Computer-assisted teaching and assessment of disabled students in higher education: the interface between academic standards and disability rights

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Abstract

Computer-assisted teaching and assessment has become a regular feature across many areas of the curriculum in higher education courses around the world in recent years. This development has resulted in the ‘digital divide’ between disabled students and their nondisabled peers regarding their participation in computer-assisted courses. However, there has been a long-standing practice to ensure that disabled students could participate in these courses with a set of disability adjustments that are in line with their learning modalities under the headings of presentation format, response format, timing, and setting adjustments. Additionally, there has been a set of supporting antidiscriminatory disability laws around the world to avoid such divide between disabled students and their nondisabled peers. However, following a successful precedent in Davis v. Southeastern Community College (1979), the opponents of disability rights have consistently argued that making disability adjustments for disabled students to participate in computer-assisted courses would undermine academic and professional standards and these laws have resulted in a ‘culture of fear’ among the staff. This paper challenges such myths and argues, based on a systematic review of four major antidiscriminatory laws, that universities have full academic freedom to set the academic standards of their computer-assisted courses despite the introduction of such laws and that there has been no grounds for the perceived culture of fear about the consequences of the participation of disabled students in computer-assisted courses.

Keywords
academic standards, computer-assisted teaching and assessment, disability adjustments, disability rights, disabled students, higher education.

Introduction

Three trends are evident in postsecondary institutions. First, community/junior colleges and universities are implementing information technology (e.g. portals, offering laptops to students). Second, they are adopting policies to ensure that their campuses are ‘wired’. Third, they are experimenting with and introducing new methods of teaching with technology (e.g. adding computer-based components to courses, using tools such as WebCT, offering entire degrees online.). Failing to proactively address the accessibility of the technologies has consequences that affect the ability of many students with disabilities to take full advantage and to participate in the same learning opportunities as their non-disabled
peers. It also puts them on an unequal footing when they graduate into a labor market hungry for new hires who are comfortable using technology. (Asuncion et al. 2004, p. 136)

‘Disabled students’ (or ‘students with disabilities’ using the student-first language especially in the US) around the world have long been denied the opportunity to pursue higher education. However, they have increasingly participated in higher education in recent years. The latest surveys and statistical data suggest that their participation rate has reached 9% based on self-reports of these students in the US (Henderson 2001).

There are two major driving forces for the increasing participation of disabled students in higher education: increased regulation of their participation at both the school and the postsecondary levels. First, there have been public policies ensuring the participation of disabled children in schools, starting in the 1980s: the Individuals with Disabilities Education Act (1991) and its predecessors in the US; the Education Act (1996) and its predecessors; and its national versions in the UK; and similar state laws in Australia. These laws have required the education authorities in each country to identify disabled children and to provide them with an ‘appropriate education’ where possible (e.g. Konur 2006a).

Second, there have been public policies ensuring the participation of disabled students in higher education, starting in the 1970s: Section 504 of the Rehabilitation Act (Section 504) (1973) in the US has been one of the oldest laws around the world for this purpose. The scope of this act has been extended by the Americans with Disabilities Act (ADA) (1990). Although there have also been various state laws further supporting such policies, Section 504 and ADA have opened a new era in the protection of disabled students, forming the basis for similar laws around the world (Konur 2000; Weber 2002).

There have been a number of state equal opportunity laws in Australia in the 1980s that provide protection for disabled people. In addition, the Disability Discrimination Act (DDA) (1992) has provided protection for disabled students at the federal level as in the US (Hampton & Gosden 2004; Marshall 2005). The act has been supported by the recent introduction of the Disability Discrimination Amendment (Education Standards) Act (2005).

On the contrary, the DDA (1995) in the UK did not originally prohibit discrimination against disabled students as the whole education sector was specifically excluded from the act. The protection of DDA was extended to disabled students by the Special Educational Needs and Disability Act (SENDA) (2001). This protection of the act has been effective since September 2002 in a three-stage process. (Konur 2002b). The protection of the DDA has been extended to professional training and licensing from 2005 under the European Employment Directive (2000). Further improvements have been made by the DDA (2005) in the light of this directive.

In the meantime, the policy and practice has evolved in the area of computer-assisted teaching and assessment, as Asuncion et al. (2004) note in the quote above. With the computer-based technological advances, computer-assisted teaching and assessment has become a regular feature across many areas of the curriculum in higher education courses in more than one way, as Asuncion et al. (2004) helpfully give the definition of computer-assisted teaching and learning used in this paper.

