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ABSTRACT

This module, one in a series of performance-based teacher education learning packages, focuses on a specific skill that vocational educators need to be successful in the area of instructional management. The purpose of the module is to give educators skill in planning, designing, and organizing the physical facilities of the vocational education laboratory. Introductory material provides terminal and enabling objectives, a list of resources, and general information. The main portion of the module includes five learning experiences based on the enabling objectives. Each learning experience presents activities with information sheets, samples, self checks, checklists, and case studies. Optional activities are provided. Completion of these five learning experiences should lead to achievement of the terminal objective through the sixth and final learning experience that provides for a teacher performance assessment by a resource person. An assessment form is included. (YLB)

MODULE E-9

Manage the Vocational Laboratory

Second Edition

Module E-9 of Category E—Instructional Management
PROFESSIONAL TEACHER EDUCATION MODULE SERIES

The National Center for Research in Vocational Education
The Ohio State University

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INTRODUCTION

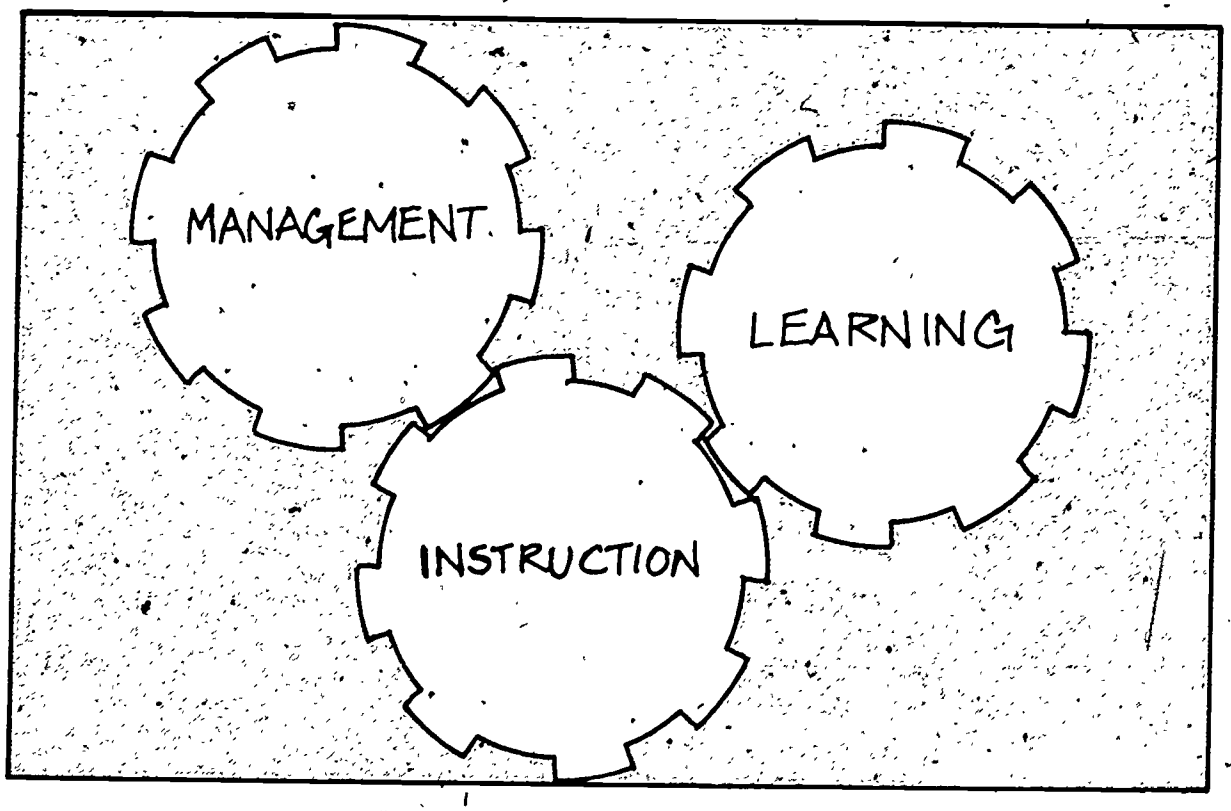
A well-managed vocational laboratory is like a great smooth-running machine. The students work like precision gears; the equipment runs as one intricate and complex mechanism. The instructor functions as the throttle and linkage, moving back and forth to control the energy of the whole operation. Teaching and learning are accompanied in the laboratory by a quiet whirring of activity.

Like a beautifully engineered machine, a good laboratory is a source of satisfaction and pleasure. The teacher works with a minimum of tension and fatigue and with a great sense of accomplishment. Students learn the skills of their chosen occupation rapidly and well, and they find joy in learning. The administration appreciates the efficient way in which the community's resources are being used.

Everybody benefits—but only if all contribute. The instructor needs to develop management plans and procedures and to see that they are maintained. Students need to participate in the work of keeping the facility orderly and the equipment functioning. The administration needs to cooperate with teachers to establish and support workable policies for laboratory use.

Each vocational-technical area has laboratories that are unique to itself, yet there are needs, problems, and solutions that all laboratories share. It is to these common areas that this module is addressed. Five of the more important common aspects of managing and maintaining vocational laboratories are (1) controlling the environment in the laboratory, (2) controlling tools, equipment, and supplies, (3) maintaining tools and equipment, (4) maintaining a student personnel system, and (5) scheduling laboratory use All these management concerns are interrelated, and all are responsibilities of the vocational teacher.

Module E-8, *Organize the Vocational Laboratory*, is concerned with planning, designing, and organizing the physical facilities of the vocational education laboratory **This** module is designed to give you skill in (1) managing and maintaining the laboratory in an ongoing program and (2) solving the day-to-day problems of laboratory management. It will help you develop a laboratory program that will function efficiently and will be a potent factor in helping students achieve their educational goals.



ABOUT THIS MODULE

Objectives

Terminal Objective: In an actual teaching situation, manage the vocational laboratory. Your performance will be assessed by your resource person, using the Teacher Performance Assessment Form, pp. 59-60 (*Learning Experience VI*).

Enabling Objectives:

1. After completing the required reading, demonstrate knowledge of the principles and procedures involved in managing a vocational laboratory (*Learning Experience I*).
2. After completing the required reading, plan a tool and equipment inventory control system for a vocational laboratory in your occupational specialty (*Learning Experience II*).
3. After completing the required reading, plan a tool and equipment maintenance system for a vocational laboratory in your occupational specialty (*Learning Experience III*).
4. After completing the required reading, plan one aspect of a student personnel system for a vocational laboratory in your occupational specialty (*Learning Experience IV*).
5. Given an actual vocational laboratory in your occupational specialty, evaluate the management system of the laboratory and develop plans for its improvement (*Learning Experience V*).

Resources

A list of the outside resources that supplement those contained within the module follows. Check with your resource person (1) to determine the availability and the location of these resources, (2) to locate additional references in your occupational specialty, and (3) to get assistance in setting up activities with peers or observations of skilled teachers, if necessary. Your resource person may also be contacted if you have any difficulty with directions or in assessing your progress at any time.

Learning Experience I

Optional

Reference: Silvius, G. Harold, and Curry, Estelle H. *Managing Multiple Activities in Industrial Education.* Bloomington, IL: McKnight and McKnight Publishing Company, 1971.

Learning Experience II

Optional

Reference. Storm, George. *Managing the Occupational Education Laboratory.* Ann Arbor, MI: Prakken Publications, 1979.

A vocational laboratory in your occupational specialty that you can visit.

Learning Experience III

Optional

Reference. Storm, George. *Managing the Occupational Education Laboratory* Ann Arbor, MI Prakken Publications, 1979.

A vocational laboratory in your occupational specialty that you can visit.

Learning Experience IV

Optional

A vocational laboratory in your occupational specialty that you can visit.

Learning Experience V

Required

A vocational laboratory in your occupational specialty that you can visit to observe and evaluate the management system.

A resource person to assess your competency in evaluating the management of a vocational laboratory and planning for its improvement.

Learning Experience VI

Required

An actual teaching situation in which you can manage a vocational laboratory.

A resource person to assess your competency in managing a vocational laboratory.

General Information

For information about the general organization of each performance-based teacher education (PBTE) module, general procedures for its use, and terminology that is common to all the modules, see About Using the National Center's PBTE Modules on the inside back cover. For more in-depth information on how to use the modules in teacher/trainer education programs, you may wish to refer to three related documents:

The *Student Guide to Using Performance-Based Teacher Education Materials* is designed to help orient preservice and inservice teachers and occupational trainers to PBTE in general and to the PBTE materials.

The *Resource Person Guide to Using Performance-Based Teacher Education Materials* can help prospective resource persons to guide and assist preservice and inservice teachers and occupational trainers in the development of professional teaching competencies through use of the PBTE modules. It also includes lists of all the module competencies, as well as a listing of the supplementary resources and the addresses where they can be obtained.

The *Guide to the Implementation of Performance-Based Teacher Education* is designed to help those who will administer the PBTE program. It contains answers to implementation questions, possible solutions to problems, and alternative courses of action.

Learning Experience I

OVERVIEW

After completing the required reading, demonstrate knowledge of the principles and procedures involved in managing a vocational laboratory.

You will be reading the information sheet, Managing the Vocational Laboratory, pp. 6–14.

You may wish to read the following supplementary reference: Silvius and Curry, *Managing Multiple Activities in Industrial Education*, pp. 249–260.

You will be demonstrating knowledge of the principles and procedures involved in managing a vocational laboratory by completing the Self-Check, pp. 15-17.

You will be evaluating your competency by comparing your completed Self-Check with the Model Answers, pp. 19–21.

Activity 1

Read the following information sheet to learn about the general principles and procedures involved in managing and maintaining a vocational-technical laboratory. As you read, attempt to relate the information to laboratories in your occupational area.

MANAGING THE VOCATIONAL LABORATORY

Most vocational-technical laboratories are complex and expensive facilities. It is important that they be managed well if the community's investment in them is to be justified and the goals of the program are to be achieved. There is equipment to acquire and maintain, supplies to be purchased and distributed, a physical facility to be arranged and kept in order, and students to be organized and given direction.

All this is a demanding part of your duties. At the same time, a well-managed laboratory can be a source of great personal satisfaction to you and a boon to students as they work to learn the skills of their chosen occupation.

Laboratory management is not, of course, an end in itself. A clean and bright laboratory with every tool in place, every instrument and machine gleaming from loving care, and every student moving like clockwork is an impressive sight, but it should not be considered the ultimate goal of teaching. The smoothly functioning laboratory should be designed to allow students to successfully enter their occupation, and it should be protected so that it is available to generations of students as they move through the program.

There are quite a number of reasons why good laboratory management is so important. A laboratory in which the tools and equipment are in order, the noise under control, and the students well organized **facilitates instruction.** You can work effectively because the instruments of teaching are available, the students can see and hear instruction, and the atmosphere enhances your effectiveness.

An orderly laboratory **fosters student learning.** The facilities encourage use, the physical environment is comfortable, and the clean and bright surroundings are psychologically stimulating. Students can learn because the requirements for learning and practice are all there. The student identifies with a successful operation in which he or she, too, can succeed. Students also will tend to spend more time on task, a crucial element in learning.

A well-organized and maintained laboratory **provides a safe setting** in which you and your students can work. Equipment that is in good operating condition, tools that are well adjusted and properly sharpened, clean floors and counter tops, good lighting, and neat storage all contribute heavily to safety. Ensuring student safety through good laboratory management is one of your prime responsibilities.

The **community** expects its **investment** in the vocational-technical program to be wisely used and conscientiously protected. Since the cost of education is a major portion of the local tax burden, the community wants to be sure that expensive equipment is maintained so as to ensure years of instructional use and that teachers make every effort to control loss and damage. It is difficult for schools to retain the community's support unless basic standards of good management are achieved.

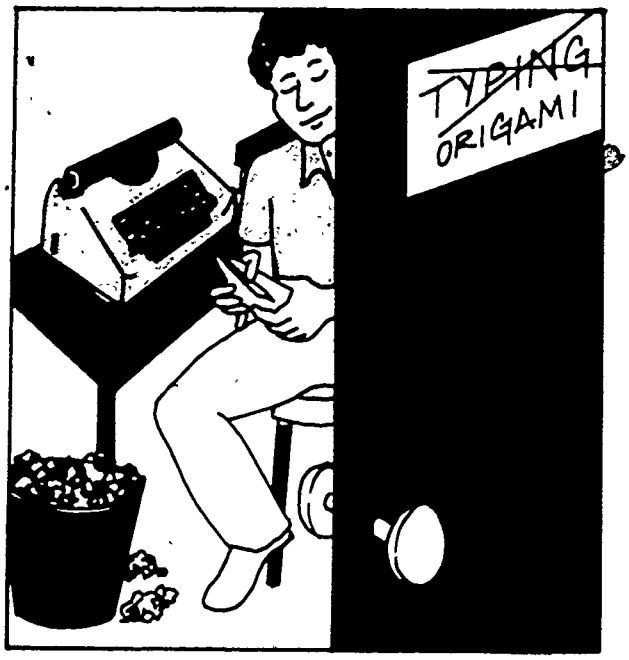
By working in a laboratory that is itself a model of excellence, **students can learn acceptable occupational work habits and procedures.** They can begin to acquire an understanding of the responsibilities they will have for maintaining their own work stations. And they will learn the expectations of employers in their field. If they participate in a successful laboratory maintenance program, they can develop positive attitudes toward efficiency, craftsmanship, and the care of tools and equipment. In attractive surroundings, students will tend to enjoy learning and, therefore, want to continue to work and learn in their occupation.

A pleasant and businesslike laboratory **will attract new, interested, and capable students.** If they see exciting activities going on in an impressive setting, good students will want to become involved and will be proud to be a part of the program.

The laboratory management system should have clearly conceived objectives. These objectives should be based on or consistent with the goals of the total vocational or technical program. While they may not need to be written down, laboratory management objectives should be thoughtfully established. You should ask yourself, "Just what am I trying to accomplish in organizing the laboratory?" and "Why am I doing it in this way?" Such self-examination can keep the management program in proper perspective and can help expose management ideas that are simply personal habits or idiosyncrasies.

For example, one typing teacher insisted that students fold wastepaper, instead of wadding it, before putting it in the wastebasket. An auto mechanics teacher assigned a student to clean the water cooler

at the end of each period. A drafting teacher allowed students to operate the blueprint machine only on Fridays. It is questionable whether these management rules are really designed to promote the goals of the program or are consistent with the demands of the occupation.



Before developing a set of laboratory management plans, it is helpful to review the stated goals and objectives of the program. If statements of goals and objectives do not exist, then it is essential that they should be prepared. Each objective should be examined to see if it has any implications for laboratory management.

For example, assume an objective states that "the student will exhibit the ability to work effectively with others in a small group on a common task." Organizing laboratory cleanup and maintenance around small work crews would be appropriate to meet this objective If, on reviewing the program objectives, you find nothing about helping handicapped students to enter and complete the program, then perhaps the objectives should be reexamined.

