

Table 2:

Accessible laboratories, workshops and other practice-based environments: Potential barriers and possible solutions.

- 1) Anticipate students' needs and make reasonable adjustments.
- 2) Always consult individual students before making adjustments to suit their specific needs.
- 3) Bear in mind that many students already possess equipment and software which is specifically tailored to their needs.
- 4) Remember that this is not a comprehensive guide. Please use this table to generate your own solutions.

	Potential barriers	Possible solutions
Dyslexia, dyspraxia and other specific learning difficulties	New information provided during a practical session (e.g. handouts or verbal instructions)	a) Provide information before each session. b) Provide information in a range of formats (e.g. on paper, disc and/or audio tape).
	Practical activities which require good gross and/or fine motor skills (e.g. cycling, dancing, lab experiments, painting and computerised assessments)	a) Revisit the intended learning outcomes. Consider the following: <ul style="list-style-type: none">• Does the activity play an essential role in relation to the intended learning outcomes?• If no, does the activity need to be changed or abandoned?• If yes, do students need to be physically involved in the practical activity (e.g. because they need to learn a skill) or is it sufficient that they observe and understand what is involved in it?• If students are expected to learn a skill, but are unable to physically participate in the activity, is it sufficient that they observe or direct an educational support worker through the task? b) Consult individual students and make reasonable adjustments (e.g. can the activity be adjusted so the student can participate?). c) Consider whether working in pairs or in groups might help to remove this potential barrier. Often group members take on different roles. In other

		words, not all group members get an opportunity to conduct all aspects of an activity.
	Having to carry out activities, experiments, measurements, calculations, and/or interpretations of results within a specific time frame	a) Consult individual students and make reasonable adjustments, for example, extend the time frame.
	Some virtual laboratories might not be compatible with assistive software	a) Many virtual laboratories are accessible and provide excellent surrogate learning experiences. However, it is worth checking that they do not pose potential barriers to assistive software (e.g. Texthelp's Read & Write software). Remember to plan virtual learning experiences well in advance because they can seldom be prepared at short notice.
Deaf or hard of hearing	Unable to hear demonstrator over noise	a) Supplement aural with written information. b) Invite the Health, Safety and Environment Office (ext.3049) to come and monitor the noise in the laboratory, workshop or other practice-based environment.
	Unable to hear video or DVD	a) Use captioning and/or transcripts.
	Unable to hear due to distance	a) Encourage students to sit close to the action because then they are more likely to be able to hear what is being said. Furthermore, they can benefit from an unobstructed view of, for example, a demonstrator or a performer. b) Use a microphone.
	Unable to hear because several people are talking at once (e.g. during group work)	a) Make all students aware of this issue and encourage them to speak one at a time.
	No hearing loop	a) Request the installation of a hearing loop or invest in a portable version.

		b) Alternatively, borrow a portable hearing loop from another department, for example, the Disability Resource Centre (ext.3880).
	Equipment which relies on sound	a) Provide/purchase equipment with lights or other visual means of indicating on/off status. However, bear in mind that a lot of equipment can be monitored by touch (e.g. it is possible to feel when a timer sounds because it tends to vibrate). For more information, please visit the Royal National Institute for Deaf and Hard of Hearing People's (RNID's) website: http://www.rnid.org.uk
	Unable to lip-read due to visual obstructions	a) Remove the obstructions and/or change the seating arrangements (e.g. arrange the room in a horseshoe shape so that the faces/lips of all speakers are visible to students who lip-read).
Blind or partially sighted	Inaccessible text (e.g. signs, labels, handouts, instructions, and health and safety notices)	<p>a) Provide information in a range of formats (e.g. in large print, in Braille, on disc, on CD and/or on audio tape).</p> <p>b) Alter the colour and/or increase the colour contrast between the text and the background.</p> <p>c) Verbalise text.</p> <p>d) Purchase electronic reading aids (e.g. a scanner and optical character recognition (OCR) software. For further details, please visit the Royal National Institute of the Blind's (RNIB) website: http://www.rnib.org.uk</p>
	Inaccessible visual information (e.g. photographs, illustrations, diagrams, graphs, symbols, signs, and maps)	<p>a) Describe essential visual information in detail, for example:</p> <ul style="list-style-type: none"> i) explain what type of photograph it is and describe what you see on it ii) describe what a symbol looks like and what it means <p>or</p> <ul style="list-style-type: none"> iii) describe what you see on a map and give clear directions <p>b) Enlarge the visual information and/or try to present the same information in an alternative format.</p> <p>c) Alter the colour and/or increase the colour contrast.</p> <p>d) Purchase or learn how to produce tactile diagrams, pictures, symbols, signs and/or maps. Tactile graphics can be produced in a number of different</p>

