Selecting Accessible Science Equipment

This guide describes the features of accessible equipment that meet universal design principles. Use this guide to help you determine what types of equipment may be suitable for a student with a disability in your lab. For ease of use, this guide is divided according to the type of disability.

The following accessible science equipment solutions are low-cost strategies drawn from the DO-IT Access to Science online resources (see Access to Science page and a guide on helping students who are blind or have low vision), as well as the authors' experiences:

Visual Disabilities – Blindness

- Braille text and raised-line images (useful in tactually depicting graphs, charts, and other pictorial images that are displayed in the lab).
- Verbal descriptions of visual aids and equipment in the lab (helpful in providing the student with auditory information about what is visually happening in an experiment or demonstration).
- Braille or tactile ruler, compass, angles, and protractor (allow the student to carry out measurements independently, and can facilitate increased participation in lab experiments).
- Braille equipment labels, notches, staples, fabric paint, and Braille at regular increments on tactile ruler, glassware, syringe, beam balance, stove, other science equipment (Braille labelling allows the student to independently identify equipment and, where appropriate, operate equipment in the lab).
- Talking calculators (allow the student to independently carry out equations, and have information read out audibly).
- Talking timers, thermometers, and analytical balances.
- Different textures (e.g., sand paper) to label areas on items (enable student to independently identify different equipment and areas within the lab).
- Make a syringe tactile by cutting notches in the plunger.
- Identify increases in temperature on a stove or hot plate with fabric paint.
- For a measurement tool, use staples on a meter stick to label centimeters.
- When measuring liquids, provide glassware with specific measurements, or use a tactile graduated cylinder with embossed numbering.
- Plastic containers (e.g., beakers).
- Protective glove or surgical gloves to handle wet or slippery items.

Visual Disabilities – Low Vision

- Verbal descriptions of demonstrations and visual aids (helpful in providing the student with auditory information about what is visually happening in an experiment or demonstration).
- Preferential seating to assure visual access to demonstrations.
- Large-print, high-contrast instructions and illustrations.
- Raised-line drawings or tactile models for illustrations (useful in tactually depicting graphs, charts, and other pictorial images that are displayed in the lab).
- Large-print laboratory signs and equipment labels.
- Video camera, computer or TV monitor to enlarge microscope images (can be used to enhance images and enable the student to work with a microscope independently).
- Hand-held magnifier and binoculars.
- Large-print calculator (enables a student to solve equations independently).
- Funnel for pouring.
- Plastic containers (e.g., beakers).
- Coloured mats to provide contrast between the glassware and surroundings.
- Protective glove or surgical gloves to handle wet or slippery items.

Hearing Loss

- FM system.
- Alerting systems (e.g., visual alarms).
- Transparent face masks (see an example).

Learning Disabilities

- Computer with voice output, spelling checker, grammar checker.
- Scanning and speaking “pen.”

Mobility Disability

- Preferential seating to avoid physical barriers and assure visual access to demonstrations.
- Mirrors above demonstrations.
- An enlarged screen.
- Wheelchair-accessible, adjustable-height work surface (enables a seated student to access needed equipment at an appropriate work surface).
- Non-slip mat.
- Utility and equipment controls within easy reach from seated position.
- Electric stirrer, and container filler (enable a student who may have challenges with dexterity to independently transfer and mix chemicals in the lab).
- Support stand, beaker and object clamp; test tube rack.

- Handles on beakers, objects, and equipment (used for ease of grip and better grip control).
- Protective glove or surgical gloves to handle wet or slippery items.
- Modified procedures to use larger weights and volumes.
- Extended eyepieces (enable students who use wheelchairs to access microscopes).
- Flexible connections to electrical, water, and gas lines (enable the student who is seated to easily reach/access gas lines in a safe manner).
- Single-action lever controls in place of knobs.
- Alternate lab storage methods (e.g., "Lazy Susan" and storage cabinet on casters).
- Computer equipped with special input device (e.g., voice input, Morse code, and alternative keyboard).
- Left-handed and right-handed laboratory tongs with a rubber cover to improve grasping.
- Funnels for pouring.
- Plastic containers (e.g., beakers).

Note that students with mental health and chronic medical disabilities may not need modification to specific equipment in the lab, and the modifications described above may not suffice to fulfill their requirements.

Applying the principles of universal design will help you to identify and select scientific tools and equipment, including those used to prepare an experiment, and gather and visualize data. These tools can incorporate multimodal representations of the information they are designed to deliver, increasing the opportunity for diverse learners to accurately capture evidence and data. On the other hand, these tools can enable the collection of data in alternative formats or using different methodologies, ensuring the accessibility of experimental results to all students. Computer-controlled laboratory equipment is one of many examples of universal design tools. Today, many laboratory devices, which are required for the majority of experiments in most fields, are computer-controlled and therefore likely accessible to a diverse group of users.

It is also possible to retrofit traditional assistive technology solutions (such as a closed-circuit television, or CCTV) to serve specific purposes for students with disabilities. One example is to use a CCTV stage as a dissection platform for animal surgery in a biological sciences lab. Correct positioning of the camera above the stage allows for imaging the dissection and visualization on the CCTV monitor. It is important for faculty to be aware of available assistive technologies, and to work with the student and staff from the disability services office to determine the most applicable and creative uses of these technologies.

The learning needs of many students with disabilities can be addressed through the creative adaptation of mainstream and off-the-shelf technology or equipment. Scientific supply companies, with their engineering expertise and understanding of their products, are well positioned to help develop these solutions.