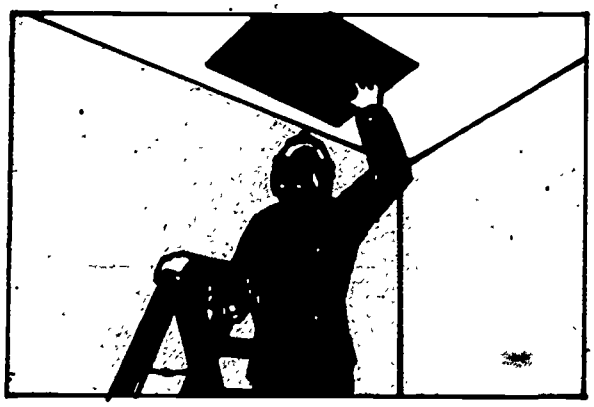
Controlling the Laboratory Environment

One of your general management duties is to control the laboratory environment. This includes providing proper heating, healthful ventilation, adequate lighting, and controlled noise level. Laboratories that are too hot or cold, poorly ventilated, or noisy cause physical discomfort to students. These conditions can increase behavior problems and interfere with learning. To some extent, you can control the laboratory environment and adjust it to suit the situation.

While most lighting fixtures are permanent parts of the building, you can usually control the type and the amount of light. The fixtures, bulbs, and tubes can be regularly inspected to be sure they are operating efficiently. Steps should be taken immediately to have poor or nonfunctioning lighting replaced.

It is usually good practice in modern laboratories to turn on the general lighting when classes begin and leave it on during the instructional period. Special local lighting in storage areas, in exhibit spaces, and on machines should be used when needed. Window shades can be raised or lowered as necessary to provide maximum light without direct glare. An ill-lighted, gloomy laboratory is not only an unsafe and inefficient place to work, it is also depressing to both students and teacher. Sometimes all that is necessary to remedy the situation is a flick of the light switch.

You need to make sure that the laboratory has a supply of fresh air and that the room is at the proper temperature. You can turn the ventilating fans on when needed and, perhaps, adjust the window openings. In some buildings, the heating and cooling thermostat can be regulated to control the temperature in the individual laboratory. You can operate the exhaust systems as needed to remove potentially harmful dust, gases, and exhaust emissions.



A good air environment is always desirable, but in some occupational areas, state or local health and safety regulations are also involved. You need to make sure your laboratory meets these standards.

Some vocational-technical programs require that special environmental conditions be maintained in the laboratory. The horticulture program's greenhouse may require a high relative humidity. A meat-cutting laboratory may need an unusually lower temperature. Teachers of such programs should know what is required and should make sure the custodial staff makes the necessary adjustments to maintain the right conditions.

Noise is a big problem in many laboratories, and it is becoming more and more severe. As secondary

and postsecondary schools get more crowded and as the world outside the schools gets increasingly noisy, the laboratory becomes a more difficult place in which to work. Because the effects of noise can result in apathy, depression, lack of concentration, or fatigue, you must make every effort to keep noise under control.

Noise is unwanted sound. Thus, even the sound of the band playing the school song in the other wing of the building or the sound track of the film being shown next door is noise in the laboratory.

Noise coming from outside the laboratory can be at least partially controlled. Doors or windows can be closed. Acoustic ceiling tile can be installed. Sometimes it may be necessary to work out a cooperative arrangement with your fellow teachers so that their class noises are not scheduled during your lecture/demonstration times, and vice versa.

You may also be able to reduce the noise produced within your own laboratory. When purchasing equipment, if a quieter, more well-insulated model is available, specify that model. Sound-absorbing cork pads can be installed under the legs of vibrating machines. Fiberglass padding can be placed inside machine cabinets. You can keep tools and equipment well adjusted and replace worn, noisy parts to hold down sound levels. For example, power cutting tools (such as circular saws) make less noise if the blades are kept sharp and clean.

Some laboratory noise (such as that produced in testing jet aircraft engines) is so intense that it requires sophisticated engineering to keep it within tolerable limits. The individual instructor cannot solve such problems. If all else fails, require that students wear ear protection devices when operating especially noisy machines.

Another source of noise is that produced by the students themselves. While most students cannot be expected to work in silence, they can be expected to keep noise down to a minimum. Equipment noise begets student-created noise, which starts a vicious circle of confusion. If students are to learn, you must control the amount and volume level of their conversations.

Of course, there are definite limits to what you can do to provide a high-quality laboratory environment. The laboratory may be directly under the flight pattern of a nearby airport. The building engineer may control the heating, ventilation, and even lighting for the entire building. The laboratory may be located next to the agriculture cow barn, and the roof may leak. You then must use every possible device to minimize the difficulties and cultivate the advantages of the situation to the fullest extent. However, some things may simply have to be endured because nothing can be done about them.

Tool Management

In most vocational-technical laboratories, there are a great number and variety of tools that need to be provided to students. Tools are the devices or instruments used by the practitioner in the course of work. They are usually portable and hand operated. The mechanic's hammer and wrenches, the machinist's micrometers, the cook's carving knives, the office worker's rubber stamps, and the nurse's stopwatch can all be considered tools.

Tools range in size from tiny burrs used in the dental auxiliary program to giant wrenches used for diesel engines. Some tools are very inexpensive, but many are extremely costly. The thing they have in common is that they are in constant use by students and must be readily available to them. Yet, they must be managed by the teacher in order to keep the tools in good condition and under control. This is no simple task, and it usually requires some form of highly organized system.

Management of tools is an important aspect of your responsibilities. While some of the duties of tool management may be delegated to others (e.g., a teacher's aide may do the sharpening or adjustment), the ultimate responsibility must be yours. The community expects you to safeguard its investment in laboratory tools and to use them efficiently.

The whole instructional program can be affected by the effectiveness of the tool management system. Students cannot work and learn efficiently if the essential tools are lost or in poor condition. Their interest and enthusiasm soon lag. On the other hand, a smoothly functioning management system promotes habits of orderliness and efficiency in future workers. In planning your tool management system, there are several principles that should be considered, as follows.

All the necessary tools of the occupation should be available to students. You should not retain a separate collection for your exclusive use. However, very delicate or very expensive tools should usually be kept securely under your control. Students can then sign the tools out when they are needed.

Tools that are frequently used by students should be located as close as possible to the work area in which they are to be used. This saves students' time, and students will be less likely to disturb each other as they move around the laboratory.

Tools should be organized so they can be quickly and accurately located by students. In practice, this means that each tool must have a definitely assigned spot and that there should be some logical grouping arrangement (e.g., all measuring tools together or all templates grouped on one panel).

Tools that come in a series or in gradations of some kind (e.g., size, color) should be organized in sequence for easy identification. For example, metric wrenches should be placed so that 10, 11 and 12mm wrenches are next to each other; lettering pens should be arranged from fine to heavy. Of course, this means that tool holders should be designed so that only the correct tool will fit the holder. If this is not done, the series will be constantly out of sequence because, when several tools are off the panel, it will be difficult to replace any one tool correctly.

Tools should be organized so you can inspect them quickly and easily at the beginning and end of the laboratory period. You should be able to see almost at a glance whether a tool is in its right place and in proper condition.

Tools should be made to look and feel attractive. A good worker takes pride in fine tools, and this attitude can be learned through the training program. Tool surfaces should be bright and clean, the bodies painted or finished as appropriate, and the handles smooth and neat. It is difficult to enjoy working with rusty tools with sticky handles, even if they do actually work satisfactorily.

Tools should be stored in such a way as to prevent damage. For example, hand saws should be hung separately on a panel, not piled in a drawer where they will damage each other. Metal tools should never be stored near hydrochloric acid since the acid fumes will cause severe corrosion. Instruments with delicate mechanisms should not be stored in a magnetic environment.

Lost or damaged tools should be replaced or repaired quickly. Student work should not be hampered by the lack of a single tool. If tools are not replaced, you may have difficulty remembering which ones are supposed to be there and which are not. The tool management system soon gets out-of control. If it is impossible to replace the item immediately, its place on the storage panel should be taken by a tag or other marker saying, "Being Repaired" or "To Be Replaced."

There are several suitable techniques for providing students with access to tools. The choice for any particular vocational-technical program will depend on a number of local factors including (1) how tools are traditionally handled in the occupation, (2) how many related programs there are in the occupational cluster, (3) the number and complexity of tools needed in the training program, and (4) the degree of security required to safeguard tools in a particular school setting.

Following are a number of techniques for making tools accessible to students. Using combinations of these various tool distribution techniques may be the best solution.

Tool storage rooms (tool cribs) can be located within the laboratory. Students may check out tools from the attendant (a fellow student assigned on a rotating basis). This method increases security but usually creates considerable waste of time.

A centrally located tool room can serve several laboratories. If the number of programs warrants it, a paid attendant may be in charge. There is a possibility with this arrangement that students will lose still more time.

Open tool panels can be located conveniently about the laboratory to give students free access to tools. The panels may be closed and locked when the class is not in session. If properly designed, such panels can be attractive, convenient, and safe. You will, however, need to inspect them on a regular basis.

Kits of basic tools can be assigned to each student for a designated period of time. Students can work more effectively because the needed tool is always handy. The expense of providing multiple sets of tools may be high, however, and storage space may need to be provided for the tool kits.

Each student can be required to purchase his/her own set of basic tools. This method is defensible if students will be expected to have their own tools when they enter the occupation as beginning workers. If draftsmen are expected to have their own drafting instruments, they may as well acquire and learn to use them in the training program. Nurse trainees might purchase a sweep-second-hand watch and a stethoscope. Cooks frequently own their own set of knives. Teachers of some trades (e.g., machinist or tool and die maker) often encourage students to gradually acquire a set of precision tools for themselves.

"A place for everything, and everything in its place" is an adage that is particularly appropriate for the laboratory. An organized tool management system that provides a convenient and safe place for everything will be of tremendous value to the program. Students and teacher alike will enjoy productive work in the laboratory.

Handling Supplies

If students are to learn through laboratory practice, the necessary supplies for the learning activities must be available to them. You have the job of getting the supplies, storing them properly, and distributing them to students when they are needed. These can become time-consuming tasks that take away from the central work of instruction. Therefore, you should manage the supply system so that it functions with as little effort as possible and controls supplies efficiently. Many supply items are expensive, others pose handling problems because they must be stocked in great variety or are bulky or hazardous. Without an efficient system, you will spend a great deal of time and effort trying to solve supply problems and taking care of emergency needs.

Laboratory supplies are unique to each occupational area, but there are some characteristics of laboratory supply systems that are common to all. Most important of these are the following. First, students should have **all the supplies** that are necessary to complete the learning activities required to attain occupational competencies. These supplies should be of the **appropriate type and quality** for the learning activities, and they should be in good condition when they reach the student. Poor materials discourage good work.

Supplies should be **readily available** to students so they do not waste valuable laboratory time waiting for supplies. This does not mean that you should be constantly running to provide students with materials. The system should help students work efficiently, not be an obstacle to them or a burden to you.

Waste of laboratory supplies must be **kept to an absolute minimum.** This requires well-managed supply storage, intelligent purchasing, and organized distribution. Students often need to be taught how to avoid waste. They may not realize, for example, that cutting a section out of the middle of a board or a piece of fabric, just because that piece is most attractive, is poor practice. In some occupations, knowing how to use supplies without waste is an important occupational competence.

Loss of supplies due to carelessness, pilferage, or vandalism must be **kept in check.** This is an increasingly difficult problem for vocational-technical teachers and will require considerable effort in some settings.

Hazardous substances and materials subject to student abuse must not only be **stored securely** but must be distributed so as to **control** their use.

Some of the above characteristics of a good supply system are apparently contradictory. For example, students should have ready access to needed supplies, yet loss of supplies must be controlled. If possible, you will want to devise supply procedures so that all desirable characteristics are included. It may be necessary, however, to make some compromises. In that case, it will be necessary to decide which are the most important objectives of the supply system. Is it better, for example, to be sure that students can get supplies easily and quickly, even if this means some chance of loss?

Dispensing Supplies

Vocational-technical instructors do not always agree on the best system for dispensing supplies from storage to students. They do tend to agree that, if it is not done systematically, it will be a nuisance to the teacher and will distract from the work of instruction. As in handling tools, the choice of the system for distributing supplies will depend on the type of program and the school setting. Following are some of the alternatives.

A supply room or supply cabinet can be located within the laboratory. Student attendants may be assigned on a rotating basis to dispense supplies and record any charges. You may take personal responsibility for dispensing supplies. However, if this is the case, the supply room should only be open for business for a short, specified time at the beginning of the laboratory period. If at all possible, the system should require students to fill out a requisition for supplies a day in advance so you can have the orders filled and ready to go. Though special circumstances may arise, it is important that you don't continually break off instruction in order to get some small item for a student.

A central supply room can be set up to serve several programs. A paid clerk may be used to dispense supplies and keep the records. This arrangement relieves some of your load, but it can also cause some problems. Students may waste time getting supplies, and the clerk may not know exactly what material they need.

Supplies can be kept in open cabinets or on shelves and racks, freely available to students as needed. You can oversee the use of supplies generally to be sure they are not misused. This system may work perfectly well with mature groups in situations where the supplies are fairly simple and easy to manage and in programs where the supplies have little value outside the laboratory itself. Such conditions may exist in training programs for such occupations as keypunch operators, bricklayers, offset printers, or welders. Obviously, such an uncomplicated arrangement makes less demands on the teacher.

Policies for Laboratory Use by Others

Very often, institutions with vocational or technical programs are asked to share their facilities and equipment with other in-school and out-of-school groups.

Community education classes, work force development and training programs, summer school programs, and special adult short courses may require the use of vocational-technical facilities.

The sharing of these educational resources with the community is a vital aspect of the institution's total educational function and should be done at every opportunity. However, sharing instructional resources should not impair the vocational-technical program for which the resources were primarily provided. The needs of students who are in the regular day and evening programs have priority. The facilities and equipment should be available to them when needed, in the proper working order.

To ensure that a sound educational situation continues to exist, policies should be established beforehand to cover the use of the physical facilities by others. You may have to take the initiative in making known to the administration the need for such a policy. Or you may be asked by the administration to assist in developing such a policy or in updating and modifying an existing policy.

The following guidelines should prove helpful in developing policies for the use of the physical facilities and equipment by other groups:

- Any proposed policy for the use of facilities and equipment must conform to local and state regulations.
- The proposed policy should be approved and supported by the school administration.
- A schedule for the use of facilities and equipment should be drawn up. This schedule should be agreed to by all those concerned.
- Provision should be made for the security of facilities, equipment, and materials.
- Sharing of responsibility for lost, stolen, or damaged equipment or materials should be established.
- Provision for maintaining and cleaning the equipment should be made.
- Separate storage of projects and matenals for each group should be provided.
- A complete inventory of tools, equipment, and supplies should be maintained.

Scheduling Laboratory Use

Vocational-technical laboratories are usually busy places. In order to derive maximum usefulness and efficiency from the facilities, the activities of the laboratory should be scheduled carefully. Attention should be given to scheduling classes, scheduling units of instruction, and organizing students within a class so as to make maximum use of all the available laboratory work stations.

If two or more teachers are using the same laboratory for their classes, they need to have their class schedules planned to provide best use of the facility with a minimum of conflict. In most institutions, class scheduling is done by an administrator, not the teachers, but it is possible to provide input to the person in charge of scheduling. He or she should be informed of the special problems arising from having more than one teacher use the laboratory.

The teachers involved may be able to make suggestions about the best class schedule. It may be possible, for example, to schedule the work load of two teachers so that one will teach a related class in a classroom while the other teaches in the laboratory, thus using the available resources to their fullest extent.

