Principles of Technology
Facilities Requirements and Equipment Purchases

Lab Design and Facilities Considerations

When equipment is used to teach specific principles, it' is essential that some real apparatus -- typical of that used in today's work place -- be used. Students must see and understand the physics principle as it is applied with typical apparatus used in the technical workplace. Students must also learn to use that apparatus.

Principles of Technology has been designed with a strong emphasis on lab experience. PT requires up to three times the number of laboratory hours found in many traditional curricula.

Principles of Technology lab are classified as "clean labs". This means they are typified by:

- Apparatus that is portable and easily assembled, disassembled, and stored.
- Light duty tools; few power tools.
- Student work surfaces and tables that do not require specially hardened surfaces or heavy construction.
- Environment of room similar to that found in a traditional classroom -- drop ceiling, florescent lighting, and linoleum floor coverings.
- Little or no use of oil or corrosive liquid substances during lab experiments.

The Size of the Lab

The major factors in the selection or construction of a clean lab facility include:

1. Student load, 2. Apparatus requirements, 3. Experiment format, 4. Single vs. multiple-purpose facility and 5. Dedicated vs. multiple subject use.

Except for apparatus requirements, all of these factors will vary from school to school.

Optimal student load for a lock-step experimental format is between 15 and 24 students, with 2 to 4 a student per lab station. Generally, clean laboratories should have a minimum space allotment of 40 square feet per student. This allotment includes work area, storage space, and access space and is stipulated for a work space intended as a lab room only - not as a combined classroom/laboratory room.

The size for a multiple-purpose classroom can be determined with the following formula:

Section capacity x { laboratory space + classroom space } = minimum space

(i.e. # of students) x {(@ 40 sq. ft/student) + (@ 15 sq. ft/student)}

Utility Service Requirements

When the maximum number of lab workstations had been identified and the size of the rooms has been determined, the requirements for utility services should be considered. Utility services include electricity for outlets and lighting, compressed air and vacuum, water and drain. Related considerations are the number of connections to each required service, the arrangement of service connections, and the safety devices and precautions built into the utility service systems.

What About Furniture and Storage Arrangements?

Clean lab furniture is generally found in two basic designs: Low-form and standard. Low form furniture is 28 - 30 inches from the floor to the top of the working surface and intended to be used by students who are seated. Low form furniture may or may not have drawers or cabinets. Standard furniture has a floor-to-working surface distance of 26 - 38 inches and normally ahs storage space (drawers or cabinets). This lab furniture may be placed against the walls - jutting out into the room in peninsula fashion - or may be isolated from the walls in an island style. Island style workbenches provide the greatest efficiency and maximum student work area. Lab furniture provides room for storage of some of the materials, but this does not serve as a total solution. Tall cabinets along the walls will help. In some instances, you may dedicate a separate area to storage area. In any case security and safety, as well as accessibility must be given consideration.

What About Safety?

The lab is an area of potential hazard. There should be an emergency electrical disconnect switch for all electrical circuits in the lab except for the main room lighting. This emergency switch can also be wired to deactivate all gas and water utility services and to activate an alarm. Such an arrangement is called a "scram circuit". The scram circuit should be placed near the main room exit, located behind a breakable glass window to discourage pranksters. **No lab work should be preformed in the absence of qualified supervisory personnel.**

Tips About Equipment Purchase.

Principles of Technology is a lab-intensive class. The program has been designed so that roughly 40 percent of a student's time in any submit is spent in a hands-on lab situation. At the end of this course, a student will have completed about 90 labs. In these 90 labs, the student will have been exposed to nearly 200 different equipment items.

The PT teacher's responsibility includes procuring equipment items, identifying them, storing them, and maintaining them. This is a large task. The PT equipment list identifies all of the items needed, based on the labs in the given text. You can take one of two paths to obtain this equipment. You can (1.) take a "do it yourself" approach, or (2.) identify a PT equipment vendor who can deliver essentially all of the equipment items to your doorstep. When ordering equipment, insist on the latter.

The "do it yourself" method has the advantage of being cost effective. How ever, be aware that the do-it-yourself approach will require much of your time, well in advance of actually teaching the lab.

Identifying a recognized PT equipment vendor is obviously the simplest way to obtain your lab equipment though you must be prepared to pay for their services, as well as the equipment items. You will want to consider these options, based on your experience and ability, as well as your budget.