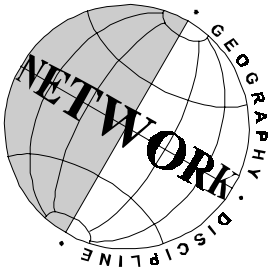

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Providing Learning Support for Blind and Visually Impaired Students Undertaking Fieldwork and Related Activities

Ifan Shepherd

Middlesex University

Series edited by Phil Gravestock and Mick Healey
University of Gloucestershire

This work was undertaken as part of the Higher Education Funding Council for England's 'Improving Provision for Disabled Students Funding Programme'.

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Ifan Shepherd

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About the Author

Ifan Shepherd (Middlesex University)

My name is Ifan Shepherd, and I am currently Professor of GeoBusiness at the Middlesex University Business School. However, I have spent most of my professional career as a geographer.

My current research interests include: business and public sector applications of geographical information systems and computer mapping; evaluation of information quality on the Internet; data visualization; multi-sensory GIS; evaluation of public sector projects; student transfer of knowledge and skills; and the building of a spatial database for late nineteenth-century London. I have undertaken numerous consultancies in the public sector, including several large-scale audits: poverty in the London borough of Hounslow; early years provision in the London borough of Hackney; and NHS Direct in West London.

I have been involved over many years with research and development in the field of educational innovation, key skills and computer-assisted learning, and I have been a visiting consultant on e-learning to several universities in the UK. I am a member of the editorial board, and former joint editor, of the *Journal of Geography in Higher Education*.

I have a personal motivation for writing this guide. As a child, I vividly remember a blind neighbour in my home village in Wales who taught basket making in a local evening class. At that time, basket making was one of the few, and certainly the most readily recognised, occupations open to the blind. A measure of the progress made since my childhood in bringing the blind back into the social mainstream is the considerably greater range of occupations now open to them. Nevertheless, unemployment among the blind is still very high (NFB, 2000b), and certain job markets, notably the UK armed forces, are still resistant to disabled entrants.

I was also inspired, more recently, by a geography student with about 10% vision, who refused to be anything other than 'normal'. Not only did he master the art (as it then was) of map interpretation, assisted by maps that had their artwork redrawn with extra-thick lines, but he also joined the student Outdoors Society and spent weekends dragging companions across the Pennines in the North of England. By comparison, the fieldcourses he attended presented him with few significant challenges.

In the past decade, I have been involved in research into multi-sensory GIS and data visualisation, which has opened my eyes to the sensory deprivation perpetuated by modern geographical software that caters almost exclusively for the visually adept. Although several sections of this guide reflect a belief that computer technology can be applied to helping blind and visually impaired students learn more effectively, I hope that this technological perspective does not overshadow the human approaches that are essential if blind and visually impaired students are to participate in effective field learning.

Editors' Preface

Awareness of the need to develop inclusive practices, which provide equal opportunities for disabled students in various parts of their courses, is beginning to spread through Higher Education Institutions (HEIs) in the UK. This has been stimulated by the publication of the Quality Assurance Agency (QAA) (2000) *Code of Practice – Students with Disabilities* and the extension of the Disability Discrimination Act (1995) to education through the Special Education Needs and Disability Act (2001).

This series of guides to providing support to disabled students undertaking fieldwork and related activities is the main output from a project funded by the Higher Education Funding Council for England's (HEFCE) *Improving Provision for Disabled Students Funding Programme*.

The advantage of focusing on fieldwork is that many of the issues faced by disabled students in higher education are magnified in this form of teaching and learning. If the barriers to full participation by everyone can be reduced or overcome it is likely that our awareness of the obstacles to their full participation in other learning activities will be heightened and the difficulties of overcoming the barriers will be lessened.

The project has been undertaken by the Geography Discipline Network, a consortium of old and new universities based at the University of Gloucestershire, whose aim is to research, develop and disseminate good learning and teaching practices in geography and related disciplines. This project was undertaken by a group of geographers, earth and environmental scientists working alongside disability advisers and educational developers.

There are six guides in the set. The first '*Issues in Providing Learning Support for Disabled Students Undertaking Fieldwork and Related Activities*' provides an overview to the series, including the role of fieldwork models of disability, barriers and strategies and the legislative and quality assurance frameworks. It also discusses ways of developing an inclusive fieldwork curriculum and the role on institutional disability advisers. The text is peppered with case studies and boxed examples of good practices. Each of the remaining guides addresses the application of these general issues along with the particular circumstances involved in providing support to particular groups of disabled students:

- Providing Learning Support for Students with Mobility Impairments Undertaking Fieldwork and Related Activities
- Providing Learning Support for Blind or Visually Impaired Students Undertaking Fieldwork and Related Activities
- Providing Learning Support for d/Deaf or Hearing Impaired Students Undertaking Fieldwork and Related Activities
- Providing Learning Support for Students with Mental Health Difficulties Undertaking Fieldwork and Related Activities
- Providing Learning Support for Students with Hidden Disabilities and Dyslexia Undertaking Fieldwork and Related Activities

These categories are ones commonly used in providing information, support and analysis of disabilities. Furthermore, many of the obstacles that disabled students face in undertaking fieldwork, and the appropriate methods of overcoming or minimising them, are specific to the kind of disability. Despite using medical categories for describing disabilities we are committed to emphasising a social model to exploring disability, which emphasises the barriers to disabled students which society creates. The distinction between the medical and social model is important because it shifts the responsibility for improving the provision for disabled students from individuals (blaming the victim), to society and the strategies and policies that higher education institutions and their constituent departments develop and enact. The emphasis of this series of guides is on identifying the barriers that disabled students face to participating fully in fieldwork and the ways in which institutions, departments and tutors taking field classes can help to reduce or overcome them.

The net outcome of the quality assurance and legislative changes is that HEIs will need to treat disability issues in a more structured and transparent way. In particular we may expect to see a relative shift of emphasis from issues of recruitment and physical access to issues of parity of the learning experience that disabled students receive. The implication of this shift is that disability issues 'cannot remain closed within a student services arena but must become part of the mainstream learning and teaching debate' (Adams & Brown, 2000, p.8). But there is an opportunity here as well as a challenge. As we become more sensitive to the diversity of student needs we can adjust how we teach and facilitate learning in ways which will benefit all our students.

Phil Gravestock and Mick Healey
University of Gloucestershire
November 2001

References

Adams, M. & Brown, P. (2000) *'The times they are a changing': Developing disability provision in UK Higher Education*, paper presented to Pathways 4 Conference, Canberra, Australia, December 6-8.

All World Wide Web links quoted in this guide were checked in November 2001.

1 Introduction to this Guide

1.1 General introduction

1.1.1 The significance of vision

The visual system can be justly considered as the dominant sensory modality in humans. Almost half the brain is devoted to sight, and about 70% of the total capacity of the brain devoted to processing sensory information is devoted to handling visual information. Studies of visual perception have revealed that there tends to be an attentional bias towards the visual modality (Shams, 2000). Less well known, perhaps, is that where there is conflict between visual inputs and other sensory inputs, either the overall percept is determined by vision, or else the nature of the percepts in the other conflicting modality is modified by the visual information, rather than vice versa (Shore, *et al.*, 2000).

In addition to these biases in the human sensory system, there are also visual biases in the languages used by humans to describe the world. Valkenburg & Kubovy (2000) suggest, for example, that notions of objecthood have traditionally been framed in visuocentric terminology. Others argue that much of modern culture asserts the primacy of the visual, and downplays the role of the other senses. It has been suggested, for example, that Gutenberg's invention of the printing press in the sixteenth century played a major role in shifting the transmission of textual information from a shared, communal multi-sensory experience to a private and largely visual experience. (Marshall McLuhan, in his 1967 classic *The Gutenberg Galaxy*, argues that ‘manuscript culture is intensely audio-tactile compared to print culture’ (p.28), and that the ‘transformation of the audible into the visual world was the prime effect of typography’ (p.123).)

With so much of human experience and culture bound up with vision, it would seem that students who are visually impaired have a mountain to climb in making the most of their fieldwork experiences, particularly since so much fieldwork experience is traditionally linked to visual experience, from 'look-see' trips to observational studies in which the 'observation' is more often than not visual.

1.1.2 The significance of fieldwork

Fieldwork provides a significant learning opportunity for disciplines such as geography, earth and environmental sciences. The basis of its appeal and its educational effectiveness lies in its adoption of experiential study, in which students learn first hand about natural and human environments and processes. Many undergraduates find this form of learning both challenging and fulfilling, often reflecting later in life on their abiding memories of 'learning in the field'. It should not be forgotten that the field is not only used to introduce the subject matter of spatial disciplines, but it also functions as a kind of laboratory in which students can acquire and practice various skills, including: investigation, observation, recording, data collection, the use of specialist equipment, etc. The process of field investigation usually involves the use of various key skills, including: communication (e.g. interviewing), interpersonal (e.g. teamwork), numeracy (e.g. analysing survey results), and ICT (e.g. data logging).

Although there are financial pressures to reduce or eliminate fieldwork from the curriculum, it is likely that it will enjoy a continuing and significant presence, not least because of the considerable store placed on this form of study by various government bodies – including, in the UK, the Quality Assurance Agency (QAA). Appropriate arrangements should therefore be in place to ensure that students with a visual impairment benefit as much from fieldwork opportunities as do their fully sighted peers.

Further ideas on the role of fieldwork are outlined in Healey *et al.* (2001).

1.1.3 Aims of this guide

The main aim of this guide is to identify the problems that visually impaired students encounter when undertaking fieldwork, and to suggest ways in which they can overcome these difficulties. An attempt will be made to answer questions, such as whether fieldwork is different for visually impaired students and, if so, what are the implications. Some of the advice and guidance offered will be generic, but some of it will apply to specific visual impairments. Because every student is unique, it is important to recognise that most of what is discussed here must be made relevant and personal to the individual involved. There can be no blanket approach to managing the needs of visually impaired students undertaking fieldwork.

The main part of the guide takes a roughly chronological approach to fieldwork, and is structured around the various stages of the fieldwork experience. It outlines the activities involved at each step, and the implications for visually impaired students. However, the guide does not focus exclusively on the student. Recognising that successful fieldwork requires a partnership between students and staff, the guide also discusses awareness raising and support provision activities needed by teachers who are charged with developing effective fieldwork experiences for visually impaired students. It also considers how other students can be sensitised to the needs of the visually impaired, and how they can be encouraged to provide some of the necessary support structures.

A considerable amount of the guide is necessarily skills focused. A broad distinction is made between general-purpose skills (i.e. those which the visually impaired student might be expected to have mastered already), and field-related skills (i.e. those which the student may not have met before). The guide will concentrate on the latter.

1.1.4 Towards a student-centred approach

This guide makes no attempt to be exhaustive. Not only is every teaching situation and learning environment different, but each visually impaired student is unique. We have also refrained from being too prescriptive – we do not pretend to know all the answers, or to be able to provide the best advice for each and every situation, or each and every student. However, it is hoped that the issues raised and the advice provided will help you to think through the potential problems that might prevent your visually impaired students from gaining the best study opportunities possible, and achieving the very best that they are capable of.

There is no substitute for talking with your students. This is essential if you hope to identify the student's real concerns and develop an approach that meets with their approval and consent. With this in mind, we have developed what we call the 'mutual adjustment' approach to learning, which is discussed elsewhere in this guide (Section 3.1). The main principle behind this approach is that visually impaired students, together with staff and other students, need to negotiate a set of accommodations to ensure they develop the most effective learning environment for their needs.

At any particular time, the number of visually impaired students undertaking fieldwork in your department is likely to be very small. This reinforces the need for an integrative approach in which the visually impaired students are treated as no different from other students, and that they are fully socialised within their peer group. This should be encouraged from the first day of the degree programme, and reinforced at every stage of the fieldcourse. Fieldwork must be recognised as among the more academically social activities in a degree course, and it is important that the visually impaired student partakes fully in this social event, and is not singled out for apparently 'special treatment', or treated with kid gloves.

1.2 Who this guide is for

The guide is written for two kinds of reader:

- *Academics involved in the design and delivery of fieldwork*. The guide is intended primarily for academics working in geography, geology and environmental science. However, its content may also be of interest to academics in other disciplines that involve fieldwork, including: archaeology, anthropology, architecture and ecology.
- *Disability specialists*. It is hoped that the focused discussion of fieldwork in this guide will provide insights into a form of study that may not be familiar – at least in detail – to the staff who advise staff and students and assess student needs in the broad area of disability.

The contents of this guide may also be of some use to other support staff who are involved in some way either with the learning needs of visually impaired students, or with field teaching (see Section 4.3).

2 Geography, Fieldwork and the Visual

The importance of sight to humans has been discussed in Section 1. Here, the significance of being able to see is discussed in relation to geography and fieldwork.

2.0.1 Vision and geography

Until relatively recently, when maps and map making began to lose their eminent place in the discipline, geography (along with its cognate disciplines), has traditionally been an intensely visual discipline. Many of the subject skills acquired by geography students, from map reading to field recording, lab work to sketching, all demand visual skills. And even the modern technologies that are increasingly used to supplement or enhance field study, particularly multimedia CAL (computer assisted learning), desktop mapping, GIS (geographical information systems) and remote sensing software all make heavy demands on the student's visual information processing system. (See Shepherd, 1995 on the visual discrimination of GIS technology.)

Sight plays a significant role in many aspects of classical geographical discourse, and has made a central contribution to mapping, graphics and visualisation. (It was a geographer, W.G.V. Balchin, who put the key skill of ‘graphicacy’ on the map.) However, sight also makes a not insignificant contribution, albeit rather more metaphorically, to the ‘gaze’ of modern human geography.

In terms of the craft of the modern geographer, sight is intimately related to most learning activities, including reading, writing, sketching and drawing. Few skills, whether key or specialist, can normally dispense with the faculty of sight, whether it involves calibrating a strain gauge in a geological laboratory or maintaining eye contact during inter-personal exchanges.

Although the nature of the field experience is typically taken as synonymous with the sighted fieldworker, it is worth enquiring as to the exact nature of this relationship, and asking whether fieldwork is impossibly difficult for the visually impaired student.

2.0.2 Vision, fieldwork and visual disability

Various visual skills are deployed/required for fieldwork, including:

- map reading
- observation and recording
- landscape sketching
- judging heights and distances
- spatial skills
- co-ordination and balance.

However, it is important to recognise that not all field study situations are alike. Indeed, field study takes a number of forms and guises, each of them posing a different mix of problems for the visually impaired student. Here are some typical examples:

- Local project work – e.g. as an adjunct to class or laboratory work. Typical activities include questionnaire surveys, etc. Usually involves individuals and small groups.

- Day trip – mainly 'look-see' at a selection of locations within a study area.
- Field week – extensive mix of study activities involving a medium-to-large group of students.
- Dissertation or project work – usually involves an individual student, typically without accompanying staff.

These are discussed further in Healey *et al.*, 2001. The mix of study activities, and this the relative disadvantage to visually impaired students, can vary considerably between these formats. We can go further than this, and suggest that the field experience of visually impaired students varies along a number of dimensions, including:

• the educational context of fieldwork	e.g. whether it is compulsory or optional
• subject mix	e.g. whether it is human, physical or a mixture of the two
• skills mix	e.g. whether the students are required to walk across difficult terrain or merely to stand in a street interviewing shoppers
• nature of learning style	e.g. whether the focus is on passive observation or active exploration
• expected learning outcomes	e.g. whether the learning is subject- or skills-focused
• curricular links	e.g. whether the field experience is tied to broader learning objectives built into the entire curriculum, or whether it is a stand-alone activity.

2.0.3 Overcoming barriers – lessons from elsewhere

One indication of changing social attitudes is that blind people, and those with a visual impairment, participate in a wide variety of pursuits that might previously have been thought out of bounds. These include: blind sports (BSI, 2000; IBSA, 2000), mountain climbing (NFB, 2000a) and exploration (Ananova, 2000a). Geographers have a lot to learn from these activities, not only in terms of the narrow practicalities of 'how to do it', but also in terms of the broader motivational factors involved. The participation of the blind or visually impaired in these pursuits suggests that we should not longer ask the question 'Can they do it?' when considering visually impaired students undertaking fieldwork. Rather, the question should be: 'How shall we do it?'.

2.1 The nature of visual impairment

Among the disabled, the blind have a special place. The painting of *The Blind Girl* by the Victorian artist John Everett Millais, and the story of *The Country of the Blind* by H G Wells are indicative of the artistic recognition afforded to the blind in the past. In the UK, the blind currently have their own national body recognised by royal patronage – the Royal National Institute for the Blind (RNIB) – but other forms of visual disability are not so well endowed. The partially sighted or otherwise visually impaired have perhaps not been given as much consideration by society, perhaps because of the diversity or relative invisibility of other visual impairments, or perhaps because of the widespread occurrence of visual degradation that attends the ageing process.

2.2 What is visual impairment?

Visual impairment takes a number of forms, each posing a different mix of problems for field study. According to the RNIB, there are about 80 different eye conditions which can affect sight in various ways (SSC, 2000a, provides definitions of over 60). These conditions include short- and long-sightedness, colour blindness, cataracts (responsible for almost half of all cases of blindness worldwide (Sight Savers International, 2000)) and glaucoma (often referred to as the world's leading preventable cause of blindness).

It is worth noting that some eye conditions are selective (e.g. colour blindness is most common in males; glaucoma and cataracts are more frequent in older people), while others are more randomly distributed in the population. Another important thing to recognise is that people who are registered as blind or visually impaired often have significant residual abilities – e.g. 70% can use text if it is clear and large enough (SSC, 2000c).

