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ABSTRACT

This participant handbook is composed of supplemental instructional materials for a course designed to teach the organization and management of training, including roles and functions performed and the needs, costs, benefits, and productivity of training systems. A course outline or syllabus provide a course description, course objectives, subject matter topics, instructional format, assignment general instructions, and grading practices. The types of materials included are assignment sheets, information sheets, pretests, modules, and job performance aids. The following topics are covered: understanding the training and development function; assessment and analysis of training needs; determining when training is, or is not, the solution to a problem; organization and management of training; selection and development of the training staff; behavioral sciences in training and development; budgeting and controlling training costs; legal and legislative aspects of training; training facilities and equipment; organizational development; using external training resources; relating training to operational problems; the performance audit; key training and development roles; labor force and career planning; and national and international training associations and organizations. An answer key for the pretests is appended. (YLB)

TRAINING
for
HUMAN RESOURCE DEVELOPMENT

PARTICIPANT HANDBOOK

Revised Editions 1991, 1993, 1995, & 1997

Note. This document was prepared to enhance teaching and to supplement other instructional materials used in a nonprofit educational setting. The author receives **no** royalties (profit) from the sale of this work.

INTRODUCTIONS

In any college course, one of the most difficult, yet important, steps is to become acquainted with the instructor and other participants. To make the process of introducing yourself a little easier, consider the following statements. There is space for you to jot down some thoughts and ideas. It's fair to look at this later when you are addressing the group.

1. Who am I? _____

2. What I value most is: _____

3. Three adjectives my closest friend might use to describe me:

   A. _____ B. _____ C. _____

4. What I like most about my job is: _____

   _____

5. What I like least about my job is: _____

   _____

6. What motivates me is: _____

   _____

CONTENTS

Human Resource Development 470
Training for Human Resource Development

The University of Tennessee
Knoxville, Tennessee

COURSE OUTLINE/SYLLABUS

1. Course Description: (from Undergraduate Catalog)

   Training for Human Resource Development (3) Organization and management of training, including roles and functions performed as well as the needs, costs, benefits, and productivity of training systems.

2. Course Objectives:

   A. Help the participant become a more skillful, confident, and resourceful trainer
   B. Review and clarify strategies for meeting training and development needs
   C. Discuss the role and function of a trainer
      - Guiding a group of specialists
      - Goals and objectives for the training department
      - Training costs and benefits
      - Making the training department important to management
   D. Provide some practical understanding of selected topics from item 3.
   E. Initiate a selected reading program

3. Subject Matter Topics:

   A. Understanding the training and development function
   B. The assessment and analysis of training needs
   C. Determining when training is, or is not, the solution to a problem
   D. Organization and management of training
   E. Selection and development of the training staff
   F. Behavioral sciences in training and development
   G. Budgeting and controlling training costs
   H. Legal and legislative aspects of training
   I. Training facilities and equipment
   J. Organizational development
   K. Using external training resources
   L. Relating training to operational problems
   M. The performance audit
   N. Key training and development roles
   O. Manpower and career planning
   P. National and international training associations and organizations

4. Instructional Format:

   The course includes student participation and a blend of instructional strategies including lecture-discussion, individual and small group activities, self-learning modules, supplemental reading, individual consultations, as well as the use of non-print and audiovisual media, and guest presenters when they can be scheduled.

5. Assignments: Note. See the assignment sheet titled **COURSE DELIVERABLES** for details on activities A-D below.

   Performance measures and a final paper/pencil knowledge test will be used. Course participants shall:

   A. Preview relevant audiovisual media and submit typed audiovisual media evaluation forms.

   B. Participate in a current awareness reading program and submit duplicated documents: clippings, reprints or photo copies of carefully selected relevant text. Submittals are to be made at regular intervals so that selected items can be shared with the class through "mini-briefs."

   C. Prepare an executive summary (paper). Those interested in earning extra credit should make arrangements with the instructor for a class presentation.

   D. Attend a meeting dealing with training and/or supervision or a closely related topic and submit a one-page typed report.

6. Understanding Grading Practices:

   Grading constitutes a complex and difficult process. While human beings cannot be pigeonholed, they can be judged on the basis of their performance. The following descriptive profiles attempt to explain why different participants obtain different final grades.

   The "A" Grade — Superior Performance:

   Traditionally, the "A" grade represents some form of extra effort and superior performance.

   "A" participants are punctual and present for the entire class period. They have virtually perfect **attendance**. Their commitment to the course resembles that of the instructor.

   "A" participants are **prepared for class**. They always read the assignment sheets and other instructional materials. Their attention to detail is such that they submit all work on time and occasionally submit suggestions for improvements to the instructional materials being used.

   "A" participants **show interest in the class and in the subject**. They feel responsible for their own learning and look up or dig out what they don't understand. They participate in the class, asking interesting questions and making thoughtful comments.

   "A" participants have **retentive minds**. They are able to connect past learning with the present. They bring a background with them to class and share relevant experiences with others.

   "A" participants have a **winning attitude**. They have both the determination and the self-discipline necessary for success. They show initiative, doing things they have not been told to do and going the "extra mile" to ensure success.

"A" participants have something special. It may be exceptional intelligence and insight. It may be unusual creativity, organizational skills, commitment — or a combination thereof. These gifts are evident to the instructor and to the other participants as well.

"A" participants make high grades on course submittals (deliverables) and written tests.

The "C" Grade — Satisfactory Performance:

"C" participants often miss class, arrive late, and/or leave early. They put other priorities ahead of academic work. In some cases, their health or fatigue renders them physically unable to keep up with the demands of high-level performance.

"C" participants prepare their assignments but in a perfunctory manner. Their work may be sloppy or careless. There is little or no evidence that quality control checks were made before an assignment was submitted. At times, submittals are incomplete and/or late.

"C" participants are not visibly committed to the class. They participate without enthusiasm. Their body language often expresses boredom.

"C" participants vary in talent. Some have exceptional ability but show undeniable signs of poor self-management or bad attitudes. Others are diligent but simply average in academic ability.

"C" participants obtain mediocre or inconsistent results on course submittals and written tests. They have some concept of what is going on but clearly have not mastered the material.

Note. These descriptive profiles were adapted from "Clarifying Grade Expectations" by J. H. Williams, 1993, The Teaching Professor, August/September, p. 1.

7. Required Course Text: (available at cost, no profit to author, from Graphic Creations, 1809 Lake Avenue, Knoxville, phone 522-6221)

   Participant Handbook

PLEASE NOTE:

1. Slipshod and untidy work is not acceptable. Close attention will be paid to details. Don't let the quality of any submittal fall below your personal standards or those of the course and profession. A quality control (QC) check by you and others is recommended before every submittal.

2. In response to previous course participant concerns, and as a matter of courtesy, portable electronic communication devices with an audible signal should be deactivated (turned off) during class.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Assignment Sheet

COURSE DELIVERABLES

Charge: To share expertise, knowledge and learning acquired in a selected subject/topic.

Activity A. **Audiovisual media**

Preview **three (3)** films/video tapes/video disks/sound slide programs/filmstrips/audio tapes **dealing with training or supervision methodologies, techniques,** etc., and submit typed audiovisual media evaluation forms. Turn in one (1) evaluation by class session four and the other two (2) not later than class session eight.

Submittals are rated with a (✓+), (✓), or (✓-). A (✓+) is the highest rating and (✓-) the lowest. A quality control check of each audiovisual media evaluation form is recommended before its submittal.

Activity B. **Duplicated documents**

Submit **four (4)** different duplicated documents, clippings, reprints or photo copies of text dealing with any of the subjects/topics listed on the next page (Page 2 of 2). Focus on applications/information dealing with print "hard copy" vice audiovisual media or methods. Show your comprehension of the content by **highlighting the text that is important to the subject/topic identified**.

Turn in one (1) document by class session five and the other three (3) at **regular intervals during the first 11 sessions** of the course term so that selected items can be shared with the class through "mini-briefs."

Each submittal needs to be **carefully selected** from a book, journal, magazine, etc. for its **quality** and **relevance to a particular subject/topic**. Submittals **shall include** (a) a source reference in accordance with the Publication Manual of the American Psychological Association (APA), fourth edition; (b) the appropriate subject/topic and its number from the list on Page 2 of 2; and (c) your name as well as social security number. Consider providing all three components on a cover page.

A judgment will be made concerning the (a) **care exhibited in selecting the document** for its **relevance and quality**; (b) **comprehension shown through selected highlighting**; as well as (c) **accuracy of the source reference and format**. Submittals are rated with a (✓+), (✓), or (✓-). A (✓+) is the highest rating and (✓-) the lowest. A quality control check of each document is recommended before its submittal. Avoid the use of binders and plastic page protectors.

Activity C. **Paper**

Submit an executive summary ("boiled-down" version of a paper) approximately six double-spaced typewritten pages in length on any of the subjects/topics listed on Page 2 of 2. It is to be a **derivative work** (based on preexisting works) prepared in accordance with the APA Manual. The paper shall include a (a) minimum of one illustration and (b) reference list.

Don't forget to use headings, mention Figures and/or Tables in your text, and document your work by citing sources. Staple pages in top left corner — do not use a binder or plastic page protectors. The paper is due **not later than** class session 14. Those interested in earning extra credit should make arrangements with the instructor for a class presentation during session 12 or 13. Papers shall be submitted for evaluation immediately after the class presentation.

Activity D. **Meeting**

Attend a meeting dealing with training and/or supervision or a closely related topic and submit a one-page typed report (in accordance with the APA publication manual) by class session 14. Meetings of the Smoky Mountain Chapter, American Society for Training and Development are excellent for satisfying this activity.

Subjects/Topics: The subject/topic for activities B and C should be selected from the following list. Any of these topics or a sub-division of the topic may be chosen for activity C without instructor approval. If an alternate topic is preferred, a brief written proposal must be submitted to the instructor for approval prior to any writing effort. Focus on applications/information dealing with print "hard copy" vice audiovisual media or methods.

1. Needs Analysis/Assessment
2. Job and/or Task Analysis
3. Job Performance Measures (Criterion-Referenced Performance Tests)
4. Job Performance Aids
5. Personalized Training Using Packaged Instructional Materials (Modules)
6. Budgeting and Controlling Training Costs
7. The Costs and Benefits of Training (Cost-Benefit Analysis)
8. Training Program Evaluation (Internal and/or External)
9. Training Follow-up Activities (How to Combat Training Failure Which Occurs When the Training Experience Is Not Applied to the Work Situation)
10. Internal Efficiency of Formal Vocational Education and Training (VET) Centers
11. External Efficiency of Formal VET Centers
12. Increasing the Effectiveness, Efficiency, and Relevance of Training
13. Labor Market Skill Requirements and Training Output
14. Training/HRD Policy

THE VALUE OF FILMS AND VIDEO TAPES

More and more trainers are recognizing the value of audiovisual media. As a result, they are using films and video tapes to a greater degree in their courses and programs. In comparison to print materials, it has been estimated that a well-made film can **increase interest in a topic by as much as 40 percent**. Studies show that a film or video tape can make just about any subject matter 25 percent more understandable. In addition, researchers found that persons viewing films retain approximately 33 percent more information for as long as 1 year after the viewing.

The Chinese proverb, "To see a thing once is better than to hear it a hundred times," emphasizes the inadequacy of using only words in communication. People have multiple sensory abilities. They can see, feel, taste, smell, and hear. We know that training techniques which stimulate as many of these senses as possible enhance learning and strengthen retention.

Films and video tapes combine two powerful senses — sight and hearing — and support training/learning in ways such as the following:

1. Difficult concepts can be presented on a practical level in a short period of time.

2. Interest in learning can be increased through the dramatization of ideas.

3. Because sound and picture are presented simultaneously, attention can be focused on the critical elements of a mechanical process or a human interaction.

4. Because people are involved, viewers often relate directly to the situations depicted and see ready applications for the information presented.

5. They help avoid boredom inherent in any lesson which depends on a single instructional technique.

6. They provide a means for the storage and immediate retrieval of important information that can be shared with many individuals or groups in exactly the same way.

7. They set the stage for role play, case study, discussion, and other experiential learning opportunities.

AUDIOVISUAL MEDIA EVALUATION FORM

REVIEWER _____ DATE _____

REVIEWED FOR _____

TITLE _____

SUBJECT MATTER _____

PRODUCER/DISTRIBUTOR _____

DATE PRODUCED _____ LENGTH (TIME) _____

RECOMMENDED AGE LEVEL _____

☐AUDIO ☐SLIDES ☐FILM ☐FILMSTRIP ☐VIDEOTAPE / ☐COLOR ☐B & W

RATING

	Poor		Average		Excellent
A. QUALITY					
1. Sound Quality (audibility/voice/music)	0	1	2	3	4	5
2. Picture Quality (clarity/color)	0	1	2	3	4	5
3. Narration/Acting	0	1	2	3	4	5
B. CONTENT AND ORGANIZATION					
1. Content is current	0	1	2	3	4	5
2. Vocabulary & concepts are appropriate	0	1	2	3	4	5
3. Organized/logically presented	0	1	2	3	4	5
4. Provides interest/appeal	0	1	2	3	4	5
5. Content accurate	0	1	2	3	4	5

SYNOPSIS OF CONTENT
(Continue on back of sheet if necessary)

ESTIMATE OF OVERALL VALUE OF THE MEDIA

POOR		AVERAGE			EXCELLENT
0	1	2	3	4	5

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Information Sheet

TIPS FOR SUCCESSFUL WRITING

To meet requirements for effective written communications, study Chapter 2, Expression of Ideas, and Chapter 3, APA Editorial Style, in the Publication Manual of the American Psychological Association. In addition, consider the following guidelines:

1. Adequate time must be allowed for (a) planning, (b) information gathering, (c) writing, (d) review, and (e) revision, so as to meet the deadline without undue haste.

2. In order to achieve effective and efficient communication, (a) write from an outline, (b) self-review the manuscript a day or so after it is written, and (c) have someone with the requisite skills critique the manuscript.

3. The subject, topic, or problem to be pursued should be stated in a clear and concise manner.

4. Lead with the main point — Don't bury the main point in the middle of a paragraph or the reader might miss it. To discover what your main point or main sentence is, read a paragraph. Now decide which sentence would be the last one you would toss out. That sentence is your main point for the paragraph.

5. Make your writing easy and pleasant to read by using the following techniques: (a) indent main points in a paragraph; (b) use boldface or italic type for emphasis; (c) use lists — white space rests the reader's eyes; and (d) use subheadings to break space and ensure clarity. Think of things you've read that appeal to you. Save those examples and use the devices you like in them.

6. If you want your writing to be understood, keep the reader's needs, concerns, and point of view in mind as you write and revise. Avoid unfamiliar language or terms, and address questions you know the reader will logically have about your subject.

7. Don't overwrite and don't be reluctant to cut. Every written communication should serve a useful purpose. Avoid overburdening the reader with unnecessary words and information. Consider the impact of the Declaration of Independence, the Gettysburg Address, and the Lord's Prayer. Remember, the reader's time is valuable. Never use a paragraph when a sentence will do — always strive for brevity.

Be concise; do not over-elaborate and extend the text beyond its effectiveness. Make your written communications as short as possible, yet maintain the clarity necessary to impart the necessary information. Two things happen if you are not concise — the reader may (a) not get to the crux of the problem because it seems a waste of time to wade through excess wordage, and (b) lose the emphasis that should be placed on various areas.

8. The most important information is stated first, with each succeeding paragraph presenting information in order of its decreasing importance. Tie your thoughts together.

9. Use (a) one-, two-, or three-syllable words; (b) under twenty-word sentences; and (c) under ten-line paragraphs. Anything more looks "too involved!"

10. Avoid injecting your opinion unless you are a recognized expert on the subject. Give readers the facts and let them form opinions.

11. Keep first person "I" out of writing. Third person writing is powerful.

12. Avoid qualifiers and vague modifiers — Don't use modifiers that almost say what you want when you can find ones that are exact.

Close	**Exact**
The flight was very late.	The flight was 4 hours late.
The young trainee	The 16-year-old trainee

13. Don't use cliches (e.g., gut-level response, two-way street, cover all bases) — Worn-out expressions can wear a reader's patience thin.

Trite	**Natural**
First and foremost	First

14. Avoid exaggeration — Avoid the superlative when you write. The greatest, the worst, the prettiest all leave you open to exception. To avoid arguments from the reader, avoid overstating your position.

15. Use correct grammar, spelling, capitalization, and punctuation. Rewrite awkward phrases and use easy-to-understand words with specific meaning. Typing and copy quality should be given careful attention.

16. Quote directly what cannot be better said in your own words. Don't forget to cite the source of quotes, information, illustrations, etc.; consult the APA Manual.

17. Sum it up — The last paragraph should summarize what you've been discussing.

Use the methods and mechanisms of effective writing to the best of your ability. Bear in mind that self-evaluation and objectivity are absolutely necessary for you to grow in effectiveness. To become an accomplished writer takes practice. The more you write, the more you think about writing, and the more you read the good writing of others, the more successful you will be at writing.

HOW TO HANDLE STRESS

1. Deal with the cause — If tension comes from your relationship with a person, try talking out your differences. The longer you contain yourself, the more stress you'll build up. If tension comes from an unfinished task, restructure your priorities so you can complete that task.

2. Learn to distance yourself — When involved in an argument, stop and ask yourself, "Is this something really worth arguing about?"

3. Realize your limits and plan around them — Don't take on more than you can handle. Nobody can do everything. Tackle tasks in order of urgency.

4. Learn to pace yourself — You can't be in high gear all the time. Set goals and then reward yourself when you've attained them.

5. Accept imperfection — Don't insist on perfection, go easy on yourself.

6. Make the most of your time — Learn to delegate.

7. Streamline your work procedures — Break down big jobs into small components.

8. Develop a positive and outgoing disposition — If you look at the bright side of things and beyond yourself, you won't concentrate on problems.

9. Plan for change — Coping with the unexpected is always a great source of stress. Try to predict change in some cases and reduce the shock.

10. Don't fight the inevitable — **Accept what you cannot change**.

11. Talk out your troubles — Learn to talk things over with someone you trust. It releases pressure and makes you feel better.

12. Eat sensibly and get plenty of rest — Don't let your body run down; things look worse than they really are.

13. Exercise — A physical workout is a great tension releaser.

14. Get away from it all — Take some time each day to be quietly by yourself. Plan a vacation.

It does no good to worry about situations that are beyond your control — or those which do not impact you directly.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Information Sheet

THE ART OF LEADERSHIP

This information sheet provides a number of selected statements about leadership.

Simply and plainly defined, a leader is one who has followers.

Leaders see things through the eyes of their followers. They assume that their followers are working with them, not for them.

Leaders can be led. They are not interested in having their own way, but in finding the best way. They have open minds.

Leaders have a sense of humor. They can laugh at themselves.

Leaders should realize they are, in fact, five or more people. They are who they are, and who they think they are (and these are never quite the same); they are also who their bosses think they are, who their peers think they are, and who their subordinates think they are.

Leaders who work hard to get feedback from many sources are more likely to understand and control their various selves, and hence be better leaders.

Leaders must be honest with themselves or they will slip into the terrible habit of self-deception. Even the best leaders make mistakes. By smoking out these mistakes and correcting them quickly, a good leader can become a superb one.

Leaders who share their power and their time can accomplish extraordinary things. The best leaders understand that leadership is the liberation of talent; hence they gain power not only by constantly giving it away, but also by not grabbing it back.

Listening is an important skill. Introverts have a great edge, since they tend to listen quietly and usually don't suffer from being an "interruptaholic." Leaders should "squint with their ears." Too many bosses are thinking what they will say next, rather than hearing what is being said.

Leaders usually must make prudent decisions when they have only about 60% of the information they need. Leaders who demand nearly all the information are usually months or years late making decisions.

Organizations need indispensable institutions, not indispensable people. Leaders should not allow themselves to become indispensable, nor should they let any of their subordinates do so.

Leaders must set long-term goals for their people and for their organization. People want to know where they are going and in what order of priority.

Leaders thank the invisible people. There are lots of fine people doing great work who seldom get thanks because they are "invisible." They work so quietly and so competently that they often are not noticed by the leader.

Leaders are superb at time management and are competent in speed reading, personal computers, and the use of manual and electronic brainstorming techniques.

Leaders must sniff the air constantly to ensure that high standards of ethics are maintained.

Leaders focus on both performance and results. How you get results is important. Leaders who don't concern themselves about the performance that leads to the results are making a mistake. Always ask yourself what it took to gain those great results.

Leaders don't confuse being busy with being productive. Without discipline, managers can become slaves to their meetings, travel schedules, in-boxes, e-mail, and telephones. They get so wrapped up in the minutiae that they can become "in-box managers" rather than visionary leaders.

IMPORTANT MESSAGES ABOUT MANAGERS

Managers constitute a small minority of the typical organization's workforce, yet they account for most of the impact on its well-being. This is because they are relied upon for their judgment and influence.

Most of the time, managing involves two key areas: people and the allocation of resources. It's often in the people area that managers are weakest. One of the most important tasks is assigning people to jobs that use their expertise and challenge them to excel. Effective managers identify what they do very well, what they do well enough, and what they need to do better. Then they build on their strengths and seek help where needed.

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1. Reinforce (praise) work that is well done, and do so in a timely fashion. People are desperate for their contributions to be acknowledged. They work more earnestly when their work is appreciated.

2. Know when and how to delegate.

3. Solicit ideas and involve others in planning, problem-solving, and decision making.

4. When possible, give subordinates a chance to do the job their way.

5. Learn to set goals and priorities; then manage time effectively.

6. Look successful at all times. Good clothes help morale.

7. Associate with people who are cheerful, optimistic, and successful. You may imitate them.

8. Be enthusiastic, speak cheerfully. Keep a positive frame of mind.

9. Be friendly toward others. Your actions will probably be reciprocated.

10. Do thoughtful things for others. It gives you a good feeling.

11. Don't dwell on occasional discouragements. Move on and grow.

12. The law of averages is important. The more irons you have in the fire, the less you need be concerned about the outcome of any one of them.

13. Don't compare yourself with others. Reflect on your past successful accomplishments to increase your confidence.

14. Maintain good work habits. They show in the final product.

A MANAGER'S WORK: MYTHS AND FACTS

Introduction

When asked what they do, many managers will say that they (a) plan, (b) organize, (c) coordinate, and (d) control. Do not be surprised, however, if what you see managers do seems unrelated to what they say they do. The fact is that even though these four words have been used by managers since 1916, they do not tell what managers actually do! Without knowing what managers do, how can we improve managerial practices? This is the question we must answer if we hope to improve our own managerial skills.

First, let us review some common myths (misconceptions) about a manager's work. Next, we will look at a description of ten roles that seem essential to all managers' jobs. This information sheet concludes with a number of implications for achieving more effective management, both in the classroom and on the job.

Myths and Facts

There are four generally accepted myths about a manager's job that do not bear up under careful scrutiny.

1. MYTH. A manager is a reflective, systematic planner.

   FACT. Studies found that managers work at an unrelenting pace, that their activities are characterized by brevity, variety, and discontinuity, and that they are strongly action-oriented and tend to dislike reflective activities. Consider the following:

   A. A study of first line managers showed that they averaged one activity every 48 seconds and that their work pace was unrelenting. The same was true for chief executives. Even coffee breaks and lunch were work related.

   B. None of the studies found any pattern in the way managers scheduled their time. They seemed to jump from issue to issue, continually responding to the needs of the moment (crisis management).

Does this describe a reflective and systematic manager: Hardly! The studies show that managers terminate many of their own activities, often leave meetings before they end, and interrupt their own desk work to call in subordinates. It was found that many managers place their desks so they can look out of their offices, and often down passageways, thereby inviting interruptions. It seemed that no matter what was being done, the manager was plagued by the possibilities of what else could be done and what must be done.

When managers needed to do some planning, they did it within the context of daily actions. Without exception, never did they set aside a specific time and place with peers to do creative action planning. Indeed, the job of a manager does not breed reflective planners but rather an individual who responds to a stimulus, one who is conditioned, by the job, to prefer live rather than deployed action.

2. MYTH. The effective manager has no regular duties to perform. It seems that we are constantly being told to spend more time planning and delegating and less time counseling and negotiating.

   FACT. In addition to handling exceptions, a manager's work involves performing a number of regular duties, including "ceremonies", negotiations, and processing those bits of soft information that link the organization with its environment. Consider these:

   A. One study found that managers of small organizations engaged in routine activities because they were so short on operating personnel that the absence of a single person was felt very hard.

   B. Two other studies suggested that it is a natural part of the manager's job to see clients.

   C. Studies also show that managers play a key role in securing "soft" external information (much of it available only to them because of their status), and in passing it along to their subordinates.

3. MYTH. The manager needs aggregated information, which a formal management information system best provides.

   FACT. Managers strongly favor verbal communication, namely, telephone calls and meetings. Consider the evidence that comes from several studies:

   A. Managers spend an average of 74 percent of their time in verbal communication.

   B. Senior managers treat mail processing as a burden.

   C. Senior managers skim-read routine reports and periodicals almost ritualistically. Also, on their own, they initiate little written correspondence.

   D. Another interesting finding was that managers seem to cherish "soft" information, especially gossip, hearsay, and speculation. The reason is that it is timely; today's gossip may well be tomorrow's fact.

The manager's emphasis on verbal communication raises two important points. First, verbal information is stored in the brains of people. Only when we write this information down can it be stored in our organization — whether in file cabinets, on magnetic tape, etc. — and managers apparently write down only a little of what they hear.

