departments would be wise
not make any kind of an offer to a disabled applicant to study at their particular university until they have been informed by Disability Services that the prospective student can be adequately supported.

Despite the 1995 and 2001 legislation and the 1998 Human Rights Act, undoubtedly there is much case law to be developed concerning disabled people working and studying within higher education. For this reason, guidance notes have been provided by The Higher Education Funding Council for England (HEFCE) concerning disability statements (12). They recommend that institutions explain to prospective students inter alia about their policies concerning the admission procedure for students with disabilities and additional needs as well as other policies concerning examinations and assessments.

Declaration by students on their UCAS application forms of any disability/additional need is voluntary and so many students never declare that they have a disability of one sort or another. Very often, an applicant will only disclose their particular needs once they arrive on campus – safe in the knowledge that they have been accepted onto a degree course solely by academic criteria alone. A student may do this because of being afraid that declaring a disability would mean that a university would turn them down. The institution cannot in these circumstances be bound to provide the same level of provision and support to such students as it must to those who have previously declared. Students in this case may have to make the decision whether or not to continue with their selected course.

2. THE CURRENT STATUS OF DISABLED PEOPLE STUDYING AT HIGHER EDUCATION INSTITUTIONS

From 2002, British universities must for the first time actively demonstrate that they can provide their usual range of services to disabled people as well as non-disabled people. Current and intending disabled students need no longer be recipients of an institution’s good practice alone and from 2004 they may begin to use the full weight of the law to force institutions to make reasonable adjustments in every area of the traditional student experience.

Although there is still some time before the requirements of recent legislation come in to being, it is time for engineering departments to undertake audits of departmental policies and practices as well as the programmes that they offer in relation to the requirements of disabled people. Furthermore various groups of disabled people will technically not be covered by the legislation and for whom reasonable adjustments etc. need not be made. In these cases, institutions must judge for themselves whether to provide the support that is required as a matter of "good practice" rather than obeying the letter of the law.

As ludicrous as it seems, there are virtually no annually published statistics which show how many disabled people are taking courses in higher education institutions according to whether the courses taken are full time, part time, distance learning etc. UCAS and the Higher Education Statistics Agency (HESA, 14) provide the little data are available, however these won’t provide a complete picture of numbers of disabled people since declaring one’s disability on the UCAS application form is voluntary. Data for engineering are even sparser.
Disabled people following under-graduate and post-graduate courses within higher education institutions, have a tendency to study book-based subjects rather than those involving practical work, field studies, site visits and perceived elements of danger. There are many possible reasons why disabled people take this route, but fear of being turned down to study the course, concerns over being unable to take part in all aspects of the course and concerns over health and safety will figure very highly among their concerns. Academic members of staff need to receive some training relating to disability issues especially if they are involved with admissions or examinations and assessments. If departmental staff don’t have any expertise themselves; the courses offered by the department may be audited in relation to specific impairments by outside agencies such as SKILL (14) or the National Disability Team (15). The organisation Teachability (16) based at the University of Stirling aims to educate academics, admissions tutors etc about the needs of disabled students and staff in individual academic departments. The group helps academics to understand what aspects of the courses they offer may need adapting as well as any departmental procedures that impact upon disabled people. Finally, under the auspices of JISC (17), the specialist group TechDis (18) focuses on technology to provide advice and information concerning making the syllabus inclusive to universities and colleges.

2.1 Disability and special needs
The most common types of impairment to be disclosed by applicants on their UCAS application forms are presented below.

2.1.1 Dyslexia
By far the most common “disability” prospective students declare on the UCAS forms is dyslexia or some other specific learning difficulty. Dyslexic students may require:

- Help with taking adequate notes in lectures, seminars and tutorials and to write essays effectively.
- Specific help from a dyslexia tutor in organising their time table effectively so that they can make the best possible use of their practical work periods and of the time set aside for writing essays etc.
- More extensions for handing in essays and course work.
- To take their examinations separately from the large examination halls because they may have been awarded extra time as a result of an educational psychologist’s assessment.
- To hand write, type or use voice-activated software to get their examination answers down on to paper.

2.1.2 Visual impairment
The next largest group of students is those with hearing or visual impairment. If a course contains little “hands on” practical work, blind students may be able to adequately complete their courses as long as adequate preparation is made before their arrival at the beginning at term. For example, it takes approximately three months to get a standard textbook reproduced in an accessible format for a student. The degree of preparation and cost depends on the extent of the impairment. For example mild visual impairment may only require handouts and examination sheets to be printed in larger font size. Blind students however may require extra equipment and support workers to take notes during lectures and then transcribe them into an accessible format. In common with
dyslexic students, some visually impaired students may ask a lecturer to give them a copy of their overhead projector acetates and/or a copy of their own lecture notes to help them produce their own notes.

2.1.3. Mobility-based impairment.
If a student walks with the aid of crutches or walking sticks or uses a wheelchair or buggy, their ability to take part in some practical work may be compromised. Maybe a wheelchair user just can’t get close enough to a piece of machinery to make use of it safely or even close enough to a table to write comfortably. In such a situation, the inability to undertake a piece of practical work shouldn’t necessarily mean that a disabled person in this position is unable to take this particular course. There will be ways and means of enabling that student to partake in the practical work even if it is by instructing someone else on what to do. There are various organizations throughout the country that can provide advice with these difficulties in mind. If visits to potentially unsafe places are to be undertaken, it is likely that there will be some technological means available so that a mobility impaired student can still join in with the activity.