In most vocational-technical programs involving several areas of work, it is not feasible to provide each student with his/her own equipment. To attempt to do so would entail enormous expense and a great deal of space. It is, therefore, necessary for you to plan the work of the class so that each student is allowed a fair share of time to work with each piece of equipment. This may be accomplished by developing fixed time schedules, by having students work on a variety of learning activities, or by scheduling very informally as opportunities arise.

It is becoming increasingly important that every vocational-technical student be provided with the time and opportunity to work in all instructional areas in the program. In some occupational areas (cosmetology and dental assisting, for example), state regulatory agencies require a designated number of hours of work in clinical situations (i.e., with actual customers or patients).

In competency-based programs, it is essential that students have the opportunity to develop the required degree of skill in all of the specified competencies of the occupation. In order for the teacher to certify student competency, he/she must have observed the student performing the skill according to the predetermined criteria. It is, therefore, imperative for the

teacher to manage the laboratory on a systematic basis so that the necessary experiences take place and learning occurs.

Coping with the management problems in a laboratory where several major learning activities are going on at the same time is demanding. Teachers who have been most successful at this are those who have planned and prepared for it. The problems and constraints of each service area are perhaps unique, but there are a number of procedures you can follow that will help you to schedule laboratory activities effectively.

For example, there may be several instructional areas in the laboratory where tools, equipment, and work stations are grouped for some major activity. Since all the learning activities do not need to take place at the same time, you could plan the term's work so that certain **work stations** are used for one type of activity at the beginning of the term and for another activity at the end of the term.

Or, in order to get the school year off to a smooth and efficient start, you could select for the **beginning learning activities** those that can be done by the whole group at the same time. This means that the activities will probably have to be relatively simple and limited ones. There will have to be sufficient hand tools and work stations so all may work without hindrance. Students will complete these first activities at varying rates and can then be assigned a variety of continuing activities.

However, because of the limitations of tools and equipment, it may be impractical to begin the class with only one activity. If several **different student activities** are to be started at the beginning of the term, you should delay actual laboratory work until a series of basic lessons or demonstrations have been given. Important and representative operations should be demonstrated in each of the activities that students are about to undertake.

When this latter method is used, there will be a considerable time lapse for some students between the time when they receive group instruction for a task and the time when they actually have a chance to practice that task at their work stations. You can minimize the difficulties this can cause by using the following techniques:

- Schedule activities to keep the time lapse to a minimum.
- Provide instruction sheets to help students remember the steps in the task.
- Provide individual or small-group mini-demonstrations to refresh the memory of students as they finally begin the task.
- Have students who have successfully completed the task help those who are just beginning.

Another option is to install a **work station rotation system** so that each student is provided with a definite and predetermined number of days to work at each piece of equipment. Students can be rotated individually or in small groups. The rotation period can be weekly or every two weeks. This system has some obvious and serious deficiencies, because all students do not work or learn at the same rate. However, where facilities are very limited, it may be a necessary solution.

Students can also be rotated among the required work stations on the basis of **individual progress.** As a student achieves the competencies of one area, he or she is assigned to a new area of work. This permits individual students to work at their own rate and continue until they have learned the necessary skills.

The movement toward individualized instruction, competency-based instruction, and open-entry/open-exit programs requires that students rotate through work stations on an individual basis. In order to make this system work, flexible scheduling of students and a suitable record-keeping system are necessary.

You can maintain a **progress chart** to keep track of student achievement and to assist you in implementing a work rotation system. A progress chart posted in the laboratory not only aids you in devising work station assignments but also keeps students informed about how well they are meeting the course objectives. Be aware, however, that in some institutions and states posting student progress records is prohibited.

In a competency-based program, some form of progress chart (either posted or kept in your records) is essential in enabling you to record and keep track of each student's achievement in a great number of occupational skills. A simple progress chart is shown in sample 1.

SAMPLE 1

PROGRESS CHART

Agricultural Mechanics Laboratory

Laboratory Activities / Students	Joshua	Ann	Marc	Ricky	Jack	Blaine
Maintaining Small Gasoline Engines	10–17 / 10–28	10–31 / 11–14				
Using Agricultural Mechanics Tools			10–17 / 11–11			
Oxyacetylene Welding				10–31		
Electric Arc Welding						10–17 / 11–11
Mixing and Using Concrete	10–31 / 11–11	10–17 / 10–28				
Constructing Small Buildings					10–31	
Applying Paints				10–17 / 10–21	10–24 / 10–28	
Installing Electrical Wiring				10–24 / 10–28	10–17 / 10–21	

Key

10–17
10–23

Date student started activity
Date completed

A further option is to provide a scheduled variety of **customer work** so students can fully use the available work stations. In programs such as television repair, cosmetology, auto repair, and dental hygiene, the instructional program depends on "live work" (i.e., actual customer service work).

You should schedule and organize live work on the basis of student instructional needs rather than on customer convenience. In auto mechanics, for example, if some students need learning activities in wheel alignment and the equipment is not in use, you can keep that work station operating by searching for suitable wheel alignment customers among school staff, students, or community members.

Finally, you could provide **open laboratory time** for students. Periods of time when regular classes are not using the laboratory can be scheduled as open labs. This time is usually scheduled during late afternoon or evening hours. During the open laboratory time, students can come in on a voluntary basis to make up missed hours, work on personal projects, practice skills, or use equipment that is in heavy demand during the regular class period. You, or some other paid supervisor, must be on hand when the laboratory is open, but for the most part, the work should be self-instructional. Unfortunately, schools with crowded class schedules or double sessions often cannot arrange for any unscheduled laboratory time.

Optional Activity 2

For more information on storing tools and for ideas that you may be able to apply in your own laboratory, you may wish to read Silvius and Curry, *Managing Multiple Activities in Industrial Education*, pp. 249-260.

Activity 3

The following items check your comprehension of the material in the information sheet, Managing the Vocational Laboratory, pp. 6–14.

SELF-CHECK

I. Essay:

Each of the four items below requires a short essay-type response. Please explain fully, but briefly, and make sure you respond to all parts of each item.

1. Explain the following statement: "Good laboratory management greatly increases the potential for student learning in a vocational-technical program."

2. What, if anything, is the relationship between the objectives of the vocational-technical program and the system of laboratory management that is implemented?

3. What responsibility does the teacher have for the general environmental conditions (e.g., heating, lighting ventilation) in the laboratory?

4. How can tools be controlled and safeguarded—and yet be accessible and useful to students working in the laboratory?

II. Case Study:

Read the following case study, which describes two teachers' approaches to managing their respective laboratories, and **critique in writing** the teachers' performance. In your critique, include suggestions for how the teachers could improve their management procedures.

You have arranged to visit the Arcadian Area Vocational School to see two vocational laboratories and talk to the teachers who are responsible for the programs. Mr. Carl Yancy, the administrator in charge of instruction in the school, takes you down to the office machines laboratory. "I want you to meet one of our best teachers, Ms. Priscilla Thomas. Ms. Thomas runs the finest laboratory program in the country."

After Mr. Yancy leaves, Ms. Thomas begins to show you around the laboratory. The cabinets are painted lovely pastel colors, the floor is carpeted, and the place is spotless. The teacher is obviously proud of the equipment, and with reason. "We just got this expensive machine recently. I demonstrate its use, but of course I don't let students use it because they might damage it."

You comment on the fine collection of reference materials you see on the shelves in Ms. Thomas's office.

"Yes," she replies, "the school has been generous with funds for library materials. I find it very helpful in planning my lessons."

In answer to a question about student participation in the management and maintenance of the laboratory, Ms. Thomas responds, "Students are indeed very valuable in helping to maintain the laboratory, and I use them whenever I can. Those two in the back of the room, for example. They finished today's assignment early, so I got them to straighten the supply cabinets."

You inquire whether she is planning any changes or additions to the program. "No, not really. We should have a stencil duplicator, I suppose, because many of the small businesses in the area use them, but it is so messy, you know."

You thank Ms. Thomas for an instructive visit and make your way to the back of the school to see the laboratory for farm equipment maintenance.

It is actually just a large shed next to a field. The only wall is where the shed meets the school building. It hardly deserves to be called a laboratory, you think. You see the teacher outside with a group gathered around a tractor.

He makes the introduction. "You're the visitor from the college, and I'm Al Fresco," he booms.

You tell him you are there to get ideas about managing laboratories, and he cuts in, "Don't believe all that stuff you read in those teacher education modules; it can't be done. You always have too many students and not enough money. It takes two weeks just to get a faucet fixed. We do have good ventilation out here though," he laughs. "When it rains, we go inside and have a related lesson."

Mr. Fresco talks nonstop as he shows you around. "The important thing is to keep the students busy . . . get plenty of jobs set up so they can practice maintenance operations . . . keep all the equipment running even if you have to come in Saturdays to do it. Mr. Yancy gets on me sometimes about how the shop looks, but after all, farm mechanics isn't a white-glove occupation. I really should build a new tool panel . . . haven't lost a tool in a couple of years though . . . students want to use the tools, so they take care of them . . . we don't have a cleanup organization . . . everybody just pitches in to get the job done, and I try to see that one person doesn't always get the dirty work. Supplies? They all just use what they need . . . no problem, except things are hard to find sometimes."

You leave Mr. Fresco's lab at the end of the hour, worn out and slightly confused about laboratory management. You spot a convenient tree under which you can sit to collect your thoughts and come to some conclusions.

NOTES

Feedback 4

Compare your written responses to the self-check items with the model answers given below. Your responses need not exactly duplicate the model responses; however, you should have covered the same major points.

MODEL ANSWERS

I. Essay:

1 Even experienced teachers are sometimes astonished to find that students can learn under very poor conditions if they are motivated enough. There is, however, no doubt that students will learn more efficiently and will want to continue learning if conditions are attractive, comfortable, and convenient. In a laboratory that is well managed, the teacher attempts to provide just the right environmental setting for learning.

Physically, students should be able to see and hear instruction if they are to learn. The temperature, humidity, and ventilation need to be such that students are comfortable and can concentrate on the job at hand. The sound level in the laboratory should be low enough that it does not cause tension, depression, or a short attention span—conditions that interfere with learning.

Learning is enhanced if students feel that they are in an environment where success is possible. If the tools of learning are accessible and attractive, students will tend to want to use them. If the surroundings are attractive and orderly, students will be stimulated and more productive. A laboratory that is a model of occupational management will encourage students to copy the model and develop good work habits and attitudes of their own. The teacher who skillfully manages a vocational-technical laboratory will be fostering learning at the same time.

2. The ultimate goal of any vocational-technical program is to prepare students to successfully enter the occupation for which they are being trained. Most of the program's objectives lead to that goal, and these objectives deal with the specific knowledge, skills, and attitudes needed in the occupation. Every laboratory management plan should be designed to help students reach the goal of entering the occupation.

Ideally, all the management activities that affect students should be planned to further one or more of the objectives. Even an ordinary and routine task (e.g., cleaning the equipment) should be related to a needed skill or attitude (e.g., the need to keep tools and equipment clean on the job). And purchasing supplies should be done in such a way as to provide the best material available for student laboratory learning activities.

It is not always possible to draw a direct relationship between program objectives and management procedures. Some things must be done just to fulfill administrative or business regulations and may occasionally tend to interfere somewhat with program goals and objectives.

It is very important, however, for you to prevent personal convenience, whims, or supposed tradition from influencing your laboratory management design. All plans, procedures, and regulations should be subject to scrutiny to be sure that, as much as possible, each one promotes the objectives of the program and assists students in achieving their educational and personal goals.

3. The teacher's responsibility for providing proper environmental conditions in the laboratory will vary considerably from school to school. In some buildings, heating, lighting, and ventilation are completely controlled by the custodial staff or by automatic devices that don't seem to take orders from anyone. In that case, there is not much the teacher can do except to be aware of whether the system is working properly and to notify the right person if the system malfunctions.

In other buildings, the teacher has individual control of heating, air conditioning, general room ventilation, exhaust fans, lighting equipment, windows and shades. A good deal of personal discretion is then possible in providing a good laboratory environment.

No matter what the institutional setting or conditions, the instructor has a real responsibility to make every effort to provide the best possible environment in the laboratory. It is always possible to work for improved conditions, to cooperate with other instructors to minimize noise interference, and to organize laboratory activities to avoid environmental difficulties. The health, safety, comfort, and learning processes of students (and teacher) depend on it.

4. The simplest way to keep tools from getting lost, taken, or damaged is to keep them tightly locked in a storeroom and to never let students get their hands on them. The easiest way to provide students with convenient access to tools (at least for a while) is to scatter the tools at the various work stations within easy reach. Obviously, neither of these "solutions" is desirable or feasible; some compromise or combination of methods is needed.

   The basic principle of good tool control is to provide a designated storage spot for every tool—only one place for each tool and only sufficient places for the tools available. When a particular tool is not in actual use, it is to be in its storage holder. You should make a quick and accurate inspection of the tool panels at the beginning and end of every laboratory period (and even during the period) to be sure all is in order.

   If such a system is carefully worked out and presented to students, they will usually cooperate in making it function because it is to their own advantage. It is very important to achieve this wholesome and cooperative attitude about tool care and to avoid a kind of "police state" atmosphere in which there is mistrust and antagonism between teacher and students.

II. Case Study:

There is no doubt that both Ms. Thomas and Mr. Fresco are sincerely concerned with helping students learn through laboratory experience. Their approaches to this goal are quite different, however.

Ms. Thomas seems to think that a beautiful and smoothly functioning laboratory is an end in itself. She appears to get a great deal of personal satisfaction from managing such a laboratory. Her students, too, probably enjoy the fine setting in which they work, though they must feel rather restricted sometimes. They might learn even more if they were allowed to use all the equipment that was intended for them in the program.

Her concern for protecting the community's investment is commendable. However, if Ms. Thomas gives adequate instruction, surely the chance that students will damage the equipment is minimal and worth taking in view of the benefits involved. The same is true of the reference library because it, too, should be available to students, not just to the teacher.

It is unfortunate that her determination not to include an occupational process in the program was made on the basis that it is "so messy." The training value to students, not the effect on the appearance of the laboratory or the convenience of the teacher, should be the deciding factor.

In another way, also, Ms. Thomas seems not to have thought through the needs of her students. She is **using** two of them to straighten cabinets for her—though it might be hard to justify this use of students' time. Are they being trained for skills needed in the occupation? It is also a very poor "reward" for students who are conscientious and finish their assignments quickly. Surely some interesting additional laboratory activity would have been better.

It is significant that Mr. Yancy, the dean of instruction, is impressed with Ms. Thomas as a teacher. The outward evidences of success are very apparent, but both Mr. Yancy and Ms. Thomas should look more deeply at the laboratory program and assess its effectiveness in meeting the objectives of vocational instruction.

Mr. Fresco's "laboratory" is a different situation altogether. The facility itself is poor, the general conditions are disorderly, and there doesn't seem to be much system to the whole operation. The attitudes that Mr. Fresco expresses are in some ways disappointing, though perhaps somewhat justified. There is much that could be done to improve the laboratory.

At the same time, students do appear to be learning and enjoying it. Mr. Fresco keeps them busy with productive work, keeps the equipment in good operating order, and provides the tools they need in order to do the job. From what he says, they cooperate with him and with each other—certainly a good atmosphere to have in any laboratory.

Mr. Fresco seems to have a good point when he implies that the standards of orderliness in the vocational laboratory must be realistic for the occupation involved. He appears to be making the best of a difficult situation.