In most cases, students will know on entry to a course whether they have a specific eye condition and, if so, what effect it might have on their study. However, this is not always the case, because some eye conditions develop slowly, and may only become apparent under specific study conditions. **Colour blindness**, for example, may become more noticeable when a student is asked to interpret multi-coloured maps or analyse graphical images on screen in preparation for a fieldcourse, or when asked to distinguish soil horizons or vegetation patterns in the field. There are several common forms of colour blindness – or colour deficiency – each of which poses different problems. Tests for several forms of colour blindness are available on the Web, including:

- Ishihara test – www.toledo-bend.com/colorblind/Ishihara.html
- Waggoner test – members.aol.com/protanope/colorblindtest.html

(N.B. These tests should not be used as substitutes for visiting a trained ophthalmologist.)

Another condition, which does not reside in the eye, is the inability to accommodate properly when using a stereoscope, with the result that the student is unable to form a three-dimensional image from pairs of overlapping aerial photographs – a commonly used field study resource.

In the case of colour blindness, steps can be taken to replace confusing colours in printed or computer displays. It is more difficult to overcome the problem of stereoscope accommodation.

2.2.1 Born versus acquired impairment/blindness

A useful distinction can be made between the *congenitally blind* (those who are blind from birth) and the *adventitiously blind* (those who developed blindness later in life, perhaps as a result of accident, trauma, disease, or medication). Most visually impaired people lose their sight rather than being born sightless – some 85% suffer progressive sight loss (SSC, 2000c).

The difference between these two visual impairment groups can be substantial, because a student who has been blind from birth is more likely to have developed mature adaptive mechanisms, whereas someone who has recently become blind may still be learning to cope, and therefore require considerably more support and assistance while undertaking fieldwork. Another difference lies in the development of spatial concepts. Congenitally blind children, for example, may find it more difficult making sense of tactile

maps than adventitiously blind children, because they have not previously acquired spatial awareness through visual interaction with their environment.

Other differences among in the experience of visual impairment can also be educationally significant. For example, visual impairment may be congenital or adventitious, it may be the result of numerous causes (e.g. age related, triggered by disease or subsequent to an accident), and while many visual impairments occur gradually, others happen very suddenly.

2.2.2 Temporary versus permanent visual impairment

Some forms of visual impairment are permanent, while others are reversible. Although some rare forms of blindness (e.g. those caused by trauma) may reverse themselves, most blind people never regain their sight, particularly if they have been blind from birth. By contrast, some conditions (e.g. conjunctivitis) are usually temporary, and others (e.g. glaucoma or diabetic retinopathy) may be reversed by an operation. Where the eye condition is age-related, such medical procedures are especially important for senior citizens wishing to return to formal study. The difference between temporary and permanent condition is significant, both in terms of student expectations and staff/departmental support. Where an eye condition is temporary, a field visit may possibly be deferred, whereas a permanent condition may require a different strategy.

It is also worth noting that in some cases the severity of the condition can fluctuate through time, which means that its impact on a student attending a fieldcourse may be partly down to chance.

2.2.3 Categories of visual impairment

The severity of most eye conditions, and therefore the degree of impairment, can vary considerably. In broad terms, the range of impact can run the entire gamut from total blindness through low vision to minor impairment. A broad distinction often made in UK disability legislation is between people who are registered as blind and those who are registered as partially sighted. These two groups may exhibit rather different study patterns and difficulties, and may require different kinds of support, especially during fieldwork. The following table summarises some of the main differences between the two kinds of visual impairment:

Blind	**Partially sighted**
• unlikely to be able to use print without some adaptation • unlikely to be able to produce hand-written work • likely to have difficulty in note-taking • likely to have difficulty producing written assignments • likely to have particular mobility difficulties • likely to have to rely on listening rather than watching • may have problems with spelling and specialist vocabulary • may have problems in group discussions • may use Braille	• can see in certain conditions • may be able to cope with print but take longer to read it • may be able to produce handwritten work • has probably been educated in mainstream schools • may be able to use low-vision aids in classroom settings • will probably not use Braille

(List adapted from University of Edinburgh handout on student disability.)

In the US, a distinction is made between three degrees of vision loss: visual acuity of 20/200, low vision, and partial sight (UMNDS, 2000).

Section 2.4 discusses the potential impacts of various eye conditions on fieldwork.

2.3 Visual impairment statistics

2.3.1 The population at large

Although figures vary between sources and on the base population used, between 6.6 million (DRC, 2000) and 8.6 million (DSS, 1998) people in the UK are classed as disabled, which is almost a fifth of the working age population. Among adults of working age, about 112,000 have difficulty in seeing as their main disability (DRC, 2000). An important fact in relation to mature age students is that some 70% of economically active disabled people become disabled during their working lives and, as more people live longer, so the incidence of visual disability will increase (Employers Forum, 2000).

Worldwide, 45 million people are blind, and 80% of this blindness is preventable or curable. Within this total, about 1.5 million children are blind, mostly in the developing countries of Africa and Asia, and 40% of this blindness is preventable or curable (Sight Savers International, 2000). Avoidable blindness within developed countries is far less prevalent.

2.3.2 Student populations

Data from the Higher Education Statistics Agency (HESA, 2000) indicate that in 1998/9 22,500 higher education students self-assessed themselves as having a disability; 3.3% of these students had visual impairments. (The National Library for the Blind (no date) suggests a figure of 513 students.) Within geography, a recent survey suggests that only about one in five geography departments have had experience of blind or visually impaired students undertaking fieldwork (Table 1).

Table 1. Departmental experiences of students with different disabilities undertaking, or being required to undertake, fieldwork (total number of respondents = 86). Source: Hall *et al.* (2001)

Disability	Departments with experience of students with this disability undertaking fieldwork	Percentage of total respondents
Dyslexia	61	69
Hidden disability	60	68
Mobility impaired	52	59
Deaf/hearing impaired	27	31
Mental health	27	31
Blind/visually impaired	18	21
Multiple disability	14	16

2.4 Visual impairment impacts on fieldwork

When attempting to relate visual impairment to fieldwork, the following principles are important:

- From an educational viewpoint, what matters most is not so much the eye condition which produces the impairment, but the functional effect the impairment has on fieldwork activities, as these can vary from student to student, depending on the coping mechanisms they may have developed.
- Most eye conditions can vary considerably in severity – it is not enough simply to know which condition a student has.
- It is essential to talk to students to identify the potential impact of their condition on proposed fieldwork activities.
- The impacts of a visual impairment can be positive as well as negative.

There are a number of ways in which eye conditions can impact on fieldwork activities. Mann (1999) indicates some of these:

Ocular albinism	difficulties with scanning, tracking, depth perception, rapidly shifting visual points, reading
Cataracts	wide variation in visual acuity (though full visual field usually maintained), and near and far vision often adversely affected
Diabetic retinopathy	fluctuating visual acuity, distortion of vision, and possible impairment of visual field
Glaucoma	progressive loss of visual field, poor visual acuity, impaired peripheral and night vision, and difficulty in adapting between light and dark
Macular degeneration	loss of central vision (hence reliance on eccentric or sideways looking), difficulty in discerning fine detail and reading, and problems in colour discrimination (especially reds and greens)
Nystagmus	blurred vision, difficulty in scanning and tracking, and problems with depth perception
Optic atrophy	variable loss of vision and/or total blindness
Retinitis pigmentosa	night blindness, narrowed field of vision (resulting in tunnel vision).

According to the Scottish Sensory Centre (SSC, 2000a; 2000d), visual impairment impacts are likely on the following visual capabilities:

- ability to see details
- contrast sensitivity
- colour vision
- accommodation to changing light levels
- width of visual field

- changing focus
- seeing moving images
- sensitivity to glare.

Staff responsible for designing fieldwork will need to determine which field activities are likely to be compromised by deficiencies in any of these visual capabilities. They should then consider adopting a suitable course of action (see Section 6.1).

2.4.1 Fieldwork difficulties due to visual impairment

There is no single universal difficulty; each visual impairment will impose its own set of demands and limitations. When undertaking fieldwork, visually impaired students may experience difficulties with a variety of tasks, including:

- taking accurate notes in non-classroom environments
- multi-sensory tasking – listening, observing, recording and reading
- speed of handwriting and legibility
- organisation of time
- orientation, reading maps
- slow reading speed for accurate comprehension
- visual perceptual difficulties with poorly photocopied material, particularly black print on white background
- group work
- recording data and making mathematical calculations.

2.4.2 On the positive side

It is important to recognise that visually impaired students may have counter-balancing strengths in other areas. Staff as well as students should therefore do their best to discuss with the student their particular strengths, and to harness these abilities during fieldwork. For example, groups should consider using the visually impaired student's abilities to compensate for weaknesses in other members of a fieldwork team.

Other advantages include the stimulus given to staff to rethink the accessibility of the fieldwork experience to all students, not simply to those with a visual impairment. (This point is discussed further in Section 14.) Finally, as mentioned in the introduction, the experience of having a visually impaired student undertake a geography course and participate in fieldwork can enthuse and inspire staff and fully sighted students alike.

3 Approaches to Visual 'Disability'

> For me, my disability is a fact and not a problem. I'm not living the life of a disabled person. For sure, I have to handle some things differently from other people. But it's not so different from the life of someone who is not disabled. In any case, who is really not disabled?
>
> Thomas Quasthoff, opera singer

> While people have impairments, the environment – attitudinal as well as physical – can be disabling. It is simplistic to attribute problems about disability to individuals who are said to 'have' this or that disability when the reality is that many such problems disappear when environments are accessible. And although there is little that staff in higher education can do to change the facts of students' impairments, there may be scope for altering the environment of higher education, which, like any environment, may be disabling.
>
> Teachability Project (Shaw, 2000)

Reflecting the sentiments expressed in the quotations above, the term 'visual impairment' is used throughout this guide, rather than the currently more common 'visual disability'.

Following the WHO (2000) definitions, the present guide considers the provision of learning support for students with visual impairments, whose experience of disability is as a result of the interaction between their impairment, the learning environment, and its social organisation. In common with other guides in this series, the social model rather than the physical model of disability is seen as the best approach to empowering the visually impaired student in the field. The Overview Guide to this series (Healey *et al.*, 2001) discusses various models of disability in more detail, and indicates their relationship to subject-based and educational issues in the context of student disability.

We have seen in other parts of this guide that taking a flexible approach to the needs of blind and visually impaired students can yield positive dividends. It is argued here that such an approach is also a characteristic feature of an effective curriculum for **all** students, and that it moves higher education back from being an exercise in mass delivery towards being an exercise in personalised delivery – within a broad set of agreed learning outcomes. (See the related discussion in Section 14.)

Underpinning a flexible approach is the need for clear and regular communication. There is no substitute for talking with your blind or visually impaired students. This is essential if you hope to identify their real concerns and develop an approach that meets with their approval and consent.

All students are unique, and each visual impairment is different from other visual impairments. Because of this, there can be no across-the-board approach or standard template for dealing with the study needs of visually impaired students. Rather, each student needs to be considered individually, and this necessitates individual discussion and negotiation.

3.1 The mutual adjustment model

In order to frame this approach, we have developed what we call the '*mutual adjustment*' approach to learning. The main principle behind this approach is that visually impaired students together with staff and other students negotiate a set of 'accommodations' to ensure the most effective learning environment for the student concerned. The principle behind this approach is based on the likelihood that it may not be possible to meet all visual impairment needs in particular departments or on particular fieldcourses.

But why should a student with a particular visual impairment be expected to 'accommodate' – or, more bluntly, to compromise on – their needs? There are several reasons why this may be necessary:

- resource limitations
- competing needs of other students
- safety.

One way that this might translate into action is through an **information-sharing** exercise. The student would be asked to declare the nature and severity level of their visual impairment, and the staff team would make available a detailed inventory of all of the problems and resources known to them. The information offered by the students should be treated as confidential unless the students have made it clear that they wished information about their disability to be made known to other staff and/or students.

Time allocation is another area in which mutual adjustment could be considered. From the student's perspective, this might mean that they ensure that sufficient (maybe additional) time is given to attend classes and briefing sessions, to read prepared materials, and to make their way to and from fieldcourse venues and sites. From the staff point of view, the time needed to drop off and pick up students may need to be adjusted, the time allocated to group follow-up activities may need to be extended, and handing-in deadlines possibly adjusted. Decisions should always try and consider worst-case scenarios.

Mutual adjustment may also require the design of **alternative study activities**. Where these are introduced, care should be taken to ensure that the visually impaired student experiences an equivalent learning experience – i.e. is not fobbed off with a time-filling but largely meaningless activity (see also Section 6.1).

Communication is an essential component of higher education. But with visual impairment, it is even more essential for students and staff to confer on a regular basis. This is essential to ensure that all problems have been foreseen, appropriate plans have been laid, and relevant resources identified. Neither party should wait for the other to indicate that things are going wrong. Regular discussion, however brief, will prevent what might be a drama from turning into a crisis. Whether this requires a special tutor to be allocated to blind and visually impaired students – or maybe all students with disabilities – is perhaps for an individual department to decide, based on the numbers involved, and the nature of the fieldwork activities likely to be undertaken by students.

One area where mutual adjustment may be necessary is with those blind students who have a **personal guide dog** (Section 11.2). Here, it is important that other students recognise that the dog is a working animal rather than a pet, and staff will need to take into account the space and other needs of the dog when planning field sorties. For the blind student themselves, it may be necessary to exercise some patience over the way in which other students attempt to treat the dog.

Another area where there may need to be give and take is with the visually impaired student who works best by recording or transcribing the spoken word during various study encounters, and may need to use **special equipment**. For example, staff and other students may need to take into account the student who has a hand-held tape recorder, and who needs to be 'close to the action' – whether it is in the front row of the lecture or study room in a field study venue, or close to the person being interviewed in the field. Similarly, where the visually impaired student creates Braille on the fly, allowance will need to be made for the noise of the typing and some planning may be needed to ensure the safe stowage of the portable Braille reader on minibuses, etc. On the part of the visually impaired student, due acknowledgement will need to be made that their needs may at times inconvenience other students – e.g. a blind student may compete with a partially deaf student to be closest to the current speaker.

Finally, on the issue of **money**, it may be necessary to agree on a cost-sharing approach. For its part, the department should consider spending money to buy specific equipment, or to use external services – e.g. for the production of raised-line maps. In return, the visually impaired student should consider approaching support agencies to fund the acquisition or loan of special equipment for fieldwork, or the purchase of additional computer hardware or software (e.g. facilities for data sonification) (see also Healey *et al.*, 2001).

3.1.1 Flexibility the keyword

Perhaps the most effective mindset for staff to adopt when dealing with visually impaired students is that of flexibility (Shaw, 2000). Individual staff, departments and institutions all need to be able to act flexibly to attract and support the visually impaired student while undertaking fieldwork. This flexibility might include:

- attendance requirements
- availability of programme in various study modes (e.g. full-time, part-time, open learning mode, online)
- choice of modules and/or study elements
- extensions to assessment due dates
- scope for transfer to alternative programmes.

Naturally, the issue of flexibility has to be considered in relation to the needs of sighted students – and this raises the over-arching issue of equity of treatment. (On this issue, see Section 14 and the related discussions in Sections 4.1 and 5.3.)

3.2 General etiquette

It is sometimes difficult for sighted people to know how to behave when they interact with blind or visually impaired people. The following broad precepts, gleaned from several sources, provide useful guidelines:

- Visually impaired students are rarely deaf, so speak with them in a normal voice.
- Speak directly to the visually impaired student rather than through a third party.
- When entering a room or approaching a visually impaired student, introduce yourself by name, and use their name in conversation.
- Ask a visually impaired student before attempting to 'guide' them through a building or across a road.

For an example of how the blind wish to be treated, take a look at 'The Courtesy Rules of Blindness' (http://www.blind.net/bg000001.htm) (see also Section 11.2). Above and beyond all these ideas, however, just treat blind and visually impaired people as individuals.

4 How to Prepare Yourself and Your Colleagues

4.1 Increasing awareness – staff development

4.1.1 Why raise awareness?

In a recent survey of over 1000 blind and partially sighted young people, it was found that teachers needed to be made far more aware of the needs of visually impaired students through visual awareness training (Sortit, 2000).

If academics are to respond effectively to the needs of the visually impaired student, they will need to invest time in relevant staff development. All members of the fieldwork team should be involved in awareness raising activities, preferably organised well in advance of the fieldwork, so that new lines of thinking could find their way into detailed fieldwork planning. The department and institution will play a significant part in supporting these activities (see Section 4.3 for details).

Geography staff involved in fieldwork will probably already have attended a First Aid course. In one sense, learning about visual impairment is on a par with this training – it provides a base level of skill should things go wrong. However, it needs to be much more than this, because it is not only proactive and preventative, but it is intimately related to the creation of an effective curriculum, particularly in relation to the design and delivery of study activities in the field.

4.1.2 Content and approach

The material contained in this guide could form a useful starting point for staff awareness training. Some of it takes a general overview of visual impairment and its relation to fieldwork. Other parts address the more specific issues that are related to undertaking a particular fieldcourse, and may well be used as the basis of a chronologically-arranged checklist, beginning with an audit of fieldcourse venues and accommodation through to the fieldwork activities, the follow-up work and the assessment. Because of this, it might be appropriate to divide staff awareness raising into two distinct phases:

Initial awareness raising

- introduction to visual impairment; general implications for fieldwork; review of available resources
- meet with visually impaired students; discuss issues and approaches with relevant support staff

Fieldwork planning

- how to audit a fieldcourse for visually impaired students; designing fieldwork activities; etc.

4.1.3 Some issues for discussion

Here are some of the questions, some broad and some relatively narrow, that staff could usefully ask themselves in their awareness raising sessions:

- The approach taken in this guide aims to encourage the provision of equal opportunities for visually impaired students. To what extent might a concern with providing these ‘equal opportunities’ be detrimental to the other, non-

visually impaired students in the group? Is there a case to be made for the view that changing fieldwork to cater for the needs of a small minority of visually impaired students could compromise the other students' learning experience in the field? (See the broader discussion in Section 14.)