Tracking the evolution and diversification of computer-assisted teaching and assessment is outside the scope of this paper. However, it suffices to note three recent papers. Pearson and Trinidad (2005) developed an instrument for refining the design of e-learning environments, the Online Learning Environment Survey, using a student sample in an Australian university to improve the practice in online learning.

Scanlon and Issroff (2005) examined practice in the evaluation of learning technologies in the UK and proposed a new approach informed by Activity Theory to understand students’ and lecturers’ experiences of technology-based teaching environments. They identified a need for a broader view of the outcomes and value of using learning technologies and related this activity to a new approach based on an Activity Theory-enhanced view of evaluation.

Similarly, Weller et al. (2005) examined the student experience of two integrated and component-based virtual learning environments (VLE). In general, students preferred the component system, although this may have been influenced by other factors such as performance. They argued that the component approach is a viable one from a student perspective, that the broader context in which the VLE operates is important in student perception, and that poor system performance may have unpredictable consequences for the learning experience.

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Since the introduction of these antidiscriminatory disability laws, one of the most discussed issues has been the interface between disability rights introduced by these laws for disabled students and the academic standards in higher education courses maintained by universities (Konur 2002c; Weber 2002; Hampton & Gosden 2004; Marshall 2005; Riddell et al. 2005). The opponents of disability rights have often argued that the extension of disability rights to higher education has not been right because the academic standards in these courses would be lowered. Indeed, this was the main reason advanced for the late extension of disability rights to the education sector in the UK in 2001 (Konur 2000). Therefore, the exploration of the interface between academic standards and disability rights has been of utmost importance for the participation of disabled students in computer-assisted teaching and assessment in higher education around the world.

The increasing use of computer-assisted teaching and assessment in higher education courses has brought both opportunities (inclusion of disabled students in computer-assisted courses with suitable disability adjustments) and threats (‘digital divide’ – exclusion of disabled students from computer-assisted courses without suitable disability adjustments) for disabled students, as Asuncion et al. (2004) note in the quote above.

Although there has been ample research on several aspects of participation of disabled students in computer-assisted courses in the US, and most recently in the UK (Seale 2006), there has not been any recent study with a focus on the discussion of the interface between academic standards and disability rights from a comparative and interdisciplinary perspective (cf. Konur 2000, 2002a, 2006b; Justesen 2002).

Therefore, this paper explores the critical interface between academic standards and disability rights from a comparative and interdisciplinary perspective. First, the key aspects of the four major antidiscriminatory laws are reviewed to place the research issue in a broader legal context using the four-prong classification developed in Konur (2002a). These broader policies shape the incentive structures for all the key stakeholders in the light of the teachings of the ‘New Institutional Economics’ (North 1992, 1994; Khalil 1995).

It would be necessary to look at the empirical evidence on the participation of disabled students with suitable disability adjustments in computer-assisted courses. For this reason, a number of empirical studies, all published in 2002, are reviewed on the basis of academic disciplines, countries, types of disabilities, and topical areas. The review follows the pattern developed in Konur (2006b): perspectives of disabled students, service providers, academic staff, and nondisabled peers.

One of the common characteristics of these empirical studies is that they deal with a common category of adjustments: adjustments made to the learning technologies. However, it would be necessary to examine these adjustments in a broader context and in more detail. For this reason, disability adjustments are presented under the four headings following the classification system developed in Konur (2002c) in the assessment context and Konur (2006b) in the teaching context: presentation format, response format, timing, and setting adjustments.

The interface between academic standards and disability rights emerges as a key factor in ensuring the participation of disabled students in computer-assisted teaching and assessment in higher education. It is true that universities are required to make adjustments to the computer-assisted teaching and assessment of disabled students in these courses as the major aim of the public policies is to ensure participation of disabled students in these courses as their nondisabled peers (Konur 2000; Seale 2004).

However, this finding is only one face of the coin. Universities have extensive powers to refuse to make adjustments to computer-assisted teaching and assessment in computer-assisted courses in order to maintain academic standards. As in the case of Davis v. Southeastern Community College (1979), universities are the only decision makers to determine whether to allow any adjustments to teaching and assessment in computer-assisted courses. Therefore, academic staff are the gatekeepers for the equal participation of disabled students in computer-assisted courses as in the traditional courses (Konur 2002c, 2006b). Therefore, there is no ground for the development of ‘culture of fear of the consequences of the Act(s)’ in higher education such as the perceived threats of litigation and penalties as stated by many commentators such as Marshall (2005, p. 324).