Secondly, the manager's extensive use of verbal communication helps to explain the reluctance to delegate tasks. When we realize that most of a manager's important information comes in verbal form and is stored in the brain, we can well appreciate this reluctance. There is no folder of information that can be handed to someone; the manager must take time for a "memory dump" to tell someone all about the subject, and usually finds it easier to do the job personally.

4. MYTH. Management is, or at least is quickly becoming, a science and a profession.

   FACT. By almost any definitions of science and profession, this statement is false. Science involves the systematic, analytical, and exact determination of procedures or programs. Profession involves "knowledge of some department of learning or science."

The fact is that managers of today are basically indistinguishable from their counterparts of a hundred years ago. The information they need is different, but they seek it in the same way — by word of mouth. Decisions may concern space technology, but the procedures used to make those decisions are essentially the same as the ones used by a nineteenth-century manager. Even though we now have computers to help us, as managers we are in a kind of loop with increasingly heavy work pressures but no aid forthcoming from management science.

Basic Job Description

A manager, by definition, is a person in charge of an organization or one of its sub-units. Besides the general manager, this definition would include department heads, division heads, etc. Can all of these people have anything in common? Indeed they can, and do! For an important starting point, all are vested with formal authority over an organizational unit. From formal authority comes status, which leads to various interpersonal relations, and from these comes access to information. Information, in turn, enables each particular manager to make decisions and strategies for their own organization.

The manager's job can be described in terms of various "roles." Formal authority gives rise to three interpersonal roles. These, together with informational roles, enable a manager to play decisional roles.

A. INTERPERSONAL ROLES. Three of the manager's roles arise directly from formal authority and involve basic interpersonal relationships.

   1. Figurehead role. By virtue of the position, managers perform some duties of a ceremonial nature. The general manager greets the touring dignitaries, the sales manager takes an important customer to lunch, the foreman attends the wedding of a lathe operator, etc. Managers should expect to spend considerable time in this capacity.

Duties that involve interpersonal roles may sometimes be routine, involving little serious communication and no important decision making. Nevertheless, they are important to the smooth functioning of the organization and cannot be ignored.

   2. Leader role. The influence of a manager is most clearly seen in the leader role. Formal authority vests the manager with potential power; leadership largely determines how much of it will be realized.

3. Liaison role. In this posture, a manager makes contacts outside the organization. Until recently this role has not been mentioned very much. Yet virtually every study shows that managers spend as much, if not more, time with peers and other people outside their organization as they do with their own subordinates.

As an example, three studies show that managers spend 44 percent of their time with their peers, 46 percent of their time with their superiors, and only 10 percent of their time with subordinates. As we shall see, a manager cultivates contacts outside the organization largely to find information. In effect, the liaison role is devoted to building up the external information system — informal, private, verbal, nevertheless, effective.

B. INFORMATIONAL ROLES. By virtue of interpersonal contact with both subordinates and peers, the manager will emerge as the organizational nerve center. The manager may not know everything, but typically knows more than others in the organization. The processing of this information is a key part of the manager's job, and in so doing, the manager will display two distinct roles.

1. Monitor. By maintaining liaison with contacts and talking to subordinates, the manager will receive a lot of unsolicited soft information.

2. Disseminator. The manager ought to share and distribute much of the "soft" information that is collected; otherwise, subordinates with a need to know will have no access to it.

C. DECISIONAL ROLES. Information is not an end in itself but rather it is the basic input to decision making. It is clear that a manager plays a major role in decision making. Only the manager can (a) commit a program to important new courses of action and (b) make decisions that determine the strategy for change. As decision maker, there are three roles that a manager will alternate between:

1. Entrepreneur. In this role, the manager seeks to improve the organization's ability to adapt to changing conditions.

2. Resource allocator. Here is where the manager decides who gets what, as well as how to manage time. The manager is charged with designing the program structure and the pattern of formal relationships that determines how work is to be divided and coordinated.

3. Negotiator. This is the final decisional role played. All studies showed that managers spend considerable time in negotiations. They are an integral part of the manager's job.

D. THE INTEGRATED JOB. It should be clear by now that these roles are not easily separable; they form an integrated whole. No one role can be pulled out and still leave the whole job intact. Consider what would happen, for example, if the monitor role was pulled out and the organization gained no "soft information."

This is not to say that all managers will give equal attention to all roles. They will not. Some will spend more time in the interpersonal roles, others will give more attention to the decisional roles, and still others will spend most of their time in the informational roles. The important thing to remember is that some attention must be given to each.

Toward More Effective Management

So what does all this boil down to? Managers' effectiveness is significantly influenced by their insight into their own work. Your performance depends on how well you understand and respond to the pressures and dilemmas of your job.

Now let us look at three specific areas of concern, logjams that revolve around the verbal nature of your information. There are great dangers in decentralizing the informational data bank in the mind of a manager. When you leave, you take your memory with you!

A. A manager is challenged to find systematic ways to share privileged information. Options to be considered include a regular debriefing session with key subordinates, a weekly memory dump into a tape recorder, or maintaining a diary of important information. Confidentiality may be a problem, but the risks of exposing privileged information must be weighed against having a well-informed team that functions.

B. Here again, the manager is challenged to deal consciously with the pressures of dealing with "hard" issues instead of superficial ones. This is best done by stepping back to look at all the information and see the broad picture.

A manager has to be ready to respond quickly to various problems, but a big danger lies in attempting to respond to every issue equally, and usually abruptly, without sifting through all the information to put each situation into proper perspective.

C. The manager is challenged to gain control of his/her own time. One suggestion is that managers should turn obligations to their own advantage by turning those things they wish to do into obligations.

A manager has to spend so much time discharging obligations that, if they were viewed as just that, the manager would leave no mark on the organization.

When managers are required to give a speech or a talk, they should use it to lobby for a cause. A required meeting is a chance to reorganize a weak department, etc.

Also, managers need to free some time to do those things that they feel are important. This is done by turning them into obligations. Free time is made, not found, in any manager's role. It has to be forced into the schedule. Hoping to have some free time is the same as hoping the pressure of a job will disappear. One very good method to make free time is to delegate and require feedback at specific times.

It is the manager who determines whether a program serves well or whether talents and resources are squandered. It is time to strip away the myths about managerial work and time to study it realistically so that the difficult task of making significant improvements can begin.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Information Sheet

PERFORMANCE RATINGS

Background

Performance rating is a systematic evaluation by supervisors or others who are familiar with an individual's work performance. These ratings customarily involve instruments, forms, and procedures developed specifically for the purpose. The ratings become a part of an individual's personnel record, available for use in connection with personnel actions such as promotion, salary increase, incentive award, retention, transfer, layoff, and discharge. Performance ratings are also known as performance or employee appraisals, merit or personnel ratings, and personnel performance evaluations or reviews.

Although formal performance rating systems are of relatively recent origin, the rating of individuals by supervisors is by no means a new development. Supervisors have always evaluated their subordinates, and it is no doubt true that evaluations made in a slipshod and unsystematic fashion, unrecorded and undefended, whether valid or not, have been as important in influencing personnel actions as evaluations made by carefully designed and executed rating systems.

In some organizations, workers do not undergo performance ratings. Conversely, the performance of nearly everyone employed by the U.S. government (managers and workforce, including officers and enlisted members of the armed forces) is rated at least annually.

The changes that have come with systematic performance rating systems do not involve making evaluations where none existed, but rather involve a shift from informal, unsystematic evaluations to those that are made more systematically, and in a manner that results in more comparability from one individual to another. The question, then, is not whether supervisors should rate their subordinates — this has always been and probably always will be done — but whether the use of a formal system increases the value of such ratings both to management and to employees.

Purposes

Various purposes have been cited for using a performance rating system. In general, however, these purposes seem to fall into two categories: (a) administrative and (b) self-improvement (or clinical). An analysis of the administrative uses suggests that those presented under the following heading are the most important.

Administrative

Promotion is considered by many to be the principal administrative use of performance ratings. It is in the common interests of both management and the workforce to promote employees into positions where they can most effectively use their abilities. A properly developed and administered performance rating system can aid in determining whether individuals should be considered for promotion. There is, however, an important distinction to be made in using performance ratings for this purpose. Such ratings should differentiate between the performance of the individual on the present job, and potential performance in a higher-level job. The **ability to perform effectively on one job does not necessarily give assurance of an employee's potential for greater responsibilities**. These potentialities need to be evaluated separately.

There are occasions when it is necessary to consider various types of personnel actions such as transfers, layoffs, and discharges. In some cases, such actions may be necessary because of unsatisfactory performance on a present job. In other cases, the actions may be necessary because of economic conditions, organizational changes, or changes in the production/manufacturing processes.

In some instances, performance ratings are used as a basis for granting wage or salary increases. In other cases, merit and seniority are used in combination when granting increases.

An appropriate performance rating system is useful for training purposes as well. It can aid in identifying employees' knowledge or skill deficiencies, which can then be corrected by training.

Self-Improvement

For a performance rating system to serve in self-improvement, employees must know where they stand with the supervisor. This can be discussed during an interview between the supervisor and employee. It should be noted here that employee self-improvement must be predicated on some knowledge by the individual about their personal strengths and weaknesses.

Problems

One overriding problem with performance ratings is that they rob employees of their right to pride of workmanship. Most workers want to do a good job and, for them, the "annual rating" is a demoralizing experience. After each rating, management sorts out the "good" from the "bad".

W. Edward Deming and other quality experts contend that such judgments cannot be made with precision, particularly over a short period (6 to 18 months). No matter how well they are done, performance ratings are inherently flawed and their negative effects can harm workmanship, self-esteem, and teamwork. Employees may become bitter and/or depressed, and often do inferior work for weeks after a negative rating.

Many rating systems force performance into a frequency distribution so that the majority of employees fall in the middle — the average. What would happen to your self-esteem and morale if you were told you were average, or worse yet, below average? No one wants to be average or below average, yet that is a consequence of such ratings.

Another shortcoming is that performance ratings done by supervisors and managers **adversely affect teamwork**. If I do something to help you, you might get a higher rating than I do. There is no good reason to cooperate. Rating systems foster suboptimization, people working toward personal rather than organizational goals.

There have been many attempts over the years to improve performance rating systems. Despite the efforts, they remain imprecise — plagued with high degrees of ambiguity and subjectivity.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 1

HISTORY OF TRAINING

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. One modern phenomenon that has developed from the long history of craftsmen's guilds is

   A. the emphasis on social legislation.
   B. the emergence of labor organization by industry.
   C. the strong support of labor unions for legislation to provide vocational-technical education.
   D. labor unions' opposition to vocational-technical education in order to maintain control of training.

2. A result of America's change from an agrarian to an industrial economy was

   A. the substitution of apprenticeship training for most other types.
   B. a de-emphasis on agricultural training.
   C. reduced interest in training programs because of high unemployment.
   D. the establishment of vocational training schools to augment apprentice training.

3. History shows that the greatest stimulus to the growth of training in the United States has been

   A. wartime workforce needs.
   B. the decreasing influence of the profit motive.
   C. the prosperity of the 1920's.
   D. the difficulty of finding skilled workers.

4. The program to train shipyard workers during World War I was based on the principle of

   A. show, tell, do and check.
   B. traditional long-term apprenticeship training.
   C. classroom training separated from the worksite.
   D. avoiding the use of work supervisors as trainers.

NOTES

5. How did the Depression years of the 1930's further the cause of training in later years?

   A. Most companies instituted new training programs to meet changing manpower needs.
   B. High unemployment always increases industry efforts to train workers.
   C. Federal handicraft programs made many people conscious of the possibility of training to promote their personal welfare.
   D. For the first time, the government became involved in vocational training.

6. Which of the following is true of the Job Instructor Training program of World War II?

   A. It was oriented to first- and second-line supervisors.
   B. It taught how to instruct and emphasized human relations between the supervisor and worker.
   C. It was originally designed for use in defense industries.
   D. All of the above.

HIGHLIGHTS OF EARLY UNIONISM IN THE U.S.A.

1. Workers reacted to the disadvantages of their roles by forming producers' or consumers' cooperatives designed to restrain management control, by political action aimed at (a) overthrowing the wage system, and (b) bringing pressure on employers by forming unions.

2. The union movement in the U.S.A. began in the latter part of the 18th century with associations of workingmen. They pledged not to work alongside those who did not serve an apprenticeship.

3. First genuine strike occurred in 1786 by printers in Philadelphia.

4. Between 1792 and 1794, the first continuous workers' organizations appeared. Shoemakers in Philadelphia are an example.

5. Associations of masters fought unions through the courts, using the charge of conspiracy. Journeymen shoemakers were convicted of joining a conspiracy because they went on strike in 1806 and used collective bargaining to gain higher wages.

6. After the War of 1812, there was a long period of dominance by mercantile capitalism. Mills appeared alongside shop and home production.

7. Trade associations or unions were formed or reformed in many crafts. After 1820, strikes occurred in (a) craft shops and (b) mills (factories).

8. Early union unrest was a response to:

    - Mercantile employers' cost cutting by holding down wages, lengthening the work day, breaking down the master-worker relationship, and introducing women and children into industry.
    - Atmosphere of Jacksonian democracy, with its war against the aristocracy and exalting of common people.

9. Under adverse circumstances, workers organized against bankers and other aristocrats. They demanded an end to social inequality, imprisonment for debt, and child labor in New England mills.

10. **Equality of opportunity was the workers' slogan**, and the key, they thought, was a system of free education.

11. In the early 1830s labor moved, for a time, toward politics:

    - Workingmen's parties were formed in various cities.
    - Aim was to get labor representatives into the legislature.
    - Parties disappeared and labor merged with the Jacksonian movement.

12. The American workforce had no aims as a class; rather, workers wished to better themselves within the framework of capitalism and share in its benefits.

13. National Labor Union — formed in 1866

    - Composed of national, local, and city assemblies of trade unions and reformist movements.
    - Politically-minded **federal employees campaigned for 8-hour day, which was granted in 1868**.

14. First national strike occurred in 1877 by railroad workers. Touched off by a reduction in wages by the Baltimore and Ohio Railroad.

    - Militia called out to keep trains running.
    - Over 100 killed and several hundred wounded.

15. Knights of Labor — founded by Uriah S. Stephens in 1869

    - Initially a secret organization of skilled workers.
    - Reformist organization, rather than a revolutionary one.
    - Demanded government ownership of railways and telegraph systems and graduated income tax.
    - Interested in producers' cooperatives.
    - Favored boycott over strike.
    - Reached its peak in 1886. By 1893, only 75,000 of 700,000 left; virtually extinct by 1900. Causes:
        a. Inept leadership.
        b. Strikes ended disastrously.
        c. Working class split among racial, national, and religious groups, with employers exploiting these hostilities.

16. Haymarket riot in Chicago — 1886

    - Organizations of Socialist Labor Party sought to convince working class of the necessity for violent destruction of capitalism.
    - During struggle for 8-hour day at McCormick factory, lockout turned into a strike.
    - Fight between police and strikers led to a mass protest meeting; during the meeting, a bomb was thrown, killing several policemen.
    - Wave of hysteria broke over the country. Radicals were rounded up by the police. Eight leaders were arrested, tried, and convicted.
    - Consequences: (a) enabled employers to open a counteroffensive against labor movements in general, (b) convinced labor leaders of necessity to stay clear of

radicalism, and (c) symbolized possibilities and limitations of radical action by workers and the determination and ability of conservative forces to resist radicalism.

17. Breaking point between the Knights of Labor and the craft unions was reached during Haymarket riot.

- Leadership of Knights of Labor opposed the membership's desire for a strike.
- During a conference in 1886, delegates decided to form a new organization, the American Federation of Labor (AFL). Samuel Gompers was elected first president. AFL interested primarily in higher wages, greater job security, and better working conditions.

18. Craft union (AFL) — dominated labor movement until middle 1930s.

- Samuel Gompers and Adolph Strasser built a strong union among cigar makers.
- Gompers abandoned interest in revolutionary ideals and became an opponent of socialism. He typified conservative trade unionism in the U.S.A.

19. AFL superior to Knights of Labor

- AFL provided for union autonomy, based on craft principles; suited the non-class-conscious American worker.
- Proved that they knew how to organize and win strikes by limiting their objectives and size.
- Dissociated themselves from radicals.

20. Homestead Strike — 1892 battle between the Association of Iron and Steel Workers (an AFL union) and the Carnegie Steel Company

- Centered around plant in Homestead, Pennsylvania.
- Decided to strike rather than accept terms of contract renewal.
    a. Company demanded that workers take a wage cut.
    b. Workers staged a strike when the company began a lockout.
    c. Company attempted to overcome the strike by bringing in Pinkerton detectives and more workers. A bloody battle resulted, killing 10.
    d. Strike leaders arrested on a murder charge.
- Strike ended — November, 1892 — bitter defeat for labor.

21. American Railway Union — formed in 1893 by railway workers who were dissatisfied with conservatism and ineffectiveness of the "brotherhoods" (former organization of railroad workers)

- Members employed by Pullman Palace Car Company had numerous grievances. They resented company owning all houses, banks, and utilities.
- Strike demands were for reinstatement of discharged members, lowering of rent on Pullman houses, and restoration of formerly higher wages.

- Court injunction declared picketing illegal, and strike leaders were jailed. The strike collapsed.

22. Strike of United Mine Workers in 1902

- Grievances — low pay, unfair methods of weighing coal, long hours, and dangerous working conditions.
- Intervention by President T. Roosevelt resulted in strikers going back to work, pending the findings of an arbitration commission.
- Consequences — several secondary concessions; main aim of recognition as a union was denied.

23. Clayton Act amended anti-trust laws and penalties of injunction. AFL grew from 4.2 million members in 1914 to 5.1 million by 1920.

24. Post-WW I labor conditions

- Steel strike began in September, 1919, weakened in January, 1920, then collapsed.
- Depression of 1921 resulted in considerable decline of trade union membership.
- Company unions formed and, by 1926, had about half as many members as AFL.
- Workers in non-union plants subjected to "yellow-dog" contracts, binding them not to join a union.

25. Depression years

- Seven million people lost jobs by 1930; 15 million by 1932, and, thus, trade union membership declined more.
- Norris-La Guardia Act passed in 1932, revoking power of judges to issue injunctions in labor disputes, and outlawing "yellow dog" contracts.
- Wagner Act passed in 1935. National Labor Relations Board, an independent government agency, was formed to enforce provisions of Act.

26. New Deal — Committee for Industrial Organization (CIO)

- Formed by dissatisfied delegates of 1935 AFL convention. The controversy which split the AFL and resulted in the formation of the CIO was largely a clash over personality and method rather than fundamental principles.
- CIO unions were expelled from AFL, with exception of the Ladies' Garment Workers.
- Rubber workers in Akron joined a union and went on strike, followed by General Motors workers in 1936/37 with a "sit-down" strike, and then by U. S. Steel Company workers.
- CIO transformed itself into the Congress of Industrial Organizations in May, 1938, with basic principles and structure much like AFL.

27. Labor during World War II

- The War Labor Board was set up and labor yielded right to strike.
- Smith-Connally Act (a) gave President the right to seize any plant involved in war production, (b) demanded a 30-day notice of strike, and (c) forbade labor to contribute money to political campaigns.

28. Labor since World War II

- Greatest outbreak of strikes in American history — 1946.
- Taft-Hartley Act — 1947, restrictive legislation which cut union power.
  a. Prohibited unions from coercing members.
  b. Prohibited secondary boycott.
  c. Prohibited jurisdictional strikes.
  d. Banned closed shops.
  e. Granted employees the right to call plant elections.
- AFL and CIO merged — 1955
- Landrum-Griffin Act — 1959, provisions covered union elections, disciplining members, rights of members, trusteeships over local unions, etc.

29. A Comment. Perhaps the greatest single contribution of collective bargaining has been to insure equitable treatment of workers by employers. In any event, unions have provided improved conditions to workers and wages that are higher than non-union workers receive. Nevertheless, membership has declined to about 15% of the nation's workforce. However, based on current evidence, it appears that workers of the future will continue to want some control over their destiny, especially when productivity and profits increase while working conditions and job security decline. Without unions, workers would probably suffer losses beyond the growing disparity between what they are paid and the benefits received by top management.

Course Number & Title
Subject Matter

School and Location
Skill Lesson Plan No. ____

LESSON PLAN FORMAT

Objectives:

1. Identify what must be achieved by the learner.
2. Should be easily understood, clear, and concise.
3. Must be within the scope of the lesson.

Equipment, Tools and Supplies:

1. List all essential equipment, tools, and supplies needed to demonstrate the skill or skills planned.
2. List all instructional aids to be used.
3. It is critically important to have at hand everything that is needed.

PREPARATION (of the learner)

1. Be specific in describing how you will gain and sustain the attention of the learners.
2. This step should be no longer than necessary to develop interest among the learners for what is to follow.
3. There should be noticeable break between this step and the one that follows.

PRESENTATION (The demonstration of the skill(s) to be learned)

STEPS	KEY POINTS
1. List each step in the order they are to be performed.	1. List key points for each step to be explained.
2. Each step should be clearly stated.	2. Each step, including safety considerations, should be clearly explained.
3. Demonstration should not require more than 20 minutes.	3. Provide for questions to be asked.

PRESENTATION (Continued)

STEPS	KEY POINTS
	4. This column is used to remind you of important things to say about what you are doing. 5. A time schedule can be helpful as a reminder of where you should be in the lesson by a certain time. 6. Discuss and show, when applicable, the attainment standards required of learner.

APPLICATION (The learners practice what they have observed)

After the PRESENTATION step, and a short break, each learner is provided the opportunity to perform the job task or operation observed. This is the chance to try his/her hand, so to speak: to develop skill in work performance.

1. Learner is given a job sheet (or operation sheet) to guide efforts in developing skill.

2. Learner returns to work station and proceeds into the performance routine.

3. The instructor circulates throughout the lab giving assistance and instruction where it is needed, on an individual or small group basis.

4. The instructor attempts to prevent learners from making errors; to correct errors that may be made.

5. Length of the APPLICATION step depends upon learner progress.

EVALUATION (Measurement of learner achievement)

1. Learner is on his/her own. Expects no help from the instructor.

2. Instructor checks the quality of work, time required to do the work, and how well the student is able to follow directions.

3. Test criteria should be based upon standards observed in the trade.

4. Testing is usually based upon performance. Oral questions can also be used.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Assignment Sheet

FOUR-STEP LESSON PLAN

Directions: Read the numbered items under each step (e.g., Preparation) and check the appropriate statement. Supply additional comments in the space provided.

Use of the four-step lesson plan

First step — **Preparation**

1. Excellent
   ___A. Made it clear how new material related to previous learning.
   ___B. New material was introduced with good indication for practical use.

2. Good
   ___A. Could see some relationship between new material and previous learning.

3. Needs Improvement
   ___A. No attempt to relate new material to previous learning.
   ___B. No attempt to show practical use of new material.

Comment: _____

Second Step — **Presentation**

1. Excellent
   ___A. Careful presentation of material in clear steps and in logical sequence (safety precautions emphasized, when appropriate).
   ___B. Steps presented at a pace that learner could follow without getting lost.
   ___C. Adequate provisions for questioning.
   ___D. All material and equipment present.
   ___E. New equipment and material properly identified.

2. Good
   ___A. Could follow all but a few of the steps in the procedure.
   ___B. Steps in the procedure were presented too rapidly without an adequate opportunity for trainee questions.
   ___C. Most new procedures, equipment, and materials were identified somewhat.

3. Needs Improvement
   ___A. Steps of procedure not in proper sequence.
   ___B. Difficult to follow instructions.
   ___C. No opportunity to ask questions for clarification.
   ___D. New procedures, equipment, and materials not properly identified.

Comment: _____

Third Step — **Application**

1. Excellent
   ___A. Trainees felt comfortable performing the procedure after practicing under supervision.
   ___B. Trainees performed a return demonstration identifying the steps as they were performed.
   ___C. Adequate instructions for continued practice of the procedure.

2. Good
   ___A. Some uncertainty about a procedural step(s).
   ___B. Return demonstration performed without the supervision needed to correct errors.
   ___C. Unsure of instructions for continued practices.

3. Needs Improvement
   ___A. Instructor demonstration only — no supervised return demonstration.
   ___B. No instructions for continued practice.

Comment: _____

Fourth step — **Evaluation**

1. Excellent
   ___A. Trainees aware of proficiency standard(s).
   ___B. Testing standards presented to trainees.

2. Good
   ___A. Some mention of proficiency standards, but not complete.
   ___B. Method of testing performance not clearly stated.

3. Needs Improvement
   ___A. No mention of proficiency standards.
   ___B. No mention of testing methods provided.

Comment: _____

Physical Movement

In the space below, identify the physical movements and mannerisms that **contributed to** or **detracted from** the lesson (i.e., eye contact, posture, etc.).

CLASS SIZE

The complexity of instructional management is related to class size. In an integrated analysis of over 100 studies with good experimental controls, Glass and others (1982) found that there was a "threshold effect" when class size was reduced to 15 students or less. Gains in achievement were significant. When class size extends beyond a ratio of about 1:30 students, there can be adverse effects on learning. In smaller classes, instructors are more likely to use practices which enhance learning: greater time-on-task, fewer interruptions and less time spent on routine procedures, the accommodation of individual differences, more instructor-directed instruction, and greater attention to questioning, feedback, and reinforcement, among others (Bourke, 1986). It is these mediating factors, brought into fuller play in small classes, that have a positive effect on learning, and not just the small size of the class.