- What information is available on living with disability? (See Section 15.)
- How many publicity channels do you use to inform students about your fieldcourses? How suited are they to the needs of visually impaired students? Would it be useful to have additional channels that better suit the needs of the visually impaired student – e.g. email or Web, in addition to class announcements or handouts?
- Do you have facilities in your institution for producing information in forms other than paper – e.g. Braille or audio-cassette? If so, are these available to staff, students, or both? Are there are any costs involved?
- Do you require students to visit particular Web sites – maybe including your own – to familiarise themselves with the area in which the fieldcourse is being held? People with a severe impairment or who are totally blind may rely on screen reading software to access Web information. Do you know whether the documents they are meant to consult conform to Web Accessibility Guidelines? (See Section 9.6.)
- How useful might it be to suggest that your blind and visually impaired students use a student helper or buddy? How could you accommodate such a person in the field to help the visually impaired student?
- Should blind or visually impaired students work alone or in groups on fieldcourses? (See Section 6.5.)
- Which learning style approach would be most effective for visually impaired students? For example, how appropriate is active learning or problem-based learning, and how far should tutors insist on all students becoming autonomous learners in the field? (As an exercise, create a worst-case scenario for these in relation to visually impaired students.)
- Discuss the issue of self disclosure – how much information should blind and visually impaired students be asked to give about themselves so as to assist in the design and planning of fieldwork to maximise their learning effectiveness and minimise the safety risks?
- In the past, academic staff have been used to delivering a standard curriculum to all students. In the future, will they need to be more flexible and adaptive, fashioning individual curricula for variously impaired students? Should this attitude be extended to all students? (For more on the latter issue see Section 14.)
- Academic staff traditionally regard themselves as guardians of their subject. How far should they also be thinking about being apostles of best teaching practice – e.g. what creative thinking might be necessary to ensure that students with visual disabilities can enjoy a positive and fulfilling learning experience?

- What are the trade-offs between maintaining academic standards and ensuring that blind or visually impaired students can enjoy a positive and fulfilling learning experience? There are some academics who are wedded to the approach prevalent in the past of delivering a standard curriculum to all students, so that everyone received the same education. In the future, how necessary will it be for us to be flexible and adaptive, and can this approach be adopted without sacrificing educational standards?
- Who are the relevant members of support services (Student Services, Student Welfare, Disability Support Unit, etc.)? How can they help in devising fieldwork for blind and visually impaired students?
- Explore various official support schemes and sources of financial support – e.g. the Disabled Student Allowance.

4.1.4 Students as well as staff

It is important that initiatives aimed at raising staff awareness are not divorced from similar initiatives aimed at students. For maximum effect, the two should be developed hand in hand with one another (see Section 5.3). At several points in the fieldwork planning process, staff and visually impaired students need to put their heads together, whether it is to decide early on whether certain field activities are viable, or to determine the practicalities of getting from A to B in the field.

4.2 Educational entitlements and requirements

Any fieldwork policy based on individual tutors making arbitrary decisions as to how to accommodate the needs of blind and visually impaired students is no longer acceptable. The needs and rights of such students are now enshrined in a range of legislative and regulatory frameworks, and these need to be understood and taken on board by fieldwork tutors.

4.2.1 Relevant legislation

The 1990s saw considerable advances in legal support for visually impaired people in terms of their educational expectations. As a result of recent legislation, visually impaired students are now entitled to the same learning experiences as sighted students. The main legislation is the *Americans with Disabilities Act* (ADA) of 1990 (see Iowa, 2000b). In Australia, the relevant legislation is the *Disability Discrimination Act* (DDA) of 1992 (the full text is available at http://www.dircsa.org.au/pub/docs/ddact.txt). The Human Rights Act (HMSO, 1998) means that visually impaired students throughout the European Union may have recourse to the law if they receive less than equal rights to various forms of education.

As far as UK legislation is concerned, the 1995 *Disability Discrimination Act* (DDA) was a major landmark, especially in terms of the employment rights of the disabled. Although higher education was exempt from the 1995 Disability Discrimination Act, it was required to produce a publicly accessible *Disability Statement*. (An example can be found at the University of Southampton site: http://www.soton.ac.uk/~acreg/dis/dsintro.html.) From 2000, the Higher Education Funding Councils have required that this statement be updated and made available to all students and staff. The passing of the Special Education Needs and Disability Act (SENDA) in 2001 was a further landmark as it extended the provisions of the DDA to higher education. For details see the Overview guide in this series (Healey *et al.*, 2001).

4.2.2 Policy within higher education

As far as institutions and departments are concerned, the relevant policy guidelines are those provided by the funding councils and the Quality Assurance Agency for Higher Education (QAA). In its *Code of Practice on Assessment* (QAA, 2000), it states very clearly that programme specifications should include no unnecessary barriers to access by disabled people. Its guidance includes the proposal that:

> Institutions should consider establishing procedures which ensure that:
>
> - The setting and/or amendment of academic and other programme requirements during approval and validation processes includes well-informed consideration of the requirements of disabled students
> - Programme specifications and descriptions give sufficient information to enable students with disabilities and staff to make informed decisions about the ability to complete the programme.

The QAA's *Code of Practice for the Assurance of Academic Quality and Standards for Students with Disabilities* (QAA, 1999), which came into force in September 2000, is designed to assist institutions in ensuring that disabled students have access to a learning experience which is comparable with that of their non-disabled peers. It contains 24 precepts against which institutions will be assessed and covers the student experience from pre-entry to exit. The Code makes clear its expectations in relation to fieldwork and study overseas in Precept 11:

> Institutions should ensure that, wherever possible, disabled students have access to academic and vocational placements including fieldtrips and study abroad.

The Quality Assurance Agency (QAA) *Code of Practice: Students with Disabilities* (QAA, 1999) asks institutions to:

> Consider making arrangements which ensure that all academic and technical staff:
>
> - plan and employ teaching and learning strategies which make the delivery of the programme as inclusive as is reasonably possible;
> - know and understand the learning implications of any disabilities of the students whom they teach and are responsive to student feedback; and
> - make individual adaptations to delivery that are appropriate for particular students, which might include providing handouts in advance and/or in different formats (Braille, disk), short breaks for interpreters to rest, or using radio microphone systems, or flexible/interrupted study for students with mental health difficulties.

4.2.3 Issues for the future

The Special Educational Needs and Disability Act (SENDA) is likely to have a much greater impact on higher education than the DDA. The new Act, passed in 2001, identifies two significant policy imperatives for higher education institutions:

- a duty not to treat disabled pupils and students less favourably, without justification, than non-disabled pupils and students
- a duty to make reasonable adjustments to enable disabled students to have full access to higher education.

The advocacy of making 'reasonable adjustments', which would prevent disabled students from being placed at substantial disadvantage in comparison to students who are not disabled, will need to be considered very carefully by departments planning fieldcourses. These 'reasonable adjustments', which may be made to admissions procedures, course content, placements, teaching arrangements, provision of information and examinations, bring to the fore significant questions relating to the maintenance of educational standards and the assurance of equal opportunities in and out of the classroom (see Sections 3.1, 6.1 and 8 for related discussion). Several of these issues need to be discussed by the staff who are likely to be involved in field teaching (see Section 4.1). Further discussion of the legislation and quality assurance framework is given in Healey *et al.*, 2001.

4.3 Getting help – support networks

4.3.1 No tutor is an island

If you are a tutor who is concerned with the needs of blind or visually impaired students undertaking fieldwork, then the good news is that there is a range of information, advice and support ready to help you. Among the people and organisations available are:

- institutional disability and student welfare groups
- national visual impairment groups and organisations
- subject centres – both national and international
- global resources on the Web.

The rest of this document suggests ways in which you can participate in an institutional network of contacts and supporters to provide the best learning opportunities for blind and visually disabled students doing fieldwork. In many cases, such a network will already be in place, in other cases you may need to oil the wheels a little.

4.3.2 Institutional support

Most higher education institutions employ specialist colleagues to provide disability services to students. A local Disability Officer, or an Equal Opportunities Officer, will be able to provide on-campus information and advice of a general nature, and may also have resources that can be channelled into more specialist study activities relating to fieldwork. A useful starting point is therefore to make contact with those involved, and explore with them how they can help plan and execute your fieldwork. In particular, they may be able to advise on, and maybe help undertake, the fieldwork audit (see Section 8.4).

But the institutional support network is not just about helping staff to help students, it is also there (primarily) to help the students themselves. Among the questions you should therefore ask are:

- Does the institution provide an induction course specially geared to the needs of blind or visually impaired students? If not, does the standard induction programme provide sufficient awareness of the opportunities – and problems – of undertaking fieldwork by blind or visually impaired students? Should your department complement the central provision with local provision?
- In the fieldwork planning phase, are there opportunities for students to discuss with staff their visual impairment and the kinds of assistance they would appreciate? If they have already done so with central support staff, what are the most appropriate forms of liaison to discover these needs without compromising the privacy of the students involved? Does the department have an official policy on discussing needs directly with the students involved?
- Is it possible to arrange contact with members of the institutional support network during a fieldcourse? Who are the people who are most likely to be able to provide advice on unforeseen problems that may confront blind or visually impaired students, and what are their contact details?

4.3.3 Action point

Examine your institution's Disability Statement. (All Higher Education Institutions have to meet the requirements of the 1995 Disability Discrimination Act by producing such a statement, which outlines the support that disabled students can reasonably expect at your institution.) Working closely with central support staff, colleagues and your Head of the Department, produce a subject-specific version, specifically outlining ways in which the department intends to support blind and visually impaired students during their studies, and specifically while engaging in fieldwork. Against each special requirement (e.g. talking book software, tactile map production), identify which can be provided by the institutional unit, and which may need to be acquired by the department.

5 How to Prepare Your Students

5.1 Student funding and allowances

Disabled Student Allowances (DSAs) are available to all students who are undertaking courses which are 50 per cent of the time-equivalent of a full-time course. (Before September 2000 this allowance was means-tested and allocated to full-time undergraduate students only.) It should also be noted that these allowances do not apply to PGCE students and those in receipt of awards from Research Councils. Also, from 2000, the amount of money received by individual Higher Education Institutions (HEIs) to support their provision for disabled students is based on the numbers receiving the Disability Students Allowance at their institution. The full regulations are available from the Department for Education and Skills (http://www.dfes.gov.uk/studentsupport/uploads/Bridging2001.doc).

Students may apply for three kinds of grant under the DSA scheme:

- capital grant for equipment
- annually renewable grant for minor maintenance, photocopying, etc.
- non-medical helper's allowance (e.g. a reading service for a visually impaired student).

Students apply for an allowance through their Local Education Authority (LEA). However, the LEA awards the allowance based on recommendations from a needs assessment carried out by an Access Centre or similar body at the student's institution. This means that if any additional resources and costs are likely to arise from a visually impaired student undertaking fieldwork, then the geography department should ensure that the student's requirements are made known to the Access Centre as soon as possible after enrolment so they can be included in the assessment.

5.1.1 Question for investigation

Do your blind or visually impaired students have personal insurance cover for their equipment while on fieldcourses? Does your department and/or institution have specific insurance cover for field activities, and does this include any cover for blind or visually impaired students?

5.2 Equipment ownership and provision

Some visually impaired students, particularly those who may have been blind from an early age, will already own the kind of aids they need to complete field study effectively, and will also have developed preferred ways of working. However, others may have only a rudimentary grasp of the aids available, may own few items of specialist equipment, and may still be seeking guidance on the best way to study, particularly in relation to fieldwork.

In both cases, it is important to take the trouble to find out what equipment is already owned, and what preferred styles of working may have been adopted. For the experienced student, very little advice or support may be needed, but for the recently blind or impaired student, there may be a lot you can do to inform, guide and advise them in their choice of support aids (see Section 6.2).

Among the items of equipment commonly owned by visually impaired students are:

- portable Braille embosser
- tape recorder
- print magnification tool
- laptop computer, with speech or large print output
- scanner and optical character recognition (OCR) software (for input of printed text to computer).

The institution may already have a pool of appropriate equipment for loan by visually impaired students – e.g. programmable calculator with a speech synthesiser or a Dictaphone.

Another issue concerns sources of funding for student purchase of equipment. At a general level, students can acquire funding through the Disabled Student Allowance (DSA) scheme to buy equipment and pay for certain consumables (see Section 5.1 for details). At a specific level, it may be necessary for the department to consider the purchase of equipment or services necessary for fulfilling field study requirements. Again, consultation with the institution's disability officer or equal opportunities chair should be a useful first port of call (see Section 4.3 for further details). There are also specialist national agencies (e.g. the National Centre for Tactile Diagrams) which may be able to help (see Section 15 for details).

5.3 Awareness raising for all students

If sighted students are to respond effectively to the needs of blind and visually impaired students, they will need to invest time in relevant learning and/or training (see Section 4.1). The department and institution will play a significant part in supporting these activities.

5.3.1 Purpose

The main purpose of student awareness training is to enable them to understand the particular study and safety needs of blind and visually impaired students, especially on fieldcourses. It can also provide an opportunity for discussing group study dynamics (see Section 6.5), and maybe help in identifying suitable buddies (see Section 9.8).

5.3.2 Content

What should student awareness training include? Here are some suggestions:

- break down misconceptions
- discuss the idea of equal opportunities
- examine safety issues
- explore group dynamics and practicalities
- acquire information on living with disability (see Section 15).

5.3.3 Approach

How is it best done? There are two broad possibilities: set aside specific times and dates for awareness raising sessions, or absorb the awareness raising into mainstream classes or other events (e.g. induction).

5.3.4 Awareness raising among visually impaired students

Students with visual impairments also need to participate in awareness raising events. For example:

- they must recognise the possible consequences of not disclosing appropriate details of their visual impairment, and that such an attitude risks not only the safety of others on the fieldcourse, but also might be in breach of departmental and institutional safety policies
- they must recognise the need to liaise with staff and students over their fieldcourse needs
- they should do whatever they can to help staff and students to understand their learning and other needs.

6 The Available Options

6.1 Field study strategies

There are three broad educational strategies that can be taken when considering the participation of blind and visually impaired students in fieldwork activities:

- expect them to **adapt** to an unchanged programme of field study
- **accommodate** them by making various modifications to the field study experience
- provide an **alternative** form of study to the field experience (e.g. library or laboratory exercises, virtual fieldwork).

It is no longer acceptable to adopt the first of these strategies. Indeed, it runs contrary to the mutual adjustment model proposed elsewhere in this guide. Nevertheless, elements of all three approaches may be usefully adopted on a pick-and-mix basis as needs dictate.

6.1.1 Generic approaches

So, what kinds of broad-brush approach can be adopted when planning fieldwork by visually impaired students? The approaches outlined below are provided as suggestions to guide initial planning. They are not meant to be mutually exclusive; for individual students it may be useful to adopt more than one approach.

1. Waive participation in fieldwork by visually impaired students

   This is the 'easy option', and might have been considered an acceptable approach until relatively recently. However, it is no longer either acceptable or necessary. The remaining options described below represent possible alternative approaches.

2. Replace fieldwork with non-fieldwork activities

   For the visually impaired student, some fieldwork activities may be difficult (e.g. handling field surveying equipment), impossible (e.g. landscape sketching), or dangerous (e.g. wading across a river or taking samples from a cliff face). If the field activity does not need to be undertaken in the field in order to yield the required learning outcomes, then there is no reason why substitute activities might not be adopted. In order to decide on appropriate substitute activities, the learning outcomes will need to be carefully analysed.

   Remember, however, that the blind and visually impaired are neither helpless nor incompetent. Indeed, there are many examples of people who have accomplished an enormous amount in the outdoor world, despite lacking the ability to see. A famous example is 'Blind Jack', or John Metcalf, who was born in eighteenth century Knaresborough, in Yorkshire. Despite losing his sight at the age of six through smallpox, he became an accomplished musician, guide and road maker. Starting when he was over fifty, he built hundreds of miles of roads and bridges in the North of England, using special tools such as a specially adapted 'viameter' for measuring distances, which he was able to 'read' by touch (http://www.knaresborough.co.uk/history/town/parttwo.htm#blind).

3. Replace real fieldwork with virtual fieldwork

   Some elements of the traditional fieldcourse – e.g. the 'look-see' coach trip – can be less than fulfilling for visually impaired students. In such cases, a great deal more can be obtained from studying the field location using a variety of electronic study aids – 'virtual' fieldwork activities, Web sites, interactive CAL software, or surfing the Web. What each of these activities has in common is that they can readily be made accessible to the visually impaired student, by adopting the kind of accessibility technologies discussed elsewhere in this guide (see Sections 6.3 and 9.6).

   - **Undertake virtual fieldwork.** Digital resources of various kinds may be available to provide substitutes for some conventional field activities. (They can also be used to provide briefing for conventional fieldwork.) One of the most recent examples of 'virtual' fieldwork facilities is the JISC-funded Virtual Fieldcourse Project based jointly at Leicester University and Birkbeck College (http://www.geog.le.ac.uk/vfc/). This has produced a range of computer-based facilities, some of them tailorable and extensible by users, which are designed to enhance the field experience. A potential problem with this kind of resource is that it is designed primarily for sighted students – it is difficult to know, for example, how the 360-degree panoramas provided for various locations on Dartmoor can be usefully viewed by blind or partially sighted students.

     An important requirement of virtual fieldwork is that it should provide the visually impaired student with an opportunity to carry out realistic primary investigation – e.g. undertaking environmental measurements, or carrying out social surveys. The Soil Surveyor software developed by the CLUES project provides students with exercises in geographical sampling involving field locations, where the field activity is replaced by air photographs and Ordnance Survey maps. Another example is the *GeographyCal* unit which introduces Social Survey Design, in which various sampling exercises are provided as an adjunct to guidance on the broader process of planning a survey. There is a pressing need for other software of this kind to be developed.