Having reached this conclusion, this paper makes it clear that without the necessary disability adjustments, disabled students would not be able to participate in
computer-assisted teaching and assessment in higher education around the world, resulting in their exclusion from these computer-assisted higher education courses, i.e. in a ‘digital divide’ between disabled students and their nondisabled peers.

The areas for further research (as also highlighted by both anonymous referees) are given in the paper.

The policy makers’ perspectives: legal summary

... as the level of ignorance about the depth and breadth of duties owed under Part 4 (of Disability Discrimination Act 1995) has resulted in a culture of fear of the consequences of the Act with some disabled students receiving treatment (disability adjustments) that would not be accorded to an able-bodied student) ... (Marshall 2005, p. 324)

... Evaluating claims for disability status in universities is becoming an increasingly complex and hazardous task. Delicate, finely balanced issues of fairness weigh on the minds of decision makers along with anxieties generated by blustering threats of legal penalties for adverse decisions” ... (Hampton & Gosden 2004, p. 232)

These two quotes highlight the concerns about the participation of disabled students in higher education courses. As these stated concerns have been the starting point for this paper, it would be necessary to put the disability rights–academic standards debate in a more detailed context (Hampton & Gosden 2004; Marshall 2005; cf. Konur 2000, 2002a,b).

It is especially true that the purpose and means of major antidiscriminatory disability laws have not been well covered in the computer-assisted teaching and assessment literature from a comparative and interdisciplinary perspective. As these policies shape the incentive structures for all the stakeholders involved in computer-assisted teaching and assessment, it is also necessary to research the policy makers’ perspectives in this area.

Recently, the provisions of antidiscriminatory disability laws have been grouped under four major headings, jurisdictional and procedural tests, disability tests, discrimination and justification tests, and enforcement tests, by Konur (2002a, 2006b) in the teaching and learning context (cf. Konur 2000, 2002b; Weber 2002; Marshall 2005). Each of the former tests act as a threshold for the latter tests.

Under the jurisdiction and procedural tests, disabled students should comply with a number of tests relating to the jurisdiction and procedures of courts. For example, they should be students and should file their claims on time. Only if this test has been passed successfully could students proceed to the later tests.

Under the disability tests, disabled students should prove, by producing medical expert reports, that they are ‘disabled’ under the relevant laws. For example, disabled students in the UK must establish that they have an ‘impairment’; that their impairment ‘adversely affects’ one of the ‘normal day-to-day activities’ such as hearing and walking; that this adverse effect is ‘substantial’; and that it lasts more than 12 months. Contrary to common knowledge, neither SENDA (2001) nor the DDA (2005) has had any major impact on this test. It has been difficult to pass this four-prong test within the employment context.

Disabled students in the US, on the other hand, should establish that they have an ‘impairment’; that their impairment ‘limits’ one of the ‘major life activities’ such as learning and working; and that this limitation is ‘substantial’. Although this test could be seen as less strict than the corresponding UK tests, these tests have been the most difficult to pass since 2000 because of the changes in the law by the US Supreme Court.

In contrast, Australian applicants should only establish that they have an impairment, thus foregoing the other tests established by other laws.

Although the opponents of disability rights often highlight ‘learning disabilities’ (known as dyslexia in the UK) and attention-deficit disabilities as suspect impairments, the medical profession have established these and other impairments (e.g. depression and deafness) as true impairments (American Psychiatric Association 1994; Konur 2002a).

Next, under the discrimination tests, disabled students should prove that they have been treated less favourably on the ground of their disabilities and/or they have not been provided with suitable disability adjustments to enable their participation in computer-assisted courses (Konur 2002a). These duties of the university relating to computer-assisted courses have been termed ‘less favourable treatment duty’ and ‘reasonable adjustment duty’, respectively, in Konur (2002a). The admission of blind students to a computer-assisted engineering course as their nonblind peers is an example of the first duty of the university. The provision of the final examination of this course for blind students in an audio
format with an extended time limit in a separate examination room is an example of the second duty of the university.

However, the university in the above example could argue that the admission of these blind students to a computer-assisted engineering course as their non-blind peers would lower the academic standards of the course and the professional standards of the engineering profession. Therefore, it could justify the nonadmission of these students on the ground of academic standards under the ‘justification tests’.

The university could next argue that the provision of the final examination of this course for these blind students in an audio format with an extended time limit in a separate examination room would lower the academic standards of the course and the professional standards of the engineering profession. Therefore, it could justify the rejection of the above examination adjustments for these students on the ground of academic standards under the ‘justification tests’.