With some additional work, the management of the laboratory could be improved. Mr. Fresco could probably get the school to improve the facility if he had the support of Mr. Yancy. He could build that enclosed tool panel to show his interest and concern.

The student's energy and enthusiasm could be used to greater effect if their responsibilities were organized to include not only cleanup tasks, but lab maintenance duties and some self-government as well. Even fixing a faucet is within the scope of student skills in a farm mechanics program. Mr. Fresco seems to have great potential as a teacher—maybe all he needs is to complete a few well-chosen teacher education modules.

Level of Performance: Your written responses to the self-check items should have covered the same **major** points as the model answers. If you missed some points or have questions about any additional points you made, review the material in the information sheet, Managing the Vocational Laboratory, pp. 6–14, or check with your resource person if necessary.

NOTES

Learning Experience II

OVERVIEW

Enabling Objective

After completing the required reading, plan a tool and equipment inventory control system for a vocational laboratory in your occupational specialty.

Activity 1

You will be reading the information sheet, Inventory Control Systems, pp. 24–30.

Optional Activity 2

You may wish to read the following supplementary reference: *Managing the Occupational Laboratory*, pp. 83–99.

Optional Activity 3

You may wish to visit a vocational laboratory in your occupational specialty to examine an inventory control system in use.

Activity 4

You will be selecting a single area of instruction in your occupational specialty and developing a complete plan for a tool and equipment inventory control system for a vocational laboratory.

Feedback 5

You will be evaluating your competency in planning a tool and equipment inventory control system, using the Inventory Control System Checklist, pp. 31–32.

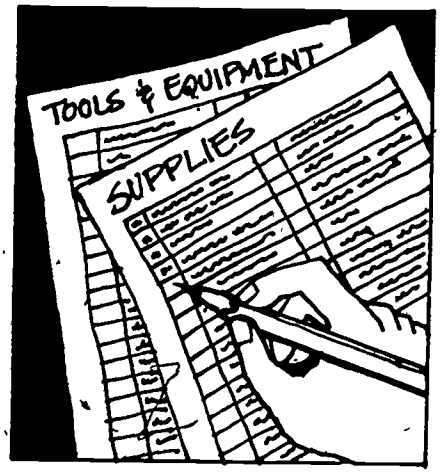
Activity 1

For your vocational or technical laboratory, you will probably need one record-keeping system (inventory) for laboratory supplies and another for tools and equipment. Read the following information sheet to learn about recommended practices and some suggested forms for maintaining each type of inventory system. As you read, attempt to relate each of the main points to laboratories in your own occupational specialty.

INVENTORY CONTROL SYSTEMS

Most vocational-technical laboratories contain a great variety of supplies and tools for student use and many pieces of expensive equipment. Adding together the value of all these items results in an impressive sum of money You are responsible for all of this and must keep track of it. In order for the task of controlling supplies, tools, and equipment to be done accurately, and with as little expenditure of your time and energy as possible, systematic inventory procedures should be used.

It is important for you to know at all times what supplies are in stock in the laboratory and what tools and equipment are located in the facility. It is the purpose of a laboratory inventory system to keep a record of these items The type and complexity of the inventory may be somewhat different for each program. However, all vocational-technical programs should maintain an accurate and current record of their supplies, tools, and equipment. The principles of maintaining an inventory are basically the same for all programs.



Inventory records are needed in order to prepare budgets for the coming school year, to wisely purchase replacement supplies, to plan for the purchasing of additional equipment, and to provide for the orderly transfer of responsibility from one teacher to the next. Well-kept records allow you to know where every item is located, thus helping to control loss due to carelessness or theft. At the end of the year, inventory records provide you with the documentation needed to report a year of efficient laboratory management.

Supply inventories help you plan ahead, so laboratory supplies are available when students need them. Having adequate supplies available helps to avoid the waste of the students' time or the necessity of changing instructional plans. If the total inventory system includes maintenance records for equipment, the maintenance program is made easier and more efficient.

Any inventory system to be adopted must fit the needs of the laboratory in which it is to be implemented. You will probably wish to select a basic system and tailor it to your particular situation. Not only do vocational-technical programs vary, but individual institutions may have their own requirements and regulations, and administrators may require specific information in inventory reports.

A complicated inventory system requiring the use of data processing equipment is seldom necessary for vocational-technical laboratories. A simple and flexible system, requiring a minimum amount of maintenance time, is usually quite satisfactory.

There are laboratory supply inventories and tool and equipment inventories. Each will require its own forms and procedures. It is not always easy to differentiate between "supplies" and "tools and equipment," however. In general, *supplies* are defined as things that are **consumed** or **destroyed** in the course of their use (e.g., typewriter ribbon, flour, paint, cement, or marking pen). *Tools and equipment* are **not consumed,** but last indefinitely with proper use (e.g., pliers, scissors, calculator, spray gun, or microscope).

The dividing line is not so clear with items that may either last for years or be used up or destroyed very quickly, depending on circumstances (e.g., drill bits, knife blades, metalworking files, or grinding wheels). Some school systems define *supplies* as items expected to last three years or less. Others define *supplies* as items that cost $10 or less per piece. Before you set up an inventory system, you will need to determine the definitions for supplies, tools, and equipment to be used in the institution in which you work.

When you arrive at a secondary or postsecondary school to take charge of a vocational-technical program, one of the first things you should do is to **take a complete inventory** of all tools, equipment, and supplies on hand. If there is an inventory record left by a preceding instructor, every item on this record should be checked very carefully.

Any discrepancies between the old inventory and what is actually found in the laboratory should be noted, and this information should be furnished to the appropriate administrator.

By going over the inventory conscientiously, you will (1) have an accurate record for the beginning of the year, (2) know what needs to be done to get all the equipment ready for use, and (3) avoid future misunderstandings about the amount and kind of equipment that is in the laboratory.

At the end of every school year, after all student activities in the laboratory are over, a complete **equipment and tools** inventory should again be taken Every piece of equipment and every tool that was on hand at the beginning of the school year must be accounted for in some way. Each item checked as present should have actually been seen to exist. It is not enough to check in an item on the inventory because you know it must be around someplace—or you think you remember seeing it a while back.

Items no longer in the laboratory at the end of the year should be accounted for (e.g., written notes in your file about how they were disposed of). They may have been sold or traded in, cannibalized for parts, transferred to another laboratory, discarded, destroyed, or lost. Items new to the inventory should also be noted as having been purchased, acquired as gifts, or received as transfers from other school programs. A copy of the equipment and tools inventory report should be kept in your files, and another copy furnished to the administrator.

An inventory of laboratory **supplies** should also be taken at the end of the school year. The supplies on the shelf or in storage should be accurately counted and entered on an inventory sheet. For each item, the quantity on hand should be multiplied by the unit cost for that item, and the total entered on the sheet. Finally, the value of all supplies should be added together to determine the total supply inventory value. An example of a supply inventory sheet is shown in sample 2.

The actual task of completing the supply inventory should be done at a time when there are no distractions or interruptions so the job can be done accurately. It often helps for two teachers to work together—one counting the quantity of the item and calling it out, the other entering the number on the inventory sheet and verifying it. Dependable students can also help take the inventory; it may be a very useful occupational competence for them. The final responsibility for the inventory is, however, yours.

SAMPLE 2

LABORATORY SUPPLIES INVENTORY FORM

School Arcadian Area Voc. School Program Office Machines

Inventory Date 9/1/82 Sheet No. 5 of 6

Person Taking Inventory P. Thomas

Article	Unit	On Hand	Unit Price	Total
Mimeo Paper, 8½" x 11"	Ream	3	6.25	18.75
White Glue	Pint	6	3.20	19.20
Cleaning Rags	lb.	40	1.40	56.00

Sheet Total $ 93.95

You and the administration will want to have an idea of how the laboratory supply money has been spent during the school year. It is important to know that all funds are accounted for and are represented either by cash on hand in the institution's accounts or by supplies on hand in the laboratory. It is possible to get an overall picture of the handling of supplies by calculating totals for the items shown in sample 3.

SAMPLE 3

SUPPLY VALUE

Beginning of School Year

A. Total value of supplies on hand, beginning of school year ..... $_____

B. Cash on hand for supplies in school account, beginning of school year $_____

C. Amount provided by school for supplies during the school year ..... $_____

D. Amount collected from students for supplies during the school year ... $_____

E. Value of supplies received from other sources (gifts, transfers, etc.) .... $_____

Total $_____

End of School Year

A. Total value of supplies on hand, end of school year ..... $_____

B. Cash on hand for supplies in school account, end of school year ..... $_____

C. Total value of supplies sold or provided to students during the school year ... $_____

D. Value of supplies used for various instructional purposes ..... $_____

Total $_____

The total of the second set of figures in sample 3 should be compared to the total of the first set. Generally, the two totals should be equal. Any difference between the two should be accounted for. If the end-of-year total is lower, it may indicate that (1) laboratory supplies have been used for teacher demonstrations, (2) students have not been charged enough for supplies they purchased, (3) there has been unauthorized use of supplies, or (4) there has been loss by theft. With the figures in hand, you have some basis for determining how well supply stocks have been managed and for developing future management procedures.

You should also develop or adopt a system that provides a **running inventory of tools and equipment.** There needs to be provision for adding new items and deleting obsolete or unusable tools and equipment at any time. It is also helpful if the inventory form provides information about the source of each tool or piece of equipment (e.g., date and from whom purchased, gift and giver, or transfer), and a record of its maintenance or repair.

A simple **file card system** is probably suitable for all your laboratory inventory needs. Such a system is easy to use and has great flexibility. File cards for each individual tool or piece of equipment can be removed, replaced, or changed as needed. Somewhat more work is required to set up a card system than to simply make a list of items, but the initial effort is easily justified because each card may be usable for many years.

To set up the card system, you must develop or select a card format to be used. Each tool or item of equipment should be represented by a separate card, and the information on the card should usually include the following:

- Item name
- Type or model
- Serial number
- Source, cost, and date acquired
- Condition of item
- Dates of scheduled maintenance
- Repair record
- Other pertinent data as needed

The cards may be either 3" x 5" or 4" x 6" in size, printed with the desired format. Index cards are available in several colors, which may be useful for color coding different categories of tools and equipment. A 4" x 6" equipment inventory card format, showing the front and back, is shown in sample 4. A card format suitable for hand tools and small instruments is shown in sample 5.

Once the card system is set up, the only time a new card needs to be prepared is when a new tool or piece of equipment is added to the laboratory. If an item is removed from the laboratory inventory, a note should be made on the card about how the equipment or tool was disposed of, and the card should be moved to the inactive file. It is necessary to keep such an inactive file so that if, at any time, a question is raised concerning what happened to an item, the answer will be available and documented. The cards themselves should be organized in a durable file box and kept in a secure place.

Some vocational-technical laboratories may need to develop very **special inventory devices** to control certain laboratory items. In health services programs, for example, drugs subject to abuse will need to be controlled with an inventory security system similar to that used in a hospital. In such a system, the materials are stored in a locked cabinet, with only the teacher having the key. The teacher dispenses the material, and the student signs an inventory sheet that records the type, exact quantity, date, and time the material was received.

Vocational or technical programs using precious metals may set up a running inventory card system in which the teacher records the amount dispensed whenever any are given out so that, at any given time, the exact quantity of the material remaining in stock is known. Valuable or delicate tools may need to be signed out by students whenever they require their use. Some schools may have developed computerized inventory systems for laboratory equipment. In any case, you should plan and construct an inventory system that will meet your particular needs.

SAMPLE 4

INVENTORY CARD

(Front)

EQUIPMENT INVENTORY

Equipment Item _____

Type _____ Size _____

Manufacturer _____

Manufacturer's Address _____

Serial No. _____ Model No. _____

Purchased From _____

Vendor's Address _____

Purchase Date _____ Cost _____

Other Information _____

(Back)

REPAIR AND MAINTENANCE RECORD

Date	Service Performed	Serviced by	Cost

SAMPLE 5

INVENTORY CARD

TOOL AND INSTRUMENT INVENTORY

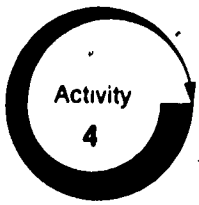
Item Hammer

Description 6 oz. machinist Cost 8.39

Date	Disposition	On Hand
9/12/82	On hand	10
10/21/82	Lost 1	9
6/1/83	Purchased 1	10

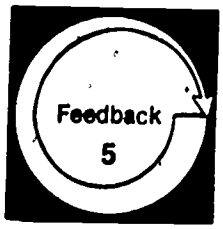
For more information on organizing an inventory control system, you may wish to read Storm, *Managing the Occupational Education Laboratory*, pp. 83–99.

To get firsthand information about inventory control problems in your own occupational specialty, you may wish to arrange through your resource person to visit a laboratory in the area and examine the inventory control system in use for supplies, equipment, and tools. During your visit, you may wish to meet with the teacher responsible for the laboratory to discuss the special problems of inventory control and the solutions he/she has found for them.



From your own occupational specialty, select a single instructional area (e.g., in a cosmetology program, manicuring; in auto mechanics, tune-ups; in graphic arts, reproduction photography; in foods preparation, baking). Develop a complete plan for a **tool and equipment** inventory system for that one area. This will include the following steps:

- Listing all the tools and equipment for the area
- Selecting or developing a format for inventory cards or sheets
- Developing a plan of procedures for the maintenance of the system



After you have developed your plan, use the Inventory Control System Checklist, pp. 31–32, to evaluate your work.

INVENTORY CONTROL SYSTEM CHECKLIST

Directions: Place an X in the NO, PARTIAL, or FULL box to indicate that each of the following performance components was not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, a performance component was not applicable, or impossible to execute, place an X in the N/A box.

Name _____

Date _____

Resource Person _____

	LEVEL OF PERFORMANCE			
	N/A	No	Partial	Full
The tool and equipment inventory control system:				
1. includes all the tools and equipment needed by the students to work in that area of instruction	☐	☐	☐	☐
2. uses inventory sheets or cards that include all information necessary and helpful for inventory control in the specific occupational specialty	☐	☐	☐	☐
3. provides a relatively easy way to add or delete items on the inventory as necessary	☐	☐	☐	☐
4. includes information about where all items are located	☐	☐	☐	☐
5. defines and maintains a clear distinction between "tools and equipment" and "supplies"	☐	☐	☐	☐
6. is organized simply and logically in some form of file box or notebook	☐	☐	☐	☐
7. includes, as appropriate, special procedures for controlling expensive, delicate, or hazardous items by:				
a. providing security for the items	☐	☐	☐	☐
b. providing information on student use of the items	☐	☐	☐	☐
8. is clearly organized and easy for others to understand	☐	☐	☐	☐
9. is relatively easy for the teacher to keep current, in that:				
a. during the school year, it requires little or no attention except when there is a change in tools or equipment	☐	☐	☐	☐
b. if a change is necessary, only the card or sheet for that item is affected	☐	☐	☐	☐
c. it requires only a simple check during beginning-of-term and end-of-term inventory procedures	☐	☐	☐	☐
10. includes a plan of procedures that provides for:				
a. at least one full inventory per school year	☐	☐	☐	☐
b. an inventory check at the beginning of the school year	☐	☐	☐	☐
c. some form of inventory report for the school administration	☐	☐	☐	☐

Level of Performance: All items must receive FULL or N/A responses. If any item receives a NO or PARTIAL response, review the material in the information sheet, Inventory Control Systems, pp. 24–30, revise your plan accordingly, or check with your resource person if necessary.