		<p>formats, for example, vacuum-formed (thermoform), swell paper (microcapsule paper), or embossed (e.g. produced on a Braille printer). For further details, please contact the Disability Resource Centre (ext.3880) or visit the National Centre for Tactile Diagrams' website (http://www.nctd.org.uk).</p> <p>e) Purchase Plastic Embossing Film. The film rises when drawn upon with a biro or an embossing tool. Available from the Royal National Institute of the Blind (RNIB).</p> <p>f) Purchase a range of enlarged bold and tactile paper, with an accompanying graph board and plotting pins.</p> <p>g) Ask disabled students to participate in demonstrations (e.g. use a disabled student as a model to show where a specific nerve is located on an arm).</p>
	<p>Equipment which relies on the display of visual information</p>	<p>a) Review the accessibility of computer equipment (e.g. the suitability of a monitor).</p> <p>b) Purchase equipment which include auditory displays of visual information (e.g. talking timers, thermometers, colour indicators and calculators).</p> <p>c) Purchase equipment which contains tactile displays of visual information (e.g. beakers, test tubes and measuring cylinders with raised markings).</p> <p>d) Alternatively, invest in a tube of Tacti-mark. Tacti-mark is a raised form of paint which can be used to add tactile marks to equipment, for example, levels on a test tube). However, it will melt upon contact with high temperatures. Available from the RNIB.</p> <p>e) Purchase Braille dymo-tape. This clear tape is ideal for marking bottles which contain chemicals because it can be stuck on without obscuring printed labels. Available from the RNIB.</p> <p>f) Purchase Bump-ons. Bump-ons are tactile markers (e.g. great for indicating levels on test tubes). They come in a range of bright colours (i.e. they can provide high contrast). Available from the RNIB.</p> <p>g) Purchase Wikki-stix. Useful for many things, for example, plotting graphs, marking the top of test tubes, and even plotting light rays. Available from the</p>

		<p>RNIB.</p> <p>h) Purchase magnifiers (e.g. hand-held, standing, pocket, and/or illuminated magnifiers).</p> <p>i) Ask individual students if they would like an assistant to read out/describe the visual information.</p>
	Unsuitable lighting	<p>a) Consult individual students and make reasonable adjustments according to their needs, for example, discuss:</p> <p>i) Is there an appropriate amount of light for all tasks? and/or</p> <p>ii) Are there any reflection, glare, shadow or high contrast issues etc. which need to be resolved? Can these issues be avoided by re-positioning equipment away from windows or by investing in anti-glare filters, blinds or curtains in matt finish?</p> <p>b) For advice about suitable lighting, please visit the RNIB website.</p> <p>c) Purchase adjustable and/or portable light sources.</p>
	Use of virtual laboratories	<p>a) Many virtual laboratories are accessible and provide excellent surrogate learning experiences. However, it is worth checking that they do not pose potential barriers to assistive software and equipment (e.g. screen readers and magnifiers). For further details, visit the RNIB website. Moreover, remember to plan virtual learning experiences well in advance because they can seldom be prepared at short notice.</p>
Wheelchair users/ mobility difficulties	Inaccessible workspace (e.g. the layout of rooms, seating arrangements, workstations, cupboards, handles, switches, sinks, taps, doors and exits)	<p>a) Make reasonable adjustments in order to make the workspace accessible to people with a range of impairments (e.g. install push, rocker or lever style switches).</p> <p>b) Any problems concerning the work environment in University buildings should be reported to the Buildings and Estate Division (ext.4552).</p>