In other words, these blind students should establish that they could meet the fundamental/essential requirements of computer-assisted courses set by the university with or without a suitable set of disability adjustments (‘otherwise qualified individual’ test under Section 504). This should be done without fundamentally altering these computer-assisted courses (known as the ‘fundamental alteration’ defence under the ADA and Section 504) as established in Davis v. Southeastern Community College (1979).

Although antidiscriminatory disability laws promote disability rights for disabled students in higher education, these rights are subject to the ‘academic deference doctrine’ in matters relating to the academic standards of higher education courses (Wynne v. Tufts University School of Medicine 1991). The academic deference doctrine has been established in other countries as well (e.g. Regina v. University of Humberside, ex p. Cousens 1994; Tang v. Griffith University 2005). Thus, the introduction of antidiscriminatory laws around the world have had no effect on the lack of jurisdiction by the courts over academic matters (Konur 2000).

This has been one of the key critical issues regarding the participation of disabled students in higher education in general as universities have had powers to determine whether the adjustments requested are reasonable and whether these students are qualified to participate in the course. This position has not been covered in substance in an explicit manner in the guidance materials prepared for the stakeholders as well as in the literature (e.g. Hampton & Gosden 2004; Riddell et al. 2005). Therefore, there have been various interpretations of the disability rights–academic standards interface in higher education, leading to the perception of a ‘culture of fear’ in higher education e.g. in the UK and Australia.

If these blind students in our example prove their case, they could receive a relatively small amount of compensation for ‘injury to feelings’. But it is highly unlikely that they could be reinstated or readmitted to their courses in the UK and Australia because of the perceived lowering of academic standards in higher education in the case of their readmission or reinstatement by court order. But it is likely they could be reinstated or readmitted to their courses in the US, at least in principle.

All these four legal tests have been difficult barriers for disabled students around the world to pass, as the decade-long experience of a learning disabled student in a medical school in the US has shown (Betts v. University of Virginia 2005).

A key insight emerging from this legal summary is that there is a critical interface between academic standards and disability rights regarding making adjustments for the computer-assisted teaching and assessment of disabled students in higher education. The academic and professional staff have the unsailable right and freedom to determine the essential characteristics of their courses and whether any adjustment sought by disabled students are reasonable as in the case of traditional lecture-based teaching and assessment in the light of the respective disability laws.

Therefore, there does not seem to be any ground for the perception of the ‘culture of fear and anxiety’ among academic staff and professionals in higher education as stated by many commentators such as Marshall (2005) and Hampton and Gosden (2004).

This section also highlights the need for policy papers discussing the perspectives of the policy makers in this area in addition to empirical papers. Policy-related matters are relevant as much as empirical data for an informed debate on the academic standards–disability rights interface concerning computer-assisted assessment and teaching.
Curriculum adjustments for disabled students: an overview

1. . . She (a blind student) has received alterations such as extra testing time (1.3x), oral delivery of her essays, audiocassette, mechanical Braille note taker, electronic Braille note taker, refreshable Braille display with screen reader software, hard copy Braille, a quiet room for testing. She has had experience with the speech synthesis technologies and a self-voicing browser.

II . . He (a student with low vision) has received alterations such as screen magnification software, large print, modification of font size, modification of text or background colour, close captioned television (CCTV), audiocassette, and a human reader. He has had experience with speech synthesis technologies, ZoomText, and Kurtzweil reader.

III . . He (a learning disabled student) has received alterations such as extra time (2x), and a scribe/amanuensis. He has had experience with speech synthesis technology.

IV . . She (a deaf-blind student) has received alterations such as extra time, large print, modification of text colour or background with CCTV, mechanical Braille note taker, electronic Braille note taker, refreshable Braille with screen reader software, hard-copy Braille, and a tactile interpreter. She has had experience with the speech synthesis technology. (Hansen et al. 2004, pp. 94–96, shortened)

The quote above includes real-life examples of the most used disability adjustments in the computer-assisted teaching and assessment of disabled students in higher education. A number of adjustments were provided for a blind student, a student with limited vision, a learning disabled student, and a deaf-blind student.

As universities have the ‘reasonable adjustment duty’ towards their disabled students attending computer-assisted courses, and there are a number of possible adjustments for each type of disability, it is necessary to examine these adjustments in more detail.