Learning Experience III

OVERVIEW

Enabling Objective

After completing the required reading, plan a tool and equipment maintenance system for a vocational laboratory in your occupational specialty.

Activity 1

You will be reading the information sheet, Laboratory Tool and Equipment Maintenance Systems, pp. 34–38.

Optional Activity 2

You may wish to read the following supplementary reference: Storm, *Managing the Occupational Laboratory*, pp. 101–140.

Optional Activity 3

You may wish to visit a vocational laboratory in your occupational specialty to observe an equipment maintenance system in operation.

Activity 4

You will be selecting a single area of instruction in your occupational specialty and developing a complete tool and equipment maintenance system for a vocational laboratory.

Feedback 5

You will be evaluating your competency in planning a tool and equipment maintenance system, using the Maintenance System Checklist, p. 41.

Activity 1

It is not enough just to keep a record of the quantity and whereabouts of tools and equipment. You must also develop procedures for maintaining tools and equipment in good condition. Read the following information sheet for recommended procedures for setting up and maintaining a tool and equipment maintenance system and suggested forms to use.

LABORATORY TOOL AND EQUIPMENT MAINTENANCE SYSTEMS

If students are to learn the skills of their chosen occupation at maximum efficiency, the tools and equipment in the laboratory should be in their best possible condition. Students cannot do good work with poor equipment. Neither will they develop positive attitudes toward the care and use of the tools of their trade if the tools in the laboratory are badly maintained. Student safety in the laboratory may well be jeopardized if electrical wiring is old and frayed, machine parts are broken or missing, or cutting tools are not sharp. There is a great deal of truth in the old saw, "A dull tool is a dangerous tool."

You have a stake in the maintenance of laboratory equipment and tools that cannot be ignored. A unit of study can't be planned and presented properly if the needed equipment is out of order. A skill demonstration lesson must be supported by well-functioning tools and equipment if it is to proceed smoothly and effectively.

You also have ultimate responsibility to the school to see that laboratory tools and equipment are properly cared for, controlled to prevent loss, and repaired when necessary. The way in which this responsibility is delegated among staff is not the same in all schools, but the obligation remains nonetheless.

The Teacher's Responsibilities

There are a number of duties involved in maintaining laboratory tools and equipment. You may be expected to do some of the maintenance work yourself or to work cooperatively with others to take care of some of the tools and equipment. Or, you may simply have the responsibility of seeing to it that a major maintenance job is completed by a service specialist. You may choose to accomplish these tasks on a "piecemeal" basis (i.e., taking care of each situation or maintenance task as it arises). However, it will be done much better, and involve much less of your time and effort, if the whole procedure is planned and carried out systematically.

One of your tasks is to **make an inspection** of all the tools and equipment in the laboratory **regularly and frequently.** For some delicate or hazardous tools and equipment, this may have to be done daily. For other tools and equipment, a monthly check is all that is required. It may be sufficient to give a quick and expert inspection of the critical areas of the tools and equipment (such as the gas regulators and hoses of an oxyacetylene welding outfit) to be sure all is well. Complex and delicate tools and equipment may require a more thorough inspection and routine tryout of the controls.

If everything appears to be in order, no special care is indicated until the next scheduled maintenance service. However, if you detect possible trouble, it should be dealt with immediately. You will have to draw on your expertise to determine how often routine inspections should be conducted, how thorough they must be, and what parts should be inspected.

A second aspect of your maintenance responsibility is to **provide routine care** for laboratory tools and equipment. The purpose of routine maintenance is to prolong tool and equipment life, prevent breakdowns, and keep things in top working condition. This is often called *preventive maintenance* because its purpose is to prevent wear and breakdowns rather than just to repair out-of-order tools and equipment. Routine care may include such operations as regular lubrication, general cleaning, minor adjustment, replacement of disposable parts (such as air filters), or sharpening of cutting edges.

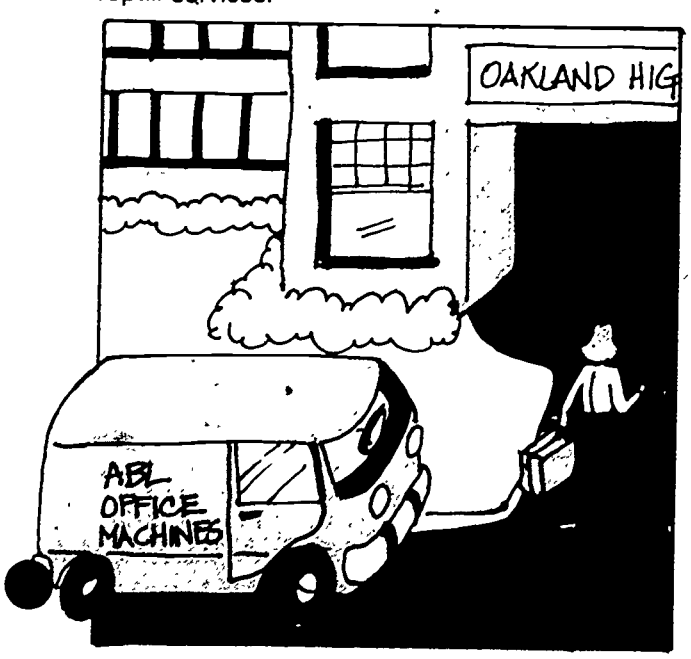
Usually, the manufacturer of each tool or piece of equipment will have worked out a maintenance schedule for it and will have provided detailed maintenance instructions in the operations manual. These manuals should become important parts of your maintenance files. Some tools and equipment have very strict

requirements for maintenance, even to the point of being subject to state or local law. For example, X-ray machines must be tested for radiation leakage and dosage at set intervals, and fire extinguishers must be recharged regularly Air compressor pressure tanks should be drained of water on a scheduled basis.

Even with good maintenance service, some items have been known to break down. **Minor repairs** are frequently needed to keep the laboratory functioning. Belts will break, switches will become defective, and lamps will burn out. When this happens, it is important to get the tool or piece of equipment working again as soon as possible. There are few things more discouraging to students than to have their laboratory work frustrated by out-of-order tools and equipment.

You may make minor repairs if you have the necessary time and skill, or they may be done by service personnel In either case, you must take steps to get the tools and equipment back in operation quickly. It is often possible to make rapid repairs if a stock of common spare parts is maintained in the laboratory. The stock may include parts known to require occasional replacement, such as electric fuses, lamps, switches, drive belts, and hoses.

Major repair to tools and equipment is another one of your responsibilities, though the actual work is almost always done by outside service personnel. You must recognize the need for the service and then take steps to see that it is done. This may involve writing a repair requisition, calling in the repair service, and checking the finished job to be sure it has been properly done. It is up to you to make sure that the job gets done, even if there are difficulties and delays due to required school procedures or busy repair services.



There is no universal pattern for designating who is to do the actual work of maintaining and servicing the tools and equipment in vocational-technical laboratories. The task is given to various persons or agencies, depending on the nature of the program and the policies of the institution. Usually, teachers in every area are expected at least to do **day-to-day inspections, general cleaning,** and **minor adjustments.** If it is part of their occupational learning experience, students are often involved.

If the laboratory is highly specialized, there may be no one available to service tools and equipment except a teacher who has the required knowledge and experience. Sometimes the teacher takes on such noninstructional service and repair work for additional compensation.

In larger institutions and school systems, the maintenance of common tools and equipment is often handled by the school staff. It may be done by the custodial staff, school maintenance staff, or the school system maintenance department. The work may be done whenever necessary without charge to the vocational-technical program, or it may be charged against a budgeted amount. An internal request or work order must usually be prepared and sent to the appropriate department in order to get the work done. The competence of the maintenance personnel, and the consequent quality of the service work, can be expected to vary widely.

Maintenance of the building and the laboratory facility itself is always the responsibility of the institution's or school system's staff. Such items as lighting fixtures, water coolers, ventilating fans, gas supply lines, and plumbing fixtures belong in this category. You are not usually expected to service these items, nor do repair costs come out of the program budget. Other items of equipment, such as electric conductors to machines (bus bars) or dust collectors, are not so clearly categorized and may be considered as building equipment or as vocational laboratory equipment.

Commercial repair services are usually employed for major repair jobs or for work on specialized tools and equipment. Often this requires cost estimates and a special purchase order before the work is begun. Some vocational service areas, notably home economics and business and office, commonly use maintenance service contracts for their equipment. The school enters into a yearly contract with a commercial firm, which undertakes regular specified routine maintenance, adjustment, and repair. Your responsibility in this arrangement is to make sure that the commercial service lives up to the terms of the agreement and that the service is performed satisfactorily.

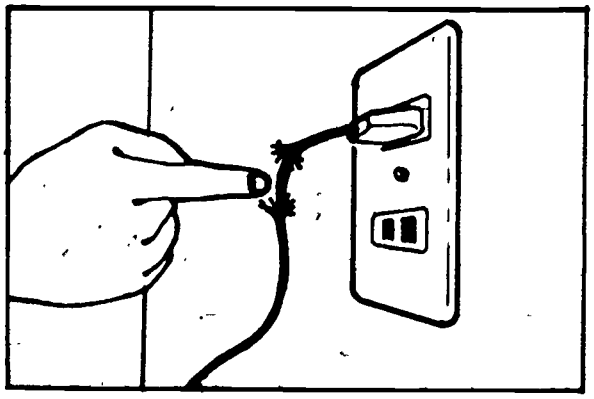
Student Participation

Vocational-technical teachers do not fully agree about whether, or how much, students should be involved in maintaining laboratory tools and equipment. Some teachers view such activity as exploiting students or as potentially hazardous to the tools and equipment because they feel students are not capable of performing such tasks. Other instructors incorporate maintenance assignments into the curriculum, making maintenance equally as important as the other laboratory learning activities.

The types of maintenance responsibilities you assign students, and the complexity of these tasks, will depend on the nature of your occupational specialty and the organization of the program. If workers in the occupation are expected to maintain their tools and equipment on the job, opportunity to learn this competency should be provided in the vocational-technical program. If caring for tools and equipment in the laboratory will encourage the development of desirable work habits and attitudes, then the experience is a worthy one.

Students in mechanical and machine repair training programs (such as office machine repair, small engine repair, refrigeration, machine shop, and automotive mechanics) clearly should benefit from helping to maintain laboratory equipment. Students in the field of electronics will probably find it essential to know how to adjust, align, and repair electronic test equipment when they get out on the job On the other hand, a data processing program should probably not involve students in maintaining the keypunch, sorter, or other machines used in the program because these duties are not expected of them on the job.

In all programs, students should be involved at least to the extent of **checking** the tools and equipment **for malfunction, wear,** or **breakdown.** They should be taught to note potentially hazardous conditions and report them to the instructor. They should certainly learn to recognize the differences between a properly functioning tool or piece of equipment and one that is out of adjustment, overstressed, or damaged.



If students are to participate in laboratory maintenance, the effort must be planned and organized. Group and individual lessons on maintenance procedures may need to be given. Practice should be provided, along with careful supervision by the teacher. This may be done as the opportunity arises during the school term, or it may be part of a formal unit of instruction.

Student responsibility for maintenance may also need to be included in the laboratory cleanup schedule, with individuals or a small crew assigned on a rotating basis to the duty of daily tool and equipment maintenance.

The Maintenance Plan

Maintaining the laboratory tools and equipment will take less of your time and energy and will be more efficiently done if a maintenance plan for the laboratory is developed. Some extra effort will need to be expended to develop the plan and materials, but this will be repaid many times over the years. The maintenance plan may differ in content and complexity among particular occupational specialties, but generally, the development processes will be the same for all programs.

The first step is to prepare a list of **all** the tools and pieces of equipment in the laboratory that require regular maintenance of any kind. This includes large machines, small equipment or test gear, and many tools. For each item on the list, prepare a listing of the **maintenance services required** and the **service interval** (e.g., maintenance required once a week, at the end of each semester, after 100 hours of use, or when a specified condition is reached).

The information for determining service operations and intervals can be found by checking operating manuals, asking other teachers who have similar tools or equipment, or relying on your own background of experience.

Maintenance requirements of school laboratory tools and equipment are not always the same as that of the tools and equipment used in an industrial or commercial setting. School tools and equipment may be somewhat lighter in construction, and school use may place different demands on the tools and equipment than use in industrial production. You will want to follow the manufacturer's recommendations carefully, modifying only as experience shows is necessary.

It is very helpful to construct a **maintenance file** or **maintenance handbook** for the specific laboratory. This could consist of a card or sheet for each tool or piece of equipment, with the necessary service operations and intervals listed. There should be spaces on the sheet for entering the dates that maintenance service was done, the initials of the person who did

the work, and any remarks that will help you keep track of the condition of the equipment or tool (e.g., "check oil level in gearbox next time," or "batteries replaced 9/14/82").

Other information on the sheet may include the name and address of the vendor or parts supply house, the name of the service person to call, adjustment specifications, or other pertinent data. An example of such a sheet is provided in sample 6.

The maintenance sheets may be kept in a three-ring binder; cards may be kept in a file box. The notebook format is particularly handy because it can be carried to the tools and equipment and the operations can be checked off as completed. Once the handbook is made up, it will serve a long time, and any necessary changes can easily be made by adding or replacing individual sheets.

After the handbook has been produced, the next step in developing a maintenance plan is to determine **who is responsible** for each duty area. You will probably reserve some specific tasks for **yourself;** certain of the tasks may be delegated to **students;** other responsibilities can be covered by **school maintenance personnel;** and still others can be handled by outside **commercial or industrial firms.**

A list of the persons or agencies who will be involved in the maintenance program should be drawn up, and the responsibilities for each one should be assigned. Obviously, the assignments should be made in accordance with school policy and practice, and with the knowledge and agreement of the individuals involved. A calendar or schedule of maintenance activities can be worked up, showing the dates on which the jobs are to be done and the persons or agencies who are to do them.

In some school systems or institutions, it may be necessary to prepare a **budget** as part of the maintenance plan. If service and repair costs are to come out of program funds, then adequate funds need to be set aside for this purpose. The budget should categorize the expenses (e.g., service by outside firms, service by school maintenance department, repair parts, or replacement fluids) and estimate the amount that will be needed for each category for the following school year.

The estimates can be drawn from your own experience, or the experience of other teachers or the tool and equipment suppliers. If there is a maintenance contract for service, that cost will be known and can be included in the budget. If possible, a contingency fund, calculated as a small percentage of the budget, should be included to take care of unforeseen circumstances. Each year, as the laboratory tools and equipment increase in age, the maintenance budget should be increased to cover the cost of service and repair.

SAMPLE 6

MAINTENANCE RECORD

Name of Item _____

Maintenance Interval _____

Inspections to Be Performed:

_____ _____

_____ _____

_____ _____

_____ _____

Lubrication, Adjustment, or Other Maintenance Operations Performed:

_____ _____

_____ _____

_____ _____

Date of Maintenance	Initials	Remarks

Optional Activity 2

For more information on organizing a laboratory maintenance system, you may wish to read Storm, *Managing the Occupational Laboratory*, pp. 101–140.

Optional Activity 3

You may wish to arrange through your resource person to visit a laboratory in your occupational specialty to see a tool and equipment maintenance system in operation. During your visit, you may wish to meet with the teacher responsible for the laboratory to discuss the special needs and problems of maintaining tools and equipment in your vocational or technical area, and the maintenance procedures he/she has found helpful.