The fact remains that few organizations can maintain small classes, particularly of 15 students or less. The best that can be expected in many cases is to keep class size under 30. It is possible, nevertheless, to incorporate into large classes the same instructional practices which contribute to greater student achievement in smaller classes. In addition, there are alternatives to "traditional" group instruction which can help to accommodate large class size because they have built-in management procedures which facilitate effective instruction.

References

Bourke, S. (1986). How small is better: Some relationships between class size, teaching practice, and student achievement. American Education Research Journal, 23 (4), 558-571.

Glass, G. V., Cahen, L. S., Smith, M. L., & Filby, N. N. (1982). School class size. Beverly Hills, CA: Sage.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 2

ORGANIZATION AND MANAGEMENT OF TRAINING

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. Managers can conclude that a formal training program will be useful when

   A. some or all jobs in the organization require specific knowledge and skill for successful performance.
   B. individuals or groups of workers are not performing well enough to meet job standards set for them.
   C. the organization is not meeting the goals included in annual or long-term plans.
   D. problems exist that can be partly or wholly solved by giving personnel identifiable items of knowledge, skill, or attitude.

2. The most important function of a basic training policy is to

   A. describe the specific training programs that will be carried out.
   B. enumerate the problems that led to the establishment of a training program.
   C. show how training will be used to help achieve organizational goals.
   D. convince top management that training is necessary.

3. Of the following, which is <u>least</u> important in deciding whether a specific training program is justified?

   A. The extent to which results of training will be measurable.
   B. Whether the job environment will allow the new learning to be applied.
   C. The ability of trainees to see personal advantage from the training.
   D. The opportunity to apply new training technology.

NOTES

4. When originally organizing training efforts, the first task is to

   A. recruit staff members for the training department.
   B. study the organization to determine training needs and priorities.
   C. decide on the internal organization of the training department.
   D. survey the training that competitors use.

5. Which of the following is <u>not</u> recommended in establishing the formal organization of the training staff?

   A. Divide the work according to the function.
   B. Provide written job description and performance standards.
   C. Assign responsibility for a single activity to more than one person.
   D. Delegate decision-making to managers close to the point of action.

6. To perform the evaluation function successfully, one requirement is that

   A. all courses and programs must have performance objectives.
   B. operations must be based on careful scheduling.
   C. operating plans must be made as long term as possible.
   D. training activities and staff must be organized by function.

WORKFORCE TRAINING

Linking Training to Organizational Goals

Selected **organizational** (workplace) **goals**, also known as strategic objectives or business goals/objectives/results, **which justify training include:**

1. Better quality (meet or exceed requirements, fitness for use, durability, reliability)
2. Improved standards/accuracy
3. Increased productivity/quantity/output/performance/efficiency
4. Increased worker versatility and proficiency
5. Improved morale/attitude/dependability
6. Improved safety and health
7. Better products and service
8. Better utilization of machines and equipment
9. Fewer defects and rejects (less rework)
10. Reduced scrap/waste/material costs
11. Less damage to tools and machines (less downtime)
12. Lower operational/unit costs and increased profitability
13. Decreased amount/frequency of supervision
14. Less worker absenteeism and turnover
15. Decreased customer complaints and warranty costs
16. Fewer accidents and medical claims
17. Less conflict, litigation (fewer grievances)

It can be argued that some of the above goals are not legitimate reasons for training; but rare indeed is the professional who would argue that none of these results ever accrues to a training effort.

Alternatives to Training

While it is the **appropriate activity** when **new skills are required** or **existing skills are deficient**, training cannot solve all organizational problems. Consequently, **the following alternative interventions should be considered before training is prescribed.**

1. Improved methods of worker selection
2. Communication of job performance requirements and standards, along with regular feedback
3. Better supervision, coaching/counseling
4. More effective utilization of existing knowledge and skills
5. Use of job performance aids
6. Changes in job requirements (job redesign)
7. Better working conditions/environment (ergonomics)
8. Recognition and reward of high level performance (financial incentives as well as other forms of appreciation)
9. Providing high quality tools, equipment, materials, and supplies

10. Introduction of new technology and automation (machines, processes, etc.)
11. Improved morale and motivation
12. Attention to interpersonal, group, and intergroup behaviors
13. Job security
14. Better pay and benefits
15. Advancement based on merit and seniority
16. Tactful discipline

Distinguishing Between Education, Training, and Development

Table 1 on page 3 of 5 facilitates a comparison of **education**, **training**, and **development** in terms of six factors. It is reasonable to conclude that a training system differs from a formal education system in that **training focuses on**:

1. The prompt application of knowledge and skills learned
2. Direct relationships to a particular job
3. Specific requirements based on a needs assessment and job analysis

Formal education systems, on the other hand, **focus on**:

1. Future applications of learning
2. Indirect relationships to a job or occupation
3. Implied learning for use in unpredictable situations
4. Successful living within a culture

Finally, **development deals with**:

1. Projected or forecast needs of a nation or organization
2. Orientation toward the entire economy or sectors of the economy
3. Organizational requirements

While their focuses differ, training is effective to the extent that:

1. Graduates of the formal education system have acquired the basic knowledge, skills, and attitudes necessary as a foundation for job training.
2. Instruction is based on performance requirements for jobs with favorable employment prospects.

Job training cannot and should not be divorced from formal education, though their goals and approaches differ.

The Role and Purpose of Workforce Training

Training is appropriate when there is a deficiency in knowledge and skills. This can happen when (a) new workers are hired, (b) a worker is promoted or transferred, (c) new jobs are created, (d) jobs are to be performed in new ways, or (e) jobs are being performed in deficient ways by incumbent workers. More specifically, publicly-funded training is an appropriate activity when one or more of the following situations exist:

1. There is a need for specific skills which do not exist in the present workforce.
2. Specific needed skills are not available in sufficient numbers in the present workforce.

Table 1

A Comparison of Education, Training, and Development

Education	Training	Development
	Definition	
Learning to be someone; developing the whole person — mind, character, personality; learning concepts and rules, etc. by formal schooling	The use of practical experiences and theoretical insights to prepare individuals for gainful employment as skilled workers or technicians	Process of growth by which a nation or organization expands the number or modernizes the nature of its activities
	Purpose	
To promote a just society; provide knowledge, skills, and values needed for successful living in a complex culture, plus ability to deal effectively with new information and changing conditions	To supply the knowledge, skills, and attitudes necessary to enter and progress in a particular job	To assure organizations of a skilled workforce, technology, and equipment to meet previously established national goals
	Expected outcome	
Individuals with social skills who continuously seek and acquire rational knowledge	Individuals who can perform job tasks proficiently in order to meet predetermined workplace goals	Competitive organizations which (a) engage in new processes and/or products; and (b) acquire the systems, materials, and workforce to remain operative
	Scope	
Deals with a complex set of abilities, attitudes, and values	Deals with specific tasks requiring certain knowledge and skills	Involves complex sets of tasks and requirements of the entire economy or sectors of the economy
	Time frame	
Long-term orientation; deals with possible future applications of learning	Deals with current needs and prompt application; short-term orientation is normal	Deals with projected or forecast needs on a long-term basis
	Relationships	
Consultative and administrative interfaces by policy makers, teachers, and special interest groups	Consultative interfaces among managers, workforce planners, job analysts, and a host of other training specialists	Consultative and administrative interfaces by policy makers, workforce planners, and other groups as appropriate

3. Workers are not performing to the specified standard of proficiency.
4. Changes in technology, methods, or required behaviors have caused current skills to be obsolete.
5. Parts of a population are not able to obtain employment in order to support themselves.

The general conditions under which training is an appropriate solution can often be expressed with the formula:

M - I = D

In this equation, the letter **M** signifies Mastery of all necessary behaviors; **I** represents Inventory of the person (or people) who must perform; and **D** represents Deficiency, or training need.

The formula can be applied to the national, regional, or local workforce in this way: let M represent the total number of workers required in a given trade and the skill level which is required of them when they perform the job. For example, assume that a region needs 10,000 electricians. If there are only 1,000 electricians in that region, the regional D (or Deficiency) may be expressed in this formula:

M (10,000) - I (1,000) = D (9,000)

Personal proficiency. The formula can be applied even more meticulously if one considers a single position. For instance, assume that a nurse's job has been analyzed, and that it is established that there are 300 tasks. (Examples of these tasks might be: bathe a baby, take temperature readings, etc.) At any point in the preparation to become a nurse, a trainee's qualification may be determined by using the formula. When there is a Deficiency of 30 tasks, the trainee's Inventory equals 270 (300 - 30) tasks. The trainee can be said to be 90% proficient.

Of course, **M** (Mastery) varies from one job or occupation to another. It can even vary within a job or occupation. Thus, nurses in one locality may be called upon to perform tasks relating to diseases or accidents unique to their locality or job.

Checklists can show the manager, trainer, and — most important — the trainee what has been achieved and what still remains to be mastered. An effective checklist for comparing the trainee's current Inventory with the required Mastery would include (a) all the tasks required by the job, (b) the standards, and (c) a place for entries about the trainee's current performance. Entries might include estimates of the degree to which the trainee meets standards, or key words about what is necessary in order to improve, or just a signature certifying that the standard has been met.

Technological change. When technological progress changes the procedure for task performance, the formula becomes useful in still another way: **M** (Mastery) is equated with a precise description of how to perform each new procedural step.

I (Inventory) is equated with those procedural steps which are common to both the old and the new way of performing. (We may assume here that the population to be trained has been performing this task and, therefore, already possesses a high Inventory. Steps that are part of the

worker's existing Inventory need not be included in the training program.) **D** (Deficiency, or Training need) is, therefore, just the list of the new (changed) steps.

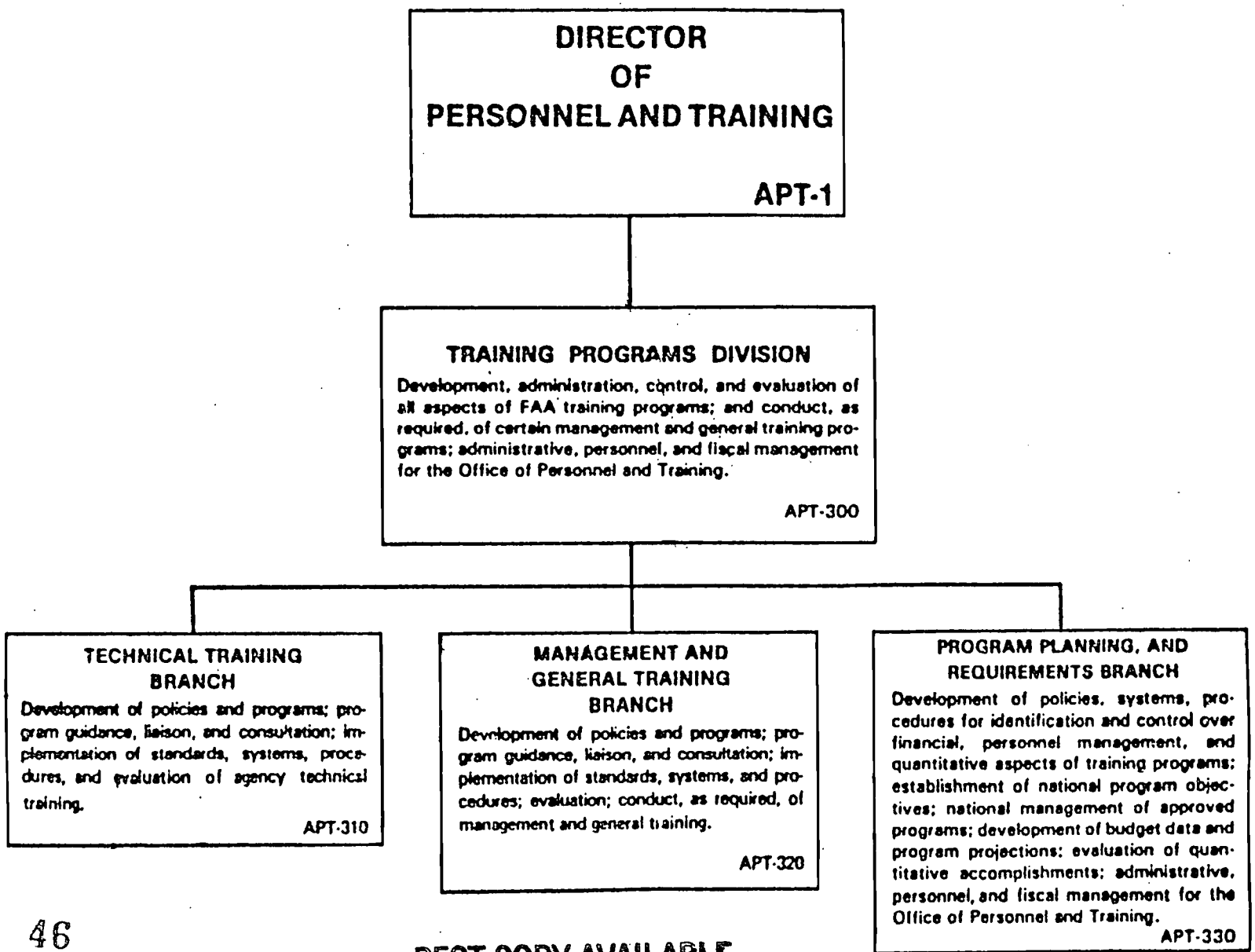
Commentary

The formula, **M - I = D**, indicates more than the training required for a worker, group of workers, or entire workforce; it also reinforces the concept that the role of training is to bring about changes in behavior. Before we can attempt to change behavior, we must know the required behavior, and the means to measure the change must be specified.

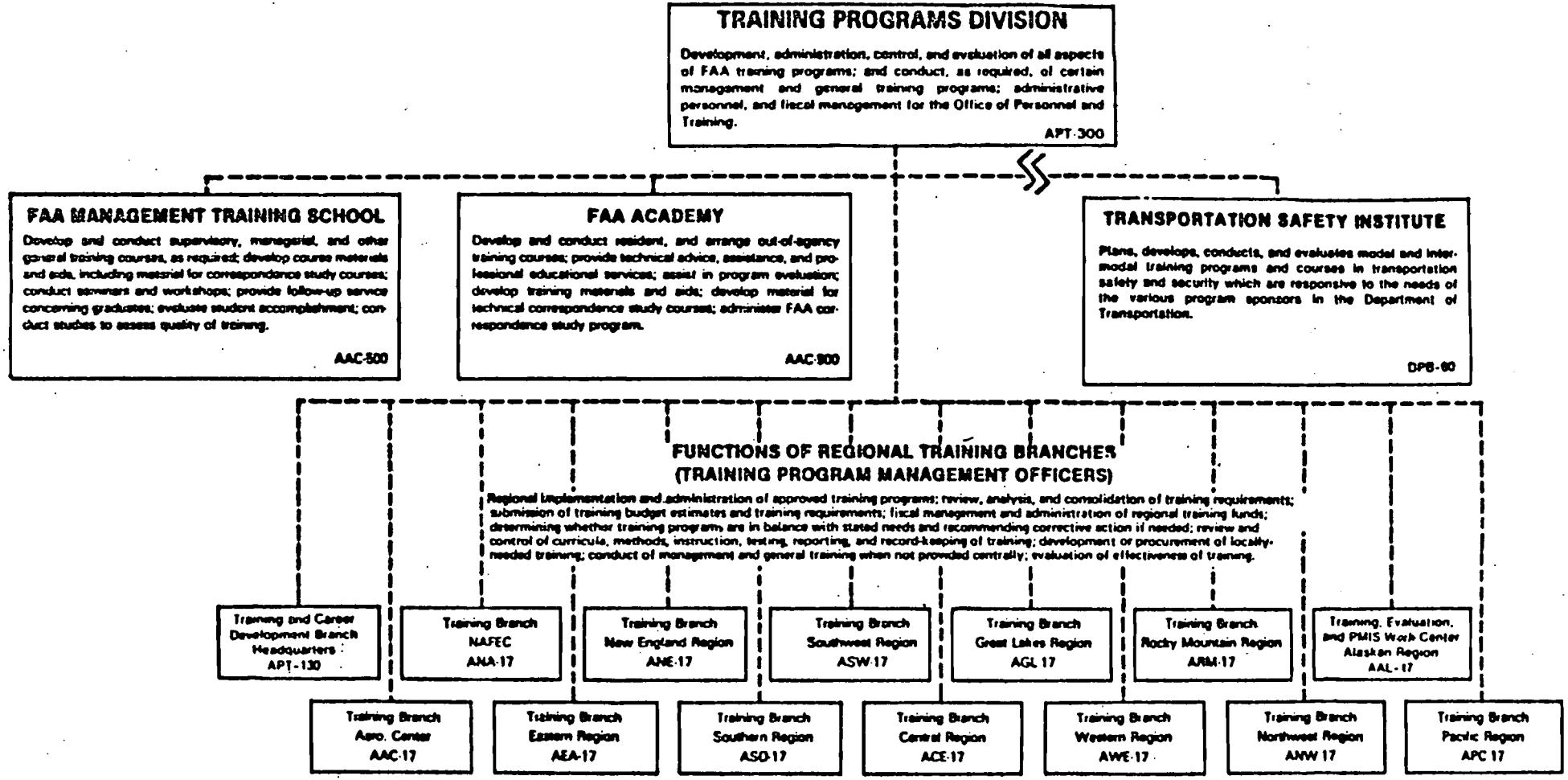
> The only valid result of training activity is a measurable increase or improvement in an individual's contribution to the goals of an organization.

Thus, the trained behavior must not only be observable and measurable, it must also be transferred to the job. Training is a means toward an end. The end is an improvement in the organization's ability to meet its goals. The basic purpose of training is to shape or reshape the behavioral pattern of an individual. The desired function of a trainer (or training system) is to provide and manage the experiences in which learning can take place.

FAA TRAINING PROGRAMS DIVISION ORGANIZATION AND FUNCTIONS



FAA TRAINING ORGANIZATION FUNCTIONAL RELATIONSHIPS

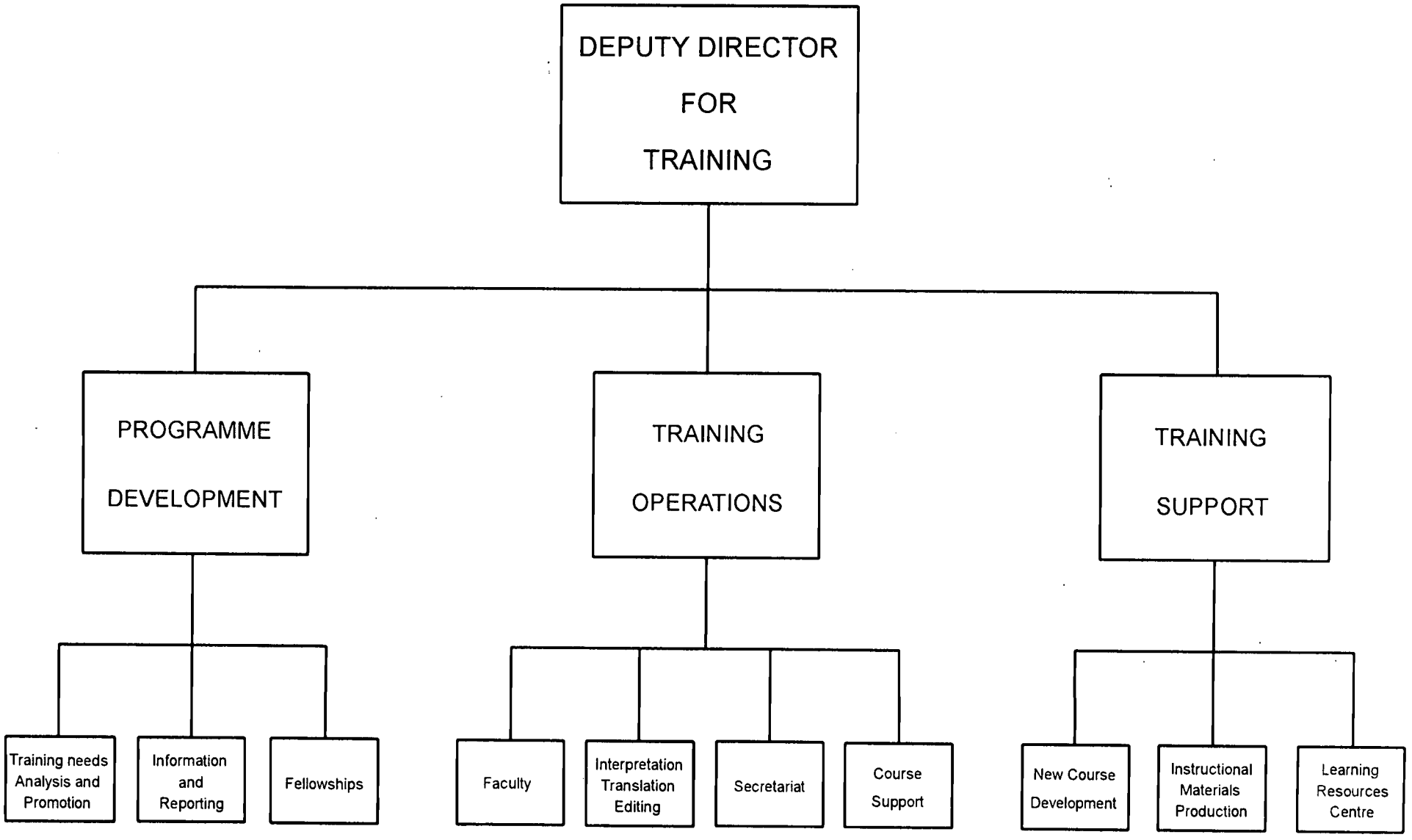


NOTE: The FAA Management Training School and FAA Academy are located in Lawton, and Oklahoma City, Oklahoma, and are under the supervision of the Director of the Aeronautical Center. The Headquarters Training and Career Development Branch is located in Washington in the Office of Personnel and Training, and is under the supervision of the Director of Personnel and Training. Regional and Center Training Branches are located in the Headquarters Offices of individual Regions and Centers, and are under the supervision of the directors of the Regions and Centers in which they are located

SPECIAL RELATIONSHIP The Transportation Safety Institute is located in Oklahoma City, Oklahoma. It is under the general control of the Administrator, Research and Special Programs Administration. The FAA Office of Budget administers its employment ceiling spaces (excluding the Institute Director and secretary). The Director of the Aeronautical Center provides, on a reimbursable basis, budgeting, accounting and payroll, personnel, logistics, and other support which the Institute requires. The Institute's services are available to all elements of the Department of Transportation. Its annual costs are prorated among user elements. FAA implements the reimbursement procedures.

ORGANISATION CHART

Training Department, International Centre for Advanced Technical and Vocational Training



Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 3

SELECTION AND DEVELOPMENT OF THE TRAINING STAFF

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. When defining training needs, designing program content, and developing validation procedures, a trainer is functioning as

   A. a learning specialist.
   B. a training manager.
   C. an internal training consultant.
   D. a senior instructor.

2. The roles of learning specialist, training manager, and consultant within a training function

   A. are independent, each striving for different overall objectives.
   B. require the same characteristics and competencies for their successful performance.
   C. are interdependent, working collectively to help correct human performance deficiencies.
   D. should not represent specialization. To be successful, all trainers must assume all three roles.

3. When an organization selects internal candidates to join the training staff, managers should

   A. select only those who are subject matter experts with long experience.
   B. invest the resources needed to allow the new trainers to develop essential job skills and knowledge.
   C. choose those who need no further training to perform their new duties.
   D. make sure first that no qualified people are available from outside the organization.

NOTES

4. The first step in filling a training position is normally

   A. publicizing the vacancy to generate candidates.
   B. informing employment agencies of the opening.
   C. contacting trade and professional organizations.
   D. specifying the job and candidate requirements.

5. In deciding what vehicle to use to generate outside candidates for training positions, the most important consideration(s) usually will be

   A. the position level and salary.
   B. the relative permanence of the position.
   C. cost and timing.
   D. whether administrative or learning specialist skills are needed.

6. When a candidate selected for a training position is deficient in knowledge, skills, or other selection criteria, the best thing for the training manager to do is

   A. invest in the training and development of the candidate.
   B. redefine the job specifications.
   C. change the selection criteria for future positions.
   D. reduce the job performance requirements.

7. Developing career paths for members of the training staff should

   A. have as little effect on organizational goals as possible.
   B. be based entirely on the future needs of the organization.
   C. combine the needs of the organization with the personal growth goals of employees.
   D. mainly be left up to the individual employees.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 4

CONTROLLING TRAINING COSTS

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. In order to justify training by its economic benefits,

   A. training should be restricted to direct production activities.
   B. capital expenditures should be charged to operating departments.
   C. no training costs should be charged to operating departments.
   D. training objectives should be measurable enough to assign financial value.

2. The financial benefits of training are typically easiest to measure in

   A. organizational development programs.
   B. production skills training programs.
   C. programs to train trainers.
   D. decentralized organizations.

3. A recommended procedure for achieving cost-effective training is to

   A. determine the absolute minimum training needs and design low-cost programs to meet these.
   B. always use the lowest-cost training method available.
   C. design and estimate costs for an optimum program and compare alternatives with this.
   D. concentrate on training costs since benefits cannot be measured in financial terms.

NOTES

4. The package presented by the training department to support its operating and capital budgets usually should include

   A. training needs, programs, costs, and benefits.
   B. information on scheduling and costs.
   C. no mention of objectives other than financial ones.
   D. substantial excess costs to allow for cutting.