Konur (2002c, 2006b) developed a useful classification system regarding these disability adjustments. First, it is necessary to divide the adjustments between ‘teaching adjustments’ and ‘assessment adjustments’. Because ‘high-stake examinations’ determine the class of the degrees and whether students could have equal access to employment and professions as Asuncion et al. (2004) note in the quote above, examinations emerge as a more critical issue for all the stakeholders (Konur 2002c). It is therefore not surprising that the law has developed regarding the assessment adjustments rather than solely teaching adjustments since the 1970s (e.g. Betts v. University of Virginia 2005). However, this does not mean that the teaching adjustments are not also a key issue for disabled students and the other stakeholders, but rather it is that the failure in examinations has higher opportunity costs for disabled students and higher importance for computer-assisted higher education courses.

Teaching and assessment adjustments could be classified according to the type of disability, with the individual circumstances of disabled students as a further helpful typology. The first type of adjustment is concerned with access to the computer-assisted curriculum and could be termed ‘presentation adjustments’. This refers to the format of the curriculum presented to the student. It could be in a paper text format, sign language format, audio format, script format, Braille format, or electronic format, depending on the preferred ‘learning modality’ of a particular student (Moreno & Mayer 2002). There are many examples of the real-life case studies presented in the quote regarding the presentation formats used by disabled students as dictated by their disabilities (Hansen et al. 2004, pp. 94–96). The presentation adjustments are necessary for disabled students not to be excluded from the computer-assisted courses.

In our example, a deaf-blind student used technological and human aids, including large print, modification of text colour or background with CCTV, mechanical Braille note taker, electronic Braille note taker, refreshable Braille with screen reader software, hard-copy Braille, and a tactile interpreter. This student, with these technological and human aids, would have access to the text of the examination questions in alternative formats such as audio format, large-print format, Braille format, and tactile format as their non-disabled peers have access to the paper text format. As the learning modality of non-disabled students is the paper text format, the learning modality of this deaf-blind student are these alternative formats.

The purpose of disability-rights policies is to ensure that disabled students, as the deaf-blind student in our example, could participate in computer-assisted courses with the presentation of teaching and assessment materials in alternative formats in line with the students’ learning modality. It would be nearly impossible for this student to participate in these courses with the presentation of teaching and assessment materials only in the paper text format.
The second type of adjustments is concerned with the format of the response made by disabled students. It could be in a similar format to presentation adjustments and could be termed ‘response adjustments’. It could be in a paper text format, sign language format, audio format, script format, Braille format, or electronic format as in the presentation adjustments noted in the quote above (Hansen et al. 2004, pp. 94–96). The response adjustments are necessary as well for disabled students not to be excluded from the computer-assisted courses.

In our example, a deaf–blind student used technological and human aids, such as large print, modification of text colour or background with CCTV, mechanical Braille note taker, electronic Braille note taker, refreshable Braille with screen reader software, hard-copy Braille, and a tactile interpreter, in responding to the examination questions. This student, with these technological aids, would make a response to the text of the examination questions in alternative formats such as audio format, large-print format, Braille format, and tactile format as their nondisabled peers have access to the paper text format. As the learning modality of non-disabled students is the paper text format, the learning modality of this deaf–blind student are these alternative formats.

The purpose of the disability-rights policies is to ensure that disabled students, as the deaf–blind student in our example, could participate in the computer-assisted courses by responding to the teaching and assessment materials in alternative formats in line with their learning modality. It would be nearly impossible for this student to participate in these courses by responding to the teaching and assessment materials only in the paper text format.

The third type of adjustments concerns the timing of access to the curriculum. It is much more related to the examination and course work adjustments and could be termed ‘timing adjustments’. The most known adjustment under this heading is the ‘extended time’ adjustment for examinations (Konur 2002c). Disabled students are normally allowed a ‘time and a half’ accommodation on an individual basis based on a detailed diagnostic documentation. As some of the examinations are long, such extensions generally require multiple sessions or frequent breaks. The use of alternative response and presentation formats during examinations requires the extension of time compared to regular paper format as the reading and response rates of examinees fall in the latter case. Thus, timing adjustments are the natural extension of the presentation and response adjustments (Konur 2002c; Hansen et al. 2004, pp. 94–96).

In our example, a deaf–blind student used both presentation and response adjustments in line with his/her learning modality. As these adjustments often require complex tasks to be done with the help of a number of professional helpers and complex technological aids, a timing adjustment would be needed.