Activity 4

From your own occupational specialty, select a single instructional area (e.g., in a cabinetmaking program, wood finishing; in office machines, duplicating). Develop a complete plan for a tool and equipment maintenance system for that one area. Include the following in your plan:

- A listing of all the tools and equipment for the area
- The maintenance procedures for the tools and equipment
- A record-keeping system
- An outline of procedures to maintain the system

Feedback 5

After you have developed your plan, use the Maintenance System Checklist, p. 41, to evaluate your work.

NOTES

MAINTENANCE SYSTEM CHECKLIST

Directions: Place an X in the NO, PARTIAL, or FULL box ~~to indicate~~ that each of the following performance components was not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, a performance component was not applicable, or impossible to execute, place an X in the N/A box.

Name _____

Date _____

Resource Person _____

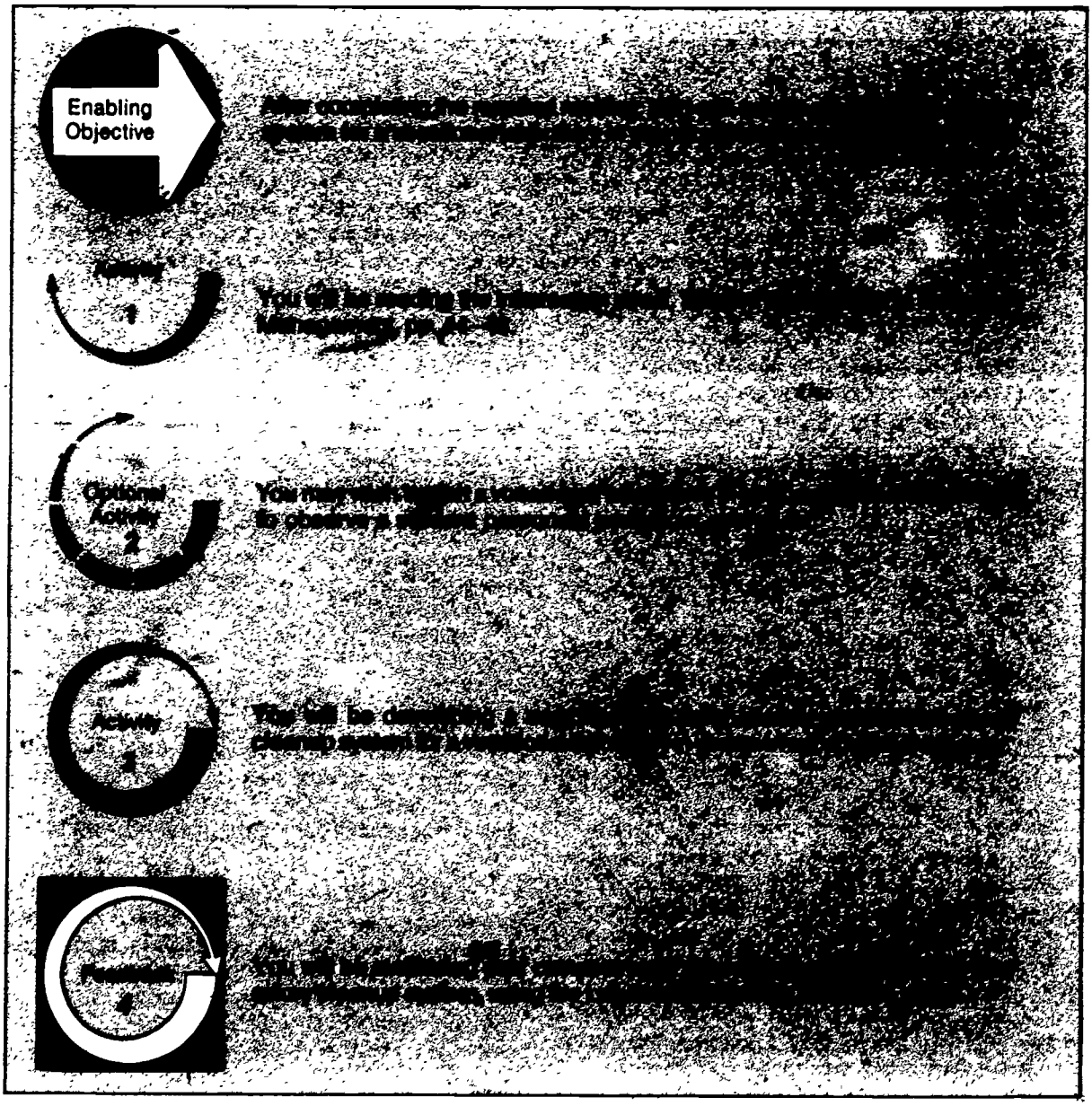
	LEVEL OF PERFORMANCE			
	N/A	No	Partial	Full
The tool and equipment maintenance plan:				
1. includes all the tools and equipment needed by students to work in the area	☐	☐	☐	☐
2. includes all tool and equipment maintenance procedures, as recommended by the manufacturers	☐	☐	☐	☐
3. uses a maintenance sheet or card that:				
a. includes all the information needed for the maintenance procedures	☐	☐	☐	☐
b. has provision for a record of completed maintenance procedures	☐	☐	☐	☐
c. is simple and easy to use	☐	☐	☐	☐
4. includes some form of overall schedule for all maintenance functions	☐	☐	☐	☐
5. identifies who is to be responsible for each maintenance operation (e.g., teacher, students, maintenance staff, or outside firms)	☐	☐	☐	☐
6. assigns maintenance operations on the basis of:				
a. the person's appropriate functions or expertise	☐	☐	☐	☐
b. accepted school policies	☐	☐	☐	☐
7. provides for appropriate instruction in maintenance operations for students	☐	☐	☐	☐
8. is in accord with local, state, and national health and safety regulations	☐	☐	☐	☐
9. includes policies for emergency repairs	☐	☐	☐	☐
10. is organized in some logical file or notebook form	☐	☐	☐	☐
11. is easy for others to understand and to work from	☐	☐	☐	☐
12. is neat and legible	☐	☐	☐	☐

Level of Performance: All items must receive FULL or N/A responses. If any item receives a NO or PARTIAL response, review the material in the information sheet, Laboratory Tool and Equipment Maintenance Systems, pp. 34–38, revise your plan accordingly, or check with your resource person if necessary.

NOTES

Learning Experience IV

OVERVIEW



Activity 1

For a discussion concerning the role of students in the management and maintenance of the vocational laboratory and recommendations for setting up student personnel systems, read the following information sheet.

STUDENT PARTICIPATION IN LABORATORY MANAGEMENT

Students should be integrally involved in the ongoing management of the vocational-technical laboratory. Their participation can be a source of personal development for them. They can learn some of the general responsibilities of their occupation, and they can assume some of the load that otherwise you would have to attempt to carry alone. If everyone in the class shares in the management of the laboratory, the duties of any one student will not be burdensome. Instead, they will be a source of positive satisfaction. Through mutual cooperation, the class may well develop a feeling of group responsibility and group solidarity.

Students can participate in laboratory management in **two basic ways.** They can take major responsibility for **routine cleanup** of the laboratory at the end of the class period, and they can participate in a great variety of ways in the **day-to-day running** of the laboratory facility. The extent and the degree of their participation will, however, vary greatly with the type of program, the maturity of the students, and the general expectations of the school community.

You must gauge these factors fairly accurately in order to give students a valuable experience, without causing resentment or frustration or endangering the efficient running of the program. **Under no circumstances** should students be **exploited** by being required to do things that are the responsibilities of others or that are not a legitimate part of the instructional program.

Beyond the class and laboratory assignments, there are a number of tasks that can be used to help students learn something of the varied roles and responsibilities they will have in their chosen occupation. Workers need to know how to **care for the tools** of their trade, how to **keep their work stations orderly,** how to **work cooperatively** with others, how to **prevent waste** of supplies. In many occupations, they need to know how to do **routine maintenance** and **adjustment of equipment.** A laboratory management system that provides students with opportunities to learn and practice these skills will be of great benefit to them.

There are few instructors who would disagree with the idea that vocational-technical laboratories should be kept as clean and orderly as the work situation allows. Cleanliness usually makes each task easier and more efficient. It is a factor in laboratory safety. It fosters careful and accurate work habits. And it provides a pleasant environment in which to work. On the other hand, dirt and disorder can make good workmanship difficult or impossible, create hazardous conditions, and lead to student frustration and apathy.

The degree to which cleanliness is desirable (or even possible) depends very much on the occupational program, of course. It is quite obvious, for example, that laboratories for occupations such as food preparation, dental hygiene, and nurses' aide require not just cleanliness but a high level of sanitation.

Other programs such as architectural drawing or automobile painting must have clean surroundings if the job is to be done to occupational standards of excellence In metal foundry, mine safety, or horticulture programs, it may not be appropriate to strive for a very high level of laboratory cleanliness. By working in a well-managed laboratory, students can learn the levels of cleanliness and order that are the accepted standards in the occupation.

Vocational-technical teachers are not, however, in complete agreement concerning the extent to which students should be involved in the daily cleanup and maintenance of the laboratory. Many teachers take the position that maintaining a clean and orderly work station is part of the job that students will perform once they are employed. They contend that students should learn the necessary work habits while in the vocational-technical program. They feel that students should have **some** daily responsibility for

cleanup and maintenance of the entire laboratory in order to help them develop the desirable traits of dependability and responsibility.

Other instructors feel that students are being exploited if they are required to clean and maintain the laboratory, beyond putting away the tools and materials they have used at their work stations. These instructors assert that the routine cleaning of the laboratory is the job of the custodial staff and that maintenance is the responsibility of the teacher or the physical plant staff.

Perhaps each of these positions can be justified, depending on the specific occupational area involved and the situation in the school. Most certainly, periodic major cleaning such as washing walls, cleaning carpets, dusting light fixtures, or emptying dust collectors should **not** be done by students. In most instances, if students do clean equipment, work benches, and tables, their responsibility should end above the floor level.

An exception to this may be a situation in which two or more classes work in the laboratory during the day, with no custodial services available between the two. In laboratories in which the normal activities produce a great deal of scrap (such as metal chips or wood shavings), it is unfair, and perhaps unsafe, for the second group to have to work in an unswept laboratory while the first class gets a clean one. In such situations, it may be necessary for students to clean the floors, as well as the work stations, before leaving the laboratory.

For some students, learning how to keep things clean and organized may be an important personal learning experience. Students may come from homes where disorder is the normal state. Or they may have been indulged to the extent of never having had to assume any responsibility for the cleanliness of their surroundings. In both cases, you may need to actually teach them the basic skills of laboratory cleaning that may seem obvious or be second nature to most people.

Regardless of the extent to which students are involved in the cleanup and maintenance procedures, you must plan and organize carefully to get the job done efficiently and effectively. The plan must also be presented to the student group in a way that will enlist their cooperation. Following are some guidelines that will help you to plan and implement a system of cleaning and maintaining your laboratory.

Identify all the cleaning and maintenance activities necessary to maintain a desirable learning environment. Develop a list of work areas, equipment, materials, or inspections that must be regularly and routinely covered. Such a list will vary greatly with the training program. A list of some typical cleanup and maintenance duties, as shown in sample 7, may stimulate your thinking about your own program.

Beginning students may be able to do only basic and routine tasks, but as they advance in their training, they should be able to sharpen tools, adjust or recalibrate instruments, provide preventive maintenance service to heavy equipment, and keep accurate records. Finally, under your supervision, they may be able to take over much of the serious responsibility of managing the laboratory.

Consult with the custodial staff for assistance in determining which cleaning responsibilities can best be assumed by students and which by custodial staff. You will probably want to make some preliminary decisions yourself before you attempt to get agreement from the custodians. There may be some tasks that you will definitely want to reserve for yourself or for your students. Some teachers want to make sure, for example, that custodians do not have access to certain tools or pieces of equipment that they are not trained to handle properly. If at all possible, secure agreement with the custodial staff through negotiation, without calling in the school administrator to settle differences.

Develop a class schedule for student responsibilities for cleanup. The cleanup system adopted should be based on the laboratory instructional activities, number of students in the class, students' level of maturity, and the time available. Depending on needs, the system can be a very simple one, or it can be very elaborate and worked out in detail. If every student works at a specifically assigned and limited area (as, for example, in drafting), it may be enough to have the student clean his/her own desk or work station.

In programs in which a variety of activities are carried on throughout the laboratory (e.g., food preparation), it will probably be necessary to specially devise a system that distributes the cleanup tasks fairly. The assignments should be regularly rotated, so that each student goes through all the tasks during a semester. It is also important to involve students with special/exceptional needs **equitably** in the cleanup schedule, so they can share in the responsibilities just as the other students do.

Vocational teachers in secondary schools have devised many ingenious systems for maintaining the cleanup schedule. These include assignment wheels that are moved ahead at regular intervals (usually each week), student name tags that are matched with cleanup assignments, personnel charts, and other devices. One of these devices is illustrated in sample 8.

In adult classes, it may only be necessary to explain to the group what needs to be done to keep the laboratory clean and then to ask everyone to pitch in

to help get the job done. This does not always work well, however, so you should not hesitate to set up a planned system. Adults, like most people, like to know what is expected of them, and they respond favorably to systematically managed laboratories.

Orient students to the system for cleaning and maintaining the laboratory. It is very important to the success of any cleanup system that the students understand it and agree to it. You should expect that students may have questions and concerns. Therefore, the explanation of the system should be planned in advance and carefully presented. Students need to understand how their participation will benefit themselves and others. In addition, they need to be able to see that the work is fairly and equitably distributed.

SAMPLE 7

CLEANUP AND MAINTENANCE DUTIES

- Clean major equipment and machine tools.
- Replace small tools, instruments, and utensils in their designated storage places.
- Put away small supplies.
- Straighten out storage areas for bulk materials (i.e., materials kept in large quantities).
- Clean work surfaces (benches, tables, cabinets).
- Put away and secure student projects.
- Check and organize library or laboratory reference materials.
- Clean sinks.
- Shut down heating furnaces, cookers, ovens, air compressors, and other continuously operating equipment.
- Sharpen and/or adjust small tools or instruments.
- Secure all valuable or hazardous materials and supplies.
- Check floors, electrical equipment, cutting equipment, etc., for safe condition.
- Sweep floors.
- Vacuum-clean or dust lighting fixtures, window sills, etc.
- Oil or wax bare metal surfaces to prevent corrosion.

Implement the system with the help of the students. The cleanup and maintenance system should begin functioning on a fixed day. You should check to see that each person knows his or her particular duty. Many students will need to be shown how to clean a particular machine, where a tool is to be stored, how to arrange the materials storage rack, or even how to use the cleaning utensils.