	Signs, maps, notice boards and notices positioned at inappropriate heights (e.g. too low or too high for wheelchair users to be able to read them)	a) Position signs, maps, notice boards and notices so information is accessible to all people (i.e. accessible regardless of whether the reader of the information is standing up or sitting down).
	Obstructed aisles/corridors	a) Remove obstacles and keep aisles/corridors free at all times.
	Workbenches are too high or too low	a) Each practice-based environment should contain at least one adjustable workbench. If this is not the case, consider purchasing or borrowing one.
	Inaccessible equipment	a) Adjust the equipment so it becomes accessible (e.g. adjust the height of a shelf, table, chair, lectern, exercise bike, music stand, easel or microphone). b) Move the equipment to an accessible level. c) Purchase clamps and other devices for holding items of equipment (e.g. visit http://www.labdepotinc.com). d) Ask individual students if they would like an assistant to help them.
Asperger's Syndrome	Might struggle to take on board verbal information presented to large groups of people	a) Talk to individual students to ensure that they have understood the verbal information. b) Provide the verbal information on a handout.
	Might misunderstand practical instructions (e.g. in a lab)	a) Make sure that all instructions are clearly written and logically presented. b) Consider having someone (e.g. a demonstrator) available to check with individual students that they understand the information. c) Sometimes individual students might need the help of an assistant throughout a practical activity. Remember to check that there are no problems regarding this solution and the intended learning outcomes.
	Sensory issues (e.g. lighting might cause	a) Where possible, remove the object which causes the sensory disturbance. Alternatively, locate the student away from the affected area (e.g. at the

	visual disturbances or a student might dislike the feel of gloves)	opposite end of the room to a flickering computer). b) If a student has sensory issues and an activity requires him or her to wear specific items of clothing, it might be possible to ask an assistant to wear the correct attire (e.g. gloves) and for the student to direct him or her through the practical activity. Remember to check that there are no problems regarding this solution and the intended learning outcomes.
Various disabilities, for example: 1) mental health difficulties 2) unseen disabilities such as diabetes, epilepsy and ME 3) multiple disabilities	Unable to participate actively in a practical activity (e.g. learn a new skill)	a) Revisit the intended learning outcomes. Consider the following: <ul style="list-style-type: none"> • Does the activity play an essential role in relation to the intended learning outcomes? • If no, does the activity need to be changed or abandoned? • If yes, do students need to be actively involved in the practical activity (e.g. because they need to learn a skill) or is it sufficient that they observe and understand what is involved in it? • If students are expected to learn a skill, but are unable to actively participate in the activity, is it sufficient that they observe or direct an educational support worker through the task? b) Consult individual students and make reasonable adjustments (e.g. can the activity be adjusted so the student can participate?). c) Consider whether working in pairs or in groups might help to remove this potential barrier. Often group members take on different roles. In other words, not all group members get an opportunity to conduct all aspects of an activity.
	An environment which it is physically demanding to work in	a) Use virtual laboratories because they tend to be less physically demanding to work in. However, some people have multiple disabilities and, therefore, it is important to check how accessible virtual laboratories are to people with a range of impairments. Furthermore, remember to plan virtual learning experiences well in advance because they can seldom be prepared at short notice.
	Might be able to	a) Consult individual students and make reasonable adjustments (e.g. flexible

	participate fully, but at a slower pace or at a different time	scheduling arrangements).
	Might struggle to work for long periods of time (e.g. due to fatigue)	a) Incorporate regular timetabled breaks in sessions.
	Inadequate lighting for the activity being carried out	a) Make reasonable adjustments until the lighting in the room is appropriate for the activity being carried out. b) Purchase adjustable and/or portable light sources. c) Invite the Health, Safety and Environment Office (ext.3049) to come and monitor the lighting in the laboratory, workshop or other practice-based environment.
	Uncomfortable room temperature	a) Make reasonable adjustments until the temperature in the room is comfortable. b) Invite the Health, Safety and Environment Office (ext.3049) to come and monitor the temperature in the laboratory, workshop or other practice-based environment.
	Uncomfortable level of humidity	a) Make reasonable adjustments until the humidity level in the room is comfortable. b) Invite the Health, Safety and Environment Office (ext.3049) to come and monitor the humidity in the laboratory, workshop or other practice-based environment.

Note: If you have come up with some innovative solutions which you think other people might benefit from, please email them to L.Hammer@exeter.ac.uk and I will add them to the above table. Thank you.