5. What is the advantage of charging the costs of a training program back to the using department or organization?

   A. The training department gains control of some of the operating department's funds.
   B. It automatically establishes the financial benefits of the training program.
   C. It substantially reduces the total cost of training to the overall organization.
   D. It reduces the training department budget by transferring some costs to the users.

6. Why might a training manager choose a rental-deferred purchase plan to buy an expensive videotape machine?

   A. Rental-purchase plans are almost always less expensive than outright purchase.
   B. The plan would always place the purchase in the capital budget rather than in the operating budget.
   C. The plan might allow the purchase to be included in the operating budget rather than in a tight capital budget.
   D. Such purchases need not be charged to the costs of training.

NOTES

7. When identifying costs for use in training department financial planning and control, it is important to

   A. include only direct costs that result from training: supplies and materials, instructors' wages, etc.
   B. exclude all costs that may reasonably be charged to operating departments.
   C. include as few costs as possible to make the cost effectiveness of the training more apparent.
   D. identify all direct and indirect costs of training, even if the organization's accounting system charges them otherwise.

DETERMINING THE COST EFFECTIVENESS OF TRAINING

Learning Objectives

Upon successful completion of this module, you will be able to:

1. Determine when to measure and report the cost effectiveness of training
2. Calculate the costs of training
3. Describe four levels of measuring training effectiveness
4. Select the outcomes (benefits) to be measured and link training to those outcomes
5. Compute how much training returns relative to its cost (return on investment)
6. Justify training investments based on the cost-benefit ratio
7. Compute the value added by training, using the bottom-line evaluation method
8. Apply the payback period method to determine how long it will take for training to pay for itself
9. Describe the advantages and disadvantages of four different methods of determining cost effectiveness
10. Apply four methods to determine if a training program is cost effective

Rationale (purposes)

1. To discuss the need for justifying training expenditures with documented benefits
2. To provide details on (a) calculating training costs, (b) measuring the effectiveness of training, and (c) methods used in determining the cost effectiveness of training. These methods provide quantitative evidence that effective training is a worthwhile investment rather than a cost.

While this module focuses on the cost effectiveness of training by private sector organizations, the content is also applicable to training provided by public (government) employers.

Introduction

Due to intense competition in an era of rapid economic and technological change, employers are closely scrutinizing their spending on workforce training. Increasingly, training departments and human resource professionals are being asked to justify whether training is a worthwhile investment. Training managers would prefer to measure the effectiveness of their courses and programs with data from criterion-referenced tests and feedback questionnaires. However, higher management requires that training be further justified in terms that are important to them (financial).

Organization of the module. This module is organized in three parts. The first part points out why some training managers are reluctant to determine the cost effectiveness of training. It discusses the need to justify training expenditures with documented benefits. Part 1 also provides practical details and examples of how to calculate the direct, indirect, and full costs of training. A progress check is provided to facilitate your understanding of the content covered and to promote learning.

Part 2 describes four levels of measurement used to determine the effectiveness of training. In addition, the need for a cause-and-effect link between a specific organizational problem and a performance deficiency is addressed. This second part of the module also discusses the selection of outcomes (benefits) to be baselined before training and tracked after training in order to determine the payback. Like Part 1, there is a progress check to facilitate review of the content covered in order to promote learning.

Part 3 of the module presents four methods for determining the cost effectiveness of training courses and programs. The methods described are:

1. Return on investment (ROI)
2. Cost-benefit ratio
3. Bottom-line evaluation
4. Payback period

In addition to providing details and examples for each of these methods, their advantages and disadvantages are identified and listed in a table. Furthermore, a progress check is provided for each

method. These progress checks will help you determine how well you understand each method.

At the end of the module is a practical example to facilitate a skill check on your understanding and attainment of the learning objectives listed on page 1.

A note on terminology. In order to enhance understanding, definitions are provided below for important terms used frequently in this module.

- **Bottom-line evaluation.** This method shows the value added to each trainee's productivity on the job and the total value added to an organization from training.
- **Cost-benefit ratio.** The ratio of projected costs of training to its predicted benefits. It is a useful method for justifying training investments when the benefits attributable to training are difficult to quantify in monetary units.
- **Cost effectiveness.** The results attained against the costs of time, effort, money, and inconvenience. Cost effectiveness also suggests assigning quantitative values to performance improvements. The criteria for effectiveness are value, worth, and merit.
- **Payback period.** A method for initial consideration of a questionable training investment. It answers the question, "How long will it take the training to pay for itself?".
- **Return on investment (ROI).** The rate of what something (training) returns relative to its cost. It is a calculative approach to evaluating a result (outcome) against the amount of resources invested.

Part 1 — Training Costs

When to Measure Cost Effectiveness

Employers have traditionally supported training because (a) it shows the organization's concern for its employees, and (b) higher management "assumes" that the benefits exceed the costs. In any event, when higher management "believes" that training is operationally critical to the organization's competitive position, there may be little or no demand for cost-effectiveness information.

Therefore, despite the increasing admonishment found in training literature about the importance of demonstrating that training is a worthwhile investment, many training managers routinely avoid the use of economic justification. However, when a belief in the value, worth, and merit of training is not part of an underlying business philosophy, reporting the cost effectiveness of training can help the training manager establish credibility and may enhance the organization's willingness to invest additional resources.

The single greatest incentive for indicating the cost effectiveness of training is its use in **justifying training expenditures with documented benefits.** Uncertainty about continued support for the training function leads to the consideration of cost-effectiveness information as a defensive measure — a way of showing higher management that training is not a luxury. Consequently, a growing number of training managers have a desire to **show a return on training investments similar to that on other business investments.** Nevertheless, many lack the knowledge necessary to determine the costs and benefits of training courses and programs (Lombardo, 1989).

When asked to report on a training investment, training managers often hesitate to calculate the costs necessary to develop, deliver, and evaluate training, and are reluctant to document and report the benefits such as increased quality, productivity, sales, and so forth. Among the reasons cited for this reluctance are the

1. Lack of reliable cost figures
2. Difficulty in identifying, monitoring, and quantifying training benefits
3. Subjective nature of the assumptions to be made

4. Inability to isolate training's influence on performance improvements from other factors

5. Time and effort involved in calculating the costs and documenting the benefits of training

6. Potential for unfavorable returns on the investment

Notwithstanding these and other reasons, training managers who feel the need to justify training with evidence that the benefits exceed costs will welcome the opportunity to determine the cost effectiveness of training using the methods presented in this module. These methods can provide quantitative evidence that effective training is a worthwhile investment rather than a cost. Once in place, the methods become easier to use each time they are applied.

Calculating the Costs of Training

Costs are incurred in developing, conducting (delivering), and evaluating training. These **costs are categorized as direct and indirect.** The **full cost of training** is the sum of all direct and indirect costs.

Often, the training manager will not have access to many of the direct and indirect costs of training and must obtain figures or reliable estimates from the organization's payroll, budget, accounting, or comptroller's office. Usually, however, all costs can be accounted for.

Direct costs. Direct costs are expenses tied specifically to a product (training course or program) (Usry, Hammer, & Matz, 1988, p. 26). **Direct personnel costs** include the wages and benefits paid to or on behalf of employees involved in training (e.g., trainees and instructors) as well as fees paid for professional services purchased from external providers (contractors, consultants, etc.). Also included in direct costs are training development and instructional materials preparation (including production) costs, or the review of materials purchased from a vendor. Other direct costs are materials and supplies, equipment, facilities, and travel and per diem.

Organizations generally pay all employee/trainee costs. Training is typically conducted during working hours; consequently, trainees are not available to perform their regular jobs. As a result, every

hour which the trainee spends in training costs the organization the equivalent of an hour's wages and benefits for that employee (Deming, 1982).

In calculating personnel costs, **wages and benefits need to be taken as a total compensation package.** All employer-paid benefits, such as insurance, pensions, time paid but not worked (vacation, holidays, sick leave, etc.), and other contributions are included. In the United States, these employer-paid "fringe" benefits average 35% of direct salary costs (Carnevale & Schulz, 1990). A calculation of total daily compensation package costs is shown below.

EXAMPLE OF A TOTAL COMPENSATION PACKAGE

The hourly wage for a welder is $17. In addition, the fringe benefits package costs the employer an additional 30%. The employer's cost for a welder's total daily (8-hour) compensation package is

$17	x	8 hours	+	30 %	x	($17 x 8)	=	$176.80
Hourly wage		Hours per day		Fringe benefits percent		Daily wage		Total daily compensation package

[. . . Daily wage . . .]

Additionally, employees' time is worth more than their total compensation package because they are expected to contribute to the organization's profitability. Consequently, there can be a cost of disruption to productivity or a loss of productivity during training time. This cost becomes more apparent as the number of employees away from their job and the length of training increases. Nevertheless, the total compensation package is the generally accepted means for calculating trainee costs.

EXAMPLE OF TRAINEE COSTS

Ten welders are attending a two-day workshop on welding techniques. Each welder has a total daily compensation package, including fringe benefits, of $176.80. The trainee costs associated with their participation in this workshop are

10	x	2 days	x	$176.80	=	$3,536.00
Number of trainees		Length of training		Total daily compensation package		Trainee costs

Just as trainee costs are calculated as a direct personnel cost, so should instructor costs be. Yet, more may be involved than just the days the instructor commits to delivering training. In addition, preparation time should be added (Deming, 1982).

EXAMPLE OF INSTRUCTOR COSTS

An instructor requires 1 day of preparation time for a two-day workshop. The instructor's total daily compensation package is $200. The instructor costs associated with this workshop are

1	x	(2 days	+	1 day)	x	$200	=	$600
Number of instructors		Length of training		Length of preparation		Total daily compensation package		Instructor costs

If an organization contracts for **external training services**, the costs of developing and delivering the training as well as the cost of preparing/producing instructional materials may be lumped together with all other costs the contractor or consultant charges. However, when the training is developed internally, **training development and instructional materials preparation costs** need to be calculated.

Calculation of training development and instructional materials preparation costs can be made based on the time expended by the

developer(s) and instructional materials production personnel involved, and on the costs of materials and supplies required in preparing all types of instructional materials, including printed materials, audiovisual media, manipulative aids, etc. A calculation of development and materials preparation costs could look like the following example (Deming, 1982).

EXAMPLE OF TRAINING DEVELOPMENT AND INSTRUCTIONAL MATERIALS PREPARATION COSTS

A developer spends 4 days developing a training workshop and an additional 7 days preparing printed instructional materials. No production personnel are involved. The developer's total daily compensation package is $225. The cost of materials and supplies required in preparing the instructional materials is $250. The training development and instructional materials preparation costs associated with this workshop are

1	x	(4 days	+	7 days)	x	$225	+	$250	=	$2,725
Number of developers		Days for training development		Days for materials preparation		Total daily compensation package		Cost of materials and supplies		Development and preparation costs

Training development and instructional materials preparation costs can be treated differently than trainee and instructor costs insofar as the training will be repeated. For example, if the cost of developing the training and preparing instructional materials was $2,725 and the workshop was conducted 10 times, then the development and preparation cost assigned to any one workshop would be the total cost ($2,725) divided by the number of workshops (10), or $272.50 per workshop (Deming, 1982).

Another way to treat training development and instructional materials preparation costs is to amortize them over the number of trainees. For example, if the development and preparation cost was

$2,725 and a total of 150 welders were trained in the 10 workshops, then the cost per trainee would be the total cost ($2,725) divided by the number of trainees (150), or about $18.17 per trainee. These simple calculations show that (a) the more times the training is delivered, and (b) the more welders trained, the more economical the investment in training development and instructional materials preparation will be.

Training managers may purchase "off-the-shelf" instructional materials marketed by a vendor. The purchase price of instructional materials such as books, modules, video tapes, etc., as well as consumable supplies, like pencils, paper, binders, and chalk, can be grouped under the heading, **instructional materials costs** (Deming, 1982).

Some instructional materials costs are the result of multiplying a per-trainee cost by the number of trainees. For example, if 10 trainees each receive a purchased $30 book, the cumulative total cost is $30 multiplied by 10 trainees, or $300.

EXAMPLE OF INSTRUCTIONAL MATERIALS COSTS

The instructional materials for a welding workshop include books purchased from a vendor, costing a total of $300, and consumable supplies which cost $75. The instructional materials costs associated with this workshop are

$300	+	$75	=	$375
Purchased instructional materials		Consumable supplies		Instructional materials costs

Training involves **equipment costs** when machines are essential to effective instruction and learning. Under certain conditions, equipment must be rented or purchased and then maintained. In other instances, training can be scheduled to use equipment available in the organization. For example, welder training requires the use of a gas tungsten arc pipe welding machine. The machine's usage for training may, for all practical purposes, be cost-free if the training can be

scheduled when the machine is idle. More than likely, however, training workshops would be conducted during normal working hours and the existing pipe welding machine could not be diverted from production for training purposes. Consequently, a duplicate machine would have to be rented or purchased, and maintained.

EXAMPLE OF RENTED EQUIPMENT COSTS

The cost of renting a pipe welding machine for a two-day workshop is $150 per day. In addition, maintenance costs for the machine are $10 per day. The equipment costs associated with this workshop are

2 days	x	($150	+	$10)	=	$320
Length of training		Equipment rental per day		Maintenance cost per day		Rental and maintenance costs of equipment

When equipment is purchased specifically for training, its purchase price can be amortized (written off) over the item's useful life, with yearly maintenance costs added, to find the annual cost. The annual cost is then distributed evenly to all training courses and programs in which the item is used. An example of how to calculate the annual cost and cost per workshop for an item of purchased equipment is provided on the following page.

EXAMPLE OF PURCHASED EQUIPMENT COSTS

A pipe welding machine was purchased exclusively for training. It cost $24,000 and has an estimated useful life of 5 years. The machine has a yearly maintenance cost of $1,800, and it will be used for 10 workshops per year. The annual equipment cost and cost to each workshop for this machine can be calculated as follows.

($24,000	÷	5 years)	+	$1,800	=	$6,600
Purchase price of equipment		Useful life of equipment		Maintenance cost per year		Annual equipment cost

$6,600	÷	10	=	$660
Annual equipment cost		Number of workshops		Equipment cost per workshop

If a workshop uses several pieces of rented or purchased equipment, their costs are added together (Carnevale & Schulz, 1990).

Facilities costs are incurred when a training facility is built, shared, or rented. In cases where a building or special structure is built for training use, the cost can be amortized over its functional life, with yearly maintenance costs added (as in the purchase of equipment).

Whenever training is conducted within a facility that is used for other organizational functions as well, the appropriate fraction of that facility's cost ought to be billed to training (Deming, 1982).

EXAMPLE OF FACILITIES COSTS (sharing a facility)

Organization facilities which are used 10% of the time for training have a yearly cost, including maintenance and building administration, of $18,000. The annual facilities costs associated with the training use of these facilities are

$18,000	x	10 %	=	$1,800
Yearly cost of facilities, including maintenance and building administration		Percent of time used for training		Annual facilities costs for training

When organization facilities are used only occasionally for training, a daily rate method may be preferable over the percent of use method shown above. To calculate the daily facilities rate, the total annual facilities cost (for all functions) is divided by the number of working days in the year. If the organization in the above example operates 5 days per week, 52 weeks per year (260 days per year), then their daily facilities rate would be $18,000 divided by 260 days, or about $69.23. The daily rate is then multiplied by the number of days the facility is used for training. For example, the facilities cost for a 2-day workshop would be $69.23 multiplied by 2 days, or $138.46. The percent of use method may then be applied to the result, if appropriate.

In those instances when the **rent** for a shop, classroom, seminar room, etc. is not a flat fee, total facilities costs for a given workshop are computed by multiplying the daily rental rate by the number of rental days. For example, the total facilities costs for a 2-day welding workshop held in a vocational training center that charges $200 per day for its welding shop would be $200 multiplied by 2 days, or $400.

For on-site training, **travel and per diem costs** are likely to be of little consequence. But for training away from the workplace, they are serious cost factors.

EXAMPLE OF TRAVEL AND PER DIEM COSTS

Ten welders traveled to another city for a 2-day workshop. Their employer is paying the $300 airfare and $70 daily per diem to cover meals, lodging, and other living expenses for each trainee. The employer's costs for travel and per diem for the trainees are

(10	x	2 days	x	$70)	+	(10	x	$300)	=	$4,400
Number of trainees		Length of training		Daily per diem rate		Number of trainees		Round-trip air fare		Travel and per diem costs

Indirect costs. Indirect costs are expenses which cannot be traced back to a specific training course or program, but which are necessary for an organization to function. Although indirect costs for training are less visible than direct costs, they are substantial.

Examples of indirect costs include interest on organizational debt, building repairs, utilities, organizational supplies and equipment, administrative and staff support salaries, and expenses for legal, payroll, accounting, and other personnel. Organizations often subdivide such costs into **overhead** and **general and administrative (G & A)** expenses (Carnevale & Schulz, 1990). Overhead and G & A expenses are generally obtained from the organization's accounting office because they are arrived at through allocation, sometimes on a judgmental basis.

Full cost of training. The final calculation to obtain the full cost of a training course or program is a simple addition problem. **First, direct costs** tied to a course or program **are summed**, including

1. Total compensation packages for employees involved in training (e.g., trainees and instructors)
2. Fees for external training services (contractors, consultants, etc.)
3. Training development and instructional materials preparation costs

4. Costs of instructional materials and consumable supplies purchased from a vendor
5. Equipment costs
6. Facilities costs
7. Travel and per diem costs

Second, indirect costs are summed, e.g., overhead and G & A costs. Finally, the totals from the direct and indirect costs are summed to obtain a grand total, the full cost of training.

EXAMPLE OF A FULL COST OF TRAINING CALCULATION

Total direct costs for a 2-day workshop are $10,000. Total indirect costs consist of allocated overhead of $1,560 and allocated G & A expenses of $375. The full cost of training is

$10,000	+	($1,560 + $375)	=	$11,935
Total direct costs		Total indirect costs		Full cost of training

Conclusion. While calculating the full cost of training is a first and critical step in determining cost effectiveness, monitoring costs is also important to planning and controlling the training budget. In addition, by analyzing costs, training managers are better able to evaluate the proportion of the organization's investment in specific training populations (supervisors; production, maintenance, or office workers; etc.), a particular program, course, or topic, and so forth.

This part of the module shows that a training manager can calculate the costs of training, albeit with the help of those who have access to fiscal data. More challenging is the art of collecting evidence of favorable training outcomes, but it too can be done, as the next part of the module shows.

Progress Check -- Part 1 – Training Costs

Directions. Read each of the following items carefully and write in your answer. If you have difficulty with any of the 13 items, go back and review the relevant content before continuing. Use a calculator or another sheet of paper for your calculations. Check your answers against those provided in the Progress Check Feedback at the end of this module.

1. Identify the greatest incentive for indicating the cost effectiveness of training.

   _____

2. Name two categories of training costs.
   (1) _____
   (2) _____

3. Calculate the total daily (8-hour) compensation package for an employee whose hourly wage is $16, and whose fringe benefits package costs his employer an additional 29%.
   Total daily compensation package = _____

4. Calculate the training costs for 12 trainees, with individual total compensation packages of $195 per day, who attend a 5-day training program.
   Total trainee costs = _____

5. Calculate the instructor costs for a 5-day workshop with one instructor who requires 2 additional days for preparation. The instructor's direct salary is $180 per day, with a 30% fringe benefits package.
   Total instructor costs = _____

6. Calculate the training development and instructional materials preparation costs for two developers, with a total daily compensation package cost to the organization of $220 each, who worked 5 days on developing training and 8 days on preparing instructional materials. The cost of supplies used in preparing the instructional materials was $210.
   Total development and preparation costs = _____

Progress Check (continued)

7. The cost of developing training and preparing printed instructional materials for a 5-day seminar was $6,300.
   A. What will be the cost per seminar if it is offered once each month for one year?
      Cost per seminar = _____
   B. If the seminar is offered only twice, to a total of 30 trainees (15 in each session), what will be the cost per trainee?
      Cost per trainee = _____
8. The employer purchased books and modules for each of 12 trainees, costing a total of $180 per trainee. Paper and pencils, which cost $45 total, were also required. Calculate the total cost of these instructional materials.
   Total instructional materials costs = _____
9. Welding Associates rented equipment for a 4-day training program (workshop) they are conducting. The rental cost for the equipment is $300 per day. Maintenance costs associated with the equipment are $20 per day. What will be the equipment costs for this training program?
   Equipment costs = _____
10. Welding Associates is considering purchasing the arc welding machine needed for training. The machine's purchase price is $22,500 and its estimated useful life is 5 years. In addition, yearly maintenance costs for the purchased machine are expected to be $2,100.
    A. What will be the total annual cost of the machine?
       Total annual equipment cost = _____
    B. If Welding Associates uses the machine in a training program offered 12 times per year, what will be the equipment cost for each program?
       Equipment cost per training program = _____

Progress Check (continued)

11. Welding Associates estimated their total facilities costs, including maintenance, for the current year to be $40,000.
    A. If the facilities are used 15% of the time for training, what portion of the facilities costs should be allocated to the training budget?
    Facilities costs (for training) = _____
    B. If the facilities are used for training 5 days per week, 48 weeks per year (240 days per year), what is the daily facilities rate for the use of these facilities?
    Daily facilities rate = _____
12. Six welders will travel from their home to another city to attend a 3-day workshop where they will learn to use specialized equipment. Welding Associates agreed to pay each employee's $400 airfare plus $75 per day for other expenses. Calculate the travel and per diem costs incurred by Welding Associates for this 3-day workshop.
    Travel and per diem costs = _____
13. Welding Associates found their total direct costs for a training program to be $17,000. Indirect costs, consisting of allocated overhead and G & A expenses, totalled $2,000. What was Welding Associates' full cost of training?
    Full cost of training = _____

Part 2 — Training Effectiveness

Measuring the Effectiveness of Training

Donald Kirkpatrick organized the measurement of training effectiveness (value, worth, and merit) into four levels. These levels are listed below, from the easiest to measure (level 1) to the most difficult (level 4). In general, the more levels used to measure a training course or program, the more complete is the evidence of its effectiveness.

- Level 1 -- Measurement of trainees' reactions to the training (feedback)
- Level 2 -- Measurement of knowledge and skills acquired
- Level 3 -- Measurement of trainees' use of their new knowledge and skills on the job
- Level 4 -- Measurement of the organization's return on the training investment

Level 1 information is gathered most often with questionnaires handed out at the end of a course or program or sent to trainees a short time later. At level 2, criterion-referenced tests are used to measure the knowledge and skills acquired. Level 3 ascertains if trainees are applying the newly-acquired knowledge and skills back on the job.

Level 4 determines what benefits (increased quality, productivity, sales, etc.) the new knowledge and skills have had on the organization's performance, and their worth in monetary value. At level 4, training managers are asking about the organization's payback (return) on its training investment (Gordon, 1991).

In most cases, it is possible and feasible to link training outcomes to organizational improvements. Doing so does not require absolute isolation of training's benefits from the possible contributions of other variables. Rather, it requires evidence that demonstrates training's valuable role (Carnevale & Schulz, 1990). Consequently, arguments about whether a training manager can absolutely separate training's influence on organizational improvements and isolate the impact are not pertinent.

Indisputable proof is difficult to come by, even when a carefully designed study using experimental and control groups is conducted. However, evidence can be collected to show that training was at least a major contributor to a particular operational savings or increase in revenue. Kirkpatrick adds that evidence is all anybody really wants, anyhow. " . . . Management isn't going to ask, 'Can you prove it?' They'll ask for evidence. And evidence is not all that hard to come by" (Gordon, 1991, p. 23).

The key to collecting evidence of training outcomes is to establish a "causal link" between a specific organizational problem, preferably one to which monetary value can be assigned, and a performance deficiency. This is best done up front, before a training course or program is even developed.

Rejected workpieces in a manufacturing environment provide one example of an organizational problem. How much does the current reject rate cost the organization? Are rejected workpieces the result of a workforce skill deficiency, as opposed to inferior materials or equipment malfunctions? If so, there is a causal link.

After establishing the link between rejected workpieces and a skill deficiency, current reject costs are determined. The accounting office can provide figures for the cost of the materials used in manufacturing the workpiece. When this cost is added to personnel, equipment, and other appropriate manufacturing costs, the total cost of the rejected workpieces can be calculated. If the number of rejected workpieces declines after the workers are trained, the operational saving provides convincing, quantitative evidence that the training provided a return on the investment.

Benefits. By selecting the outcomes (benefits) to be measured and linking training to those outcomes while holding, to the extent possible, other factors constant, level 4 measurement becomes a relatively simple matter. All training managers have to do is track the outcomes for which baseline measures were gathered before the training, and they will know what the payoff is. Among the most important outcomes (benefits) to be documented are (a) increased quality, productivity, sales, service, safety, and workforce flexibility; (b) reduced operational costs, medical insurance and

workers' compensation claims; and (c) lower absenteeism. Other outcomes, which are more difficult to document and quantify, include the increased stability of the workforce; improved morale, harmony, job satisfaction, and attitude; a lower requirement for supervision; the formation of selection pools for promotion; supervisory skill development; and improved customer relations.

Conclusion. Once training managers learn how to calculate the cost and measure the effectiveness of training, they can begin to describe the benefits from a financial perspective. **Is the training effort producing benefits that are greater than the costs involved? This, ultimately, is what higher management wants to know.**

A variety of methods are available for determining the cost effectiveness of training. Some are complex and cumbersome to use, while others are more suitable for justifying an investment in a new machine for a manufacturing plant, a new way of doing a job, and so forth. The four methods for justifying a training investment presented in Part 3 of this module were selected because they are (a) practical, (b) relatively easy to use, and (c) generally familiar to higher management. It must be pointed out, however, that all four methods have disadvantages. Consequently, none of them should be regarded as a precision tool. Nevertheless, these methods are based on accepted principles and present organized state-of-the-art procedures for determining the cost effectiveness of training courses and programs.