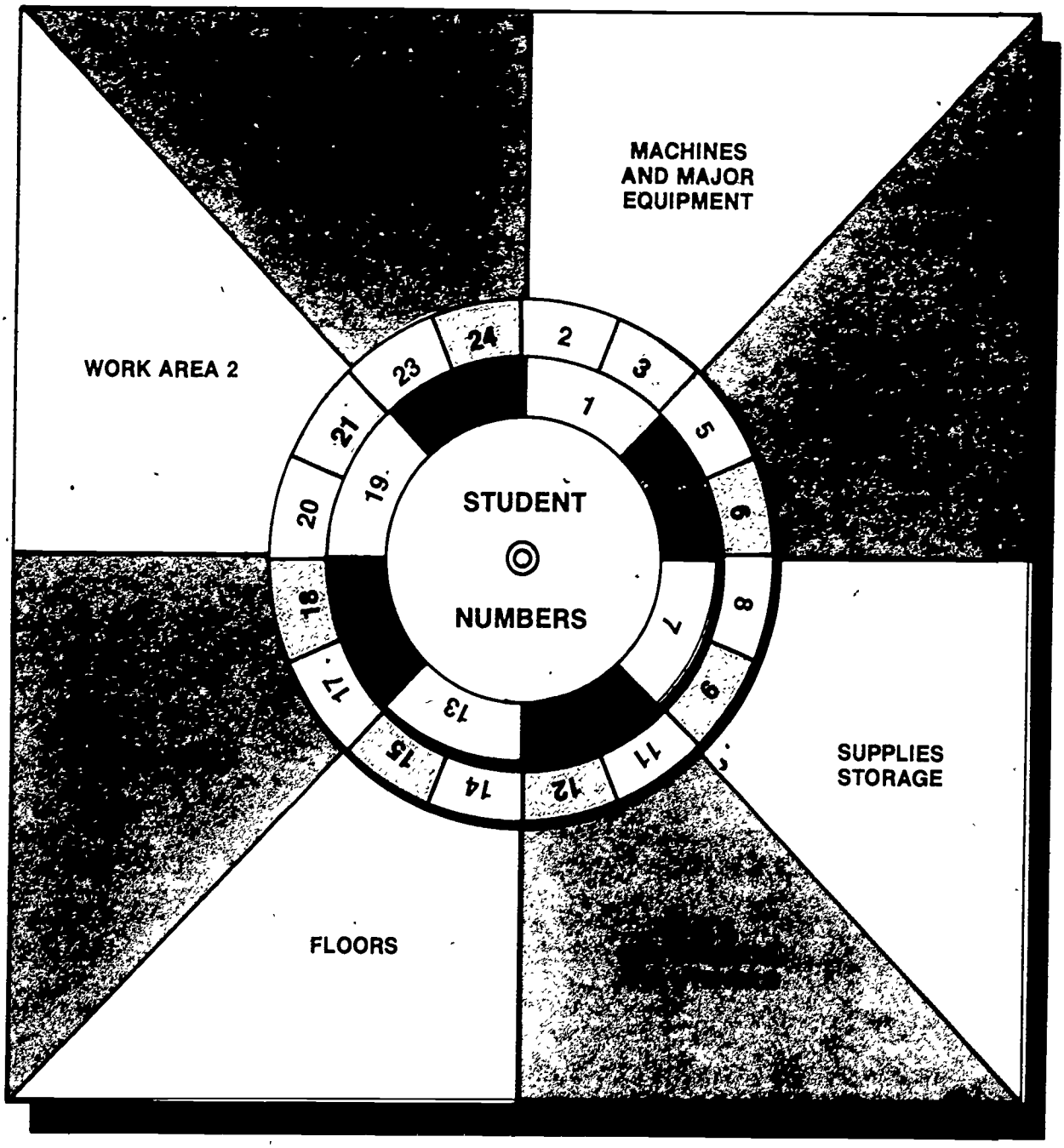
There should be relatively few snags with a well-designed system, but if difficulties do come to light, don't hesitate to modify the assignments. The most common problem is that of distributing the tasks so that they all take about the same length of time, thus permitting the group to finish together at the end of the class period. Students often have very good (and pointed) suggestions to make about how the system can be improved.

Provide for continual evaluation of student performance in the cleanup and maintenance of the laboratory. If cleanup and maintenance activities are part of the program's learning experiences (as they should be), then student performance should be regularly evaluated. In most cases, a simple **satisfactory/unsatisfactory** rating system is all that is required, with daily or weekly teacher evaluations.

In addition to cleanup and maintenance, there are often a number of other ways in which students can profitably participate in the ongoing functioning of the laboratory. Individual students can keep class attendance records, distribute laboratory supplies, inspect for safe working conditions, greet and escort visitors around the laboratory, and take over responsibility for the class if you are away from the laboratory.

SAMPLE 8

ASSIGNMENT WHEEL



In some programs, it may be desirable to set up a formal class organization, with officers such as foreman, assistant foreman, secretary, and safety inspector. For these jobs, you can choose the students who are the most able members of the class or the students who most need the experience. Perhaps an even better way is to ask the class to nominate and elect class members to fill the positions. It is wise to change class officers at least every semester so that many students have an opportunity to get involved.

Students can, and usually should, participate in many aspects of laboratory management, but you are ultimately responsible for the total operation of the program. You are responsible for laboratory instruction, handling of supplies, maintenance of tools and equipment, and the safety of students. Therefore, as students work in management activities, it is essential for you to oversee the activities and supervise the students.

For example, you can use students to assist in keeping attendance books and posting grades. However, it is important that you **verify** the accuracy of these records. In some areas, the class record book is a legal document that can be used in court to determine the whereabouts or activities of a student at a particular time. In time-based programs, the attendance record is often the basis for issuing a certificate showing that the student has completed the training program.

Optional Activity 2

You may wish to arrange through your resource person to visit a laboratory in your occupational specialty to observe a student personnel system in operation. During your visit, you may wish to interview students, as well as the teacher, to obtain their views on the characteristics of a good student personnel system.

Activity 3

For a laboratory in your occupational specialty, develop a complete plan for a laboratory cleanup system to be operated by students. Confine your plan to a cleanup system; do not plan for a total student personnel system, which includes other managerial functions. If you are a preservice teacher, you may use one of your college laboratory classes, or a secondary class with which you are working, as the basis for your plan. If you are an inservice teacher, you may use your own laboratory class as a basis for your plan.

Feedback 4

After you have developed your plan, use the Lab Cleanup System Checklist, p. 49, to evaluate your work.

LAB CLEANUP SYSTEM CHECKLIST

Directions: Place an X in the NO, PARTIAL, or FULL box to indicate that each of the following performance components was not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, a performance component was not applicable, or impossible to execute, place an X in the N/A box.

Name _____

Date _____

Resource Person _____

	LEVEL OF PERFORMANCE			
	N/A	No	Partial	Full
The laboratory cleanup plan:				
1. correctly identifies all the cleanup activities necessary to maintain the laboratory environment	☐	☐	☐	☐
2. assigns cleanup tasks to students that reflect occupational expectations	☐	☐	☐	☐
3. divides the tasks equitably so all students are involved	☐	☐	☐	☐
4. includes a rotation system so all students have a variety of experiences	☐	☐	☐	☐
5. includes a student performance evaluation system that is fair and easy to maintain	☐	☐	☐	☐
6. includes procedures for orienting students to the cleanup plan	☐	☐	☐	☐
7. provides for teaching individual students necessary cleanup skills	☐	☐	☐	☐
8. assigns leadership positions to students	☐	☐	☐	☐
9. sets standards of laboratory orderliness and cleanliness consistent with the needs of the occupation	☐	☐	☐	☐
10. provides for change and improvement in the plan on the basis of input by students	☐	☐	☐	☐

Level of Performance: All items must receive FULL or N/A responses. If any item receives a NO or PARTIAL response, review the material in the information sheet, Student Participation in Laboratory Management, pp. 44–48, revise your plan accordingly, or check with your resource person if necessary.

NOTES

Learning Experience V

OVERVIEW

Given an actual vocational laboratory in your occupational specialty, evaluate the management system of the laboratory and develop plans for its improvement.

You will be visiting a vocational laboratory in your occupational specialty and collecting information about the management systems used in its operation.

You will be (1) evaluating the effectiveness of the laboratory management system, using the Laboratory Observation Checklist, pp. 53–54, (2) writing a summary report, and (3) making recommendations for the improved management of the laboratory.

Your competency in evaluating the management system of a vocational laboratory and developing plans for its improvement will be evaluated by your resource person, using the Laboratory Evaluation Checklist, pp. 55-56.

Activity 1

Arrange through your resource person to visit a vocational-technical laboratory in your occupational specialty and to observe the laboratory in operation.

Obtain the approval of the laboratory instructor to collect information about the operation of the laboratory, as well as permission to talk to students about laboratory procedures. Observe the laboratory in operation for a least one full class session, from beginning to end.

If there is no laboratory available to you that is directly concerned with your occupational specialty, visit a laboratory that is as closely related as possible.

Activity 2

After you have left the laboratory, evaluate the effectiveness of the system used for laboratory management, using the Laboratory Observation Checklist, pp. 53-54, as a guide. Unless the instructor invites you to do otherwise, **do not** complete the checklist or write notes until you have left the laboratory.

In conducting your observation/evaluation, you need to keep in mind that your evaluation is unofficial. You are a guest of the institution involved, and as such, it is not your place to criticize the laboratory management system or dictate actions that should be taken. If the institution's staff wish to have feedback concerning your findings, this should be arranged through your resource person.

Prepare a brief summary report of the strengths and deficiencies you identified in the way the laboratory was managed. Confine your observations to the **management** of the laboratory, rather than to the physical facility or its arrangement.

Prepare a series of recommendations for improving the laboratory management system.

LABORATORY OBSERVATION CHECKLIST

Directions: Place an X in the NO, PARTIAL, or FULL box to indicate that each of the following components was not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, a component was not applicable to the particular laboratory you visited, place an X in the N/A box.

Name _____

Date _____

Resource Person _____

	LEVEL OF PERFORMANCE			
	N/A	No	Partial	Full
General Management				
1. Management procedures are in apparent agreement with the goals and objectives of the program	☐	☐	☐	☐
2. Tools are stored so as to be accessible and convenient to students	☐	☐	☐	☐
3. Students have all necessary supplies for laboratory activities	☐	☐	☐	☐
4. Distribution of supplies is effective in avoiding waste and loss	☐	☐	☐	☐
5. Work in the laboratory is organized to make maximum use of available work stations	☐	☐	☐	☐
6. A chart is maintained to record student progress in the laboratory	☐	☐	☐	☐
Environmental Control				
7. Ventilation and temperature in the laboratory are at the appropriate levels	☐	☐	☐	☐
8. Lighting is at the proper level for the activities taking place	☐	☐	☐	☐
9. Noise in the laboratory is at a minimum level	☐	☐	☐	☐
10. The laboratory is clean and orderly, as appropriate for the activities	☐	☐	☐	☐
11. The laboratory is attractive, as appropriate for the activities taking place	☐	☐	☐	☐
Maintenance of Equipment				
12. Equipment is maintained in good operating condition	☐	☐	☐	☐
13. Students are involved in laboratory maintenance, as appropriate for the occupation	☐	☐	☐	☐
14. An equipment maintenance record-keeping system is maintained	☐	☐	☐	☐
15. Routine maintenance for equipment is provided on a regular basis	☐	☐	☐	☐
Equipment Inventory				
16. A complete inventory control system for tools and equipment is maintained	☐	☐	☐	☐

	N/A	No	Partial	Full
17. The inventory system provides for adding new items and deleting items no longer in the laboratory	☐	☐	☐	☐
18. A special inventory system controls items that are especially expensive, delicate, or hazardous	☐	☐	☐	☐
Student Participation				
19. Students have cleaning and maintenance responsibilities appropriate to occupational expectations	☐	☐	☐	☐
20. An equitable rotation system is used for assigning student maintenance and cleanup duties	☐	☐	☐	☐
21. Students have been given instruction in their cleanup and maintenance responsibilities	☐	☐	☐	☐
22. Student performance in cleaning and maintaining the laboratory is individually evaluated	☐	☐	☐	☐
Use of Laboratory by Others				
23. A schedule is available, which indicates the time and extent of use of the laboratory facility by others	☐	☐	☐	☐
24. Separate storage is provided for the projects and materials of each student group using the laboratory	☐	☐	☐	☐

Feedback 3

After you have evaluated the laboratory management system, have prepared a summary report, and have developed recommendations for the laboratory's improvement, arrange to have your resource person review and evaluate your work. Give him/her the Laboratory Evaluation Checklist, pp. 55-56, to use in evaluating your work.

LABORATORY EVALUATION CHECKLIST

Directions: Place an X in the NO, PARTIAL, or FULL box to indicate that each of the following performance components was not accomplished, partially accomplished, or fully accomplished. If, because of special circumstances, a performance component was not applicable, or impossible to execute, place an X in the N/A box.

Name _____

Date _____

Resource Person _____

	LEVEL OF PERFORMANCE			
	N/A	No	Partial	Full
In evaluating the laboratory management system, the teacher:				
1. made an evaluation of all the appropriate activities in the laboratory	☐	☐	☐	☐
2. applied general principles of laboratory management and maintenance to the specific situation	☐	☐	☐	☐
3. accurately identified the important characteristics and major deficiencies of the management of the laboratory	☐	☐	☐	☐
4. dealt only with laboratory management and maintenance, rather than with the physical facility	☐	☐	☐	☐
The teacher's recommendations and plans for the improvement of the laboratory management system:				
5. corrected all the major deficiencies identified	☐	☐	☐	☐
6. were feasible and practical in application	☐	☐	☐	☐
7. were realistic in terms of actual school situations	☐	☐	☐	☐
8. were in keeping with the goals and objectives of the vocational-technical program	☐	☐	☐	☐
9. applied accepted principles of laboratory management	☐	☐	☐	☐
10. were presented in a well-organized, clear, and readable form	☐	☐	☐	☐
11. made adequate provision for:				
a. maintaining a clean, orderly, and attractive laboratory	☐	☐	☐	☐
b. maintaining comfortable and healthful environmental conditions	☐	☐	☐	☐
c. providing and distributing supplies efficiently	☐	☐	☐	☐
d. maintaining the equipment in good operating condition	☐	☐	☐	☐
e. maintaining an effective inventory control system	☐	☐	☐	☐
f. involving students appropriately in cleaning and maintaining the laboratory	☐	☐	☐	☐
g. scheduling the use of the laboratory to utilize it to the maximum extent	☐	☐	☐	☐

Level of Performance: All items must receive FULL or N/A responses. If any item receives a NO or PARTIAL response, the teacher and resource person should meet to determine what additional activities the teacher needs to complete in order to reach competency in the weak area(s).

Learning Experience VI

FINAL EXPERIENCE

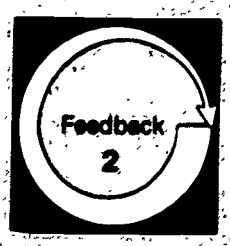
In an actual teaching situation* manage the vocational laboratory.

As part of your teaching duties, manage the vocational laboratory. This will include—

- developing general management procedures
- developing plans for systems to cover inventory control, equipment maintenance, the involvement of students in laboratory maintenance and cleanup, and the storage and distribution of supplies; or reviewing and revising (if necessary) plans you have developed previously
- developing policies to cover laboratory use by others
- orienting students to the management systems to be used
- managing laboratory activities according to the procedures and systems devised

NOTE: Due to the nature of this experience, you will need to have access to an actual teaching situation over an extended period of time (e.g., two to six weeks).

As you complete each of the above activities, document your actions (in writing, on tape, through a log) for assessment purposes.



Arrange in advance to have your resource person review your written plans and procedures and to observe at least one instance in which you are actually managing the laboratory.

Your total competency will be assessed by your resource person, using the Teacher Performance Assessment Form, pp. 59–60.

Based on the criteria specified in this assessment instrument, your resource person will determine whether you are competent in managing a vocational laboratory.