   - **Surf the Web.** A great deal can be learned about the geography of a given study area by surfing the Web. However, although this might allow the visually impaired student to unearth a considerable volume of factual information, it will have to be carefully planned by the tutors to ensure that appropriately challenging learning objectives are set for them. For example, they might be asked to undertake an in-depth evaluation of the effects of regional development policies on the economy of the local area. An additional Internet resource is the webcam – small video cameras which send regular images to Web sites. These have been placed at numerous urban, roadside and tourist locations around the world, and extensive lists of webcams are available at http://www.webcamworld.com and http://www.earthcam.com. However, despite their apparent potential as 'windows on the world', staff should take time out to select those which have clear educational value, and especially which might be useful for undertaking desktop fieldwork. An example of using a webcam for a practical exercise might be undertaking screen-based traffic counts in a tourist area. Again, some thought will need to be given to ways in which visually impaired students can make effective use of these highly visual information sources.

Another useful resource is the 'Web essay' describing the geography of a particular area. Some of these have been created by commercial organisations or tourist boards, but an increasing number of geography departments have built Web sites around their fieldcourses (examples are provided in Shepherd, 1998). In several cases these grow annually as repeat visits are made to a particular field location, and examples of the results of student practical work are often included. With careful thought, these might be 'raided' and used as a basis for field-related study activities without the need for an actual field visit. Blind and visually impaired students should be able to use screen reader software to access the text in these essays, and should be encouraged to contact the authors if images have been included without textual descriptions (e.g. through appropriate 'alt' tags).

4. Provide field activities at alternative locations

   If field activities prove problematic on account of the venue, and if a visually impaired student might be better able to undertake the activities at other locations, then an alternative venue might be substituted for the main field venue. An example might be the undertaking of a shopping survey on a village high street. For the blind or visually impaired student, part of the problem in undertaking such a survey would be the 'foreignness' of the village selected for the survey. If the visually impaired student was able to undertake the same survey at a shopping centre well known to them, then they might be better able to carry out the work with greater safety. Against this benefit is the problem that the visually impaired student would miss out on socialising with the other students in their cohort.

5. Accommodate visually impaired student needs during the regular fieldwork

   This approach is consistent with the mutual adjustment model, and might include the following actions:

   - Change routes and paths taken in the field to make them easier and/or safer for the visually impaired student to follow.
   - Modify selected field activities to make them more 'do-able' by the visually impaired student. For example, rather than asking the student to undertake a questionnaire survey by visiting a sample of residential addresses, they might be asked to question people at a fixed location – e.g. in a shopping centre or at a community centre.
   - Ensure that the visually impaired student has a buddy to accompany them while in the field, and help them take field notes and record field measurements and observations (see Section 9.8).
   - Provide additional time to get around in the field and undertake required activities. Where group work is involved, careful planning and briefing will be needed to keep the other students on side.
   - Enable students to present the results of their field investigations in non-visual, or perhaps multi-modal, formats.

6. Abandon fieldwork for all students

   A radical approach might be to replace fieldwork for **all** students by alternative learning activities. One way of doing this might be to use virtual fieldwork, as described above. Another might be to undertake the study activities normally undertaken in the field locally – e.g. on campus. At the heart of this suggestion is the idea that the field is a venue for exercising skills, rather than being a specific skill per se. If this is the case, then the skills exercised in the field may be undertaken on campus equally well. Among the incidental benefits to students are that this might involve less cost and disruption, especially for those who are supporting themselves through college, or those who have significant family commitments.

6.1.2 Strategies in practice

It is interesting to review how UK geography departments treat visually impaired students in relation to students with other disabilities. The following table summarises some of the responses currently taken by geography departments.

Departments' actions/responses to disabled students undertaking fieldwork (numbers of departments). Source: Hall *et al.* (2001)

Action/response	Mobility	Blind / visually impaired	Deaf / hearing impaired	Mental health	Hidden disability	Dyslexia	Multiple disability
Modification to teaching / learning / assessment	15	15	11	–	–	43	4
Modification to travel/accommodation/sites	26	–	–	3	8	–	2
Ensuring extra/appropriate on trip support (overt and covert)	12	7	8	14	26	4	–
Discussion of individual's needs/disclosure of disability	15	2	–	4	25	2	–
Exemption from fieldwork	6	–	–	–	2	–	–

6.2 General resources and assistance

Blind and visually impaired students have for many years made use of various kinds of aid to help them in their studies. Among the more popular are the following:

- *Long cane* – Widely used by blind people to navigate the outdoors environment. Its main drawbacks are that users are unable to maintain a straight travel path without some form of external feedback, and cannot normally detect hazards above waist height (Heyes, no date, a) (see also Section 10).
- *Guide dog* – Excellent in helping blind people to navigate often complex (e.g. urban) environments while avoiding obstacles (see Sections 10 and 11.2).
- *Large print* – Valuable for anyone with reduced vision or poor visual acuity. Most libraries stock large print versions of popular titles, but more specialist material has to be specifically converted into the format. With the advent of

low-cost PCs and laser printers, it is relatively easy for students to produce large print versions from original digital sources (see also Section 9.3).

- *Audiotape* – Useful supplement to note-taking in lectures, seminars, guest presentations and interviews (see also Section 9.2).
- *Peer note-taking* – Particularly useful in field situations where the blind or visually disabled student is attending to other tasks, such as interviewing (see Sections 9.2 and 9.8).

Section 6.3 describes some of the more recently developed aids which are available to visually impaired students, especially those which are digital or computer-based.

6.3 Assistive technologies

A wide range of products have been developed for the blind that are referred to variously as 'adaptive' or 'assistive' technologies. These include traditional devices (e.g. long cane, magnifying glass, portable Braille typewriter, hand-held video camera, talking calculator/clock/dictionary/measuring device, cassette recorder and Dictaphone, large-print books and raised-line drawings), as well as more recent technology associated with the computer (e.g. Braille keycaps, Braille embosser, Braille display, screen reader, screen magnifier, speech synthesiser, text-to-speech software, scanner and OCR software, electronic travel aid, personal navigation assistant and laptop/portable computer).

Many assistive products may be bought or acquired (e.g. long cane, Braille embosser, voice recognition software), while other facilities may be acquired as a free or paid-for service (e.g. tactile graphics production, bulk text-to-Braille transcription).

The traditional aids are described in Section 6.2. In this document, a broad overview is provided of some of the more recent assistive technologies that are of greatest relevance to visually impaired students undertaking fieldwork. It should be noted, however, that most of these were developed with neither fieldwork nor geographical study in mind, and that many of them (e.g. talking calculator and screen-reader) may be useful throughout a programme of study, not just on fieldcourse.

6.3.1 Understanding assistive technologies

There are several ways of classifying assistive technologies. A distinction between computer and non-computer aids has already been used above. An alternative approach, based on how assistive technology relates to the user's visual impairment, sees three kinds of technology:

- **Sensory replacement.** At the cutting edge of medical science are those technologies that involve the replacement of lost sight by an artificial means of seeing. One example is the recently developed retina implant which receives image information from a mini-camera fitted in a pair of spectacles (Brookman, 2000). Another is the sensor attached to the tongue. These developments lie beyond the scope of this guide.
- **Sensory augmentation.** This includes the much more established technologies that improve existing visual capability by means of suitable equipment, which is usually portable. Obvious examples include the reading glass and spectacles, but others include the screen magnifier and various computer accessibility facilities (see Sections 9.6 and 9.7 for further details).

- **Sensory substitution.** In recent years, there has been rapidly growing interest in the development of technologies that involve the replacement of lost visual ability by other sensory modalities. In most cases the substituting senses are auditory and tactile (i.e. sound and touch), and several of these are described below.

6.3.2 Sensory substitution technologies

Almost all sensory substitution technologies are now computer-related, though several (e.g. tactile graphics, Braille displays, voice recorders and video cameras) have their origins in pre-digital technology. Most of these technologies involve substitution by sound and speech, but the first two described here involve the use of touch. The cheap laptop PC, scanner, OCR software, graphics software and sound card provide a firm base on which the visually impaired student is able to build a complete kit of sensory substitution facilities. Minor utilities, such as Braille keycaps for PC keyboards, can also be extremely useful.

Braille output

It is worth noting that although Braille is perhaps the most widely known assistive technology, it is likely to be used by only a minority of visually impaired students, and few partially sighted or recently blind students will be able to read Braille. Nevertheless, for those who use it, Braille can mean a significant improvement to their study experience. Braille can be used in several ways:

- *By students to take notes* – e.g. using a portable Braille typewriter. This can be used in regular classroom or laboratory sessions (staff and students will need to accommodate to the possible noise of the key mechanism), though it is unlikely that it will be useful outdoors during fieldwork.
- *By staff to provide handouts* – e.g. through a transcription service. Many universities have a rapid Braille transcription service, though for specialist needs, an outside bureau may be necessary. (The RNIB can provide relevant information.)

There are two computer-linked items of hardware available for displaying Braille: The **Braille embosser** is the equivalent of a printer and creates Braille hard copy on suitable paper. Braille translation software is available to convert typed or scanned text into a format that can be output on an embosser. The **Braille display** displays text from the computer on a row of 40 to 80 'characters' formed by groups of pins. (These devices connect to the PC through a serial or USB port.) Some Braille displays have facilities to enable users to move around the computer screen, but such devices are still rather expensive, and are more likely to be encountered by visually impaired students at disability resource centres on campus rather than owned themselves.

Tactile graphics

While most assistive technologies have explored alternative sensory pathways for giving readers access to text, visually impaired students undertaking fieldwork are likely to need access to graphical information, including maps, diagrams, photographs, space images, landscape views, etc. Where the information is paper- or screen-based, tactile graphics can provide the necessary sensory substitution, involving the haptic sense of touch (Edman, 1992; Schiff & Foulke, 1982).

As with Braille displays, it is unlikely that students will have their own facilities for producing tactile graphics. Fortunately, in the UK at least, tutors have access to the National Centre for Tactile Diagrams (NCTD) at the University of Hertfordshire (see Section 15 for details), which can produce a variety of tactile graphs and maps at subsidised prices. For specific applications of tactile graphics in geography, mapping and fieldwork, see Section 9.4.

Other forms of tactile display have been developed, including vibrotactile and electrotactile devices attached to the finger tip, tongue or other parts of the skin. However, despite considerable research, few of these are in routine use by the blind. (See Kaczmarek, 1991 for further details.)

Talking books

Many libraries provide popular books in large-print and talking book formats for visually impaired readers. Talking books usually involve someone reading text into a tape recorder, and the reader uses a cassette player to listen to the book. Recently, however, talking books are also becoming available as digital speech files for playback on PCs equipped with a sound card. The problem from a blind or visually impaired student's point of view is that there are relatively few textbooks or field study guides available in this format (see Section 9.3).

Screen readers

An increasing number of blind or partially sighted computer users use screen reading software to listen to textual material that appears on their computer screen. This software extracts text from the desktop software (e.g. Windows), from application programs or Web documents so it can be passed to a speech synthesiser device, text-to-speech software or a Braille display (Iowa, 2000a). Among the more popular commercial screen readers are Windots and JAWS (Job Access with Speech for Windows), both of which pass information to a Braille display or speech synthesiser. A useful review of screen readers is available as a fact sheet from Ability Net (http://www.abilitynet.co.uk/content/factsheets/Factsheets.htm), and an interesting survey has been carried out on the use of screen readers by people using Windows (Earl & Leventhal, 1999). Some visually impaired students might want to explore whether a self-voicing Web browser, such as PWWebspeak, is available to them, and whether it is preferable to a combination of standard browser and separate screen reader.

An important principle is that screen readers can only work effectively if there is suitable text available on screen to be read. Staff intending to create Web documents relating to fieldwork should therefore adopt design rules that maximise the amount of information that can be accessed by screen readers (see Section 9.6 for further details). Microsoft has made available 'Active Accessibility' technology (described below), which enables software designers to build applications and documents that are relatively easy to link to screen-reading software.

Speech synthesis

Speech synthesis can be provided either by dedicated hardware (a standalone unit or a PC card), or by 'text-to-speech' software that takes the textual content of computer files or words generated by computer software and outputs this as artificial speech, usually through a PC sound card. Although DOS-based screen readers typically output text to a speech synthesiser, most Windows screen readers can also vocalise the textual contents of what is on screen through speech synthesiser software. (Note that the Lynx Web browser available for DOS can output to speech

synthesisers.) A useful review of speech synthesis technology is available as a fact sheet from Ability Net (http://www.abilitynet.co.uk/content/factsheets/Factsheets.htm).

In order to enable software developers to provide synthetic speech output of text from their programs, Microsoft has released a free Text-to-Speech utility for Windows. (For details see: http://www.microsoft.com/reader/download_tts.asp.)

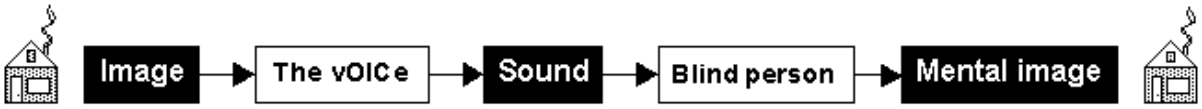
Voice recognition

Typing and mouse manipulation can be troublesome for blind and visually impaired students. An increasingly viable alternative is provided by voice recognition or dictation software, which now has accuracy rates in excess of 90%. Examples include: Via-Voice from IBM (http://www-4.ibm.com/software/speech/uk/), Dragon and Voice Xpress. A useful review of voice recognition technology is available as a fact sheet from AbilityNet (http://www.abilitynet.co.uk/content/factsheets/pdfs/Voice%20Recognition%20Systems.pdf), which explains the difference between continuous speech and discrete speech recognition systems.

Recently, Microsoft has released a free Speech Recognition utility for software developers which allows then to capture speech and convert it to text. For details see: http://www.microsoft.com/speech/.

Information sonification

Data sonification or auralisation involves converting visual information into sounds. (For a general review of multi-sensory data representation, see Shepherd, 1995). An innovative approach to this problem is the vOICe system, developed by Peter Meijer (Meijer, 2000), which is used to 'read' printed or screen images (e.g. photos, graphs). This combination of hardware and software converts pictorial images into sounds, using two aural variables: pitch and loudness to represent vertical positions and brightness respectively, while time-after-click represents horizontal positions. The flow of information in this system is illustrated in the following diagram:



This echoes earlier attempt at converting spatial data to sounds by geographers (e.g. Fisher, 1994). Another system currently under development (at UMIST) is Smartsight, which converts physical shapes captured through a hand-held video camera into melodies to which the blind person listens through earphones or speakers (Guardian, 2000b). Most sonic devices are meant for desktop use, and are therefore most relevant for use in preparatory study prior to fieldcourses, data analysis at field study venues and follow-up activities back at college. An important point about all sonification or auralisation technologies is that it takes some considerable time for the visually impaired user to learn how to interpret the sounds effectively.

6.3.3 Electronic travel aids and personal navigation assistants

Unlike most other sensory substitution systems, electronic travel aids (ETAs) are designed specifically for use outdoors, and have been the subject of considerable research and development over many years (Foulke, 1986). Some ETAs are based on similar principles to the information sonification devices, in that they attempt to sense relevant information from the environment and convert these into sound information that can be readily understood by the traveller. These devices are discussed further in Section 10.1.

6.3.4 Multi-sensory software development tools

In Windows 95 and later versions of its graphical user interface (GUI) operating system, Microsoft has adopted an 'off-screen' model for accommodating disabled users, its policy being that it will not supply adaptations of its operating system or applications programs for disabled users. Instead, it makes available interface technology that enables third parties to extract relevant information that can be used to provide alternative sensory representations – e.g. extracting text to be passed to screen readers.

From the mid-1990s, Microsoft has been developing *Active Accessibility* (MSAA), which is a software interface embedded in Windows application programs that enables them to pass important information to screen reader software or Braille display systems used by blind users. The idea behind this technology is that the application program (operating system, word processor, spreadsheet, etc.) has MSAA facilities embedded within it, and the accessibility software used by the blind includes 'hooks' that communicate with this interface. (MSAA code for developers was released in 1997). There was a major spat between the blind community and Microsoft in 1997 when version 4 of its Web browser, Internet Explorer, was released without MSAA, despite the fact that the previous version (IE3) had included it.

6.4 Sonic maps

Information sonification or auralisation (described in Section 6.3) is an example of using one sensory pathway to replace another that is impaired. Sonification or auralisation involves converting visual information into sounds. In geography, there have been sporadic efforts at using sound in sensory substitution mode, but with mixed success. One early example is the experimental software developed by Fisher (1994) to convey the uncertainty of information in raster (i.e. grid-cell) datasets acquired from remote-sensing satellites.

6.5 Individual and group work

Tutors and students will need to take a strategic decision, preferably well before the fieldcourse begins, on how much work will be undertaken on their own and how much will involve working with others. Fieldwork investigation frequently involves small-group data collection in the field, but this approach may be appropriate for a wider range of activities, including those that are traditionally undertaken by students working on their own.

- Negotiate role specialisation (e.g. leadership or co-ordinating role) among visually impaired and sighted students to maximise strengths and minimise weaknesses. Tutors should avoid jumping to conclusions as to which roles might be most effectively played by visually impaired students – they may surprise you, and their peers.
- Inform all staff involved in the fieldcourse on the membership of student groups, so that the right set of students are dropped off and picked up by minibus each day.
- Visually impaired students might benefit from working with their peers in the evening follow-up sessions, both to share information and evolving thinking about what has been studied during the day.

- If students work consistently in groups on the fieldcourse, then it might be appropriate to consider assessing them on a group basis.

