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Case study evaluating accessibility and use of a laboratory by a student who uses a wheelchair and a blind member of staff.

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Abstract

This case study describes the findings of two disabled people who visited an engineering laboratory. It highlights aspects of building design, room layout and equipment use that are often overlooked and which often can be rectified quite simply and inexpensively. The points raised may be used to audit any building and lab.

Background

The Department of Electronics and Electrical Engineering is based in a purpose-built 1970's building on 8 levels. In order to evaluate the extent to which the building's design meets accessibility requirements and to determine what modifications would be required to make laboratory areas, in particular, truly accessible, some visits by disabled people were arranged.

Methodology

Karen who uses a motorised wheelchair and John who is blind and uses a long cane volunteered for the trail. Their comments on all aspects of the access to and use of the laboratory that could be improved were noted.

Issues for access

Karen could not use the automatic sliding main door as it is accessed by a flight of stairs. Instead she entered the building on level 4 where access is provided for wheelchair users through a **narrow passageway** to a single **outwards-opening door** from the building's integral car park. Getting out of the taxi was slightly problematic as there was no **kerb** to reduce the total height to descend.

The passageway from the car park to door is a **designated smoking area** with **cigarette bins**. This door is also the out-of-hours door, when it is operated by a **card and pin pad**. Within the building there is **flat access** and **lift access** to all floors, with heavy **double fire doors** throughout, and a total width of 120 cm to all corridors and doorways.

Karen had to wait at reception before going down one level to the lab. However the waiting area's close **arrangement of furniture** did not allow access to the seating area for Karen's wheel chair. Furthermore the seating and display units created an impenetrable barrier, preventing wheelchair access to the nominally wheelchair accessible **lavatory** in the corner. She noted that a parent with a child in a buggy and a visually impaired visitor would also have problems.

One of the lab's double doors was **latched** and Karen couldn't open it. The **space between the benches** enabled Karen to manoeuvre fairly easily. However, the bench **height** was designed to be used by someone sitting on a traditional high lab stool and prolonged use from a wheelchair would have been uncomfortable. Typically, students work in pairs at each **workstation**, with insufficient room if the neighbouring workstation also has 2 students. Some equipment is normally used whilst on a **high level shelf** built above the workbench.

John has some familiarity with the building and was able to locate and use the main entrance unaided. However guidance was necessary to find and use the lift and then to

find the laboratory room as **Braille or other tactile cues** for navigation are not available in the building.

Audit for access

- Is a designated smoking area a pleasant entry to the building?
- Do cigarette bins cause an obstacle to wheelchairs?
- Is there reserved parking for disabled people?
- Is the lighting in the passageway sufficient for all disabled people, including blind persons with some light vision?
- Do entrance doors open inwards or automatically?
- Are PIN pads at an accessible height with a paddle system required for wheelchair users outside of normal hours?
- Are fire doors fitted with automated hold-open electro-magnet mechanisms or light enough to open and wide enough that only one needs to be opened to get a wheel chair through?
- Once open do the doors swing shut with the risk of trapping hands?
- Are there hoists in the lavatories?
- Are all buttons on lifts accessible?
- Can some benches be adjustable to accommodate various heights of chairs and wheelchairs?
- Are workstations far enough apart?
- Can equipment be easily moved down onto the workbench level for ease of access?
- Are there Braille or tactile clues on lift buttons, doors and corridors to assist in direction throughout the building?
- Do you operate a brief run-through before lab sessions for familiarisation with the layout of the lab, including the location of equipment?
- Do your demonstrators have training in supporting disabled students?

Issues for laboratory work

Karen's lab requires work on the computer, using the SPICE software to compare a simulation with a real circuit followed by work with the real circuit and specialist measuring equipment. Karen has reasonable use of her hands and therefore did not experience any particular problems manipulating the various **small knobs and switches** on the equipment. However she does not type and uses a **dictation package** to interact with computers. The use of software raises issues of the **compatibility** of different versions and operating systems.

John's laboratory required him to make **observations** from an oscilloscope, adjust controls, **take measurements** and **record results**. Thereafter he was required to **connect** "black boxes" to an oscilloscope, signal generator and gain phase meter with cables prepared with black or red connectors. Each box has a schematic **circuit diagram** printed on the top.

John felt that coaxial connectors and other leads can be connected without problems once items of equipment are known and understood. However there were at least three **different designs** of oscilloscope in the laboratory. Although all of them have controls performing similar functions, the locations and graduations of a given control vary and would be **time** consuming to learn by heart.

Audit for laboratory work

- Can switches and knobs be used by people who have dexterity problems?
- Are there any technological aids used to support these tasks?
- Are dictation packages connected to the computers?
- Is there compatibility between supporting software and your department's operating system?
- Is there a virtual laboratory available for the course?
- Are there Braille notetakers and computers with screenreaders and Braille displays in the lab?
- Is an appropriate extension of time given to accommodate students who have reading disabilities or require breaks in a three hour lab session?
- Are lab sheets made available in advance?
- Do you use dyno Braille tape to mark cables and equipment?
- Are symbols and circuit diagrams printed on equipment discernable to touch?
- Does equipment have audio output or RS232 computer connection to enable output of data to a computer for subsequent use with screen readers?
- Can LabView and other specialised software be read with screen

How Can Other Academics Reproduce This?

This case study illustrates how so much of what is taken for granted by non-disabled people can create problems for disabled people. Most of the access issues are easily rectified at minimal cost. The issues for laboratories can be more complicated, requiring equipment and technology, although some changes, such as Braille dynotaping to label equipment, would be relatively low cost and easy to implement. However, recognition of the need at time of purchase or replacement will ensure a much more accessible environment.

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