Progress Check -- Part 2 — Training Effectiveness

Directions. Read each of the following items carefully and write in your answer. If you have difficulty with any of the items, go back and review the relevant content before continuing. Check your answers against those provided in the Progress Check Feedback at the end of this module.

1. Kirkpatrick organized the measurement of training effectiveness into four levels. Briefly describe each level.

   (1) _____

   _____

   (2) _____

   _____

   (3) _____

   _____

   (4) _____

   _____

2. Is it possible and/or feasible to link training outcomes to organizational improvements without the absolute isolation of training's benefits from the possible contributions of other variables?

   _____ Yes, it is both possible and feasible.

   _____ It is possible, but not feasible.

   _____ It is feasible, but not possible.

   _____ No, it is neither possible nor feasible.

3. What is the key to collecting evidence of training outcomes?

   _____

   _____

   _____

4. Identify the result of selecting the outcomes to be measured and linking training to those outcomes.

   _____

Part 3 — Methods Used to Determine the Cost Effectiveness of Training

Return on Investment (ROI)

ROI is the rate at which training returns what was invested (its cost). It is an indicator of a particular course or program's value, worth, and merit. Of the four methods for determining the cost effectiveness of training presented in this module, the ROI method is probably the most appealing to higher management, since managers are accustomed to thinking in terms of return on investment. However, the ROI method is appropriate only when it is possible to quantify outcomes (benefits) in monetary units (Kearsley, 1982, p. 92).

The following steps must be taken before a ROI report can be prepared:

- Step 1 -- Calculate the direct and indirect costs associated with the training course or program. These costs are then summed to obtain the full cost of training. (See Part 1 of this module for details.)
- Step 2 -- Gather baseline measures for those outcomes to be analyzed in step 3, **before training occurs.** This is the only way to know what changes took place.
- Step 3 -- Analyze the effects of training on the outcomes (benefits), such as increased quality, productivity, sales, service, safety, and employee versatility; reduced operational costs, medical insurance and workers' compensation claims; and lower absenteeism; or any other measurable benefit. In order to apply the ROI method, these benefits must be quantified in monetary units.

Once the full cost of training is calculated, and the outcomes have been analyzed, the ROI can be computed. **Training managers should analyze only those outcomes that are accomplished, at least in part, by training.** To create a credible ROI report, training managers must present evidence that is important and believable to higher management.

Two common approaches for expressing the ROI for a training course or program are to consider **operational savings** and **increases in revenue.** For example, the training manager can assess whether an operational cost, such as accidents due to human error, is

significantly lower after employees master safety procedures. In this case, the ROI is the rate at which training costs are recovered by a reduction in the number or severity of accidents.

Reductions in accidents positively affect revenue, through lowered health care costs, insurance premiums, and disability claims, and increase productivity through fewer absentee days. Higher management will be impressed with evidence of training's valuable role in achieving both operational savings and increases in revenue. Consequently, they will look more favorably on training as a value-added service instead of just a "nice to have," but dispensable, cost of operation.

To calculate a ROI, total operational savings and increases in revenue resulting from the training are divided by the full cost of training. ROI expressed as a formula is

$$\frac{\text{Operational savings + increases in revenue}}{\text{Full cost of training}} = \text{ROI}$$

Obviously, any training for which the ROI is greater than one (1.0), the break-even point, is worthwhile, because the benefit derived from the training is greater than its cost (we are "getting out" more than we "put in"). However, a ROI of less than 1.0 means that the training investment was greater than the return.

EXAMPLE OF ROI

A safety training program resulted in operational savings through a $35,000 reduction in accident costs/payments the first year. There was also an annual increase in revenue of $5,000 as a result of fewer absentee days. The full cost of training was $25,000. The program's ROI was

$$\frac{\$35,000 + \$5,000}{\$25,000} = 1.60 \text{ (or 160\%)}$$

This training program was a worthwhile investment. It returned 160% — the original $25,000 training cost plus an additional $15,000 (60%) in the first year. It will no doubt continue to provide a benefit, even without an additional training investment.

Advantages of the ROI method.

- Provides an indicator of the training's value, worth, and merit.
- Easily understood by higher management.
- Management will be impressed with a favorable ROI report and will view training as a value-added service.

Disadvantages of the ROI method.

- It is appropriate only when it is possible to quantify outcomes (benefits) in monetary units.
- Baseline measures must be gathered for outcomes before training occurs.
- Evidence of operational savings and increases in revenue is available only after the training is conducted. Therefore, its application in predicting a favorable return is limited.

Note. The advantages and disadvantages of the ROI method can be easily compared with those of the cost-benefit ratio, bottom-line evaluation, and payback period methods by referring to Table 1 on pages 40 and 41.

Progress Check -- Return on Investment (ROI)

Directions. Read each of the following items carefully and write in your answer. If you have difficulty with any of the items, go back and review the relevant content before continuing. Use a calculator or another sheet of paper for your calculations. Check your answers against those provided in the Progress Check Feedback at the end of this module.

1. A technical training program is saving your organization $20,000 per year and has increased revenue by $26,000 per year. The full cost of training was $40,000.

   A. What was the ROI of this training investment?

   ROI = _____

   B. Was this a worthwhile investment?

   Yes _____ No _____

   Why or why not?

   _____

   _____

   _____

   _____

   _____

   _____

   C. Would your opinion change if you could have invested the $40,000 in a savings fund at a guaranteed 17% annual return instead?

   Yes _____ No _____

   Why or why not?

   _____

   _____

   _____

   _____

Cost-Benefit Ratio

The cost-benefit analysis (ratio) method is used to determine the ratio of the **projected full cost** of a given course or program to its **predicted benefits.** This method is especially suitable for justifying training investments when the benefits attributable to training are difficult to quantify in monetary units.

The cost-benefit ratio formula is presented below:

$$\frac{\text{Projected full cost of training}}{\text{Predicted training benefits}} = \text{Cost-benefit ratio}$$

If the cost-benefit ratio is less than one (1.0), the training would be worthwhile, because its predicted benefits exceed its projected costs. The smaller the ratio, the stronger the justification for training. If the ratio is greater than 1.0, costs exceed benefits and the training may not be justifiable, except when mandated by law (compliance training).

The benefits of many courses and programs, such as supervisory skill development, are not easy to show or quantify. Benefits such as reduced workforce turnover, as well as improved morale, harmony, job satisfaction, and attitude are hard to quantify in monetary units, yet they should not be overlooked. No matter how difficult it may seem to put a value on employee turnover, for example, an effort must be made to quantify all benefits for this method to work.

Technically precise and entirely objective monetary information simply is not available on the benefits for some "soft-skills" training. However, the following practical procedure provides appropriate figures for benefits that are difficult to quantify.

Before training is developed and delivered, line managers are asked to estimate the annual operational savings they expect to result for their department. These managers also rate their level of confidence, on a 0 to 100% scale, that the training will be responsible for the savings. **Estimated operational savings are then multiplied by the "confidence" percentage to yield a prediction of total cost savings** (benefits) from training.

EXAMPLE OF COST-BENEFIT RATIO

A company is considering supervisory skills training for its foremen. The enhancement of supervisory skills is expected to reduce workforce turnover. Line managers have been asked to estimate the annual operational savings they expect as a result of the reduced turnover and to rate their level of confidence that training will be responsible for the savings. They estimated the operational savings (from the reduced turnover) at $100,000, with a confidence rating of 50%. The full cost of the potential training program is projected to be $10,000. The expected cost-benefit ratio of this training investment is

$$\frac{\$10,000}{\$100,000 \times 50\ \%} = 0.20$$

Because the cost-benefit ratio is less than 1.0, the training program is considered worthwhile.

Although this example is brief, it illustrates the principles and procedures of the cost-benefit ratio method in providing evidence that this soft-skills course is worthwhile.

Advantages of the cost-benefit ratio method.

- Especially suitable in training situations where the benefits are difficult to quantify in monetary units.
- Practical procedure that provides appropriate figures for benefits that are difficult to quantify.
- Shows whether training is worthwhile, before the course or program is developed and delivered.

Disadvantage of the cost-benefit ratio method.

- The procedure used to predict training benefits in monetary units is subjective.

Note. The advantages and disadvantages of the cost-benefit ratio method can be easily compared with those of the ROI, bottom-line evaluation, and payback period methods by referring to Table 1 on pages 40 and 41.

Progress Check -- Cost-Benefit Ratio

Directions. Read each of the following items carefully and write in your answer. If you have difficulty with either item, go back and review the relevant content before continuing. Use a calculator or another sheet of paper for your calculations. Check your answers against those provided in the Progress Check Feedback at the end of this module.

1. Mr. Whiz predicted that a computer technician training program for two of his employees would result in a total cost savings of $9,000 per year in computer repairs and down-time. He rates his level of confidence, that the training will be responsible for this savings, at 80%. The projected full cost of the technician training is $2,000 per person.

   A. Calculate the cost-benefit ratio for this potential training investment.

   Cost-benefit ratio =

   _____

   B. Do you think this training would be a worthwhile investment for Mr. Whiz's company?

   Yes _____ No _____

   Why or why not?

   _____

   _____

Bottom-line Evaluation

The bottom-line evaluation method presented here determines the value added by training to each trainee's productivity, and the total value added to the organization by the training course or program. The total value added to the organization is compared to the full cost of training to determine if the training was a worthwhile investment.

This method incorporates two of Kirkpatrick's four levels of measuring the effectiveness of training. (See Part 2 of this module for a description of all four levels.) It collects both level 4 (measurement of the organization's return on the training investment) and level 1 (measurement of trainees' reactions to the training) data at the same time. A questionnaire is developed to collect level 4 and level 1 data from trainees after they have applied, back on the job, what they learned in the training.

Trainees indicate their individual opinions of (a) percent of job-time spent performing the task trained (T), (b) pre-training productivity percentages (P1), and (c) post-training productivity percentages (P2). Along with questionnaire responses, other information necessary to perform a bottom-line evaluation includes a list of the tasks performed by the trainees and their total annual compensation package (S). The bottom-line evaluation method expressed as a formula is

$$\frac{(S \times T)}{\text{Total annual compensation package}} \times \frac{(P2 - P1)}{\text{Percentage change in productivity as a result of training}} = \text{Value added by training}$$

$$\left[\text{Annual per-task compensation}\right]$$

The bottom-line evaluation method promotes the use of job analysis information in that tasks performed by the employee/trainee must be identified, along with percent of job-time spent on those tasks, in order to calculate per-task compensation (S x T, in the above formula).

Criticisms of the bottom-line evaluation method include: (a) trainee questionnaire responses are subjective perceptions; and (b) potential for biased questionnaire input. However, the calculated value added can be corrected for bias using statistical methods.

Despite the criticisms, however, this method does promote employee participation in decision making. Employees often feel that they are the best judges of their individual performance improvement following training. The method also appeals to management because it links employees' job task performance with their productivity, by comparing the full cost of the training with the value the organization receives from it.

EXAMPLE OF BOTTOM-LINE EVALUATION

A training program in erecting and dismantling scaffolding was provided to three employees. After the employees returned to their job and applied the knowledge and skill acquired, they were asked to complete a questionnaire. Each employee supplied information on their perceptions of (a) percent of job-time spent performing the task trained, and (b) pre- and post-training productivity percentages. Each employee's total compensation package, percent of job-time spent performing the task trained, and pre- and post-training productivity percentages are presented in the table below, along with their individual and total value added to the organization as a result of the training.

Employee/ trainee	Total annual compensation package ($) [S]	Job-time (%) spent performing the task trained [T]	Component pay ($) [D = SxT]	Pre-training productivity (%) [P1]	Post-training productivity (%) [P2]	Productivity gain (%) [G = P2-P1]	Value added ($) [GxD]
1	$29,000	25%	$7,250	30%	80%	50%	$3,625
2	$30,000	20%	$6,000	40%	90%	50%	$3,000
3	$34,000	15%	$5,100	50%	80%	30%	$1,530
Total value added							$8,155

The total value added to the organization by the training program was $8,155. If the full cost of training was less than $8,155, then the training program was a worthwhile investment.

Advantages of the bottom-line evaluation method.

- Promotes the use of job analysis information.
- Promotes employee participation in decision-making.
- Appeals to management, because it links job task performance with training and productivity.
- Allows the total value added to the organization to be compared to the full cost of training to determine if the training was a worthwhile investment.

Disadvantages of the bottom-line evaluation method.

- Questionnaire responses are subjective perceptions by trainees.
- Questionnaire data might be biased.

Note. The advantages and disadvantages of the bottom-line evaluation method can be easily compared with those of the ROI, cost-benefit ratio, and payback period methods by consulting Table 1 on pages 40 and 41.

Progress Check -- Bottom-Line Evaluation

Directions. Read each of the following items carefully and write in your answer. If you have difficulty with any of the items, go back and review the relevant content before continuing. Use a calculator or another sheet of paper for your calculations. Check your answers against those provided in the Progress Check Feedback at the end of this module.

1. A training manager has identified all the tasks performed by each employee within the organization, along with their total compensation packages. The training department is providing a welding training program for the welding department's four employees, at a total cost of $4,400. Each welder has a total annual compensation package of $20,000. The training manager would like to present training's value to higher management. The training is delivered and questionnaire results, in table form, are as follows.

Employee/ trainee	Total annual compensation package ($) [S]	Job-time (%) spent performing the task trained [T]	Component pay ($) [D = SxT]	Pre-training productivity (%) [P1]	Post-training productivity (%) [P2]	Productivity gain (%) [G = P2-P1]	Value added ($) [GxD]
1		10%		20%	60%		
2		40%		20%	50%		
3		30%		30%	50%		
4		20%		40%	60%		
Total value added							

A. Complete the table. For each employee, you will need to calculate component pay, productivity gain, and value added. You will also need to calculate the training program's total value added to the organization.

Progress Check (continued)

B. Was the training program worthwhile?

Yes _____ No _____

Why or why not?

_____

_____

Payback Period

The fourth method of determining the cost effectiveness of a training investment is called the payback period. This **forecasting** method answers the question, "How long will it take the training to pay for itself?" **This method should**, however, **be used only as an initial consideration of a questionable training investment.**

The payback period method does not consider the cost or time value of the money spent and tied up before, during, and after the training until the break-even point is reached. Nevertheless, it does consider some time factors in calculating the payback.

If the payback period is very short, less than one year, for example, then the training course or program is definitely promising and another method, such as ROI, cost-benefit ratio, or bottom-line evaluation, should be used for a closer examination of the training's value, worth, and merit to the organization. If the payback period is very long, 10 years, for example, then there may be no need to consider the training further, depending on the organization's philosophy about the maximum length of time allowed for investment resources to be returned.

The payback period method is represented by the following formula:

$$\frac{\text{Full cost of training}}{\text{Annual operational savings + increase in revenue}} = \text{Payback period (in years)}$$

EXAMPLE OF PAYBACK PERIOD

A company is considering an all-inclusive clerical training program. The full cost of this training is $10,000. Company managers estimate that improved clerical effectiveness resulting from the training will save $1,200 per month ($14,400 per year). Should the company give further consideration to this training?

$$\frac{\$10,000}{\$14,400} = 0.69 \text{ years (about 8.3 months or 36 weeks)}$$

Yes, the company should consider the training further. Its payback period is very short, less than one year. Further calculation shows that, if the company's savings estimates are accurate, this investment (a) has a worthwhile cost-benefit ratio of only 0.69, and (b) will return 144% in the first year (the training year).

Advantages of the payback period method.

- Provides a quick initial look at a potential training investment.
- Answers the question, "How long will it take the training to pay for itself?"

Disadvantages of the payback period method.

- Should be used only as a screening tool. If the payback period is short, then another method (ROI, cost-benefit ratio, or bottom-line evaluation) must be used to examine the training's value, worth, and merit to the organization.
- Does not consider the cost or time value of the money spent and tied up before, during, and after the training until the break-even point is reached.

Note. The advantages and disadvantages of the payback period method can be easily compared with those of the ROI, cost-benefit ratio, and bottom-line evaluation methods by consulting Table 1 on the following pages.

Table 1

Advantages and Disadvantages of Methods for Determining the Cost Effectiveness of Training

Advantages	Disadvantages
Return on investment (ROI)	
Provides an indicator of training's value, worth, and merit.	Appropriate only when it is possible to quantify outcomes (benefits) in monetary units.
Easily understood by higher management.	Baseline measures must be gathered for outcomes before training occurs.
Management will be impressed with favorable ROI report and view training as a value-added service.	Evidence of operational savings and increases in revenue available only after training is conducted. Therefore, ROI's application in predicting a favorable return is limited.
Cost-benefit ratio	
Especially suitable in situations where the benefits are difficult to quantify in monetary units.	Procedure used to predict benefits in monetary units is subjective.
Practical procedure that provides appropriate figures for benefits that are difficult to quantify.	
Shows whether training is worthwhile, before course or program is developed and delivered.	

(Table continues)

Table 1. (continued)

Advantages	Disadvantages
Bottom-line evaluation	
Promotes use of job analysis information. Promotes employee participation in decision-making. Appeals to management, because it links job task performance with training and productivity. Total value added to the organization can be compared to full cost of training to determine if training was a worthwhile investment.	Questionnaire responses are subjective perceptions by trainees. Questionnaire data might be biased.
Payback period	
Provides quick initial look at potential training investment. Answers question, "How long will it take training to pay for itself?"	Should be used only as screening tool. If payback period is short, then another method must be used to examine training's value, worth, and merit to organization. Does not consider cost or time value of money spent and tied up before, during, and after training until the break-even point is reached.

Progress Check -- Payback Period

Directions. Read each of the following items carefully and write in your answer. If you have difficulty with either item, go back and review the relevant content before continuing. Use a calculator or another sheet of paper for your calculations. Check your answers against those provided in the Progress Check Feedback at the end of this module.

1. Fixit Company is considering a training workshop for 12 employees. The full cost of the training workshop (for all 12 employees) is $9,000. The training manager has estimated that the additional training would enable the company to increase its revenue by $5,000 per year. He has decided that if the payback period was no more than 2 years, then he would give further consideration to the workshop.

   A. Calculate the payback period for this potential training investment.

   Payback period = _____

   B. Should the training manager consider the training workshop further?

   Yes _____ No _____

   Why or why not?

   _____

   _____

Practical Example Skill Check

Background information. The training manager for the Camel Company had no interest in or idea how to determine the cost effectiveness of training. Consequently, the use of economic justification was avoided, and higher management came to view training as a cost of doing business. During an economic downturn, most of the training staff was cut as a result of "down-sizing." As a result, the training manager decided that he had better learn how to justify training as a worthwhile investment if he wanted to keep his job.

The training manager's first effort was to establish a "causal link" between a specific organizational problem and a performance deficiency. Finally, he had to provide evidence, in monetary units, that training was a worthwhile investment for the company.

Because the general manager of the Camel Company was accustomed to making decisions based on return on investment (ROI) reports, the training manager chose this method to justify the cost effectiveness of training.

Answers to the following items are provided in the Practical Example Skill Check Feedback at the end of this module.

I. List the three steps the training manager must take before preparing a return on investment (ROI) report for the general manager?

(1) _____

_____

(2) _____

_____

(3) _____

_____

Practical Example Skill Check (continued)

II. The following is a list of outcomes that could be measured. To prepare a **credible ROI report**, the evidence presented to the general manager should be described in which of the following terms? Place an X in front of those outcomes (benefits) which would provide convincing evidence that training was a worthwhile investment.

_____ 1. How those trained thought the training program went

_____ 2. Any increase in operational savings attributable to the training

_____ 3. Test scores showing that all trainees passed the post-test (final exam)

_____ 4. How efficient the trainees' supervisors thought the training program was

_____ 5. Increased revenue attributable to enhanced proficiency of the workers after training

_____ 6. Suggestions for improving/deleting parts of the training, derived from the training exit survey

_____ 7. Reduced medical claims attributable to safety awareness from the training program

_____ 8. Company executives' feelings about the training program

_____ 9. Reduced operational costs

Practical Example Skill Check (continued)

III. List the advantages and disadvantages of two other methods that the training manager could use to determine the cost effectiveness of training.

Method	Advantages	Disadvantages

Practical Example Skill Check (continued)

IV. Ten employees in the maintenance department went through a one-week (40-hour) training program. The training costs were as follows:

Cost item	Amount
Workers' total weekly compensation package (10 workers)	$ 8,500
Trainers' total weekly compensation package (2 trainers)	$ 4,200
Training development and instructional materials preparation	$ 1,000
Purchased instructional materials and consumable supplies	$ 450
Equipment rental	$ 1,000
Allocated facilities costs ($70 per day)	$ 350
Overhead and G & A expenses (total)	$ 500
Full cost of training	$16,000

Actual benefits of the program were difficult to quantify. However, the benefit item amounts listed on the next page were found by (a) taking figures for each item from the 12 monthly periods before the training; (b) then obtaining an average of the 12 figures for each item reported; (c) calculating each item's average monthly benefit (the difference between the item average and the figure for the same item after training); and (d) annualizing the resulting monthly benefit (by multiplying by 12).

Practical Example Skill Check (continued)

IV. (continued)

Benefit item	Annualized benefit amount from training
Operational costs (reduced)	$ 9,600
Productivity (increased)	$13,200
Absenteeism (decreased)	$ 3,000
Quality (improved)	$ 2,400
Total annual benefit	$28,200

After applying, back on the job, what they learned in training, the employee/trainees completed a questionnaire. The response data indicated that, on average,

(1) 35% of their job-time was spent performing the task trained

(2) Their productivity in performing the task trained improved 28% as a direct result of the training.

Using the information given (in item IV), and the payback period method, how long before the break-even point for this training was reached? Show all calculations.

Payback period = _____

_____

Practical Example Skill Check (continued)

V. Continuing with the information from item IV, and using the ROI, cost-benefit ratio, and bottom-line evaluation methods, determine if this training should be continued or terminated. Describe your rationale. Use the following criteria: "Any activity in which the organization is involved, including any department within the organization, should add appreciably to our goal of 11.5% increase in total annual revenue over the next five years." (from Camel Company's *Vision, Values, and Goals* statement.)

ROI = _____

Cost-benefit ratio (using calculated costs and benefits) =

_____

Bottom-line evaluation (total value added) =

_____

_____

Determination:

Continue the training _____

Terminate the training _____

Rationale:

_____

_____

_____

_____

_____

_____

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Progress Check Feedback --

Part 1 — Training Costs (pp. 15-17)

1. Identify the greatest incentive for indicating the cost effectiveness of training.

   Justifying training expenditures with documented benefits (p. 4)

2. Name two categories of training costs.

   (1) *direct costs*

   (2) *indirect costs (p. 5)*

3. Calculate the total daily (8-hour) compensation package for an employee whose hourly wage is $16, and whose fringe benefits package costs his employer an additional 29%.

   Total daily compensation package =

   ($16 x 8 hours) + (29% x $16 x 8 hours) = $165.12

4. Calculate the training costs for 12 trainees, with individual total compensation packages of $195 per day, who attend a 5-day training program.

   Total trainee costs = *12 trainees x 5 days x $195 = $11,700*

5. Calculate the instructor costs for a 5-day workshop with one instructor who requires 2 additional days for preparation. The instructor's direct salary is $180 per day, with a 30% fringe benefits package.

   Total instructor costs =

   1 instructor x (5 + 2 days) x [$180 + ($180 x 30%)] = $1,638

6. Calculate the training development and instructional materials preparation costs for two developers, with a total daily compensation package cost to the organization of $220 each, who worked 5 days on developing training and 8 days on preparing instructional materials. The cost of supplies used in preparing the instructional materials was $210.