*For a definition of "actual teaching situation," see the inside back cover

NOTES

TEACHER PERFORMANCE ASSESSMENT FORM

Manage the Vocational Laboratory (E–9)

Name _____

Date _____

Resource Person _____

Directions: Indicate the level of the teacher's accomplishment by placing an X in the appropriate box under the LEVEL OF PERFORMANCE heading. If, because of special circumstances, a performance component was not applicable, or impossible to execute, place an X in the N/A box.

	LEVEL OF PERFORMANCE					
	N/A	None	Poor	Fair	Good	Excellent
In the general management of the laboratory, the teacher:						
1. used management procedures consistent with the goals and objectives of the program	☐	☐	☐	☐	☐	☐
2. organized tool storage so tools were accessible and convenient to students	☐	☐	☐	☐	☐	☐
3. provided all appropriate supplies necessary for laboratory activities	☐	☐	☐	☐	☐	☐
4. controlled the distribution of supplies to students to avoid waste and loss	☐	☐	☐	☐	☐	☐
5. organized the use of available work stations so all students were productive	☐	☐	☐	☐	☐	☐
6. rotated students among work stations so all could obtain necessary laboratory experiences	☐	☐	☐	☐	☐	☐
7. maintained a student progress chart to record laboratory activities and achievement	☐	☐	☐	☐	☐	☐
8. provided "open lab" time for students, in addition to scheduled laboratory instruction	☐	☐	☐	☐	☐	☐
In controlling the laboratory environment, the teacher:						
9. maintained the ventilation and temperature of the air at the appropriate levels for the activities taking place	☐	☐	☐	☐	☐	☐
10. adjusted the natural and artificial lighting in the room to maintain the proper level for the activities taking place	☐	☐	☐	☐	☐	☐
11. controlled noise produced within the laboratory to keep it at a suitable minimum	☐	☐	☐	☐	☐	☐
12. worked with the custodial staff to provide for any special environmental conditions required by the laboratory	☐	☐	☐	☐	☐	☐
In maintaining the laboratory equipment, the teacher:						
13. inspected all laboratory tools and equipment on a regular basis	☐	☐	☐	☐	☐	☐

	N/A	None	Poor	Fair	Good	Excellent
14. provided proper routine preventive maintenance on a regular basis	☐	☐	☐	☐	☐	☐
15. involved students in laboratory tool and equipment maintenance, as appropriate to their occupational resonsibilities	☐	☐	☐	☐	☐	☐
16. acted to return out-of-order equipment to service quickly	☐	☐	☐	☐	☐	☐
17. obtained major service and repairs when required	☐	☐	☐	☐	☐	☐
18. maintained an accurate and current tool and equipment maintenance record-keeping system	☐	☐	☐	☐	☐	☐
In maintaining a laboratory inventory control system, the teacher:						
19. used an inventory plan appropriate to the specific laboratory and school situation	☐	☐	☐	☐	☐	☐
20. maintained an accurate and current inventory record	☐	☐	☐	☐	☐	☐
21. took a complete inventory of tools and equipment	☐	☐	☐	☐	☐	☐
22. maintained special inventory control systems to handle delicate, expensive, or hazardous items	☐	☐	☐	☐	☐	☐
In organizing and managing the student personnel system, the teacher:						
23. gave students cleaning and maintenance responsibilities consistent with occupational expectations	☐	☐	☐	☐	☐	☐
24. worked out an equitable rotation system for assigning student cleanup duties	☐	☐	☐	☐	☐	☐
25. oriented students to the system of cleaning and maintaining the laboratory	☐	☐	☐	☐	☐	☐
26. instructed each student about his/her responsibilities in maintaining work areas and storage space	☐	☐	☐	☐	☐	☐
27. used an objective and fair evaluation system for student performance in cleanup and maintenance activities	☐	☐	☐	☐	☐	☐
In establishing a policy concerning laboratory use by others, the teacher:						
28. worked cooperatively with the administration and with others involved to establish policies fair to all groups	☐	☐	☐	☐	☐	☐
29. established policies to protect the laboratory facilities and equipment	☐	☐	☐	☐	☐	☐

Level of Performance: All items must receive N/A, GOOD, or EXCELLENT responses. If any item receives a NONE, POOR, or FAIR response, the teacher and resource person should meet to determine what additional activities the teacher needs to complete in order to reach competency in the weak area(s).

UPD 8257/11-82

ABOUT USING THE NATIONAL CENTER'S PBTE MODULES

Organization

Each module is designed to help you gain competency in a particular skill area considered important to teaching success. A module is made up of a series of learning experiences, some providing background information, some providing practice experiences, and others combining these two functions. Completing these experiences should **enable** you to achieve the **terminal** objective in the final learning experience. The final experience in each module always requires you to demonstrate the skill in an actual teaching situation when you are an intern, a student teacher, an inservice teacher, or occupational trainer.

Procedures

Modules are designed to allow you to individualize your teacher education program. You need to take only those modules covering skills that you do not already possess. Similarly, you need not complete any learning experience within a module if you already have the skill needed to complete it. Therefore, before taking any module, you should carefully review (1) the introduction, (2) the objectives listed on p 4, (3) the overviews preceding each learning experience, and (4) the final experience. After comparing your present needs and competencies with the information you have read in these sections, you should be ready to make one of the following decisions:

- That you do not have the competencies indicated and should complete the entire module
- That you are competent in one or more of the enabling objectives leading to the final learning experience and, thus, can omit those learning experiences
- That you are already competent in this area and are ready to complete the final learning experience in order to "test out"
- That the module is inappropriate to your needs at this time

When you are ready to complete the final learning experience and have access to an actual teaching situation, make the necessary arrangements with your resource person. If you do not complete the final experience successfully, meet with your resource person and arrange to (1) repeat the experience or (2) complete (or review) previous sections of the module or other related activities suggested by your resource person before attempting to repeat the final experience.

Options for recycling are also available in each of the learning experiences preceding the final experience. Any time you do not meet the minimum level of performance required to meet an objective, you and your resource person may meet to select activities to help you reach competency. This could involve (1) completing parts of the module previously skipped, (2) repeating activities, (3) reading supplementary resources or completing additional activities suggested by the resource person, (4) designing your own learning experience, or (5) completing some other activity suggested by you or your resource person.

Terminology

Actual Teaching Situation: A situation in which you are actually working with and responsible for teaching secondary or postsecondary vocational students or other occupational trainees. An intern, a student teacher, an inservice teacher, or other occupational trainer would be functioning in an actual teaching situation. If you do **not** have access to an actual teaching situation when you are taking the module, you can complete the module **up to** the final learning experience. You would then complete the final learning experience later (i.e., when you have access to an actual teaching situation).

Alternate Activity or Feedback: An item that may **substitute** for required items that, due to special circumstances, you are unable to complete.

Occupational Specialty: A specific area of preparation within a vocational service area (e.g., the service area Trade and Industrial Education includes occupational specialties such as automobile mechanics, welding, and electricity.

Optional Activity or Feedback: An item that is not required but that is designed to **supplement** and enrich the required items in a learning experience.

Resource Person: The person in charge of your educational program (e.g., the professor, instructor, administrator, instructional supervisor, cooperating/supervising/classroom teacher, or training supervisor who is guiding you in completing this module).

Student: The person who is receiving occupational instruction in a secondary, postsecondary, or other training program.

Vocational Service Area: A major vocational field: agricultural education, business and office education, marketing and distributive education, health occupations education, ~~home economics~~ education, industrial arts education, technical education, or trade and industrial education.

You or the Teacher/Instructor: The person who is completing the module.

Levels of Performance for Final Assessment

N/A: The criterion was not met because it was **not applicable** to the situation.

None: **No attempt** was made to meet the criterion, although it was relevant.

Poor: The teacher is unable to perform this skill or has only **very limited ability** to perform it.

Fair: The teacher is unable to perform this skill in an acceptable manner but has **some ability** to perform it.

Good: The teacher is able to perform this skill in an **effective** manner.

Excellent: The teacher is able to perform this skill in a **very effective** manner.

Titles of the National Center's Performance-Based Teacher Education Modules

Category A: Program Planning, Development, and Evaluation

A-1 Prepare for a Community Survey
A-2 Conduct a Community Survey
A-3 Report the Findings of a Community Survey
A-4 Organize an Occupational Advisory Committee
A-5 Maintain an Occupational Advisory Committee
A-6 Develop Program Goals and Objectives
A-7 Conduct an Occupational Analysis
A-8 Develop a Course of Study
A-9 Develop Long-Range Program Plans
A-10 Conduct a Student Follow-Up Study
A-11 Evaluate Your Vocational Program

Category B: Instructional Planning

B-1 Determine Needs and Interests of Students
B-2 Develop Student Performance Objectives
B-3 Develop a Unit of Instruction
B-4 Develop a Lesson Plan
B-5 Select Student Instructional Materials
B-6 Prepare Teacher-Made Instructional Materials

Category C: Instructional Execution

C-1 Direct Field Trips
C-2 Conduct Group Discussions, Panel Discussions, and Symposiums
C-3 Employ Brainstorming, Buzz Group, and Question Box Techniques
C-4 Direct Students in Instructing Other Students
C-5 Employ Simulation Techniques
C-6 Guide Student Study
C-7 Direct Student Laboratory Experience
C-8 Direct Students in Applying Problem-Solving Techniques
C-9 Employ the Project Method
C-10 Introduce a Lesson
C-11 Summarize a Lesson
C-12 Employ Oral Questioning Techniques
C-13 Employ Reinforcement Techniques
C-14 Provide Instruction for Slower and More Capable Learners
C-15 Present an Illustrated Talk
C-16 Demonstrate a Manipulative Skill
C-17 Demonstrate a Concept or Principle
C-18 Individualize Instruction
C-19 Employ the Team Teaching Approach
C-20 Use Subject Matter Experts to Present Information
C-21 Prepare Bulletin Boards and Exhibits
C-22 Present Information with Models, Real Objects, and Flannel Boards
C-23 Present Information with Overhead and Opaque Materials
C-24 Present Information with Filmstrips and Slides
C-25 Present Information with Films
C-26 Present Information with Audio Recordings
C-27 Present Information with Televised and Videotaped Materials
C-28 Employ Programmed Instruction
C-29 Present Information with the Chalkboard and Flip Chart
C-30 Provide for Students' Learning Styles

Category D: Instructional Evaluation

D-1 Establish Student Performance Criteria
D-2 Assess Student Performance Knowledge
D-3 Assess Student Performance Attitudes
D-4 Assess Student Performance Skills
D-5 Determine Student Grades
D-6 Evaluate Your Instructional Effectiveness

Category E: Instructional Management

E-1 Project Instructional Resource Needs
E-2 Manage Your Budgeting and Reporting Responsibilities
E-3 Arrange for Improvement of Your Vocational Facilities
E-4 Maintain a Filing System
E-5 Provide for Student Safety
E-6 Provide for the First Aid Needs of Students
E-7 Assist Students in Developing Self-Discipline
E-8 Organize the Vocational Laboratory
E-9 Manage the Vocational Laboratory
E-10 Combat Problems of Student Chemical Use

Category F: Guidance

F-1 Gather Student Data Using Formal Data-Collection Techniques
F-2 Gather Student Data Through Personal Contacts
F-3 Use Conferences to Help Meet Student Needs
F-4 Provide Information on Educational and Career Opportunities
F-5 Assist Students in Applying for Employment or Further Education

Category G: School–Community Relations

G-1 Develop a School–Community Relations Plan for Your Vocational Program
G-2 Give Presentations to Promote Your Vocational Program
G-3 Develop Brochures to Promote Your Vocational Program
G-4 Prepare Displays to Promote Your Vocational Program
G-5 Prepare News Releases and Articles Concerning Your Vocational Program
G-6 Arrange for Television and Radio Presentations Concerning Your Vocational Program
G-7 Conduct an Open House
G-8 Work with Members of the Community
G-9 Work with State and Local Educators
G-10 Obtain Feedback about Your Vocational Program

Category H: Vocational Student Organization

H-1 Develop a Personal Philosophy Concerning Vocational Student Organizations
H-2 Establish a Vocational Student Organization
H-3 Prepare Vocational Student Organization Members for Leadership Roles
H-4 Assist Vocational Student Organization Members in Developing and Financing a Yearly Program of Activities
H-5 Supervise Activities of the Vocational Student Organization
H-6 Guide Participation in Vocational Student Organization Contests

Category I: Professional Role and Development

I-1 Keep Up to Date Professionally
I-2 Serve Your Teaching Profession
I-3 Develop an Active Personal Philosophy of Education
I-4 Serve the School and Community
I-5 Obtain a Suitable Teaching Position
I-6 Provide Laboratory Experiences for Prospective Teachers
I-7 Plan the Student Teaching Experience
I-8 Supervise Student Teachers

Category J: Coordination of Cooperative Education

J-1 Establish Guidelines for Your Cooperative Vocational Program
J-2 Manage the Attendance, Transfers, and Terminations of Co-Op Students
J-3 Enroll Students in Your Co-Op Program
J-4 Secure Training Stations for Your Co-Op Program
J-5 Place Co-Op Students on the Job
J-6 Develop the Training Ability of On-the-Job Instructors
J-7 Coordinate On-the-Job Instruction
J-8 Evaluate Co-Op Students' On-the-Job Performance
J-9 Prepare for Students' Related Instruction
J-10 Supervise an Employer–Employee Appreciation Event

Category K: Implementing Competency-Based Education (CBE)

K-1 Prepare Yourself for CBE
K-2 Organize the Content for a CBE Program
K-3 Organize Your Class and Lab to Install CBE
K-4 Provide Instructional Materials for CBE
K-5 Manage the Daily Routines of Your CBE Program
K-6 Guide Your Students Through the CBE Program

Category L: Serving Students with Special/Exceptional Needs

L-1 Prepare Yourself to Serve Exceptional Students
L-2 Identify and Diagnose Exceptional Students
L-3 Plan Instruction for Exceptional Students
L-4 Provide Appropriate Instructional Materials for Exceptional Students
L-5 Modify the Learning Environment for Exceptional Students
L-6 Promote Peer Acceptance of Exceptional Students
L-7 Use Instructional Techniques to Meet the Needs of Exceptional Students
L-8 Improve Your Communication Skills
L-9 Assess the Progress of Exceptional Students
L-10 Counsel Exceptional Students with Personal–Social Problems
L-11 Assist Exceptional Students in Developing Career Planning Skills
L-12 Prepare Exceptional Students for Employability
L-13 Promote Your Vocational Program with Exceptional Students

Category M: Assisting Students in Improving Their Basic Skills

M-1 Assist Students in Achieving Basic Reading Skills
M-2 Assist Students in Developing Technical Reading Skills
M-3 Assist Students in Improving Their Writing Skills
M-4 Assist Students in Improving Their Oral Communication Skills
M-5 Assist Students in Improving Their Math Skills
M-6 Assist Students in Improving Their Survival Skills

RELATED PUBLICATIONS

Student Guide to Using Performance-Based Teacher Education Materials
Resource Person Guide to Using Performance-Based Teacher Education Materials
Guide to the Implementation of Performance-Based Teacher Education
Performance-Based Teacher Education The State of the Art, General Education and Vocational Education

For information regarding availability and prices of these materials contact—AAVIM, American Association for Vocational Instructional Materials, 120 Driftmier Engineering Center, University of Georgia, Athens, Georgia 30602, (404) 542-2586

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