For a discussion of some of the practical issues involved in buddying, see Section 9.8. Tutors would benefit from discussing this important issue in awareness raising sessions (see Section 4.1.)

7 Student Recruitment

7.1 Student expectations and recruitment

7.1.1 Student perceptions and the recruitment challenge

There is some evidence that blind and visually impaired students steer clear of geography at secondary school level. For example, in a recent survey of over 1000 blind and partially sighted young people, it was found that geography, science and physical education appeared less accessible subject areas (Sortit, 2000). The results of a recent Geography Discipline Network survey into geography department experience with disabled students (Hall *et al.*, 2001) reveals that only 20% had experience of visually impaired students undertaking fieldwork, which seems to indicate that proportionately fewer visually impaired students are coming through to take geography compared with students with other disabilities.

These findings make it important that positive messages are provided at induction and enrolment, but also earlier in the recruitment process, when tutors attend recruitment fairs or make presentations at schools. If fieldwork is perceived by visually disabled students as being difficult or impossible, then it is likely they will avoid taking subjects in which field study is an integral part.

7.1.2 The department that likes to say 'yes'!

Academic staff should adopt the default view that a student with a visual impairment **can** undertake fieldwork, unless there are compelling reasons to the contrary. Only when the risk assessment has been completed, and the resource and health and safety options have been considered should the possibility of saying 'no' be entertained. As we have said elsewhere in this guide, it is of paramount importance to discuss the issue with the student involved, so that a joint decision can be arrived at. The costs of saying 'yes' and then not being able to deliver what has been promised – whether explicitly or implicitly – must also be weighed carefully.

7.1.3 Honesty the best policy

However, it is essential to recognise that visually impaired students, no less than other students, have high hopes of a fulfilling education. In the rush to recruit as many students as possible for a particular degree course, tutors need to be scrupulously honest with visually impaired students about the realities of their future studies. It is no good promising the earth or hiding problems from view – these problems will come back to haunt you. Even worse, they may prejudice the achievement of a fulfilling educational experience by the visually impaired recruit. So, encourage visually impaired students to ask probing questions at open days and recruitment fairs, not only about your course – and specifically the fieldwork components – but also of the learning environment generally on the campus at which they will be based. And do not duck the difficult questions; be as honest as you can – it will usually repay dividends.

One way of being open about the nature of study on your courses is to provide students with information about the visual demands likely to be placed on them if they decide to enrol on the specific course they have applied for. For example, will they encounter:

- photographs and photography

- maps and mapping
- videos and multimedia
- image-rich Web sites
- 'look-see' field visits
- use of measuring equipment
- use of laboratory facilities, etc.

7.1.4 Recruitment – a joint responsibility

During the recruitment and admissions process, subject staff can benefit from liaising closely with admissions staff and others – e.g. specialist staff with responsibility for fieldwork, the institution's Disability Adviser or Officer, and the local Health and Safety representative. This liaison can be beneficial in several ways:

- Deciding on the best mix of recruitment activities for visually impaired students – open day visit, formal interview, telephone or email discussion, etc. Some kind of on-campus visit is advisable for visually impaired students, including perhaps an informal interview. This visit can be used to show them the departmental facilities, to explain what is required of them within the curriculum, and the kind of activities involved in your fieldcourse programme.
- Ensuring that the right information is made available to visually impaired students. For example, you might consider undertaking the following as joint initiatives:
  - Providing a list of support facilities available on campus.
  - Inviting along existing visually impaired students who can discuss their experience of campus study and fieldcourses with potential recruits.
- Discussing with the potential recruits possible adaptations and alternatives that may need to be made – on both sides – to enable them to achieve their study goals (see Section 3.1).

Several other issues need to be discussed jointly between subject tutors, recruitment staff and student welfare staff. For example, visually impaired students may not want their condition to be publicised. Most university student records systems have a field in which the impairments may be recorded, but it is important that they can record whether or not they wish this information to be made known to other staff and/or students. If students are required to disclose their visual impairment, then this brings with it a responsibility for maintaining confidentiality, if they so wish. (If the student states a preference as far as disclosure is concerned, then this information should be made readily available to all staff who are involved in teaching them.) Students with visual impairments must recognise the possible consequences of non-disclosure, and that such an attitude risks not only the safety of others on the fieldcourse, but also might be in breach of departmental and institutional safety policies.

Many students do not want to be treated as 'special cases', or given preferential treatment. Nevertheless, the special demands made by field study may make it necessary for visually impaired students at recruitment to be made fully aware of the need for full disclosure, at least to subject staff, so that their needs can be built into the decision making process when fieldwork is being organised. (This issue is discussed from another perspective in Section 7.2.)

7.1.5 From recruitment to enrolment

When a visually impaired undergraduate student applies to the Universities and Colleges Admissions Service for the UK (UCAS), then they must declare the nature of their disability on the application form. Similarly, if they decide to enrol on your course, then they should consider applying for a Disabled Students Allowance (DSA) (see Section 5.1).

7.2 Learning from recruitment

The recruitment process presents an ideal opportunity for learning from blind and visually impaired students whether there is likely to be any potential conflict between their impairment and the subject they are intending to study, and the study methods adopted on your courses. Whether you interact with them at open days, campus visits, formal interview or some form of correspondence, use these channels of communication to reappraise your fieldcourse offerings. Invite the students to compare your facilities and approaches to study with those they have experienced in the past. How do you match up? How could you improve what you do?

These interactions could be used as the basis for re-thinking the study requirements of your courses. To facilitate this process, the *Teachability* project at Strathclyde University (Shaw, 2000) suggests the following questions (these have been adapted for the purposes of this guide):

1. How accessible is the curriculum for students with a visual impairment?
2. How might the curriculum be made more accessible for students with a visual impairment?
3. What steps would need to be taken to implement the ways identified to enhance access to the curriculum?
4. What barriers are there to achieving the changes you have identified and what can be done about them?
5. How can the ways in which the curriculum is particularly accessible or inaccessible be made known to potential students with a visual impairment?
6. What information do you think potential students for your programme would need to have to make an informed decision about whether they could undertake the programme?
    - Is there anything you could add (or change) to help potential students, including those with impairments, to take a more informed view about whether they could and would want to undertake your programme?
    - Do you give potential students a named contact in the department if they remain in doubt about whether they could undertake your programme?
7. How could you make information about your programme(s) more easily available to potential students, some of whom have impairments?

8 Designing and Implementing the Fieldwork Curriculum

The basis for successful fieldwork by blind and visually impaired students needs to be designed into the curriculum from the outset. Several aspects of this design process are described in the following documents:

- Defining fieldcourse objectives and study activities (Section 8.1)
- Selecting fieldcourse study areas (Section 8.2)
- Selecting fieldcourse accommodation (Section 8.3)
- Undertaking an audit of fieldcourse venues (Section 8.4)
- Fieldwork assessment (Section 8.5).

8.0.1 Strategies and approaches

Here are some ideas you might like to think about:

- Treat curriculum development for the blind and visually impaired student as a twin process, involving the designing in of opportunities and the designing out of barriers.
- Consider problems likely to impact on the visually impaired student during the design and validation of the entire geography course, from the total package down to the individual module and topic. Since fieldwork is normally inter-related with other elements of the curriculum, it makes sense for the needs of visually impaired students to be considered at all levels and stages of their programme, rather than considering the field elements in a vacuum.
- Although it may be necessary to modify existing field study to remove barriers to access by the visually impaired, it is better, wherever possible, to create field study with accessibility designed in from the outset. As the authors of the Mobility Guide (Gardiner & Anwar, 2001) in this series suggest: '*It is better to attempt to design a programme which is accessible in the first place than to try to make one accessible later as an afterthought.*'
- Include accessibility statements in all course documents, and include full details of activities that are likely to impact on the blind or visually impaired student in fieldwork documents, such as travel, accommodation, the field study area, fieldwork activities, etc.
- Involve as many people as possible in the design process – blind and visually impaired students, staff from the Disability Support Unit, staff involved in running the fieldcourse, etc.

8.1 Defining fieldcourse objectives and study activities

In the twenty-first century, it is no longer appropriate to make ad hoc arrangements for students with disabilities. External pressures, such as the QAA *Code of Practice: Students with Disabilities* (QAA, 1999), and the Special Educational Needs and Disability Act, require that necessary steps be taken to ensure that students with disabilities are not disadvantaged during their higher education studies (see Section 4.2).

8.1.1 Learning objectives

The selection of appropriate learning objectives for fieldwork should be based on criteria that include the assessment of their suitability for visually impaired students. This raises the question as to whether it is desirable to modify objectives to suit the needs of individuals, in the sense that all students should be challenged to experience something beyond their current experience and capabilities. It also raises the question as to whether it is possible to modify learning objectives, in the sense that it may be educationally impoverishing to remove certain activities from a field study programme to suit a particular group of students.

An alternative way of approaching this issue is to take the view that it academically desirable to consider the needs of **all** students as part of every curriculum planning exercise. Thus, the prior experience and learning styles of students should be considered when designing any curriculum – whether it is to be delivered on campus or off campus. Here are some specific questions that might be asked of individual learning objectives:

- Are there any reasons why this learning objective may not be achieved by visually impaired students?
- Can this learning objective be redefined so as to minimise problems to visually impaired students?
- Is there an alternative objective that can be substituted with no significant loss of learning for other students?

These questions should be asked in relation to both existing and proposed fieldwork objectives.

8.1.2 Fieldcourse activities

When the broad learning objectives have been established for a particular fieldcourse, the detailed study activities can be decided. Typically, these are related both to the learning objectives established for the fieldcourse, and also to the characteristics of the field study area. However, the selection of appropriate fieldwork activities also needs to be based on criteria that judge their suitability for visually impaired students. Again, both existing and prospective fieldwork activities need to be reviewed in relation to these needs.

Normally, a single set of fieldwork activities is drawn up, and is followed by all students. However, when fieldwork involves visually impaired students, alternative approaches are necessary. Here are two examples:

- Before a fieldcourse, draw up a list of the proposed field study activities, and rate each according to the problems they might pose for visually impaired students. In the light of information about the visually impairments affecting students in the group going on the fieldcourse, select those activities that are least problematic.
- For each fieldwork learning objective, identify alternative but equivalent activities that place different demands on students in terms of their visual information processing demands. During the fieldcourse, allocate visually impaired students to those activities that rate low on visual information processing demands, and/or use only those activities that make low visual information processing demands.

8.2 Selecting fieldcourse study areas

Fieldcourse study areas are typically chosen for a variety of reasons. Among these are:

- to introduce issues or problems that are strongly or uniquely represented by a particular area
- to provide scope for applying investigative approaches and skills introduced in on-campus classes
- to enable the testing of specific theories
- to provide case study illustration of specific course themes
- to provide exposure to a range of related themes or problems within a relatively limited journey time from a fieldcourse base.

The challenge for staff designing fieldcourses is to add additional selection criteria for assessing the suitability of fieldcourse venues for blind or visually impaired students. Among these criteria might be:

- Travelling difficulties – e.g. are there particular problems in getting to and from the study area?
- Study site accessibility – e.g. how difficult is it likely to be for visually impaired students to get to specific study locations (e.g. using roads and paths) and to move around in the field (e.g. rough terrain)?
- The range of study venues within the area suitable to blind or visually impaired students – e.g. is the bulk of the fieldwork to be undertaken in one or two locations, or are students required to move from one location to another during the fieldcourse? (In terms of learning curves, it is clearly advantageous for visually impaired students to have to cope with a limited number of locations.)

As mentioned elsewhere in this guide, it is important to discuss these issues with the individual students concerned. It might be appropriate to sit down with maps of the intended study locations in order to talk them through likely problems. It might be possible to reduce some of the problems by rescheduling or relocating field study activities.

8.3 Selecting fieldcourse accommodation

A significant number of the problems encountered by blind and visually impaired students on fieldcourses centre on the venue at which they stay. Paying attention to the needs of such students when selecting accommodation can therefore pay off handsomely. Potential accommodation (hotels, etc.) should no longer be considered simply on price, food, rooms etc., but also on the safety issues related to blind and visually impaired students.

Here is a checklist of some of the practical issues that should be checked out at the fieldcourse accommodation:

- Arrival and departure – ensure that someone meets the student on arrival at the fieldcourse venue.
- Access arrangements – e.g. avoid revolving doors.

- Location of room – e.g. ground floor, and away from busy corridors.
- Size of room – recognising that many field study venues have rather basic accommodation (especially rather small rooms), check that the room is large enough to make moving around unproblematic, that it can accommodate a guide dog (if necessary), and that there is enough workspace to enable any additional equipment (e.g. laptop, Braille typewriter) to be used effectively.
- Shared room with buddy? – if so, ensure room allocations take this into account.
- Communal eating arrangements – ease of access.
- Washing and toilet facilities – are these appropriate?
- Eating arrangements – are these safe? If self-service is in operation in the dining room, ensure visually impaired students are paired up with a buddy at mealtimes.
- Evacuation and emergency procedures for the premises used during fieldwork – are all attendees familiar with these?

The Open University is developing a Disability Access Specification for choosing its study centres, which may be of some use when applied to choosing a hotel or field study centre.

Staff involved in running fieldcourses need to devise their own emergency or evacuation procedures for blind and visually impaired students and/or adopt those already in place at their chosen accommodation. Health and Safety Officers at the university should be consulted, as these will have been involved in making risk assessments of the campus environment. For example, Personal Egress Plans (PEPs) similar to those provided for students with mobility impairments on campus could be adapted for the fieldcourse venue. Bear in mind that emergency procedures might not involve evacuation but instead the use of refuges within a building.

It is essential that everyone who needs to know about the formal arrangements is actually informed. This includes the blind and visually impaired students themselves, their student helpers, buddies and room mates, and academic staff leading the fieldcourse.

It should be noted that an increasing number of hotels are making themselves visitor friendly, and include a range of facilities for visually impaired guests. Similarly, official field study centres are often well versed in the needs of visually impaired students. Where a fieldcourse is being held at or near an urban centre, or in a known tourist area, it may be possible to request a list of accommodation venues that are suitable for visually impaired students from a local information centre.

8.4 Undertaking an audit of fieldcourse venues

Risk assessments are an increasing feature of study activities and environments, whether they be on-campus (e.g. a physical geography or computer laboratory) or off-campus (e.g. a field study venue). The fieldcourse reconnaissance visit should always include an assessment based on the needs of visually impaired students, and this is best undertaken as a formal audit. Such audits should also be extended to the areas within which visually impaired students intend to carry out fieldwork while preparing their dissertation.

The main features that need to be subjected to an audit are:

- The fieldcourse accommodation – i.e. the field study base (e.g. a hotel or study centre).
- The field study venues – i.e. where the study activities actually take place in the field.

Based on an understanding of these issues, it might be appropriate to use a proforma to undertake a formal audit of the fieldcourse venue and accommodation.

Additional ideas for carrying out an audit can be obtained by visiting the site of the Fieldfare Trust (http://www.fieldfare.org.uk/), which promotes access to the countryside by the disabled. The Trust is involved in the BT-sponsored *Countryside for All* scheme (http://www.fieldfare.org.uk/bt/btcfa.html), which provides guidelines on those aspects of the countryside that affect disabled people's access. For example, there are suggestions on minimum path width for blind walkers (0.9m), and the avoidance of paths that involve overhanging obstructions. The Trust also manages the BT Millennium Project, which aims to identify and record over 2000 miles of countryside suitable for access by people with a disability.

8.5 Fieldwork assessment

It is important that forms of assessment are addressed as part of the overall design of the fieldcourse. Blind and visually impaired students may feel disadvantaged by the field experience itself, if it is biased towards activities that favour sighted students. They may therefore feel doubly disadvantaged if the methods adopted to assess the fieldwork include those they feel are weighted against them – e.g. requiring considerable use of graphics, such as posters, sketches, computer mapping, and photography. Fieldwork can – and should – be used as an opportunity to recognise the strengths of blind and visually impaired students in other areas, including verbal presentation. Special attention should therefore be given to the kind of assessment used to judge the fruits of this work.

- Standard essays or reports are likely to be the least problematical for blind or visually impaired students to produce, as these will probably have been used in several previous assessments. If a standard report is required, some consideration ought perhaps to be given to the medium in which the blind or visually impaired student is permitted to present it. Alternatives include: word processed document; spoken report (e.g. on cassette); and entirely digital submission (see Section 9 for further discussion).
- The increasingly popular poster presentation may be a challenging form of assessment for the blind or visually impaired student, who might find it considerably more difficult to do well in this presentation medium. Consequently, a verbal presentation may be more appropriate . A Web-based presentation could be both challenging and rewarding for the blind or visually impaired student, and should not be beyond their reach. Many aids are available to assist in the creation of Web documents (see Section 9.6 for further details).

Finally, some thought needs to be given to the somewhat contentious issue of assessment time. How much extra time, if any, should the blind or visually impaired student be given to prepare their assessed work? To a large extent, this issue is not

specific to fieldwork, nor to the blind or visually impaired student, so there already be general institutional or departmental guidelines in place. However, there may be special requirements (such as follow-up work in a physical geography laboratory) that suggests the need for some form of extra time allowance for blind or visually impaired students. This allowance need not necessarily be the same as that granted to students with other forms of disability, because the follow-up work may not impact equally on all students.

8.5.1 Action points

- Identify institutional or departmental guidelines towards the awarding of additional time to meet special student needs related to assessment.
- Discuss the time extension issue with all students, and perhaps indicate that any additional time allowance given for assessment preparation are no different to the time allowances made on a day-to-day basis during the fieldcourse itself.

9 Preparations

Much of the groundwork for successful fieldwork by blind and visually impaired students will take place well before the field study actually starts. Several relevant planning and preparatory activities are described in the following documents:

- auditing fieldcourse venues
- fieldcourse accommodation
- travel arrangements
- handouts.