   Total development and preparation costs =

   [2 developers x (8 + 5 days) x $220] + $210 = $5,930

Progress Check Feedback -- Part 1 — Training Costs (continued)

7. The cost of developing training and preparing printed instructional materials for a 5-day seminar was $6,300.
   A. What will be the cost per seminar if it is offered once each month for one year?
   Cost per seminar = *$6,300 ÷ 12 times offered = $525*
   B. If the seminar is offered only twice, to a total of 30 trainees (15 in each session), what will be the cost per trainee?
   Cost per trainee = *$6,300 ÷ 30 trainees = $210*
8. The employer purchased books and modules for each of 12 trainees, costing a total of $180 per trainee. Paper and pencils, which cost $45 total, were also required. Calculate the total cost of these instructional materials.
   Total instructional materials costs =
   ($180 x 12 trainees) + $45 = $2,205
9. Welding Associates rented equipment for a 4-day training program they are conducting. The rental cost for the equipment is $300 per day. Maintenance costs associated with the equipment are $20 per day. What will be the equipment costs for this training program?
   Equipment costs = *4 days x ($300 + $20) = $1,280*
10. Welding Associates is considering purchasing the arc welding machine needed for training. The machine's purchase price is $22,500 and its estimated useful life is 5 years. In addition, yearly maintenance costs for the purchased machine are expected to be $2,100.
    A. What will be the total annual cost of the machine?
    Total annual equipment cost =
    ($22,500 ÷ 5 years) + $2,100 = $6,600
    B. If Welding Associates uses the machine in a training program offered 12 times per year, what will be the equipment cost for each program?
    Equipment cost per training program =
    $6,600 annual cost ÷ 12 times offered = $550

Progress Check Feedback -- Part 1 — Training Costs (continued)

11. Welding Associates estimated their total facilities costs, including maintenance, for the current year to be $40,000.
    A. If the facilities are used 15% of the time for training, what portion of the facilities costs should be allocated to the training budget?
    Facilities costs (for training) = *$40,000 x 15% = $6,000*
    B. If the facilities are used for training 5 days per week, 48 weeks per year *[5 days x 48 weeks = 240 days per year]*, what is the daily facilities rate for the use of these facilities?
    Daily facilities rate = *$40,000 ÷ 240 days = $166.67*
12. Six welders will travel from their home to another city to attend a 3-day workshop where they will learn to use specialized equipment. Welding Associates agreed to pay each employee's $400 airfare plus $75 per day for other expenses. Calculate the travel and per diem costs incurred by Welding Associates for this 3-day workshop.
    Travel and per diem costs =
    (6 welders x 3 days x $75) + (6 x $400 air fare) = $3,750
13. Welding Associates found their total direct costs for a training program to be $17,000. Indirect costs, consisting of allocated overhead and G & A expenses, totalled $2,000. What was Welding Associates' full cost of training?
    Full cost of training = *$17,000 + $2,000 = $19,000*

Progress Check Feedback --

Part 2 – Training Effectiveness (p. 21)

1. Kirkpatrick organized the measurement of training effectiveness into four levels. Briefly describe each level.

   (1) *(See page 18)*

   (2) _____

   (3) _____

   (4) _____

2. Is it possible and/or feasible to link training outcomes to organizational improvements without the absolute isolation of training's benefits from the possible contributions of other variables?

   X Yes, it is both possible and feasible. *(p. 18)*

   _____ It is possible, but not feasible.

   _____ It is feasible, but not possible.

   _____ No, it is neither possible nor feasible.

3. What is the key to collecting evidence of training outcomes?

   Establish a causal link between a specific organizational problem, preferably a problem to which monetary value can be assigned, and a performance deficiency. (p. 19)

4. Identify the result of selecting the outcomes to be measured and linking training to those outcomes.

   Level 4 measurement becomes a relatively simple matter. (p. 19)

Progress Check Feedback --

Return on Investment (ROI) (p. 26)

1. A technical training program is saving your organization $20,000 per year and has increased revenue by $26,000 per year. The full cost of training was $40,000.

   A. What was the ROI of this training investment?

   ROI = *($20,000 + $26,000) ÷ $40,000 = 1.15 or 115%*

   B. Was this a worthwhile investment?

   Yes *X* No _____

   Why or why not?

   The ROI is greater than one (1.0), the break-even point. The training investment is returning 115% per year. The first year, this is the original training investment plus an additional $6,000 (or 15%). The training will no doubt continue to provide a benefit, even without additional investment.

   C. Would your opinion change if you could have invested the $40,000 in a savings fund at a guaranteed 17% annual return instead?

   Yes _____ No *X*

   Why or why not?

   In the first year, the 17% return on savings would be better than the 15% return from the training investment. However, the training investment will no doubt continue to provide a return without an additional investment.

Progress Check Feedback --

Cost-Benefit Ratio (p. 30)

1. Mr. Whiz predicted that a computer technician training program for two of his employees would result in a total cost savings of $9,000 per year in computer repairs and down-time. He rates his level of confidence, that the training will be responsible for this savings, at 80%. The projected full cost of the technician training is $2,000 per person.

   A. Calculate the cost-benefit ratio for this potential training investment.

   Cost-benefit ratio =

   (2 trainees x $2,000) ÷ ($9,000 x 80%) = 0.556

   B. Do you think this training would be a worthwhile investment for Mr. Whiz's company?

   Yes *X* No _____

   Why or why not?

   The cost-benefit ratio of this potential training investment is less than one (1.0). (p. 27)

Progress Check Feedback --

Bottom-Line Evaluation (pp. 35-36)

1. A training manager has identified all the tasks performed by each employee within the organization, along with their total compensation packages. The training department is providing a welding training program for the welding department's four employees, at a total cost of $4,400. Each welder has a total annual compensation package of $20,000. The training manager would like to present training's value to higher management. The training is delivered and questionnaire results, in table form, are as follows.

Employee/ trainee	Total annual compensation package ($) [S]	Job-time (%) spent performing the task trained [T]	Component pay ($) [D = SxT]	Pre-training productivity (%) [P1]	Post-training productivity (%) [P2]	Productivity gain (%) [G = P2-P1]	Value added ($) [GxD]
1	*$20,000*	10%	*$2,000*	20%	60%	*40%*	*$ 800*
2	*$20,000*	40%	*$8,000*	20%	50%	*30%*	*$2,400*
3	*$20,000*	30%	*$6,000*	30%	50%	*20%*	*$1,200*
4	*$20,000*	20%	*$4,000*	40%	60%	*20%*	*$ 800*
					Total value added		*$5,200*

A. Complete the table. For each employee, you will need to calculate component pay, productivity gain, and value added. You will also need to calculate the training program's total value added to the organization.

B. Was the training program worthwhile?

Yes ___*X*___ No _____

Why or why not?

The value added to the organization by the training ($5,200) was greater than the training investment ($4,400).

Progress Check Feedback --

Payback Period (p. 42)

1. Fixit Company is considering a training workshop for 12 employees. The full cost of the training workshop (for all 12 employees) is $9,000. The training manager has estimated that the additional training would enable the company to increase its revenue by $5,000 per year. He has decided that if the payback period was no more than 2 years, then he would give further consideration to the workshop.

   A. Calculate the payback period for this potential training investment.

   Payback period = *$9,000 ÷ $5,000 = 1.8 years*

   B. Should the training manager consider the training workshop further?

   Yes *X* No _____

   Why or why not?

   The payback period was less than the training manager's cut-off of 2 years.

NOTE. FEEDBACK PAGES (58-62) ARE NOT INCLUDED IN THIS VERSION OF THE MODULE.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 5

LEGAL AND LEGISLATIVE ASPECTS OF TRAINING

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. Training that is conducted outside the employee's normal work hours, attended voluntarily, not directly related to the employee's job, and in which the employee does no production work is

   A. by law subject to overtime pay.
   B. normally not compensable time and does not contribute to the hours in a standard workday or workweek.
   C. specifically included in federal wage and hour legislation as compensable time.
   D. not allowed for companies working on federal government contracts.

2. It is important to determine whether time spent in training is compensable time under federal legislation because, if it is,

   A. training could not be conducted during regular work hours.
   B. all participants in training would have to be paid overtime.
   C. participants in some training programs would have to be paid overtime and training costs would be higher.
   D. salaried employees taking part in training would have to be paid overtime.

3. Under federal wage and hour laws,

   A. all trainees and apprentices are exempt from minimum wage requirements.
   B. trainees and apprentices can never be paid subminimal rates.
   C. trainees and apprentices may be paid subminimal rates, under certain defined circumstances.
   D. trainees and apprentices are considered the same as salaried employees who take college courses at night.

NOTES

4. Which of the following would most likely qualify as true apprenticeship training eligible for government guidance and assistance?

   A. A one-year work/study program to train clerk-typists.
   B. An on-the-job sales training program with no classroom instruction.
   C. A work experience training program to help 14- to 16-year-old migrants learn to do farm work.
   D. A 5-year program combining classroom instruction and on-the-job experience to train electricians.

5. The Equal Employment Opportunity Act prohibits discrimination in employment practices

   A. by businesses but exempts employment agencies, labor unions, and other organizations.
   B. by all organizations of any size or purpose.
   C. by most employers and labor unions of a specified size and by employment agencies that deal with covered employers or unions.
   D. only by employers that work on federal government contracts.

6. The Equal Employment Opportunity Commission's guidelines for selecting job candidates

   A. prohibit the use of employee selection tests.
   B. view all pencil-and-paper tests as being fairer than other selection methods.
   C. do not provide guidance in the use of employment selection tests.
   D. allow the use of selection tests if the tests have been properly validated.

Note. Please be aware that company policies, agreements, procedures, directives as well as legislation and court precedents may change or be interpreted differently during the course of time. For this reason, the information in recent editions of professional journals provide the best resource.

TRAINING POLICY ANALYSIS

1. Axioms
2. Key terms
3. A definition
4. What to look for
5. Relevance, effectiveness, and efficiency
6. Basic steps
7. Financial options
8. Study the demand side
9. Demand-side issues
10. Study the supply side
11. Supply-side issues
12. Gathering information
13. Training questions
14. Comparing education and training

Note. Parts of this work are based on personal communications with W. Durr, International Labour Office, Geneva, Switzerland.

Clifton P. Campbell

Axioms

Societies seek economic and social development.

Development depends on, among other things, people with useful knowledge, skills, and attitudes — and therefore on training.

Countries need to formulate policies, including training policies, to meet economic and social development objectives.

Three training policy ingredients:

1. Program orientation
2. Resource allocation
3. Institutional arrangements

Policy formulation is one thing; implementation is another. Realistic policies must therefore recognize a variety of constraints; moreover, they must indicate priorities.

Key Terms

Policy:
A course of action by which it is proposed to achieve a certain objective, notably in government.

Development:
A process of economic and social change typically fueled by income growth.

Training:
An effort organized to transfer knowledge, skills, and attitudes which people need in order to be productive or to change their working behavior.

System:
A set of things, parts, ideas, that work together or form a whole, e.g. training policies, programs, resources, and institutions.

Analysis:
Separation into parts, e.g. the unravelling of a system to know how it works or what is wrong with it.

A Definition

Training Policy Analysis is a process of inquiry aimed at recommending how training delivery systems can be made more (a) relevant, (b) effective, and (c) efficient.

in other words,

Training Policy Analysis is an intellectual effort to decide:

where we stand; what is the problem; what is the solution; where we want to go; how best to get there given the circumstances, context, environment, i.e. the constraints and opportunities, the distance, time at our disposal, and given other, wider objectives.

What To Look For

Relevance:

The extent to which training objectives correspond to objectives, needs, and priorities beyond the training system, notably economic growth and social development.

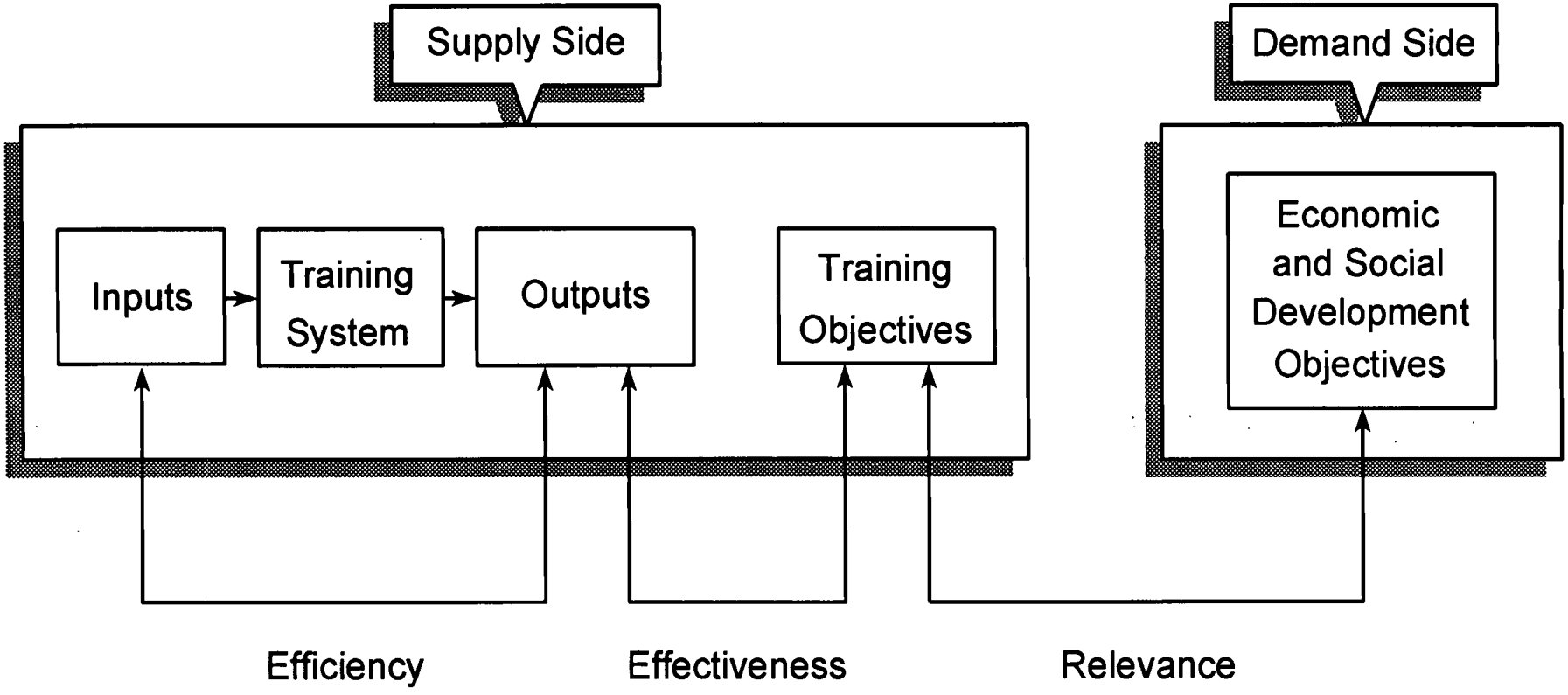
Effectiveness:

The extent to which outputs of the training system correspond to what was intended, i.e. to training objectives.

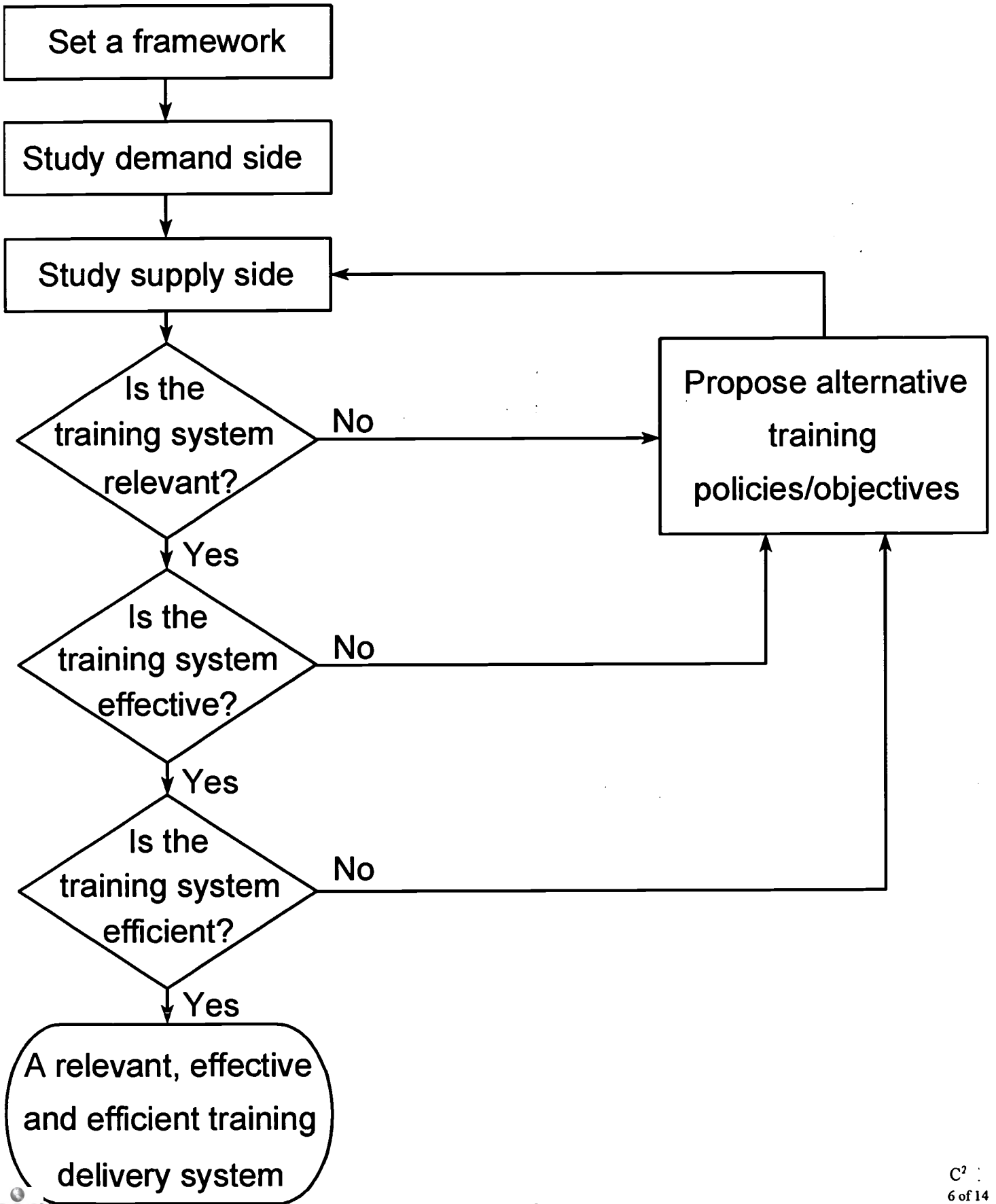
Efficiency:

The relationship between outputs and inputs; the product of efforts to reduce inputs for given outputs or increase outputs for given inputs. Producing the desired result with a minimum of expense and waste.

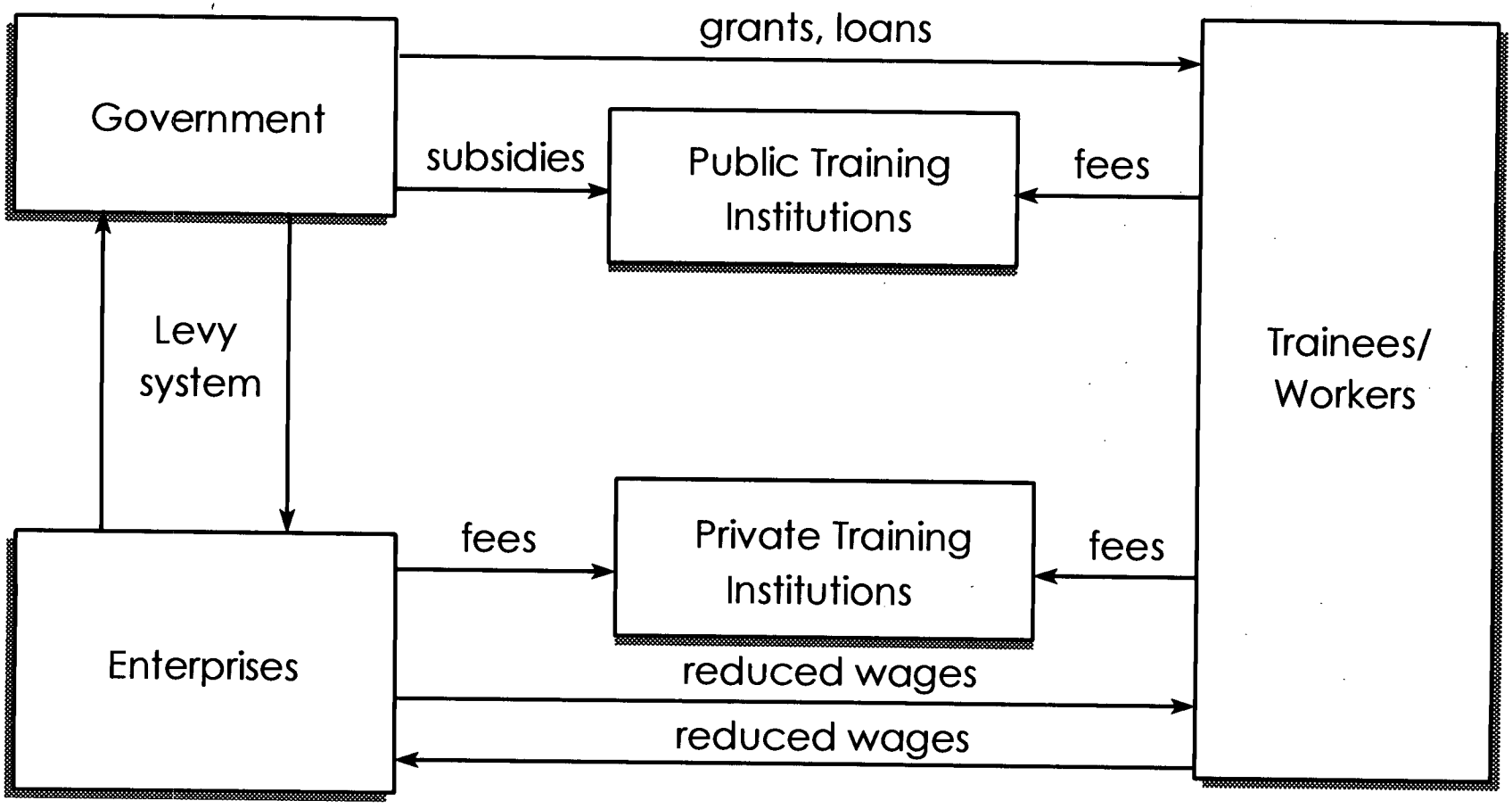
Training Policy Analysis: Relevance, Effectiveness, and Efficiency



Training Policy Analysis: Basic Steps



Training Policy Analysis: Financial Options



STUDY THE DEMAND SIDE

Q: What should the training system do? For whom?

1. Recognize the national context

2. Identify current national training objectives

3. Summarize current development objectives

4. Establish current and future labor market demand (need) for skilled workers

5. Establish social demand for training

DEMAND SIDE ISSUES

1. Demand, need, opportunity, feasibility

2. Appropriate and inappropriate training objectives

3. How specific can one get, should one get

STUDY THE SUPPLY SIDE

Q: What is the training system? What does it do? What is it capable of doing?

1. Size of the system
2. Breadth and depth of coverage
3. Standards and pass rates
4. Training costs
5. Personnel
6. Facilities, equipment, materials

SUPPLY SIDE ISSUES

1. Division of labor
2. Capacity
3. Capability
4. Targeting
5. Trainability
6. Standards & testing
7. Follow-up

Gathering Information

on the demand side:

1. Workforce Projection and Forecasting Approaches
   - Manpower requirements approach
   - Econometric models
   - Input-output models

2. Labor Market Signalling Approaches
   - Reporting by employment services
   - Employer surveys
   - Key informant interviews
   - Analysis of job advertisements
   - Follow-up studies

on the supply side:

- Enrollment data
- School visits
- Follow-up studies
- Labor turnover surveys

Training Questions

WHY
should people be trained?

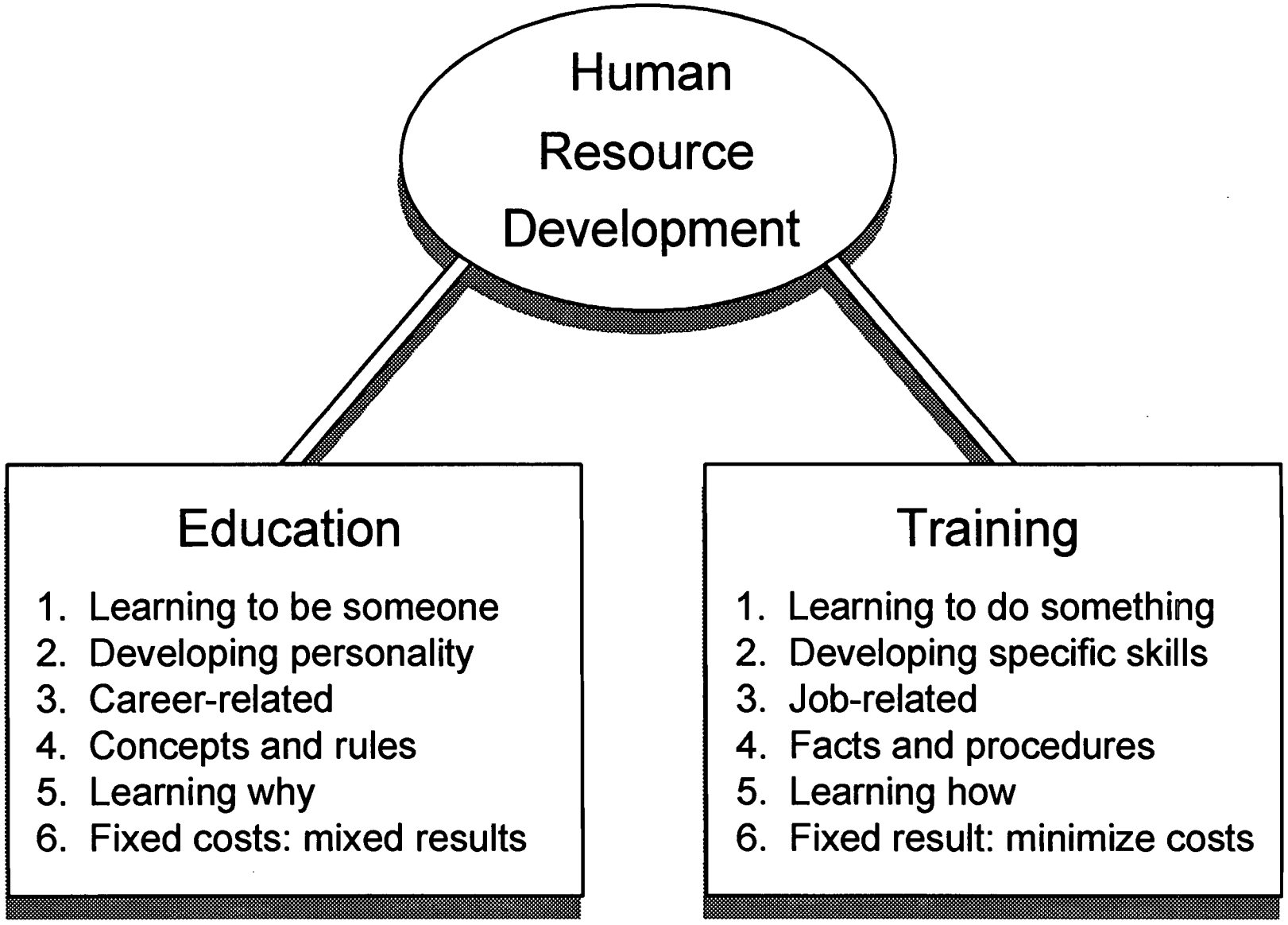
WHO
should be trained? How many? Who should be trained first?