The fourth type of adjustments concerns the settings of the examinations, lectures, or work placements. As in the case of examinations, it would not be practical to undertake examinations in a normal examination room as the adjustments often require the help of a number of professionals and technological aids, which would distract other nondisabled examinees. Such examinations are delivered in separate examination rooms and they could be termed ‘setting adjustments’. There are many examples of the real-life case studies presented above where setting adjustments are used by disabled students as dictated by their disabilities (Hansen et al. 2004, pp. 94–96). In our example, a deaf–blind student used both response and presentation adjustments in more than one format with the help of professional helpers and using the complex assistive technology products. Therefore, a separate room for the assessment would be necessary.

Other stakeholders’ perspectives: a brief research review

If the assumption that disability adjustments made for disabled students would undermine academic standards of computer-assisted courses is true, then it follows that there would be no such adjustments in practice. Thus, it is important to explore the real-life practice in computer-assisted courses around the world, albeit, briefly.

This section reviews of research findings on computer-assisted teaching and assessment of disabled students from the perspectives of four key stakeholders: disabled students, academic and professional staff, and nondisabled peers. It complements the section on policy makers’ perspectives. All these studies were published in 2002, the year that publications in this area had peaked.
These selected papers provide useful evidence on the practice regarding computer-assisted teaching and assessment of disabled students with different types of disabilities in the light of the debate on the critical interface between academic standards and disability rights. Because of space constraints, the papers will be outlined briefly. In addition, a full discussion of computer-assisted teaching and assessment of disabled students with different types of disabilities and other related issues in practice is outside the scope of this paper.

These selected papers also provide useful evidence on the single disciplinarity of research, based on a single country in this area, and on the need for interdisciplinary and comparative research on computer-assisted teaching and assessment of disabled students with different types of disabilities around the world.

**Disabled students**

Disabled students are the second key stakeholders following the policy makers. Their attitudes and experiences regarding curriculum adjustments in traditional courses in general and in the computer-assisted courses in particular are important.

The first set of papers is concerned with cross-disability studies. For example, Asuncion et al. (2002) reported on the needs and concerns of 725 disabled students with different types of disabilities in Canadian universities for access to learning technologies in computer-assisted courses, building on their large-scale studies in this area. They made a number of recommendations for the developers and merchants of learning technologies. The key insight from this paper is that the needs of these students are diverse and these needs should be considered at the design stage of learning technologies, not as an add-on later on.

The second set of studies is concerned with disability-specific issues. For example, Heck et al. (2002) investigated the reading performance of 20 university students with attention deficit and hyperactivity disorder after they used a reading software. The authors found that the use of this software reduced the students’ distractibility and stress for longer periods of time and improved their reading.

Elliot et al. (2002) investigated the study methods of 36 hearing disabled high school and university students using a speech-to-text support service, C-Print™ (National Institute for the Deaf, Rochester, NY). The authors found that university students developed multiple study strategies with the notes. They argued that students should be trained on the use of notes and study skills.

Ault et al. (2002) evaluated long descriptions of statistical graphics for visually disabled users to maximize both accessibility and their comprehension of web pages containing tabular and graphical information. They developed guidelines for web developers to describe charts and graphs commonly used in statistical applications. They found that the users’ accessibility and comprehension were increased when web pages were developed following the new guidelines.

A key insight from these last three studies is that assistive technologies, such as a reading software, a speech-to-text support service, and descriptions of statistical graphics could enhance computer-assisted learning of disabled students with different types of disabilities, thus decreasing the degree of the digital divide for them. These findings support the use of a range of learning technology adjustments by disabled students quoted from Hansen et al. (2004, pp. 94–96).

These studies provide empirical evidence that disabled students in the US and Canada have benefited from adjustments to computer-assisted teaching and assessment. A recent special issue on the use of learning technologies by disabled students in the UK supports these findings within the UK context as well (Seale 2006). These studies show that disability adjustments have been particularly helpful for students with hearing, visual, learning, and attention deficit disabilities. These disability adjustments have been instrumental for the participation of disabled students in computer-assisted courses.

**Professional staff as service providers**

The service providers in higher education courses and these courses themselves are the third key stakeholders as they facilitate the provision of adjustments for disabled students and set out institutional policies. It is therefore important to examine their perspectives on the participation of disabled students.

Michaels et al. (2002) surveyed 488 service providers of learning technologies in US universities. They found that disability service directors valued the access to learning technologies by disabled students. They argued that universities should train these students
about these technologies. Costs of technology and updates were perceived as the greatest barriers, whereas provider expertise, student awareness/knowledge of technology, and administration support were perceived as factors facilitating technology access.