Planning your field study should begin by establishing the precise details of any visual impairments among the students participating in the fieldwork, and talking through with the students their impairment in relation to specific study activities. Early discussion with students is vital, because it may be necessary to vary the overall fieldcourse strategy based on student feedback (see Section 6.1). Ideally, someone familiar with the problems should carry out a reconnaissance, preferably under the same conditions as students will be working. Part of the planning process might involve consultation with others, including operators of transport facilities and sites to be visited. Some might have specific policies with respect to access for students with mobility impairment, and some might even be able to offer help and assistance.

9.0.1 Action checklist

These are some of the key issues you should be thinking about when preparing for fieldwork that is likely to be undertaken by visually impaired students:

Information dissemination (by staff)	Have all staff involved in the fieldcourse disseminated relevant information to visually impaired students (e.g. at lectures and seminars, through handouts, on an intranet Web site)?
Information gathering (by students) – maps, articles, guides, Internet	Have visually impaired students been properly briefed on the preparatory activities they need to undertake for their fieldcourse? Do they require any special resources in order to undertake these activities? For example, if the entire student group is to analyse geographical information available in a virtual fieldcourse system, how will the visually impaired students do this?
Financial support	Have visually impaired students been made aware of sources of funding available to them for acquiring special equipment or other resources needed for their fieldwork?
Form filling	Do your visually impaired students require any assistance in filling in forms related to the fieldcourse?
Risk assessments	Have you undertaken a risk assessment of the entire sequence of activities involved in the fieldcourse? This should include the preparatory work in and around campus right through to the follow-up and assessment work after the fieldwork is over.

Developing student-led support mechanisms	One of the more effective forms of support for visually impaired students will come from their peers. Have you encouraged students to develop strong mutual support networks? It is best to do this right at the start of the degree programme, rather than leaving it to the eve of the fieldwork, as this is the best way to ensure that such support will be fully bedded in by the time the fieldwork gets under way.
Travel issues	Some elements of fieldcourse planning are normally left to the students themselves – e.g. travel to and from the field centre. However, for visually impaired students, some form of planning and staff intervention may be necessary. Have you decided which aspects you need to include in your fieldwork planning?

Although this list might appear burdensome, there are usually various people to hand who can help with some or all of these issues (see Section 4.3 for details).

9.0.2 Team work

It is imperative that all people involved in the fieldwork activities know about the visually impaired students and their particular requirements. Amongst those who need to be informed are:

- the departmental secretary or college administrator who makes group transport arrangements for students, or who books field venue accommodation (would a ground floor room be preferable?)
- the teaching assistant who helps to prepare handouts for the fieldwork
- the departmental technician who prepares equipment for use in the field.

9.1 Note taking skills

Because note taking is such a fundamental study skill, training sessions should be arranged for blind and visually impaired students on taking accurate notes, both in pre-fieldwork activities and in the field itself. These sessions could be arranged jointly between subject staff and staff in the campus disability support unit. The former would be particularly knowledgeable of the constraints of note taking in the field, while the latter would be familiar with a range of support technology.

9.1.1 Note taking on campus

Blind and visually impaired students will be expected to undertake a considerable amount of note taking, whether related to fieldwork or to general study. It is therefore important at an early stage in their course that they not only practice extensive and varied forms of note taking, but that they also become comfortable with using whatever technology they feel is necessary, and in a variety of study environments. It might be useful for fieldcourse tutors to arrange some kind of simulated field environment (e.g. a busy shopping street, a tract of farmland, a stream, or a hill slope) in which the blind or visually impaired student can practice note taking before the fieldcourse gets under way. (For related information, see Sections 6.3, 9.3 and 9.8.)

9.1.2 Note taking in the field

In many field situations, the most effective recording device for the visually impaired or blind student is likely to be some kind of tape recorder – e.g. a Dictaphone. Alternatively, a buddy or field helper could be arranged to record notes for them. This raises the significant question as to whose facts and ideas are being transcribed. Wherever possible, it is perhaps best for the blind or visually impaired student to dictate to a sighted helper. Alternatively, the sighted helper might describe something they are observing in the field, then let the visually impaired student record the finding in their own words, assisted by interrogating the sighted helper (see Sections 6.5, 9.8 and 11).

9.2 Lectures and laboratories

An essential component of the fieldwork experience are the lectures and laboratory sessions that precede, accompany and follow the study activities in the field. Among the things you can do to make lectures more accessible to visually impaired students are:

- Ensure that full advance notice is given and that physical access to the lecture or lab venue is easy.
- Ensure that visual aids used in a lecture or presentation are either directly accessible (e.g. large text format) or that some alternative is made available (e.g. in digital format on a floppy disk, or on a Web site).
- Describe the contents of any visual material (e.g. table, graph, map) displayed on screen or board.
- Pace the presentation so that visually impaired students can keep up in terms of (say) Braille or PC note-taking.

Visually impaired students should be encouraged to:

- Use a cassette recorder to record the lecture, which they can transcribe at their leisure later – remind staff to reserve a front-row seat if a visually impaired student requests one.
- Use a Braille typewriter or laptop computer to take notes.
- Use a peer note-taker – i.e. a student who will share their class notes with them. (The university disability unit may be able to provide free carbon paper to student helpers to provide this service for visually impaired students in their class.)
- Bring their guide dog into class rooms (if they have one) – allocate a suitable seat so that the dog is not in other students' way. (This is especially important in laboratories, where the possibility of accidents may be greater.)

For laboratory work, the following additional issues are also important:

- Provide suitable additional task lighting for non-blind visually impaired students.
- Ensure that appropriate safety procedures are in place, and that visually impaired students have been trained in their observance. (See your local health and safety representative for professional advice on the use of laboratories by visually impaired students.)

9.3 Handouts

Handouts are widely distributed to students in higher education, partly to outline the content, structure and requirements of specific courses of studies, and partly to support individual classes. For blind and visually impaired students, copies of the standard printed handouts may not be very helpful. Here is one alternative:

Large print

Although large-print documents are of little use to blind students, they are a valuable and relatively cheap option for students with low-vision sight, especially in view of the growing student ownership of PCs and laser printers. The best option if printing from a PC is to use a sans serif font (e.g. Arial), 18 point font size (larger font sizes reduce the number of words per line, and make reading progressively more difficult), and optionally adopting a bold type. The text should be kept as simple as possible, avoiding italics, underlining and font changes wherever possible, and there should be clear space between individual paragraphs. Alternative paper colours help students with some forms of visual impairment with their reading – find out beforehand which paper colour is best for each visually impaired student. Avoid using graphical images for backgrounds. Large print versions of existing handouts can also be made using the enlargement facilities of a photocopier, though some cutting and pasting might be needed to fit the enlarged material onto standard-sized paper.

Where students have more serious visual impairments, consider using non-visual alternatives. These include:

Braille

Despite impressions to the contrary, Braille is not much used by students with an acquired vision loss. Even the former Secretary of State for Education, David Blunkett, finds Braille too unwieldy – over two large cardboard sheets needed to contain the information from a single A4 sheet. He opts instead for information spoken into a tape recorder which he plays back at twice the normal speed (Carvel, 2000) – see below.

Audio cassette

Because of the popularity of 'talking books' among the blind, staff should seek the views of any visually impaired students planning to undertake fieldwork to see if they make regular use of this technology. If so, they should liaise with the local university disability unit to explore the possibility of creating a spoken version of relevant handouts or briefing sheets. Alternatively, a sighted student might be prepared to read the contents of relevant handouts into a tape recorder for the visually impaired student.

Synthesised speech

Where the text of fieldwork handouts are already available in digital form (e.g. as word-processed documents), it might be possible to create a digital speech file using speech synthesis software (see below). If the material is available as Web documents, then the student might be able to listen to the contents using a screen reader or a Braille display (see Section 6.3). An increasing number of files on Web sites use the Acrobat portable document format (pdf), because this ensures that the documents have the same layout as printed versions. As a result of accessibility initiatives from Adobe (see details at http://access.adobe.com/), Acrobat pdf files can be read by visually impaired students in two ways:

- use a utility program to convert them into a simple text or HTML version that can be read by a screen reader program
- use a JavaScript program that speaks the contents of forms in PDF documents through a synthetic voice (e.g. using the Microsoft text-to-speech engine – for details see Section 6.3).

In order to get handouts translated into alternative versions, it is essential that you plan ahead. It is a good idea to have alternative versions prepared for distribution to the blind or visually impaired students at the same time as the standard printed versions. If the visually impaired students are going to undertake the conversion themselves, then they will need to receive the original version in good time – last-minute distributions of handouts are virtually useless. Also, it is easier for the student to convert from a digital version than from a paper version.

9.4 Maps and other graphics

Maps are a standard form of visual communication amongst geographers, geologists and environmental scientists, and play a significant role in fieldwork. Maps are not only reference sources and navigation tools, but are also a means of presenting numerical and other structured data in graphical form, through thematic mapping and spatial data visualisation. If maps are out of bounds to visually impaired students, then their experience of field study will be considerably impoverished.

There are two broad approaches to making maps accessible to the blind or visually impaired student:

- create versions of maps that are readable by students with poor vision
- create map substitutes that are accessed through non-visual sensory pathways.

9.4.1 Redesigning conventional maps

An example of the former approach is the experience of the author who taught a near-blind student some years ago. For a map interpretation exercise, heavily simplified thick-line versions of the map handouts were prepared for the visually impaired student. Using his residual vision assisted by strong lighting he was able to make out the shapes of rivers and contours sufficiently well to enable him to comment on the spatial patterns and what they meant. We arrived at this solution by discussing with the student how we might be able to introduce him to conventional maps, which he had not previously used.

One of the benefits often claimed for digital maps is that they enable the publisher to produce maps with any combination of content and any desired symbolism. Because of the ready availability of desktop mapping and GIS software in most geography departments (e.g. MapInfo, ArcView), it is now easier than ever to convert the symbolism of a standard map into a form that is more legible by partially sighted students. Here are some useful conversions:

- *Reduce information complexity*. This can be done by separating the content of (say) topographic maps into separate layers, and perhaps printing or displaying them individually or in pairs. Although the complex spatial associations between different types of feature may be lost by doing this, the visually impaired student will at least be able to interpret some of the individual patterns, and can always attempt to compare features on a pair-wise basis.

- *Emphasise linework*. This can be done by drawing solid thick lines wherever they do not overlap other significant features, and by adopting larger and simpler point symbols.
- *Choose colours carefully*. Here, the objective is to make colours stand out clearly from the background, and to avoid problems caused by colour blindness. If a single feature is displayed on a map, then colours can be dispensed with entirely, and high-contrast black-and-white used instead.

9.4.2 Creating non-visual maps

The most common forms of non-visual map are sonic and tactile. Although there were early experiments in producing sonic navigation aids that attempted to provide a high-information representation of the environment, many of the electronic travel aids are now restricted to providing the minimum amount of information about the environment that can support the visually impaired person's primary mobility aids (see Section 6.3). Some geographers have experimented with making sonic maps in which geographical data are converted to sounds so that they can be heard by visually impaired or blind students.

Tactile maps have had a longer history, and are currently widely used. (For a general description of tactile graphics, see Section 6.3. For a general review of their educational use, see Hinton, 1994/5.) Tactile maps typically use 'raised-line' technology to enable blind or visually impaired map users to 'read' what a sighted person might see on a conventional printed map. Tactile maps consist of raised lines, shapes, textures and symbols, and are produced using a number of different technologies. The most common are:

- **Microcapsule paper**. Maps are hand-drawn or printed onto heat-sensitive microcapsule (or 'swell') paper, and when it is heated, the paper covered by black ink raises above the paper surface.
- **Thermoform**. A two-and-a-half dimensional map is produced, to act as a master. A thin plastic sheet is then placed over the master, and vacuum shaped into a tactile map.
- **Embossing Maps**. Created from patterns of raised dots, using a computer-controlled Braille printer. This is perhaps the least useful form of tactile map, though it is a cheap method of producing some kinds of tactile diagram.

Recent developments include the harnessing of several sensory modalities, including the tactile. One example in the TACIS system, funded by the European TIDE Programme, which uses a combination of tactile, tonescape and speech information to convey spatial information to the user.

In the UK, tactile maps can be acquired from the National Centre for Tactile Diagrams (NCTD) at the University of Hertfordshire. Maps from existing paper sources can be produced very rapidly, and entirely new tactile maps can also be produced, though these usually take longer. The costs are subsidised because of grants received from the various higher education funding councils.

9.4.3 Research and development issues

One of the important issues being discussed in the field of tactile map-making concerns the question of whether tactile maps should attempt to reproduce visual maps in a tactile format, or whether they should seek to represent the environment in

ways that are more compatible with the visually impaired user's sense of spatial awareness. There is now considerable research being undertaken into the way in which people with visual impairments build up their awareness of the environment, and how this differs from the process adopted by fully sighted people (Challis & Edwards, 2000; Marek, 2000; Ungar, 2000).

Another issue concerns the standardisation of symbols used in tactile maps. To some extent this will be informed by research into how best to represent features that accords with users' spatial awareness. One initiative involves building a database of tactile symbols (DOTS) (Tasker, 2000).

9.5 Video and multimedia

Video has traditionally been used in geographical teaching as a means of introducing students to elements of places and peoples that it might not be feasible to encounter at first hand. In relation to fieldcourses, video can be used not only to introduce students to some of main the characteristics of the study area, but it can also be used by the students themselves as a field study tool, recording interviews with key local informants, or creating a video 'poster' for assessment purposes.

On the surface, the viewing and creating of videos would appear to be totally unsuited to visually impaired students. However, this need not necessarily be the case, because many blind and visually impaired people routinely watch TV programmes. The Scottish Sensory Centre (SSC, 2000b) provides useful guidance in three related areas:

- how to make best use of existing video materials – choosing, supplementing, and using
- how to extend the use of existing video materials – index marks, annotated stills, supplementary audio, text subtitling
- how to develop new video materials – handling colour, contrast, complexity, movement, text and supplementary materials.

9.5.1 Multimedia program adaptations

Many multimedia simulations make extensive use of graphics, whether they are static images, video sequences or animations (e.g. computer-generated animations). Most of these are inherently inaccessible to blind or low-vision students. Rothberg & Wlodkowski (1998) review techniques for enabling graphics within simulation programs to be converted into narrated audio or text-to-speech output.

9.6 Web materials

According to the regular Georgia Tech surveys (GVU, 1998), about 8% of Web users have a disability, and nearly half of them are blind or visually impaired. Creating Web documents and sites that are accessible to the visually impaired student should therefore be an important objective for all departments in higher education institutions that rely on Web-based information.

An increasing amount of student information is derived from Web sites. There are numerous virtual fieldcourses on the Internet, and many departments of geography have their own Web server which stores information that is used to brief students on fieldwork and fieldcourses. With this in mind, it is important to review the effectiveness of this online resource for the visually impaired student (see Section 9.7 for a complementary discussion of the visual interface of modern desktop software).

The Web is almost entirely a visual experience. Not only do students have to navigate their way around the Web using a GUI, but the Web pages they encounter are likely to contain graphical images, and are laid out in ways that make design sense – i.e. visual design sense – to those who created them. Where a document consists largely of text, readability issues come rapidly into play (Nielson, 2000); where a document includes graphics, accessibility issues become more significant, though even poorly designed text can prove troublesome for visually impaired students.

9.6.1 Accessibility and accessible design

According to the RNIB, 'an accessible Web site is one that can be accessed by everyone' (RNIB, 2001). Accessibility is the degree to which a Web document or Web site can be successfully 'read' by a person with some kind of impairment. In this guide, accessibility refers to the success with which a blind or visually impaired student can use a Web site or document, and accessible design is the skill of creating a Web site or document that ensures accessibility for blind or visually impaired students.

What, then, can be done to ensure that Web documents created for, or recommended to, visually impaired students are fully accessible to them? Perhaps the first principle to acknowledge is that reading from screen can be visually uncomfortable or stressful for many people, not just for those with a recognised visual impairment. Here are some **general usage rules** for visually impaired students that will help them minimise eye discomfort (Williams, 1998):

- ensure the height of the computer screen is below normal eye level – this is particularly important for users of bifocal glasses
- sit further away from the screen, because eye strain increases as tasks are closer
- reduce the brightness level of the screen
- reduce reflective glare from the screen by using a (polarised) filter
- balance the illumination on documents used at the computer to that of the screen
- place documents at the same distance away from the eyes as the screen
- take regular breaks.

Here are some **general design rules** that can help to ensure that the visually impaired student will be able to read from the screen:

- adopt relatively simple fonts, or those that are most similar to those encountered in everyday reading (from paper sources)
- keep lines of text relatively short
- avoid visual distractions – e.g. bold colours, flashing and moving elements
- keep backgrounds plain to avoid visual interference with text
- provide clear signposting and navigation
- ensure that all images have text tags describing their contents.

It should be noted that many of these guidelines will make it easier for **everyone** to read Web documents from screen.

Visual impairments provide specific challenges to Web designers, over and beyond those relating to users with normal sight. The following notes summarise some of the best practice advocated on the Web itself.

9.6.2 Visual acuity

Perhaps the simplest approach when designing Web pages for students with poor visual acuity is to use a large font size for all text. An example of a Web site that does this is the National Library for the Bind site at: http://www.nlbuk.org/navigator.html. A more flexible approach is to allow the user to change text fonts, text colours font sizes and background colours to suit their visual capability. Here are some useful examples:

- The Action for Blind People Web site (http://www.afbp.org/cgi-bin/parser.pl/1005/www.afbp.org/homepage.htm) allows users to choose a variety of colours, fonts and font sizes.
- The Guide Dogs for the Blind Association Web site (http://www.gdba.org.uk/) is designed so that blind visitors can use speech synthesising software to read the text on its pages, and partially sighted visitors can adjust the font size and background colour to improve readability.