HOW
is training best organized, managed, and financed? Who does what?

WHAT
should people learn? How is this determined and assessed? How about standards?

HOW
is training best delivered? By whom? Where? When?

Human Resource Development: Comparing Education and Training



Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 6

TRAINING FACILITIES AND EQUIPMENT

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. Well-planned training facilities directly affect the success of training programs by

   A. reducing the need for visual display material.
   B. facilitating successful lectures.
   C. making up for deficiencies in the instructional materials.
   D. creating the kinds of attitudes that contribute to learning.

2. Determining future needs for training space and equipment requires

   A. well-researched, effective plans for current and future training programs.
   B. an inventory of existing facilities and data on their utilization.
   C. detailed knowledge of the resources needed for training preparation and presentation.
   D. all of the above.

3. In designing training facilities,

   A. the design should reflect the interdependence of all activities to be accommodated.
   B. the training rooms are the important thing and other activities need little attention.
   C. physical dimensions and structural designs should be set before detailed studies of equipment needs are made.
   D. audiovisual equipment needs are the main control of overall design.

NOTES

4. The most important consideration in determining the room size needed for a given number of training participants is

   A. the number of times a course or program will be offered.
   B. the seating arrangement and furniture appropriate for the materials and methods of presentation.
   C. the number of instructors who will be teaching the course or program.
   D. the amount of money available for construction.

5. To make the design of facilities easier, improve the utilization of equipment, and insure comprehension of projected material, it is a good idea to

   A. make sure all letters and numbers will be at least 13/16 inch high when front projected.
   B. make sure that no one is seated more than 24 feet from the front projection screen.
   C. always plan to use the largest-sized letters or numbers possible.
   D. develop and consistently follow graphic arts standards for all visual material.

6. Which seating arrangement would probably be best for training in which participants use books and loose-leaf binders extensively but do not need to interact with each other?

   A. Classroom style.
   B. Theater style.
   C. U-shaped style.
   D. Random seating.

7. Heating, ventilation and air conditioning, seating design, lighting, and other environmental factors

   A. relate only to comfort and have no effect on the amount of learning that takes place.
   B. require careful design because they affect the attentiveness of participants and can contribute to learning.
   C. can follow standard designs found in any office setting.
   D. are the least important factors in developing effective training facilities.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 7

THE BEHAVIORAL SCIENCES IN TRAINING AND DEVELOPMENT

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. One of the most important findings of the Hawthorne studies from 1927-32 (5 years) was the conclusion that

   A. physical and environmental influences have little effect on worker efficiency.
   B. social interactions and group influences may have a stronger effect on work efficiency than physical factors in the environment.
   C. experimental methods are of little value in improving work effectiveness.
   D. the best incentive for increased productivity is higher wages.

2. Which of these statements is true, according to Rensis Likert's interaction-influence principle?

   A. A manager's influence over subordinates is weakened by allowing subordinates to participate in decision-making.
   B. A manager who has little influence on superiors will usually have strong control over subordinates.
   C. Little relation exists between a manager's roles as superior and subordinate.
   D. A manager who has considerable influence on superiors will usually have a strong influence on subordinates, as well.

3. Based on his social psychological analysis of management, Rensis Likert supported a management system called

   A. exploitive-authoritative.
   B. participative-group.
   C. consultive.
   D. benevolent-authoritative.

NOTES

4. One argument in favor of a management style based on Douglas McGregor's Theory Y philosophy is that

   A. Theory Y allows a range of management approaches; Theory X permits only one.
   B. subordinates will always use self-direction in meeting organizational goals.
   C. employees will always seek responsibility.
   D. achieving security is the main motivation of employees.

5. Abraham H. Maslow's hierarchy of needs would predict that a worker whose physiological, safety, belonging, and love needs were satisfied would be motivated

   A. largely by the incentive of salary increases.
   B. by chances to satisfy esteem and self-actualization needs.
   C. by further chances to satisfy physiological, safety, belonging, and love needs.
   D. only by the fear of punishment or loss of reward.

6. According to Frederick Herzberg's two-factor theory, which of the following lists includes job factors that are likely to be strong motivators and sources of satisfaction?

   A. achievement, responsibility, and the work itself.
   B. working conditions and salary.
   C. status and job security.
   D. interpersonal relations and supervision.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 8

DETERMINING TRAINING NEEDS

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. Training and development needs may result from

   A. current human performance not being what is required by organizational objectives.
   B. future responsibilities needing new skills.
   C. organizational goals of helping employees achieve their potential.
   D. all of the above.

2. A consumer or customer survey may be carried out when investigating training needs because

   A. performance problems may exist that are unknown within the organization but that cause friction with customers.
   B. customers are more aware of the overall effectiveness of operations than those within the organization.
   C. most training and development needs can be identified in this way.
   D. it is comparatively easy to get survey information from customers since benefits to them are obvious.

3. A good policy when conducting needs surveys is to

   A. concentrate only on surveying the target group in order to increase objectivity.
   B. carefully avoid placing constraints on how the survey results will be used before the survey is carried out.
   C. concentrate on concrete responses and avoid eliciting attitudes, motives, and other subjective responses.
   D. survey three levels: the target group, their supervisors, and their subordinates.

NOTES

4. Organizational audits may reveal training needs by

   A. using surveys of perceived training needs.
   B. exposing performance deficiencies that show up in records of the results of operations.
   C. eliciting opinions concerning future training needs from a panel of informed managers within the organization.
   D. establishing a system of assessment methods that do not rely on existing records.

5. One kind of organization record that can easily be designed to show directly some kinds of training and development needed in the future is the

   A. record of absences.
   B. employee turnover records.
   C. annual personnel inventory.
   D. operational control records from accounting.

6. One way that records of effective and ineffective critical incidents can contribute to a training needs analysis is by

   A. directly revealing a training need when a large number of ineffective critical incident behaviors of the same type are discovered.
   B. eliminating the need to plan overall individual development programs.
   C. replacing performance reviews with achievement testing.
   D. revealing needs without the necessity of observing behavior.

Needs Assessment

What is a Needs Assessment?

A needs assessment is the process of identifying and clarifying human performance problems. It reveals discrepancies between the "actual state" of knowledge/skills and a "desired state."

TIP: Be very clear about the desired state of knowledge/skills. The desired state of knowledge/skills should be decided prior to — not as a consequence of — the needs assessment. This is done in order to provide a backdrop against which to assess the data generated in the needs assessment process. Without clarity of what constitutes the "desired state," the assessor will often interpret the data incorrectly.

Why a Needs Assessment?

1. To serve as a road map between actual and desired performance.

2. To provide assurance that training is the proper intervention.

   CAUTION: Be open to the possibility that training may not be the answer. Decide ahead of time what you will do if you find yourself in this situation.

3. To help identify problem areas not yet considered.

   TIP: Allow flexibility in your needs assessment to uncover these hidden areas.

4. To distinguish between the knowledge, skills, and attitudes that a person must have to do the job and those that are nice but not essential. The clearer the definition of desired skills, the easier it will be to distinguish between what is essential and non-essential.

When to Do a Needs Assessment

1. When changes (in a job design/procedure, in desired skill levels, or in the organization-at-large) are expected.

   TIP: A good needs assessment occurs prior to implementation of a change and helps to move the change along. Design the needs assessment to be of help in the change process.

2. When productivity starts declining. A needs assessment can help identify reasons for the decline and suggest ways to reverse the trend.

3. When there is a request for an assessment.

When Not to Do a Needs Assessment

1. Too soon after the last needs assessment. Avoid returning too frequently (normally within 18 months) to the same population. Avoid using the same methodology twice in a row — vary the approach. This helps validate your last assessment and is easier on the population.

2. Don't do a needs assessment when the costs (in terms of energy, time, credibility) are higher than the expected benefits.

   TIP: Before doing a needs assessment do some sort of objective or subjective cost-benefit comparisons. Use the information in determining whether to do an assessment and which approach to use.

Whom to Assess

Possibilities of whom to involve in the needs assessment are endless. Simplistically, however, whom to assess can be broken down into three categories:

1. Homogenous vs. heterogeneous group. The needs assessor (you) must decide if you want a cross-section of the organization, a lateral section of the organization, or one department or unit, or if you are interested in one job classification exclusively.

   TIP: Determining what you want to assess and why usually will lead you to whom.

2. External groups. Don't overlook customers, clients, consumers, or employees in other organizations. These often tell you the kind and degree of the skill deficiency you need to correct.

   TIP: If using external sources, get prior approval.

   CAUTION: When assessing an external group, use extra care. Be very clear what you want the group to answer and why. Word questions very carefully. Remember that external sources have less invested interest in becoming involved in the needs assessment.

   Always keep in mind that an ill-designed and poorly-constructed needs assessment can damage the public image of the organization.

3. Persons to be recipients of training or persons recommending others for training. The difference here is between felt need (I need training in ...) vs. perceived need (they need training in ...). Of course, both segments can be used.

   TIP: Needs assessment can be the starting point of getting people committed to a training program. You may want to decide whose commitment you will eventually need to make the program successful and include them in the needs assessment.

How to Conduct a Needs Assessment

There are six basic needs assessment methods. Two frequently used methods are interviews and questionnaires.

Interviews. For our purposes here we are defining interviews as those activities where the needs assessor meets with an individual or group, and asks questions. The setting may be formal or informal.

There are generally two types of interview format. A one-on-one format where you meet individually with a respondent/worker is by far the most common. Less common, but equally effective, is a group format where you meet with several persons collectively. When conducting interviews, be sure to keep these tips in mind.

TIP #1: If you are new at interviewing or new to a setting, opt for the one-on-one format. It is easier to control and more focused.

TIP #2: If new, use prepared questions. Prepared questions help ensure that you get all the information you need. They also help you to compare results as all responses are to the same items.

TIP #3: Keep the interview short. A useful technique is to list all the questions you want answered. Now, half the list. Prioritize the remaining questions and be content if most of these get answered.

Establish a time limit. This helps pace the interview. Build in a warm-up period if you do not know the worker or if he or she is uncomfortable with the interview.

TIP #4: Know something about the worker you are interviewing. This will help you decide how to phrase the questions so they can be readily understood. It will also help you set a more realistic time frame and pace for the interview.

TIP #5: Use a variety of questions. Three standard types are reflective questions (which encourage greater clarity and ensure understanding); directive questions (which encourage specific information); open-ended questions (which encourage greater information and depth of response).

There are also several cautions to keep in mind.

CAUTION: If you plan to take notes during the interview:

Ask permission

Explain why you would like to take notes and how the information will be used.

Refer to your notes often during the interview. You can do this by reading back responses to assure the worker that you have accurately recorded his or her statements.

Write so that the worker can see what you have recorded. For some reason, actually seeing the writing reduces anxiety.

CAUTION: Know how you are going to interpret and compare the responses. You should give thought to this prior to the interview. Normally, interviews generate considerable information — it may be overwhelming to try to decide how to interpret and compare it all after the interview.

Questionnaires. This includes all written instruments which ask the worker to respond to specific items. Questionnaires normally use one of the following five response modes:

1. Likert Scale — Strongly Agree ---------- Agree
Like ---------- Dislike
2. Yes-No Responses
3. Rank Order
4. Check-Off
5. Numerical Scales — Extremely important = 3, Fairly important = 2, Not too important = 1
6. Open-End Responses

Questionnaires are often used because they allow a large number of people to be involved. But questionnaires may suffer from a poor response rate. Here are a few tips to increase your response rate:

TIP #1: Include a self-addressed envelope or label (even for internal returns). Studies show that stamped, addressed return envelopes, rather than conventional business reply envelopes, are one of the more effective devices to increase response rate.

TIP #2: Keep the questionnaire short — one page is preferable to two or more.

TIP #3: Write questionnaire items for the worker to answer. Use easy language, easy instructions which workers can follow, and an easy-to-follow flow of the questionnaire items.

TIP #4: Precede the questionnaire with a letter explaining its purpose and the value in completing it. An offer to send workers the results can often entice them to complete the questionnaire. Keep in mind the adage: What's in it for me?

TIP #5: Follow up the questionnaire with a second mailing or a phone call. Studies indicate that the response rate can double as a result of a second mailing. Subsequent mailings are likely to increase the response rate minimally and may not be worth the time and cost involved.

TIP #6: Test a questionnaire on a small sample of the population to ensure that you are getting what you thought you would get.

Questionnaires also need a few words of caution.

CAUTION: Make the questionnaire look professional and pleasing. Avoid the cluttered look. Avoid print too small to be easily read. Remember that the aim of the questionnaire is to capture the respondent's attention so he or she will complete it!

Avoid unanswerable questions. There are several reasons why questions cannot be answered:

A. Because they are double barrelled — "should supervisors and workers be involved in _____?"

B. Because they are biased — "should supervisors be more sensitive to worker needs?"

C. Because they request too sensitive information — (i.e. admission of a crime) "have you ever stolen from the workplace?"

NEEDS ASSESSMENT: A RATIONALE AND METHODOLOGY

Introduction

Simply stated, needs assessment is the process of identifying and clarifying human performance problems. As defined by Lampe (1986), it is "an effort to reveal the gaps between what people do at work and what their employers would like them to do" (p. 101). Needs assessment is a process that provides the information necessary for informed decision making. Kaufman (1987) maintains that "a needs assessment provides the direction for useful problem resolution through identifying, documenting, and selecting appropriate problems for training" (p. 20).

Before a trainer considers planning or providing a training course or program, a properly conducted needs assessment should have determined that the identified problem is one which can be solved through training. A needs assessment which shows that a problem cannot be solved by training alone is just as important as one which shows that training is the answer. It is the decision maker's ethical and professional responsibility to analyze all alternative interventions and make recommendations accordingly.

The conduct of a needs assessment should be planned, organized, systematic, and goal-directed. Abel (1986) recommends that "Goals should be specific, measurable, and objective" (p. 70), and categorized according to either a functional or individual level. On the functional level, they should relate directly to the accomplishment of the organization's goals. On the individual level, a distinction should be made between what a worker needs to know and what he or she should be able to do (p. 70).

Training Limitations and Alternative Interventions

Notwithstanding all its value — or perhaps on that very account, training should not be proposed as the answer to those organizational problems that are better approached in other ways. After a problem has been identified, it ought to be thoroughly investigated to determine its cause before training is prescribed as a bona fide solution. For example, **training is not the answer when**:

1. The knowledge, skills, and attitudes to be trained cannot be used on the job.
2. A change in behavior cannot be observed or measured.
3. The job environment will not permit the performance of the behaviors acquired.
4. Workers are capable of performing job tasks to standards, but for a variety of reasons, are unmotivated or unwilling to do so.
5. The organization's goals can be accomplished more effectively through other interventions.
6. There are insufficient financial, human, physical, or technological resources to complete training.

If any of these situations exist, training will be an ineffective response to the organizational problem. A different intervention or possible training as part of a broader plan of action should be considered.

When the knowledge and skills to be trained cannot be used on the job, it is usually because of an incorrect decision during the planning function. The mistake can be the result of inadequate or faulty information at the time of the original plan. It can also come from changing conditions on the job between the planning and plan implementation. Before any training is

undertaken, the skilled worker needs of the immediate future must be evaluated. And they must be evaluated carefully!

If the change in worker behavior cannot be measured, then it should not be trained. Unless it is possible to get a specific measure of trainee performance before, during, and after training, the employer will never know whether the effort failed or succeeded. Trainers must answer the question, "What will have to happen to show me that the trainee has attained job task standards?"

Measuring change becomes a problem when learning objectives are (a) not used, (b) incomplete or inconsistent with job task performance, or (c) phrased in ambiguous language. For example, a poorly-written objective like "The trainee will understand the importance of maintaining accurate records of the patient's temperature" is abstract and impossible to observe and measure. Properly stated, the learning objective would read: "Measure a patient's temperature using an oral thermometer to within one-half of one degree and record the reading on the patient's chart in accordance with clinical procedures and without assistance." Now the trainee, trainer, and all who work with the learning objective can determine when proficiency has been attained.

When workers are capable of performing job tasks to standards, but are unmotivated or unwilling to do so, training will not solve the problem. There may be many causes for this unwillingness — the job may be monotonous, boring, or workers may lack the incentive to do it well. The absence of feedback may cause workers to doubt the value of their performance. On-the-job conditions may be such that the worker is not rewarded for performing tasks properly. The worker may not even know the job task standards. Group pressures and group norms may be causing reduced production or lower standards. Those who perform job tasks properly may

be penalized. In none of these cases would training the worker in how to do the job better bring about any appreciable improvement in productivity or standards.

The question to ask in this situation is "If the workers' jobs depended on it, could they perform the job tasks properly?" Training is appropriate only if the answer is **no**. If a worker is capable of performing the job tasks to standards, but is not doing so, other interventions are indicated. The following eight side-headings provide information on non-training interventions.

Communicate Expectations

Before workers can perform effectively, they must know exactly what they are expected to do and what acceptable performance looks like. By identifying the job tasks and providing performance standards, then adding positive consequences for proper performance, workers will tend to repeat their good performance.

Add Feedback

When workers don't know how well they are doing, that is, when they don't see the results of their accomplishments or receive feedback concerning their performance, they will most likely never improve. Workers need to know when they are meeting expectations and when they are not. Feedback in itself motivates workers; it gives them more reason to care, to perform well. Periodic feedback can produce dramatic results, and it is a relatively inexpensive intervention.

Eliminate Adverse Physical and Environmental Conditions

Undesirable environmental and physical conditions in the workplace hamper the effective use of knowledge and skills. Bad equipment, materials, and supplies, as well as conditions which cause health and safety problems, all inhibit job performance.

Workers are often prevented from implementing trained behaviors by attitudinal or social obstacles. Whenever newly acquired skills and abilities conflict with closely held attitudes and

values, the work environment will not support their use. For example, training Saudi Arabians to be waiters and cooks will be fruitless if they must work in a region of the country where social mores mitigate against Saudis being employed in these jobs. In such cases, the attitudinal environment must be changed — either before training starts, or as part of a broader developmental strategy.

Similarly, to train workers in ways that maximize quality and productivity will be futile if the work group tends to penalize those who exceed group norms. In this case, the on-the-job environmental obstacle will interfere with or prevent implementation of the trained behavior. Before training, those who are responsible should assure themselves not only that it is possible to develop the desired behaviors — but also that group pressures at the workplace can be modified to accept the new knowledge, skills, and attitudes.

Enrich the Job

The trend toward simplification and specialization has resulted in many "impoverished" jobs. Some are so narrow, monotonous, and tiresome that workers do not maintain satisfactory levels of performance. Apart from adding variety through job rotation, jobs can be redesigned to encompass a complete and meaningful piece of work (product). This increases interest and leads to a sense of accomplishment. Enriched jobs add value and importance which motivate workers.

Pay Attention to Interpersonal, Group, and Intergroup Behaviors

Workers within an organization may be more motivated toward their individual or small group goals than toward the organizational goals. Organization development (OD) could be the solution when the organization needs fixing — not the workers' behavior. The process reveals how individual and small group goals and those of the organization can and should overlap, resulting in a more effective organization.

Recognize Performance

How a reward and incentive system is structured affects job performance positively or negatively. If workers are to be motivated to put forth maximum effort, to do their best, reasonable wages must be provided and recognition, as well as other rewards, must be linked to performance.

The general level of wages received by workers and the differences in pay among them can lead to problems. Wage and salary administration ought to establish a justifiable rank order of different jobs and set wages that are logical and equitable. The content of jobs and the requirements necessary for proficient performance, not custom, favoritism, or an imprecise notion of the job's value in the workplace should determine the differential rates of pay.

Recognition and tangible rewards for accomplishments nurture and emotionally drive workers to expend additional energy. They contribute significantly to the overall well-being of any workplace.

Opportunities to get ahead in the organization are also important. There needs to be a rational systematic promotion plan that recognizes and rewards proficient performance and demonstrated potential.

Add Positive Discipline

Problems of human conduct or social relationships generally make themselves quite clear. Habitual lateness and absenteeism are problems that cannot be ignored. Lack of effort, laziness, and dishonesty are others. Patterns of belligerency; lack of respect for management, organizational rules, or policies; and trouble getting along with co-workers or customers also indicate that a reprimand or tactful discipline may be in order. When discipline is handled with impartiality and good judgment, the worker's performance will likely improve.

Only a small percentage of workers cause disciplinary problems. Furthermore, the reasons for such behavior may have nothing to do with the job. Family problems, chemical dependency, emotional difficulties, and financial or legal difficulties are often the root cause. Problem workers are expensive to have on the payroll and difficult to supervise. They tend to upset the morale of the work group. If a supervisor wants a worker to be more cooperative and productive, every effort should be made to deal with the underlying reasons for the unsatisfactory behavior.

Positive discipline begins with counseling, which includes (a) listening patiently to what the worker has to say, (b) refraining from criticizing or offering hasty advice, and (c) trying to determine if the worker is troubled by something deeper than what appears on the surface. Counseling interviews are aimed at helping workers unburden themselves. The payoff comes when the worker gains confidence in the supervisor and consequently doesn't vent resistance and frustration on the job (Bittel, 1974, pp. 286 & 404).

Use On-the-Job Coaching

Coaching involves on-the-job development where a supervisor supports an individual's progress through a planned set of learning experiences. According to research by the General Electric Company, 90% of employee development is done this way. While this may not be true in all organizations, it does emphasize that coaching is an important method for inspiring workers to improve their knowledge, skills, and attitudes.

Supervisors must identify specific things that workers can do to improve quality and productivity, then make a commitment to help in their accomplishment. They must take advantage of opportunities to guide workers to their full potential in an environment that motivates them to excel.

Summing Up

While examining situations where training is not appropriate, eight alternative interventions were presented. All things considered, training is an appropriate solution to job-related problems where workers have actual or potential deficiencies of knowledge or skill (Laird, 1985, p. 83). This can happen when (a) new workers are hired, (b) a worker is promoted or transferred, (c) new jobs are created, (d) existing jobs are to be performed in new ways, (e) new technology or equipment is introduced, or (f) there is a need to improve safety. However, before a decision is made to undertake training, planners ought to consider five more alternatives.

1. Change employee selection methods. This can increase the pool of skilled workers.
2. Improve job performance methods and use existing knowledge and skills more efficiently.
3. Assign workers to jobs that fully use their expertise.
4. Involve workers in planning, problem-solving, and decision-making that affects them.
5. Introduce new technology.
6. Reorganize and adjust priorities or change business practices.

The alternatives discussed and listed may be more efficient and/or cost effective than training would be. Consequently, determining the appropriateness of training is of paramount importance in building credibility with an organization.

Needs Assessment Methods

The best source(s) of accurate and complete information, whether documents or people, ought to be identified. This is true even if the source proves to be difficult to access or use because of expense, unavailability, or unwillingness.

Document Review

Workplace documents which can provide clues to problems as well as other pertinent information include: (a) employee records such as performance appraisals, absenteeism and turnover data, complaints and grievances; (b) position (job) descriptions; (c) strategic business plans and budget reports; (d) production and quality control records; (e) accident and critical incident reports; (f) regulatory requirements; and (g) exit interviews. Data can be collected from these and other documents without interrupting workers and asking them for information which is already available in workplace records and reports.

A check with the personnel department will reveal which employee records are accessible. Since privacy laws and regulations have become stringent, some of these records may be considered privileged information (Donaldson & Scannell, 1986, p. 24).

There are many methods and combinations of methods for collecting information from human sources. They run the full gamut, from an informal interview to a complex formal research design. Some of the best methods are:

1. Interviews (one-on-one and group)
2. Observations on the job
3. Survey techniques (questionnaires, checklists, rating scales, etc.)
4. Performance and achievement tests
5. Work samples
6. Advisory committees

Interviews

There are two main types of interview formats. The **one-on-one**, where the interviewer meets with an individual worker in person or talks with him over the telephone, is the more

common type. Less common, but also effective, is a **group interview**, where the interviewer meets with several workers collectively. The group interview tends to elicit information that individuals might not bring up on their own. However, it may stifle honest discussion. Either of these formats can be structured, using prepared questions, or highly unstructured and informal, taking place over a cup of coffee or during lunch. If the conversation is initiated by the person being interviewed, so much the better. If not, tactful questioning should be used. Interviews can be quite effective at revealing causes of and possible solutions to problems (Donaldson & Scannell, 1986, p. 23).