Ofiesh et al. (2002) surveyed 163 university disability service directors in the US to assess the use of learning technologies by disabled students. They found that voice recognition systems, reading machines, frequency modulation systems (for hearing-disabled students), and text enlargement systems (for visually disabled students) were mostly used and that visually disabled and hearing-disabled students used these learning technologies most often.

As academic staff members are often advised by university administrators and specialist disability officers, the professional development of such officers are also important in helping the academic staff in making curriculum adjustments for disabled students.

These studies have provided empirical evidence for adjustments made by higher education institutions for the computer-assisted teaching and assessment of disabled students. In other words, these adjustments were not found to undermine the academic standards of the relevant courses. These studies have also highlighted the need for staff development and student training relating to assistive technologies.

Academic staff

The academic staff (termed ‘faculty’ in the US) are the fourth key stakeholders. It is particularly important to examine the determinants of their attitudes towards making adjustments for disabled students. It is similarly important to determine the extent of the provision for academic development.

Sheppard-Jones et al. (2002) investigated knowledge of disabled students using a web-based survey of 2130 academic and administrative staff. They found that staff had some basic knowledge but lacked access to specific resources when needed.

These findings are reflective of case law, where some type of adjustments are not considered reasonable by the courts on the ground that doing so would lower academic standards Davis v. Southeastern Community College (1979). In essence, such studies provide further empirical support for the legal powers of the academic staff to determine the reasonableness of the requested adjustments as their duty to make accommodations is not absolute under the disability laws as outlined above.

Nondisabled students

Nondisabled student peers are the fifth key stakeholders. It is important to examine the determinants of their attitudes towards adjustments made for their disabled peers as their attitudes have important implications for the integration of disabled students. The opponents of disability rights have often argued that the participation of disabled students in computer-assisted courses with disability adjustments would be unfair to their nondisabled peers (e.g. cited in Hampton & Gosden 2004).

Upton and Harper (2002) surveyed university students’ attitudes towards academic adjustments made for their disabled peers as a function of gender, type of disability, and level of study. They found that female students had more positive attitudes than their male peers. Students used a factor of ‘deservedness’ in making judgements.

Kawauchi (2002) examined 375 Special Education students’ attitudes towards curriculum adjustments for students with visual disabilities in Japan. These students were most likely to accept adjustments that improved the external learning environment for these disabled students, such as provision of assistive technologies by the university, and were most likely to reject adjustments that gave their disabled peers an advantage in their grade point averages.

It is also important to assess the effect of the type of disability on the attitudes of nondisabled students. This study generally provides further empirical evidence that the type of disability, as a function of the degree of stigma attached to these disabilities, affects their attitudes in general.

Thus, it is important to develop student development courses to improve the attitudes of nondisabled students towards their disabled peers. As these studies found that the contact with disabled people might positively affect nondisabled students’ attitudes, it is important to study the effect of such contacts with disabled students and disabled staff.

Conclusion

The participation of disabled students in computer-assisted courses and the teaching and assessment of

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these students in these courses have become an important public policy issue in recent years. This is because nonparticipation of disabled students in these courses would clearly result in the ‘digital divide’ between these students and their nondisabled peers.

For this reason, a number of antidiscriminatory disability laws have been introduced around the world since the 1970s to ensure the participation of disabled students as their nondisabled peers in higher education courses including computer-assisted courses.

However, the opponents of disability rights have often successfully argued that the participation of disabled students in computer-assisted courses would undermine the academic standards and professional standards because making disability adjustments for them would fundamentally alter the essential characteristics of these courses, following the successful precedent in Davis v. Southeastern Community College (1979).

Although large number of empirical papers have been published regarding the participation of disabled students in computer-assisted courses, the issues relating to the academic standards–disability rights interface have been mostly neglected. Unsurprisingly, the perceived ‘culture of fear’ among the academic staff of the consequences of the participation of disabled students in higher education courses has been cited most often.

This paper explores the interface between academic standards and disability rights, outlining key provisions of the four major antidiscriminatory disability laws in a broader context. It is asserted that the broader provisions of these laws are important to consider because they shape the actions and behaviour of all the key stakeholders as they set the incentive structures for them, following the teachings of the ‘New Institutional Economics’ (North 1992, 1994; Khalil 1995).