Another flexible approach to handling text is to put all text formatting in a 'User Style Sheet', rather than in the Web document itself. Different versions of the style sheet can then be made available to suit people with different visual impairments (cascading style sheet technology is supported by the latest versions of most browsers).

Even if Web designers do not provide this kind of flexibility (and few do), students can readily change the default font size on their browser to improve the readability of the documents they are reading. Here is how it is done in the two most commonly used browsers:

Netscape 4

To increase the text size in a document, click on the **View** option on the toolbar, and select the 'Increase font' option – click on this repeatedly until the text in the current document is the required size. Alternatively, click on the **Edit** option on the toolbar and select 'Preferences' from the drop-down list. Click on the 'Appearance' section, and select the 'Fonts' and 'Colors' options. Be sure to click on the relevant check box to override the settings embedded in the Web documents. (It is also possible to change the link colours.)

Internet Explorer 4

Click on the **View** option on the toolbar and select 'Internet options' from the drop-down menu. Click on 'Font' or 'Colors' to change the text colours, font and font sizes.

In each case, the new setting overrides that of the document itself, and stays in force until it is changed again.

Another design tip is to avoid using multiple frames, as these reduce the amount of space available for enlarged text. If frames are unavoidable, then they should be arranged horizontally across the screen, to reduce the need for horizontal scrolling should the text size be increased.

Most blind computer users rely on 'screen reading' software, which extracts the text in a Web document so it can be spoken by a speech synthesiser or passed to a

Braille display (see Section 6.3 for details). For these to work effectively, it is important to ensure that all components in the Web document are represented with suitable text. For example, image descriptions should be provided using the 'alt=' tag, and links to other documents should be provided in text form if image links are adopted. Splitting up a document into vertical columns can be problematic for less sophisticated screen readers, which read from left to right across the document.

9.6.3 Colour blindness

Colour blindness, or more generally colour deficiency, is common amongst males (affecting 8% of the population), but less common amongst females (affecting only 0.5% of the population) (Hess, 2000). Although there are several forms of colour deficiency, each involving a weakness in sensitivity to a particular colour (e.g. protanopia, protanomalia, deuteranopia and tritanopia), few affect more than a small fraction of the male population. The most common condition is deuteranomalia, a weakness in green sensitivity, which affects 4.9% of the male population.

There are both general and specific ways of designing Web documents to ensure that readers with colour deficiencies will not be disadvantaged (Lowney, 1998; Arditi, 1999):

- Avoid using colour as the sole means of conveying information, using it instead as a supplementary coding.
- Ensure that text and graphics stand out against their backgrounds. One way of doing this is to adopt a strong contrast between foreground and background colours. In practice, this might mean using a suitable combination of black and white (or light and dark greyscale levels), or adjusting the lightness and saturation of the required hues. This can be done relatively easily for illustrations, because most painting and drawing programs provide tools for adjusting the three basic components of colours in the HLS (Hue-Lightness-Saturation) colour model.
- Let the user customise colours to suit their own needs and preferences.

For detailed guidance on the technical issues behind the design of 'safe' Web colours for those with colour-deficient vision, see the discussion and tools at Christine Rigden's BT site (Rigden, 2000).

For their part, users should ensure that the colour contrast is set relatively high on their computer monitor. (Microsoft Windows also provides the ability to switch to a High Contrast setting from the Control Panel.)

9.6.4 Web accessibility guidelines

Because of the growing importance of the Web as an information dissemination medium, several individuals and organisations have attempted to put together sets of guidelines for the design of accessible Web documents and sites. The premier organisation that defines appropriate accessibility standards for Web sites is the World Wide Web Consortium (W3C), which has for many years been running a Web Accessibility Initiative (WAI). This has published the Web Content Accessibility Guidelines (WCAG) (http://www.w3c.org/TR/WAI-WEBCONTENT/), which are based on expert international contributions. (An extremely useful summary checklist is available from the W3C at http://www.w3c.org/TR/WAI-WEBCONTENT/full-checklist.html, and another from the Iowa Department for the Blind at http://www.blind.state.ia.us/access/tips.htm.)

In the UK, the Royal National Institute for the Blind (RNIB) provides its own guidelines for accessible Web design (http://www.rnib.org.uk/digital/hints.htm), and in the USA the National Federation of the Blind outlines eight principles for designing accessible Web pages (http://www.nfb.org/tech/webacc.htm). The Director of Technology at the National Federation of the Blind has also produced a similar set of guidelines and suggestions for making Web sites accessible to visually impaired users (Chong, 2000).

Several commercial software developers have instigated broad initiatives aimed at making modern desktop software more accessible to the blind or visually impaired, including:

- Microsoft Accessibility site: http://www.microsoft.com/enable/
- Apple's Special Needs site: http://www.apple.com/education/k12/disability/
- IBM's Accessibility Centre: http://www-3.ibm.com/able/index.html
- European Community TIDE Project: http://europa.eu.int/information_society/programmes/evaluation/pdf/reporttide_en.pdf

9.6.5 Web site testing services

A number of organisations and individuals offer Web document testing facilities on the Internet, to see how well they conform to accessibility guidelines. One example is Bobby (http://www.cast.org/bobby/), which is a free service to members of CAST (Center for Applied Special Technology) which helps identify and repair significant barriers to access by individuals with disabilities. Web documents may be submitted to Bobby for vetting, or the software may be downloaded to a user's PC for testing entire Web sites. Sites that pass the tests may display a 'Bobby approved' icon. A somewhat broader test is provided by HTML checking services (there are free ones on the Web at: http://validator.w3.org/, and www.htmlhelp.com/links/validators.htm), which will identify non-standard HTML that may cause problems for screen readers.

Exercise

As a class exercise, identify and evaluate the accessibility of a selection of virtual fieldcourse sites on the Web. (Some examples are listed in Shepherd, 1998.) If they fail to match up to the standards and principles and standards reviewed above, consider contacting the site authors with a view to improving them.

9.7 Using popular computer applications

9.7.1 Commercial software and visual impairment accessibility

In the run-up to fieldwork, during fieldwork and after fieldwork, students will often be required to use general application programs, including word processor, spreadsheet, database, drawing and presentation software. Because the GUIs adopted by most PCs and Apple Macs are intensely visual environments, applications software can present considerable problems for visually impaired students. (See Morley, 1995 for a blind person's view of Windows technology; see Edwards, 1995 for a brief history of the impact of the evolution of GUIs on the visually impaired community, and early responses to it; and see Petrie & Gill, 1993 for a description of some early research on ways of making GUIs more accessible to visually impaired students.)

For several years, Microsoft has been working to incorporate accessibility facilities within Windows to help those with particular disabilities use its operating system and applications software. However, there was a significant hiccup when Internet Explorer 4 was first released without the Active Accessibility facilities available in the previous version (Chong, 1997), and this lead to considerable protest by the blind community (see Section 6.3). Microsoft has since tried to make good by announcing a raft of visual accessibility features in its MSN Explorer software (Microsoft, 2000). Apple also has its own accessibility initiatives, and IBM has recently released a talking Web browser (Home Page Reader 3.0) that includes advanced facilities that will benefit visually impaired students (Keeler, 2000). These include: audio presentation, voice changes, sound effects, and tagging of text links so they can be spoken, and the speaking of multimedia applications.

Despite these and other initiatives, large software and Web companies are frequently criticised for not doing more to deliver accessible software or services. Macromedia, for example, has been criticised for failing to think through effective ways of making Flash animations accessible to visually impaired users (Clark, no date). Blind users have criticised AOL, one of the world's largest Web portals, arguing that its Web site violates the Americans with Disabilities Act (Ananova, 2000b). And the official Web site of the Sydney Olympic Games was severely criticised by the Australian human rights and equal opportunities commission for making it difficult for blind users to access information (Guardian, 2000a).

9.7.2 Improving the experience of using applications software

In the rest of this section, some suggestions are provided as to the approaches that visually impaired students might take when using applications programs, especially in a GUI environment. Most of the discussion focuses on the Microsoft Windows environment, which is used on over 90% of desktop PCs, and on its common applications programs. It should be noted that although many of Microsoft's products adopt its Accessibility Guidelines, their effectiveness is varied.

Readable text

Most application programs allow users to change the font and font size used to display text on screen, including all members of the Microsoft Office suite. Several Windows applications provide a tool to enable quick changes to be made to text size – e.g. increasing the font size in Netscape (q.v.) and increasing the magnification in Word and Excel using the percentage zoom option on the toolbar. Simple fonts are usually more readable than fancy fonts – serif and italics are usually less readable than sans serif fonts and non-italic characters.

Screen display enhancements

Screen enlarger programs allow users to selectively magnify parts of the screen so their contents can be more clearly seen. The effect is similar to holding a magnifying glass in front of a page of text. This kind of utility software is available for most desktop systems, including Windows, Apple, X-Windows and Unix. Another tactic for improving screen legibility is to change the standard mouse cursor for a larger and/or coloured one – the size can be changed in Windows itself, but the colour change requires a separate item of software. Another useful tactic is to acquire a large-size screen (e.g. 19-inch) and use a low-resolution display setting.

Keyboard navigation

The WIMP (Windows-Icons-Mouse-Pointer) environment used on most modern PCs demands excellent vision. For most blind and poorly sighted students, the mouse and cursor combination is difficult to use, especially on portable flat screens where the cursor can be difficult to locate and track visually. Fortunately, almost all mouse actions in the Windows environment have keyboard equivalents, so blind and poorly sighted individuals can more or less dispense with the mouse. Alternatively, if the MouseKeys feature is installed (in Windows), the mouse can be moved using the numeric keypad and certain keys can be used instead of the mouse buttons. Inexpensive but effective aids include large print or Braille keytop stickers. More expensive solutions include the cursor keys provided on some Braille display devices, but these require specially adapted software to work effectively.

Desktop appearance

Visually impaired students can modify several elements of the GUI environment to improve the visibility of the desktop:

- switch to a lower screen resolution – but this may adversely affect carefully formatted documents (e.g. Web pages)
- switch on a High Contrast screen display mode (in Windows)
- use larger text fonts
- use the large-sized version of icons (these are enlarged versions of the originals)
- use customised icons for maximum visual discrimination of available tools.

Sound

Sound can be used to augment actions or events:

- arrange for actions and events to be signalled by distinctive sounds
- assign audible sounds for keystrokes.

For Microsoft Windows users, these facilities are available by clicking on the My Computer icon on the desktop, then clicking on the Control Panel icon, then clicking on the Accessibility Options icon.

Audio input/output

Most applications software is able to output textual information in spoken form, either through standard PC speakers or through a sound card. There are some utility programs than can direct text output from application programs and direct it to a speech synthesiser. AbilityNet provides a fact sheet describing how voice recognition and speech synthesis can be used in tandem (http://www.abilitynet.co.uk/fullvis/alt-tech/cac/Communication.htm).

With the recent advent of effective dictation software for PCs, the promise of audio input is beginning to be realised. Command-driven software (e.g. CAD programs such as AutoCAD) often have add-on software to enable users to speak command keywords, keeping their hands free for other actions. A useful review of voice-recognition systems is available from AbilityNet (http://www.abilitynet.co.uk/content/alt_tech/voice/voice_recognition.htm#Overview).

9.8 Staff and student buddies

Although there is a danger in treating the blind or visually impaired student as a 'helpless' individual, who needs continual 'watching over', there is an equal danger of leaving such students to fend for themselves during various phases of fieldwork. In the daily environment of the college campus, the blind or visually impaired student will have developed routines for getting around, and will quickly develop a familiarity with the layout and location of the various facilities they need to use. However, on a fieldcourse, where there is little time to develop such habitual familiarity, it may be sensible to consider an alternative approach: the buddy (see the related discussion in Section 6.5).

9.8.1 Benefits of buddies

If the visually impaired student has not encountered the idea before, it would be worthwhile discussing with them the benefits of being assigned a particular member of staff, or one or two students, who can act as continual reference points or assistants during field study. Although buddies can be valuable on campus, they are even more important on fieldcourses where the venue and study locations will probably be unfamiliar. A student companion will not only speed the learning process, but will also reduce the risk of accidents.

Buddies can fulfil several specific roles on fieldcourses:

- take notes – e.g. in lecture classes, at briefing sessions, during fieldwork interviews, in the field
- accompany the visually impaired student while undertaking interactive activities – e.g. street interviewing
- accompany the student while undertaking field activities – e.g. landscape observation and recording, environmental data gathering.

9.8.2 Selecting buddies

Buddies should be chosen at an early stage, and preferably well before the fieldtrip itself, so that a relationship based on trust can have time to develop. You should recognise that an on-campus buddy may not be studying the same subject as the visually impaired field student, or may not be in the same student cohort undertaking the fieldwork. If a different buddy needs to be chosen for fieldwork, then ensure they are fully trained – e.g. through the university Disability Support Unit. Check with both parties whether they wish to have rooms near each other at the study centre, or share the same room if double-up accommodation is being used (see Section 8.3 for related discussion).

10 Travel

It is relatively easy to advise students on how to get to a fieldcourse venue, then leave them to their own devices, forgetting the needs of blind of visually impaired students in the group. There are several approaches that can be adopted in these circumstances – the best one to use is the one most acceptable to the individual students involved:

- arrange for them to be given a lift to the fieldcourse venue in a student or staff car
- arrange for them to be picked up and dropped off at the nearest railway or coach station to the fieldcourse venue
- arrange a minibus or coach to take all students to and from the fieldcourse venue
- advise the blind or visually impaired student of the various travel options available.

These approaches apply specifically to formally organised fieldwork involving groups of students. It can be more difficult making suitable arrangements for students working alone – e.g. on dissertation-related fieldwork. In these situations, it may be necessary to ask a buddy or study helper to provide transport, and discuss repayment of the costs with the department or the institution's disability adviser.

10.1 Mobility aids

The primary mobility aids used by blind and partially sighted students are likely to be the Guide Dog (Section 11.2), the long cane, and personal helpers (e.g. Buddies – see Section 9.8). Other recent technological innovations include tactile maps, various electronic travel aids and personal navigation kits.

Electronic travel aids (ETAs) (see also Section 6.3.3) are designed specifically for use outdoors, and have been the subject of considerable research and development over many years (Foulke, 1986). There has been some debate (Heyes, no date, a) as to whether such devices should attempt to provide a complete non-visual 'map' of the immediate environment (i.e. a vision substitution system), or whether they should provide a small amount of information on a specific characteristic of the environment (e.g. a mobility support aid).

The Sonic Pathfinder falls clearly into the second of these categories, and is designed specifically as a supplement to other primary mobility aids. This is a head-mounted device which provides a simple tonal display that provides advance warning of objects that lie in the user's travel path (Heyes, no date, b). It is a highly selective aid, providing information only of immediate practical use to the pedestrian, and prioritising objects lying straight ahead of the user. As with data sonification devices, training in the use of ETAs is essential. In the case of the Sonic Pathfinder, training has to be provided by specialist trainers, and takes several sessions spread over the best part of a week.

A more advanced and integrated system, involving the use of GIS and GPS technology, has been developed as part of the **Personal Navigation Assistant** project (Golledge *et al.*, 1991; Loomis *et al.*, 1998).

11 Field Activities

There are four broad types of activity that occur on fieldcourses that are significant for blind and visually impaired students:

- 'Everyday' activities – those activities relating to the daily round that would be undertaken whether the student was on a fieldcourse or not (e.g. eating, socialising). Little more will be said of these in this guide, though it is important to understand that even apparently simple tasks, such as getting dressed, eating meals, and using toilet facilities, may take longer than anticipated, and may therefore need to be factored into the daily schedule during a fieldcourse.
- Study centre activities – evening activities should adopt the same conventions and approaches adopted for activities undertaken on campus during the preparatory and follow up phases of the fieldwork (see Sections 9.2 and 9.7).
- Travel and movement while undertaking fieldwork (see Section 11.1).
- The field study activities themselves (see Section 11.3).

11.0.1 Social dynamics

Some general issues relating to how students work together in the field also need to be considered in relation to all of the activities listed above. For example:

Should visually impaired students work alone?

Blind or visually impaired students are every much as sociable as sighted students. During work in the field, and follow-up activities in the evening, as well as during recreational breaks, try and encourage situations where the visually impaired student is able to capitalise on their gregariousness, etc. The last thing you should try and do is to cocoon them. Consider how you might organise each day's activities in the field so that it includes both individual and group work (Section 6.5), and do your best to include the visually impaired students as equal members of each work group.

Should visually impaired students work with their buddies?

Section 9.8 explores the important role of the student buddy or study companion for the visually impaired student. However, it may be necessary to moderate the time that these pairs spend together in the field, so that the visually impaired student benefits from the social and team-based experiences that are such an integral part of most fieldwork. (By contrast, where a visually impaired student is engaging in lone field research, say while preparing a dissertation or project paper, the role of the buddy would be paramount.)

11.0.2 'Look-see' visits

When (literally) pointing out landscape features, tutors should use a more fully descriptive approach. For example, instead of saying ‘over there...’, a better phrases might be: ‘across to your left, in the middle distance beyond a low field wall...’ Invite regular questions from the blind or visually impaired student – your answers might be more than occasionally helpful for sighted students.

11.0.3 Guest lectures

It will be necessary to brief guest speakers on the need to consider an appropriate speed of delivery to permit the visually impaired student to take notes. This applies equally to lecturers visiting the field study venue or talks being presented at external organisations.

11.1 Getting around

In a recent survey of over 1000 blind and partially sighted young people, it was found that over 80% had difficulty getting out and about, that 70% of those in mainstream schools had not received mobility and attendance education, and that most wanted more mobility education (Sortit, 2000). This is corroborated by a recent RNIB survey (Guardian, 2000c), which found that only about a quarter of visually impaired young people in the UK have received mobility education. The need for careful thinking about fieldwork-related mobility is therefore likely to be of considerable importance to any visually impaired students on your course.