2.1.4. Deaf or hearing-impaired students
It is probable that students with hearing difficulties will have a range of adaptive technology available to enable them to hear a little better during lectures, seminars, tutorials and presentations. Some deaf people may require a communication support worker to interpret what others are saying by means of British Sign Language. In practice, this is unlikely to happen for an individual, because BSL-using deaf people will be more likely to go to university where they know that other deaf people will be present. Currently it is not illegal for a lecturer to refuse to wear a tie microphone for the benefit of an individual student. Fortunately this will be changing – but not until 2005.

3. THE LTSN ENGINEERING DISABILITY PROJECT

In May 2001 the Disabilities & Additional Needs Service at Loughborough University combined with LTSN Engineering to work together on a disability related project concerning Engineering. This project will exist for 12 months and has two clearly defined outcomes. It is also anticipated that further benefits will be gained during its progress.

3.1 First output
A series of disability awareness booklets are being produced, each of which will relate specifically to an area within engineering – e.g. civil engineering, mechanical engineering. The booklets will firmly be grounded in the social model of disability and in Disability Equality Training principles (19). Areas that may cause a disabled person difficulties are being highlighted and possible solutions are being sought and devised. Each booklet discusses what is and what isn’t disability and how different people understand disability. Guidelines are provided concerning interaction with disabled people by an impairment specific basis – such as communicating with a blind person or with a wheelchair user. For prospective students the types of work undertaken in each field of engineering are described, e.g. a civil engineer may be involved with; site visits, surveying, technical drawing/using CAD software etc. Finally, each
booklet contains contributions from disabled persons who are either studying or working within an engineering-based discipline or from academics who support disabled students.

The booklets are intended for a diverse selection of people including:
- Admissions staff of higher education institutions.
- University staff members who will come into contact with both disabled students and disabled members of staff.
- Professional institutions who may validate university degree programmes.
- Disabled people who are considering whether to study and/or work in an engineering-based discipline.

The booklets will also provide information that will be of use to other disciplines, the sciences, computer science and psychology for example.

3.2 Second output
A study day is being organised at Loughborough University for 8th April 2002 for the benefit of engineering department academics from the higher education sector, disabled engineers and engineering students and other LTSN project staff. In addition to the presentation of case studies expert speakers will be invited to lead discussions in the following five areas:

- What barriers actually exist within the discipline that dissuades disabled people from considering the discipline as one suitable for them.
- How accredited engineering degree programmes might be made more accessible without compromising academic credibility.
- How technological advances may enable previously inaccessible courses and disciplines to become accessible.
- How recent disability legislation is likely to impact upon engineering education within the further and higher education sectors as well as courses provided by professional institutions.
- How some of the principles, which have been applied to engineering could be applied to other subject areas. For example, the disability awareness booklets might easily be adapted for the sciences, geography and technology-based subjects where such matters as field trips, working safely within the laboratory/workshop etc are areas of concern.

Engineering is a fascinating area to be relating to disabled students! Disabled people do practice in every branch of engineering – there are wheelchair using engineers just as there are deaf or visually impaired engineers. If disabled people show an interest in either studying or working within engineering-based industry, then the majority of intellectually able but physically disabled students should be supported in doing so.

4. DISABILITY AWARENESS TRAINING & ENGINEERING EDUCATION
As part of the study day being hosted by LTSN Engineering, there will be an opportunity for participants to receive Disability Equality Training (DET, 20) which applies the social rather than the medical model of disability and:
is about disability rather than about impairment;
• is about challenging understanding of disability, and changing practices, rather than improving general attitudes towards disabled people;
• promotes a social rather than a medical model of disability;
• is seen as part of the wider struggle for equal opportunities in both policies and practices;
• uses discussion based methods for teaching and learning rather than simulation exercises;
• is devised and delivered by disabled people.

That DET is a measure of how important it is for academic departments within colleges and universities to make their courses more accessible to disabled people and to continue to improve possibilities without compromising their academic credibility. The various forms of legislation which provide more civil rights for disabled people must not mean that academic standards be lowered for disabled people (21). Indeed disabled students do not want “watered down” courses, they wish to be able to study the same courses as their non-disabled peers.

DET is important in the context of engineering since it is only by training, that departmental staff will begin to appreciate what aspects of a course may be inaccessible and thus how it can be made more accessible. DET provides an opportunity for defining what disability actually is within any particular context whether it be engineering, law or education. Those people who receive DET who are without any personal experiences of disability, begin to appreciate that by making poorly thought out policies for example, can be a disabling factor for disabled people.

Equality of opportunity of disabled with non-disabled engineering students or other engineering employees cannot be achieved merely through the use of adaptive technology, various support staff and other access provision. Provision for disabled engineering students and employees should be individually packaged so as to provide identical learning outcomes for all students while at the same time taking account of a student’s additional needs.

REFERENCES

1. Universities & Colleges Application Service (UCAS)
10. Disability Discrimination Act, 1995
11. Special Educational Needs and Disability Act 2001 (SENDA)
13. Higher Education Statistics Agency (HESA) (http://www.hesa.ac.uk)
15. National Disability Team (http://www.natdisteam.ac.uk)
16. TEACHABILITY (http://www.ispn.gcal.ac.uk/teachability)
17. JISC (Joint Information Systems Committee) (http://www.jisc.ac.uk/)
18. TechDis (http://www.jisc.ac.uk/services/TechDis)