Contrary to the impression given by the opponents of disability rights, it has been a most difficult task to pass all the four stages of the antidiscriminatory disability laws. First, disabled students should comply fully with the tests relating jurisdiction and procedures of courts under the ‘jurisdiction and procedural tests’. Second, they should prove that they are disabled under the ‘discrimination tests’. Third, they should prove that they are treated less favourably by universities on the grounds of their disabilities and/or they are not provided with a set of reasonable adjustments by universities under the ‘discrimination tests’. Fourth, they should further prove that their admission to the courses and the requested disability adjustments would not undermine the academic standards of their courses and the professional standards of their chosen profession under the ‘justification tests’. Finally, they should argue that their demands for ‘monetary reliefs’ and/or ‘injunctive reliefs’ are permissible under the ‘enforcement tests’. A 10-year-long experience of a learning-disabled former medical student has been a strong reminder of this difficult task for disabled students.

Therefore, there is less likelihood that universities would be liable for any monetary and/or injunctive reliefs as a result of court claims by disabled students that relating to disability adjustments in computer-assisted courses. It follows that there is impossibly less likelihood that the academic staff would be liable for any monetary penalties as a result of such claims by disabled students in courts.

Having contradicted this myth, more importantly, this paper finds it clear that there is less likelihood that the academic standards of computer-assisted courses would be undermined with the participation of disabled students in these courses with a number of requested adjustments in alternative formats in line with their learning modalities.

First, all antidiscriminatory disability laws acknowledge the right and academic freedom of universities to set the essential characteristics of their computer-assisted courses and to establish the set of disability adjustments that would fundamentally alter these essential characteristics of the courses. In other words, universities are the sole decision makers in setting and maintaining the academic standards of their courses. After Davis v. Southeastern Community College (1979), there have been many examples of universities exercising their academic freedom regarding the participation of disabled students in higher education courses. It is particularly striking that a large number of disabled students have successfully participated in Nursing and Midwifery courses around the world since the Davis case (Konur 2002b). This means that universities around the world have not shared the perceptions of Southeastern Community College that the participation of disabled students in Nursing courses would undermine academic and professional standards in these courses and in the Nursing profession.

Second, there has been strong empirical evidence based on long-standing practice that disability adjust-
ments under the headings of presentation adjustments, response adjustments, timing adjustments, and setting adjustments are necessary for the successful participation of disabled students in computer-assisted courses around the world. In our example, it would have been impossible for a deaf–blind student to receive examination questions and make responses in a paper text format as his/her nondisabled peers do. This is simply because, as dictated by his/her disabilities, the learning modality of this student differs from his/her nondisabled peers’ learning modalities. This student would need to receive examination questions and make responses in alternative formats such as audio format, large-print format, Braille format, and tactile format using a number of assistive technology aids and human help (large print, modification of text colour or background with CCTV, mechanical Braille note taker, electronic Braille note taker, refreshable Braille with screen reader software, hard-copy Braille, and a tactile interpreter). The timing and setting adjustments naturally follow the response and presentation format adjustments as the use of these complex, time-consuming, and distracting adjustments would need a separate room and more time.

Thus, this paper challenges the myths advanced by the opponents of the participation of disabled students in computer-assisted courses on the grounds of lowering of academic and professional standards.

This paper then locates a challenging role for the teams of academic staff and professionals in facilitating the participation of disabled students in computer-assisted courses, as policy makers have entrusted academic staff with powers and discretion to promote the participation of disabled students in computer-assisted courses to avoid the ‘digital divide’ between them and their nondisabled peers, and the professionals would have the crucial advisory and operational roles for such participation (Konur 2002d).

With the increasing development of computer-assisted courses in higher education, the importance of the critical interface between academic standards and disability rights would increase in the coming decades with major implications for all the stakeholders.

The research priorities for the next decades could be set out from a comparative and interdisciplinary perspective as: the attitudes and experiences of disabled students in computer-assisted courses; the attitudes and experiences of academic and professional staff towards disability adjustments in these courses; the effect of adjustments on the academic performance of disabled students in these courses; and finally the attitudes and experiences of nondisabled students towards disability adjustments in these courses. Adjustments for high-stakes examinations in computer-assisted courses merit particular attention as such examinations have high opportunity costs for all the stakeholders.

It would be particularly helpful to note the need for further research (as also highlighted by both anonymous referees) on the general discussion of computer-assisted teaching and assessment of disabled students; the historical review of research on these aspects; the discussion of the legal cases on these issues; the effects of the types of disability on computer-assisted teaching and assessment of disabled students; and the effects of the context of computer-assisted teaching and assessment as defined in Asuncion et al. (2004) on the disability rights–academic standards interface.

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