11.1.1 Some practical issues

Getting around involves not only moving about while undertaking field study activities, but also travelling to and from the fieldcourse venue (see Section 10), getting around at the field studies centre (a hotel or study centre), and also in the local area. All students and staff should attend to basic safety procedures when walking around the fieldwork venues. Additional issues come into focus when students are required to work individually in the field, not just on organised fieldcourses, but also when undertaking personal dissertation-related fieldwork.

Some specific field-related mobility issues are summarised in terms of risk in the list below:

Field terrain

Not all terrain is difficult for visually impaired students to negotiate (see Section 2.4 for a description of the problems likely to be caused by specific impairments). In many cases, strict policing of the safety rules adopted for all students will suffice, particularly where accidents might occur (e.g. crossing a stream or climbing across scree slopes). If you are in any doubt as to whether a particular sortie could prove problematic to a visually impaired student while in the field, have a discrete chat with the student involved, describing the nature of the terrain they are likely to encounter.

Urban environments

For blind students and students with severe visual disabilities, pedestrian safety is a prime consideration, especially when undertaking field surveys in busy urban areas. Some guidelines from an American source are available in the Pedestrian Safety Handbook published by the American Council for the Blind (http://www.acb.org/pedestrian/index.html).

Overseas

A considerable amount of fieldwork by UK universities is now undertaken overseas. In addition to general health hazards (e.g. poor quality drinking water) there may be additional features of a particular field venue that could pose problematical to the visually impaired student – e.g. poor quality bathing water, lack of access to local medical facilities. These should be explored

systematically when undertaking the fieldcourse reconnaissance. Although overseas travel can place additional burdens on students, these should not necessarily be over-stressed, as visually impaired students may be just as equally well travelled as their peers.

One point worth bearing in mind is that some countries provide concessionary rates for travel on public transport by people with visual impairment (e.g. Diamond, 2000). And in the UK, 1995 legislation to be enacted from 31 March 2001 means that blind people cannot be charged extra for taking their guide dog in a taxi.

For an exploration of some of the technology that can be used by visually impaired students to get around in the field, see Sections 6.3 and 10.1. Other related parts of the guide include Sections 6.5, 10, 11.2.

11.2 Guide dogs

If a dog is man's best friend, then for many blind students it is an essential study companion.

One thing to bear in mind is that for a blind student, a guide dog may actually make fieldwork possible, where the absence of a dog may make certain activities extremely difficult to undertake.

How should you accommodate a student's guide dog? How should other students behave with the dog around? And what specific implications does a guide dog have for field study? Many general answers are available on the Web site of the Guide Dogs for the Blind Association (http://www.guidedogs.org.uk), or through the links to the many guide dog Web sites in North America listed on the Ability Web site (http://www.ability.org.uk/Guide_Dogs.html).

In planning fieldwork which includes a blind student bringing along their dog, there are a number of issues that need to be considered:

- **Space**. Ensure that suitable space for a guide dog is available, for example in briefing and work sessions, on minibuses, and during visits to external organisations.
- **Weather, etc.** Guide dogs may get very wet if it rains, or very dirty if fieldwork is undertaken in open ground or near rivers. This should be borne in mind when planning sites for activities.

Ask the visually impaired student when and where they are likely to need to be accompanied by their guide dog. Where the dog is not needed, consider whether it may need to be quartered. Many blind students will always want to be accompanied by their dog, even if you feel there may be no 'need' for their presence – e.g. in a briefing session at the study venue.

11.2.1 Guide dog etiquette

In most people's experience, a dog is a pet. But in the life of a blind student, a dog performs an essential role – i.e. like guard dogs, tracker dogs or sniffer dogs, they are working animals first and foremost. This means that students may need to be alerted to the fact that the visually impaired student's guide dog should not be treated as a pet. Rather, the following rules of engagement might be more appropriate:

DON'T

- pet or stroke the dog
- feed the dog
- attempt to distract the dog's attention – this could be extremely dangerous.

DO

- talk to the blind student normally, face to face if possible, in an appropriate manner, rather than to their canine helper
- remember when helping a user to cross roads or negotiate other obstacles to ask first – the dog may already have been trained for just that eventuality.

11.3 Data collection and recording

Some of the generic issues relating to basic field-related skills are covered elsewhere in this guide – e.g. note-taking using a Braille embosser, laptop or Dictaphone (see Section 9.1). However, some thought may need to be given by tutors to helping the blind or visually impaired student transport their essential equipment to and from field study sites.

11.3.1 Field investigation

The following list indicates some of the more common fieldwork tasks, and the kind of accommodation that might need to be made for blind or visually impaired students. However, as has been stated in other parts of this guide, each student will need to be treated on an individual basis, because different forms of visual impairment will impact differently on the ability to participate in field-related activities.

Some of the problems associated with key field study activities are summarised below. It should be noted that most problems can be minimised or eliminated by effective preparation, student briefing and training on campus before the fieldcourse begins.

Interacting with people

Most fieldcourses involve students carrying out interviews in the field, to gather qualitative and/or quantitative data. These may be with experts, local ‘voices’, or members of the general public, and may take place out in the street, in homes or in offices. Visually impaired students can have difficulties with various elements of interview activity:

- *Reading questions on questionnaires* – use a device (e.g. text-to-voice software on a portable PC) which speaks the contents of the form or questionnaire. (It might be advisable for the student to listen through a earpiece so as not to interfere with interaction with the respondent.)
- *Filling in forms* – whether paper or electronic; wherever possible use recording sheets or forms that reduce the need for entering text by hand; use a handheld device that allows completion of forms by selecting clearly defined options.

A general idea is to work in pairs for interviews, with each student taking turns to ask questions or record answers.

Observing and measuring the environment

One of the most common field activities involves gathering qualitative and quantitative data through observation surveys. This can include:

- land use recording
- field sketching
- event recording (e.g. traffic)
- perception-based studies
- townscape or landscape evaluation studies.

Recording sheets or pre-printed forms can help in capturing the data, reducing the need for writing text. Some activities involving sight (e.g. traffic counting, landscape sketching) are always going to be difficult for the blind or visually impaired student. But careful use of student helpers (e.g. the sighted student doing the looking) or appropriate technology (e.g. a camera or video-recorder doing the recording) can often be used as enabling devices.

Where more systematic and instrumental data gathering and mapping activities are involved, the visually impaired student may not be so disadvantaged. These include:

- data logging – e.g. water, biogeography, weather
- sampling – e.g. augering, soils, peat cores, flora/fauna
- measuring – e.g. slope profiles, bedform.

Here, the use of computer-based technology such as a portable PC or computerised data logging kit may make it possible for the visually impaired student to carry out the recording largely unaided. If personal digital assistants (PDA) with speech output and PCs with voice entry are available, then this makes the task even more accessible.

Studying documentary evidence

Where fieldwork involves access to written records, whether contemporary or historical, then the visually impaired student moves onto fairly familiar territory. As long as the 'guardians' of the relevant materials (e.g. a museum curator, company archivist or environmental agency librarian) are brought on board, then a certain amount of textual analysis may be possible and fulfilling. Again, the pairing of visually impaired students with sighted students is a useful strategy to adopt.

11.3.2 Evening follow-up work

In the evening there is an opportunity to sift through information gathered during the day, undertake data entry tasks or even begin preliminary data analysis. For the visually impaired student, a talking calculator or PC with voice synthesiser would be extremely helpful.

12 Follow-up Work

The problems faced by blind and visually impaired students do not end as they leave the field study venue. They are likely to confront a number of potentially problematic activities as they undertake follow-up work and prepare themselves to be assessed on their field studies. These problems fall under the following broad headings:

12.0.1 Data collation

A considerable amount of fieldwork involves groups of students working together on investigations in the field. From this, jointly gathered data are usually brought back to campus for subsequent sharing and analysis. This raises the problem of how group members should get together to share and collate their data. One way of forestalling this problem is for staff to arrange for all raw data to be shared during the fieldcourse – e.g. during evening work sessions. Back at campus, the following approaches might help the visually impaired members of particular work groups:

- students within a group meet at a time and place convenient to the visually impaired student
- data are posted to a Web site, thus avoiding the need for arranging meetings. (This might require the development of a Web server script to accept, store and make available the submitted information.)
- a tutor acts as data intermediary – individual students deposit the required data with a member of staff by an agreed date, then this is distributed to all members of the group, including the visually impaired student.

12.0.2 Data analysis and interpretation

Much of the mapping, data visualisation and statistical analysis undertaken after a fieldcourse should be organised using the same general strategies in place for this kind of work in the degree programme at large (see Section 9). If the visually impaired student does not have access to suitable facilities – e.g. software adaptations for data visualisation and mapping – then several alternative strategies might be considered:

- provide additional time
- use a student buddy
- work in groups, so that the visually impaired student undertakes the work that plays to their particular strengths
- undertake alternative forms of analysis.

Where safety considerations are involved – e.g. with the use of laboratory equipment – then additional time and appropriate supervision should certainly be made available.

12.0.3 Assessment requirements

Special attention needs to be given to the kind of assessment used to judge the fruits of fieldwork if it is to reveal the full range of learning that has been achieved by blind or visually impaired students (see the discussion in Section 8.5).

12.0.4 Evaluating the fieldcourse

Most forms of teaching and learning are evaluated nowadays, increasingly by formal feedback mechanisms. The fieldcourse is perhaps subject to more evaluation than most other forms of teaching, because of the resource implications of this form of learning. For the blind or visually impaired student, it is important that their experiences are debriefed, so that lessons can be learnt and applied to subsequent fieldcourses. Some of this debriefing may be undertaken during the fieldcourse itself, either informally with the individual visually impaired student, or as part of a more structured feedback session held with all students. After return to campus, the fieldcourse tutor might also arrange a meeting with the visually impaired students to discuss any additional issues they feel might be relevant.

Two forms of action can be taken. During the fieldcourse itself, some on-the-fly adjustments might be necessary based on daily feedback form the visually impaired students. (This might include modifications to daily schedules where it is found that these students require more time to complete specific field activities.) In the longer term, the feedback should be used to improve the field experience of subsequent cohorts of visually impaired students (see the related discussion in Section 13).

13 Graduation and Beyond

When blind and visually impaired students graduate, some form of feedback or other contribution from them could be valuable to subsequent students with similar impairments.

- You could elicit the reflective views of blind or visually impaired graduates towards the fieldwork they undertook to help improve the design of subsequent fieldcourses in order to benefit other visually impaired students. (Clark & Higgitt, 1997, provide an example of a research study that elicits the views of geography alumni.)
- It may also be worth trying to determine whether any of the field experiences of visually impaired students, and particularly the skills they learnt and/or exercised during fieldwork, were subsequently transferred to a work context. For some students, individual skills may have been most applicable in a work context; for other students, the group-based activities might have proved to be of greatest value. By exploring the subsequent use made of field-related skills in a job context, it might be possible to make further modifications to the design and organisation of fieldwork in order to further increase their applicability when the student moves into employment. This is particularly important for visually impaired students, because fieldwork is an opportunity to practice operating autonomously in complex and/or challenging environments in order to solve defined problems.
- Blind or visually impaired graduates might also be persuaded to participate in future fieldcourses, either as a guest speaker, or as a design consultant.

14 A Generic Approach to Teaching and Learning?

14.0.1 From special case to general practice

It is a common experience in education that when the spotlight falls on one group, technology or educational approach, it often illuminates those beyond the immediate target. The adoption of computers in education, for example, has led to undertake a wholesale re-examination of other educational approaches, such as experiential learning, or distance and open learning. Similarly, the current interest in the educational needs of students with various impairments can – and should – lead to a re-evaluation of how **all** students are handled during their years in higher education.

McKendrick & Mooney (2001) argue that education providers need to be sensitive to the specific needs of various client groups. In their paper, they focus on the needs of non-geography students studying geography at Glasgow Caledonian University, while Maguire (1998) has written about the needs of women in relation to fieldwork. By attending to the needs of minorities, it can be suggested that we not only broaden access for particular groups, but also pave the way for a more flexible and sensitive approach to meeting the educational needs of **all** students.

One of the principles of good practice advocated in this guide can be summed up as: listen to the (visually impaired) learner. But should we only listen attentively to the visually impaired learner? And how far do we restrict our collaborative approach to planning fieldcourses to students with special visual needs? Could there be generic principles of good practice embedded in our approach to this particular student minority? As the authors of one of the companion guides point out: ‘Many of the measures needed to assist students with hidden disabilities are, however, no more than the delivery of general good practice.’ (Chalkley & Waterfield, 2001). The authors of another guide take a similar view: ‘good learning for d/Deaf students is to a large extent a subset of good learning for all’ (Clark & Wareham, 2001).

At a practical level, consider the issue of choosing specific field site visits and activities. If the presence of a visually impaired student on a fieldcourse leads staff to reappraise the visit to a particular site, on the grounds that although it might be arduous and maybe dangerous for the student to get there, it would not add materially to that student's learning, then perhaps the relevance of that visit should be questioned for **all** students. If the site visit does not provide added value when compared with a standard lecture (whether back on campus or at the field study centre), then maybe it should be dropped from the itinerary. And this principle applies equally to all other field activities. Of course, there needs to be a consideration of both the learning outcomes and the social or personal development outcomes of field activity when arriving at these decisions, but the central principle remains that of maximising the return on investment for all students.

A second example is the extra time given to visually impaired students to transcribe their field notes. This, too, is a activity from which most sighted students could benefit.

Taking a leaf out of the book of those architects who espouse the concept of universal design, Silver *et al.* (1998) propose a Universal Instruction Design (UID) approach to instruction planning, in which accessibility issues are placed at the heart of curriculum planning and course delivery. The suggestion is made that effective teaching for students with disabilities represents good practice for all students.

Exercise

Either individually or with colleagues, consider how you might develop a generally flexible and adaptable approach with all your students, based on meeting the special needs of visually impaired students.

15 Resources

15.1 Internet resources

Ability Net, http://www.abilitynet.co.uk/
This charity provides a major set of resources on all aspects of disability, through its Web site, its helpline, home visits and training courses. Particularly strong on visual disability and 'get around' technology for computers, for which it has produced a number of detailed technical factsheets.

A Blind Net, http://www.blind.net/
A guide to resources for the blind.

Blindness Resource Center, http://www.nyise.org/blind.htm
Information and guidance for the blind from the New York Institute for Special Education. (Good example of a Web site available in several formats: graphics, text-only, large print, and frames.)

Blind Mobility Research Unit (BMRU)
Based at the University of Nottingham; now defunct.

British Computer Society Disability Group, http:// www1.bcs.org.uk/homepages/361/
Undertakes a range of activities aimed at giving disabled people a better quality of life, especially in relation to the use of IT.

National Clearinghouse on Education and Training for People with Disabilities (NCET), http://www.deakin.edu.au/tedca/ncet/
An Australian Web site launched in September 2000 as a centralised source of information on tertiary education and training opportunities for people with disabilities.

NLBUK (2000) National Library for the Blind, http://www.nlbuk.org/
A UK gateway to library services for visually impaired people.

Oedipus (2000) Blindness-related Resources on the Web and Beyond, http://www.hicom.net/~oedipus/blind.html
An extensive collection of links to international sources on the Web.

Scottish Sensory Centre, http://www.ssc.mhie.ac.uk/
Promotes and supports new developments and effective practices in the education of children and young people with sensory impairments. Provides an excellent summary of the characteristics of a wide range of visual impairments, and makes recommendations on how best to use video with visually impaired students.

Blindness and Visual Impairment Ring, http:// http://j.webring.com/hub?ring=bvi
A Web 'ring' (connected set of thematic Web sites) relevant to the blindness and visual impairment. Over 260 sites were listed at the end of 2000.

VIG (2000) V.I. Guide: a guide to Internet resources about visual impairments, for parents and teachers, http://www.viguide.com/
A structured guide to resources on the Web for the blind, with an educational slant.

15.2 Web links

Here are some Web sites which provide extensive sets of links to sites dealing with various aspects of blindness and visual impairment:

Adaptive Technology: http://www.seidata.com/~marriage/rbadapt.html

Resource Sites on Blindness: http://www.nyise.org/blindness.htm

Disabled People's Association (Singapore) Websites: Blind and Visually Handicapped: http://www.dpa.org.sg/VH/welcome.html

15.3 Other resources

Disability Rights Commission (DRC): http://www.drc-gb.org/
Set up to police the working of the Disability Discrimination Act of 1995; comes into force in April 2000.

RNIB (Royal National Institute for the Blind): http://www.rnib.org.uk/
The main UK organisation representing the needs and interests of blind and visually impaired people. Provides a wide range of information and advice, and lobbies on behalf of the community it represents.

Sensory Disabilities Research Unit (SDRU): http://www.psy.herts.ac.uk/sdru/.
Based at the University of Hertfordshire, this carries out research into visual disability.

National Centre for Tactile Diagrams (NCTD): http://www.nctd.org.uk/
Based at the University of Hertfordshire, this provides a subsidised tactile diagram production service for further and higher education. It also holds open days, runs training courses, provides consultancy to organisations, and is developing an archive of tactile diagrams.

The Disability Information and Resource Centre, South Australia: http://www.dircsa.org.au/
Provides useful information on topics ranging from legislation and travel rights to fact sheets and resource links.

Special tutorials and keyboard guides are available to help people learn to use general Windows applications programs from Project ASSIST at the Iowa Department for the Blind (http://www.blind.state.ia.us/assist/).

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16.1 Further reading

The *Journal of Visual Impairment and Blindness* contains regular contributions on all aspects of visual impairment and blindness, including reports on developments in assistive technology.

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