A structured interview is more formal, generally occurring during a pre-scheduled meeting. Previously prepared questions usually solicit information concerning:

1. Problems encountered on the job
2. Improvements that could be made
3. Most- and least-liked parts of the job
4. Accomplishments on the job
5. Personal goals
6. Felt needs for acquiring additional knowledge or skills

It is extremely important that the questions and interview itself not be perceived as prying or playing a clandestine role. In addition, it is always necessary to respect the confidentiality of the responses. The advantages and disadvantages of the one-on-one (both in person and over the telephone) and group interview formats are presented in Appendix A.

Observations

Training needs can also be discovered with little or no interference with operational activities through on-the-job observations of worker performance. The observation can be as formal as a time and motion study or as behaviorally specific as watching a new worker operate a machine. It may be as unstructured as walking through an office and hearing overtones of conflict or misunderstandings between workers.

A complaint from a co-worker about telephone messages, outgoing correspondence, etc. may indicate a need for secretarial training. Observed problems such as poor housekeeping, hazards, time-wasting practices, and so forth may be traced to an ineffective supervisor or a need for training. Observations can be used to distinguish between effective and ineffective interpersonal, group, and intergroup behaviors; however, the presence of an observer may bias the behavior witnessed. Consequently, observations should be checked and verified by repetition or by comparison with those of other competent observers. The advantages and disadvantages of the observation method are listed in Appendix A.

Survey Techniques

Survey techniques range from simple response sheets to sophisticated questionnaires. Surveys are used to reach a large number of people, or people located over a large geographic area, in a relatively short period of time. A commonly used approach is to prepare a list of questions about training needs, and then solicit opinions from workers, their supervisors, and other stakeholders. The training needs are then identified by analyzing the data collected.

Since the resources (time and money) required to survey an entire population are often unavailable, a randomly selected or stratified sample may be surveyed instead. A variety of question formats may be used, including the open-ended, forced-choice, and priority-ranking

types. Unfortunately, know-how, time, and hard work are required to (a) develop the questions, (b) write explicit instructions, (c) format and pilot-test the questionnaire, and (d) compile the information collected. See Appendix A for a list of the advantages and disadvantages associated with survey techniques.

Performance and Achievement Tests

Job task performance can be assessed through criterion-referenced performance tests. Pre-employment and periodic performance testing will reveal deficiencies in knowledge or skills, thereby establishing a need for training.

A comprehensive achievement test facilitates the process of "testing out". This makes it possible to eliminate repetitive training in knowledge and skills already attained. Additionally, it reveals the magnitude of the training yet to be accomplished.

Work Samples

Tangible samples of work such as management reports, or less tangible examples like how a manager conducts a meeting, can identify problem areas that require further analysis. This unobtrusive method provides direct information on the organization's actual work. It requires an analyst who is familiar with the work process and product standards.

Advisory Committee

A training advisory committee, composed of leaders representing key departments and committees/groups within an organization, can serve as a "sounding board" for new program ideas and act on training requests. Meeting agendas should be developed, distributed in advance, and followed. Decisions and recommendations should be recorded and brought to the attention of management. When involved in a positive and meaningful way, committee members will be the best advocates for training (Donaldson & Scannell, 1986, p. 25). Even though "has-beens" and

semi-retired individuals can frequently be spared to attend meetings, they should not be included for obvious reasons.

Other Sources of Information

1. **Behavior assessment.** Instruments that measure the work behavior of individuals and groups include tests of attitudes, self-reports, opinionnaires, simulations, games, and other such devices.

2. **Consultations.** Discussions with colleagues in the same or a similar industry can also be helpful.

3. **Requests from management.** Because management support is needed for training courses and programs, these requests should be investigated, but not overreacted to. However, top-level management is the major information source regarding organizational strategy, current policies, and future expansion or down-sizing. Consequently, they may know what training will be required to fulfill these special needs.

Choosing a Method

Although all possible sources of accurate and complete information should be consulted to ensure a successful needs assessment, "criteria will vary for different organizations in different situations" (Blackburn, 1987, p. 48). Time schedules, resources, and costs must be considered in choosing which needs assessment method to use (Lampe, 1986; Kaufman, 1987). However, Lawrie (1986) maintains "data closest to a situation not only is most likely to be valid, but also has the best chance of being accepted" (p. 22) by both the selected workers and the organization.

The results of a study which surveyed human resource departments in America's top companies revealed that (a) **informal discussions** (interviews) was the most frequently used needs assessment method, and (b) **observations** was the next most frequent. One may have expected to

find the more scientific needs assessment methods rated higher than the unstructured and informal interview. Nonetheless, even when a more formal method is used, experienced training professionals realize that "informal discussion is often needed to gain the necessary commitment from the clients to accomplish a project or program" (Ralphs & Stephan, 1986, p. 74).

Training needs can be either perceived (felt) needs or demonstrated (measurable) needs (Bowman, 1987; Lampe, 1986). Whichever the case, involving the intended trainees in determining their training needs "may have the largest impact on design decisions" (Lampe, 1986, p. 101). It is also important to solicit and listen to workers' ideas in order to "build [their] commitment to the training program" (Bowman, 1987, p. 32). When participating in the needs assessment process, workers should be assured that their responses are confidential and will be taken seriously by management (Abel, 1986).

After collecting information from the potential recipients of training, additional data can be collected from their co-workers, supervisors, and subordinates to get a comprehensive profile of training needs. When discrepancies are discovered among these different populations, the trainer should, if necessary, investigate further. Differing opinions sometimes indicate a communication problem within the organization, which provides another potential training need (Bowman, 1987).

Data should also be collected from top management, because they can provide pertinent information regarding the company's long-term goals and strategies. Furthermore, the success of a needs assessment often depends on the support of management. Research clearly indicates that the more management participates in the needs assessment, the greater the likelihood of their support (Abel, 1986; Bowman, 1987; Swanson, 1987).

Customers or clients are another source of valuable information. They often perceive problems in areas that insiders are not aware of (Lampe, 1986; Ralphs & Stephan, 1986).

Although training requests should certainly be acted upon, needs assessments ought to be conducted in a proactive mode as well as in a reactive mode. Assessing training needs should be an ongoing process, with the trainer always being on the alert to potential problems that can be prevented through training (Kaufman, 1987). Bowman (1987) asserts "programs [should] flow from the assessment, not assessment from suggested programs" (p. 30).

In instances where a needs assessment indicates more than one training need, the needs should be prioritized. Kaufman (1987) suggests assigning monetary values to each need "in terms of what it will cost to reduce or eliminate the need and what it will cost to ignore the need" (p. 82).

Preparing a Report

Once the training needs have been analyzed and prioritized, a report should be prepared and presented to management for approval and support. The report should contain (a) the purpose and objectives of the needs assessment, (b) methodology used, (c) data sources, (d) the analysis of information collected, (e) results, and (f) a recommendation as to the appropriate plan of action. Appendix B shows a worksheet that is useful in preparing a needs assessment report.

In Conclusion

The success of training begins with conducting a needs assessment. A properly conducted assessment actually saves time and money. It enables the organization to make informed decisions and to realize a return on the investment of resources. A needs assessment may provide erroneous information, however, if it is conducted in a "hit-or-miss" fashion. The result would be an inadequate and disappointing training course or program that reflected poorly on training as a profession.

A needs assessment should be properly conducted in a systematic manner to maintain training's professionalism and integrity and to gain respect from management as a profitable activity. Galagan (1986) asserts, "As training struggles to establish itself as a credible contributor to bottom-line results, it must be able to conduct, report, and justify effective needs assessment" (p. 4).

Training can't solve all problems — not all problems are training problems.

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APPENDIX A

Advantages and Disadvantages of Needs Assessment Methods

Advantages	Disadvantages
One-on-one (in-person) Interview	
• High response rate. • Individuals are generally more willing to talk than to fill out a questionnaire. • Misunderstood questions can be clarified. • Appropriate for jobs involving considerable personal judgment or mental application (intellectual tasks). • Yields precise, complete, and comparable information. • Additional information revealed through non-verbal messages (body language). • Appropriate with illiterates and those with language difficulties. • Responses can be recorded on audio tape or through written notes.	• Expensive and time-consuming to prepare for and conduct a number of individual interviews and compile the information collected. • Results depend upon the cooperation of those interviewed. • Can interfere with operational activities. • Requires a skillful, understandable interviewer with a pleasant personality and the ability to listen. • Individuals tend to say they do what they think they should do, not what they actually do. • Interviewer's bias, demeanor, and appearance can distort responses. • Requires a private, distraction-free setting. • Note-taking may be disturbing and audio-taping threatening to some individuals. • Scheduling interviews with busy individuals may be difficult. • Individuals may give conflicting information which must be reconciled.
One-on-one (telephone) Interview	
• High response rate. • Individuals are generally more willing to talk than to fill out a questionnaire. • Misunderstood questions can be clarified. • Appropriate for jobs involving considerable personal judgment or mental application (intellectual tasks). • Comparatively inexpensive. • Information collected on the job or at home in a short period.	• Less sensitive than in-person interviews. • Requires a trained, understandable interviewer with a positive attitude and good telephone manner. • Individuals tend to say they do what they think they should do, not what they actually do. • Reaching busy individuals to be interviewed or having them return a call may be difficult. • As the use of telemarketing increases, some individuals will hang up, not taking the time to distinguish between an interview and a solicitation.

Advantages	Disadvantages
Group Interview	
• Few people involved. • Misunderstandings can be clarified. • Participants generally find the activity to be a stimulating and rewarding experience. • Appropriate for jobs involving considerable personal judgment or mental application (intellectual tasks). • Information collected and verified in a short time. • Consensus can be reached on conflicting terminology or other points of disagreement. • Information provided by one individual can serve as a stimulus to others for recalling additional information.	• Full-time commitment, requires time away from the job, can be expensive. • Requires a recorder and a trained, understandable interviewer (facilitator) well-versed in group dynamics. • Requires knowledgeable individuals who are able and willing to communicate and cooperate as a group. • Presence of supervisors may affect job incumbents' participation. • Requires a distraction-free and comfortable setting.
On-the-job Observation	
• Accomplished directly by observer or indirectly with a motion picture camera or an audio and video tape recorder. Simultaneous recording of personal observations is recommended. • Finds out what incumbents actually do, not what they say they do. • Few individuals involved. • Little if any interference with operational activities. • Appropriate for jobs with observable psychomotor tasks, especially when an incumbent, even with assistance, cannot describe what is actually done and how it is done. • Best way to obtain an understanding of job context or environment.	• Time and safety factors may preclude direct observation. • Not able to observe all possible conditions. • Expensive and time-consuming to observe. • Presence of observer or recording device may cause stress and/or bias performance. • Ineffective for jobs involving considerable personal judgment or mental application. • Observations should be checked and verified, whenever possible, by repetition, or by comparison with those of other competent observers. • Requires a trained and knowledgeable observer who is patient and nonthreatening. • Methods oriented and slanted to the incumbent's way of doing things.

Advantages	Disadvantages

Survey Techniques

- Useful when a large number of individuals perform the same job.
- Appropriate for jobs involving considerable personal judgment or mental application (intellectual tasks).
- Can survey a large number of geographically distant as well as mobile individuals economically by mail.
- Yields large amounts of quantifiable information in a relatively short period.
- Questionnaire can be completed, on the job or at home, at the individual's convenience.
- Bias is eliminated on questions that could be sensitive or embarrassing when asked by an interviewer.
- All individuals are asked the same questions in the same way.
- Responses can be stored, manipulated, analyzed, and reported by a computer.
- No need for trained observers or interviewers.

- Requires know-how, substantial time, and hard work to (a) develop questions, (b) write explicit instructions, (c) format and pilot the instrument, and (d) compile the information collected.
- A comprehensive questionnaire may be unduly long.
- Places a heavy demand on recall by those completing it.
- Questions may be misinterpreted.
- Some individuals may be distrustful and decline to complete the questionnaire or not provide honest, thoughtful responses.
- May be returned incomplete or filled in by unintended or inappropriate individual.
- Low response rate, especially when mailed and there is no monetary incentive or persistent follow-up.
- Address may be incomplete or inaccurate and questionnaire may not be forwarded.
- Does not facilitate further probing.
- May require a computer to manipulate the large amount of information collected.
- Inappropriate for low literacy groups.

APPENDIX B

TRAINING NEEDS ANALYSIS WORKSHEET

Requester: _____ **Date:** _____

1. Task requiring improvement: _____

2. Frequency of task performance: _____

3. Consequences of improperly performed task: _____

4. Reason(s) task requires improvement: _____

5. Training recommendation(s): _____

6. Training action plan, if applicable (identify individual/department responsible for delivery of training and the delivery method recommended): _____

_____ _____
(Training Analyst) (Date)

Reviewed By:

_____ _____
(Training Manager) (Date)

_____ _____
(Requester) (Date)

_____ _____
(Supervisor) (Date)

☐ Approve Recommendation ☐ Reject Recommendation

If recommendation is rejected, identify an alternative solution: _____

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 9

TESTING IN TRAINING AND DEVELOPMENT

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. Which of the following is a test, as defined in federal regulations barring unfair discrimination against employees?

   A. A pencil-and-paper personality inventory.
   B. A performance appraisal using rating scales.
   C. An unstructured interview with no standard questions or formal scoring or rating.
   D. All of the above.

2. To comply with federal regulations on the use of tests, employers must be able to demonstrate that

   A. tests are never used for employee hiring decisions.
   B. tests used are fair and not biased against members of "protected" groups.
   C. the same tests are used for all candidates for hiring or promotion.
   D. tests are used only to measure proficiency and not personality, intelligence, or other such traits.

3. Which one of the following statements about measures of interests and motivation is correct? These measures

   A. have proved to be the best predictors of success in management positions.
   B. suffer from "fakability", from the need to express preferences about poorly understood situations, and from other problems.
   C. have been very effective and justifiable when designed to mask their true intent.
   D. are especially useful because very complete research has been carried out on their application to personnel decisions.

NOTES

4. A manager wishing to know whether an employee has sufficient knowledge of company products to be placed on the job answering customer inquiries about product specifications would most likely use

   A. a norm-referenced test.
   B. a criterion-referenced performance test.
   C. a content-referenced test.
   D. an unreferenced test.

5. An indispensable element for successful evaluation of both individual and program performance is

   A. methods for making comparisons among employees and for communicating the comparisons to employees.
   B. good pencil-and-paper tests.
   C. standardized tests with national norms.
   D. a clear definition of the knowledge, skills, and abilities desired as a result of training.

6. When it is obtainable, the best indication of the success or failure of training programs is a

   A. good measure of employee performance on the job.
   B. written test of skills and knowledge following training.
   C. written test of skills and knowledge preceding and following training.
   D. testing procedure that closely simulates real job sites and tasks.

7. Developers of a test to be used to predict how well job candidates will score on some future measure of work effectiveness want their test to have what type of validity?

   A. Criterion-related.
   B. Concurrent.
   C. Construct.
   D. Content.

The University of Tennessee
Information Sheet

GUIDELINES FOR WRITING TEST ITEMS

Introduction

Test construction is a deliberate, time-consuming and somewhat difficult activity. However, **it is necessary** to evaluate the achievement of learning objectives. Consequently, every instructor must be able to construct test items to measure knowledge and skills.

Test items which measure student achievement are called criterion-referenced measures when they test the required behavioral actions against the criteria for successful performance that were identified in the learning objectives.

The nature of a learning objective determines the type of criterion test item needed; thus, paper and pencil items are used to assess knowledge and performance items are used to evaluate physical/manipulative skills. In choosing between any two equally valid means of evaluation, the instructor should make the selection on the basis of simplicity. Sufficient test items should be written for all learning objectives so that alternative forms, not just scrambled versions, of a test can be prepared for re-testing.

PART I

Preparing well-written test items is the form of scholarly writing that most demands clarity of both thought and expression. Most items must be brief, yet they should be clear and concise. Also consider the following handful of "Rules of English" which appeared in the Chronicle of Higher Education (May 19, 1982, author unknown).

1. Don't use no double negatives.
2. Make each pronoun agree with their antecedent.
3. Join clauses good, like a conjunction should.
4. When dangling, watch them participles.
5. About them sentence fragments.
6. Verbs has to agree with their subject.
7. Don't write run-on sentences they are hard to read.
8. Don't use commas, which are not necessary.
9. Try to not ever split infinitives.
10. Its important to use your apostrophe's correctly.
11. Proofread your writing to see if you any words out.

In addition, there are a number of other considerations involved. Listed below are descriptions of some of the more common types of test items, along with guidelines for writing those items.

True-False Items

True-False items are useful in testing knowledge of facts and details, especially when there are only two possible answers. The chief disadvantage of this type of test item is the probability of guessing.

1. Avoid irrelevant clues provided by specific determiners. A specific determiner is a key word which allows the students to guess the correct answer on the basis of test sophistication when they really do not know the answer. For example, statements which contain absolutes such as "all," "none," "never," "every," "always," "only," or "no" are usually false since unequivocally true or false statements are rare. Conversely, statements which contain the words "generally," "frequently," "sometimes," "could," "might," or "may" are usually true.

2. Avoid negatively worded items; they confuse the reader. Above all, avoid negatively worded false items. Consider this example:

   T F 1. Knowledge of results does not have a facilitating effect on learning.

   Note that in a straightforward form, i.e., "Knowledge of results has a facilitating effect on learning," it would be a relatively easy item. Worded in a negative fashion, it becomes very puzzling, and even the student who possesses the requisite knowledge might find it difficult to answer.

3. Avoid involved statements. Keep wording and sentence structure as simple and brief as possible. The purpose of a test item is to determine knowledge of subject matter rather than verbal puzzle-solving ability.

4. Test only one point (idea) in each item. Particularly, do not have two points, one of which is true and the other false. Here is an example:

   T F 2. Pacific Ocean salmon ascend fresh water rivers to spawn and then descend again to the ocean.

   When such items are keyed "false", there is always the possibility the student may receive credit for erroneous information. Consider this item, for example:

   T F 3. George Washington was first inaugurated President of the U.S. in Philadelphia on April 30, 1789.

   This statement is false since the inauguration was held in New York. Suppose, however, that a student thinks that Philadelphia is correct, but that the year was 1791 or that the date was other than April 30. This student, too, will mark the item "false" and will receive credit for the wrong reason.

5. Do not use "trick" items where an apparently true statement is rendered false by an insignificant detail. Take the following example:

   T F 4. The area of a rectangle 4 foot by 3 foot is equal to 12 square yards.

Multiple-Choice Items

Multiple-choice items can be used to measure the acquisition of facts, understanding, and the application of what has been learned. They require that the student select, from among four or five plausible choices (alternatives), the appropriate response. **The preliminary sentence** that poses the question or states the situation **is known as the stem**. The stem is typically worded either as a specific question or as an incomplete thought to which an answer can be stated concisely and for which plausible wrong answers can be created. In most cases, the same item idea can be written either way. The following is an example:

When was Virginia Colony first settled?

A. 1592
B. 1600
C. 1607
D. 1620

The same item worded as an incomplete thought.

Virginia Colony was first settled in

A. 1592
B. 1600
C. 1607
D. 1620

1. Make sure that the stem of each item contains a clearly defined idea or problem. Remember that the stem should be able to stand by itself and elicit free responses. If it cannot, in all likelihood the item is really a collection of true-false statements masquerading as a multiple-choice item. The following example shows how such items usually look.

Admiral Byrd

A. was the hero of the Battle of Manila Bay.
B. was the first man to climb Mr. Everest.
C. was a famous Antarctic explorer.
D. explored the Virgin Islands and claimed them for England.

The item idea is a simple one - the identification of Admiral Byrd. It would be best to rewrite this item as a simple question.

Who was Admiral Byrd?

A. The commander of the American fleet at the Battle of Manila Bay.
B. An Australian naval officer who became the first man to climb Mr. Everest.
C. An American naval officer famed for his Antarctic explorations.
D. A British naval officer who explored the Virgin Islands and claimed them for England.

2. Both stem and alternatives should be written so that the language is precise, and extraneous words and information are omitted. Here is an example of uneconomical use of words:

How are members of school boards usually chosen?

A. They are elected by the voters.
B. They are elected by the City Council.
C. They are elected by other members of the board.
D. They are elected by the State Board of Education.

This item should be rewritten as follows:

Who elects the members of a local school board?

A. Voters
B. City Council
C. Incumbent members of the board
D. State Board of Education

3. Types of multiple-choice items

3.1 One right answer
3.2 Best answer
3.3 Association
3.4 Analogy

Example of **one right answer** type

Directions: In each of the following items, draw a circle around the letter selected as the correct answer.

In the refrigeration cycle, heat is removed from the gas by the

A. compressor
B. evaporator
C. condenser
D. expansion valve

Example of the **best answer** type

Directions: In each of the following items, draw a circle around the letter selected as the best answer.

Mercury is used in thermometers because it

A. expands uniformly
B. does not freeze
C. does not boil
D. is highly visible
E. is plentiful

Example of **association** type

Directions: The following groups of words refer to gas welding. The first word is closely related to another word in the group. Select the word which is related most closely to the first word and place the identifying letter in the space provided. The first item serves as an example.

__C__ 1. Gauge: (A) rule, (B) torch, (C) pressure, (D) tip

_____ 2. Neutral: (A) tempering, (B) flame, (C) pressure, (D) annealing

Example of **analogy** type

Directions: In the following items, determine the relationship between the first two parts of the item. Then apply this relationship to the third and fourth parts. You will find the first two parts and the third given. The fourth must be selected from several choices on the basis of the relationship existing between the first two parts. The first item serves as an example.

__C__ 1. Triangle: three:: pentagon: ?

(A) two, (B) four, (C) five, (D) six

_____ 2. Solvent: plastic:: solder: ?

(A) cast iron, (B) galvanized, (C) black iron, (D) copper

4. Properly written multiple-choice items do not permit students to guess the correct answer. An effective and valid means of diverting the less informed student from the correct response is to use commonly made errors as distractors.

5. Alternatives such as "none of the above" or "all of the above" should be avoided.

6. Kinds of measurement obtained when the multiple choice test is used.

   6.1 **Does not** make a direct evaluation of the ability to explain, to name, to give reasons for, or similar abilities involving pupil expression.

   6.2 **Can** evaluate the achievement of specific objectives dealing with learner's ability to discriminate and make correct choices.

   6.3 **May** obtain only memory, or it may be reasoning or computational ability.

   6.4 **May** be used to apply important principles to new situations or to interpret unfamiliar data.

7. Advantages of multiple-choice tests

   7.1 Used to measure a greater variety of objectives than can other objective forms.

   7.2 Can be scored more objectively.

   7.3 Machine and other forms of answer sheets can be used to make correcting easier.

   7.4 Generally a more reliable test.

   7.5 Do not have to find a number of parallel relationships as in matching type items.

8. Limitations of multiple-choice tests

   8.1 Require more skill and more time to construct.

   8.2 Generally require more time to answer.

   8.3 Generally require more space per item on test.

9. Suggestions for constructing multiple-choice items

   9.1 Make each item practical and realistic. Avoid asking questions on trivial details and content that is merely interesting to know.

   9.2 Make certain the stem consists of a statement or an idea, not just a single word. Avoid negative statements since they often confuse the reader.

   9.3 Place all common elements in the stem of the item.

   9.4 Try to make all alternatives of about equal length.

   9.5 Have at least four, and preferably more, alternatives.

   9.6 Use plausible distractors. Do not include responses that are obviously wrong.

   9.7 Avoid use of cues that reveal correct answers.

   9.8 Make each item completely independent of every other item.

   9.9 Rotate the position (A, B, C, or D) of the correct answer in order to avoid a pattern.

10. Evaluation of multiple-choice items

10.1 Is the item as a whole realistic and practical?

10.2 Is each item independent of every other item?

10.3 Is the item as a whole specific?

10.4 Is the central problem clear?

10.5 Is the problem stated accurately, briefly, and completely?

10.6 Is each distractor important and plausible rather than obvious?

Matching Items

The matching item presents a set of problems and solutions and requires the learner to relate each problem to the appropriate solution.

1. Directions should clearly specify the basis upon which the matching is to be performed.

2. Each alternative solution should be a plausible answer for all (or most) of the problems. Here is an example of a faulty exercise:

_____ 1. Commander-in-chief of the American expeditionary force in World War I.	A.	Marne
_____ 2. Name of the famous World War I battle.	B.	Pershing
_____ 3. Date of Treaty of Versailles.	C.	Serbia
_____ 4. Country where incident igniting World War I occurred.	D.	1919

3. To reduce the probability of successful guessing, the number of alternative solutions should exceed the number of problem statements.

4. Always use the longer of the elements to be matched as the items and the shorter of the elements as the responses. Arranging the elements in this manner will reduce reading speed as an irrelevant factor in the exercise. Since the examinee must search among the responses for the correct answer, it is advisable to have these responses as short as possible. If the longer elements are used as responses, it may add considerably to the time the examinee needs to spend on the exercise.

Ordering Items

Ordering items require the student to arrange two or more referents (events, steps, processes, parts, etc.) in a specified order. The student may be given the referents in a mixed order, or he may be asked to name, as well as order, the referents.

1. Do not just say "place these in the proper order." Be sure to state what the basis for the ordering will be (alphabetical, chronological, procedural, etc.)

2. Be sure scoring directions are clear. Consider the fact that one misplaced item can throw all the other items out of their proper place.

Completion Items

The completion item requires the learner to furnish a key word, number, symbol or phrase to complete an idea.

1. Be sure that the item can be answered only by a unique word, phrase, or number. If it cannot, you may find yourself challenged by students who insist that their answer to the question is as correct as your own. Take this item as an example:

   Congress convenes in _____.

   Presumably the author of this item meant the answer to be "January." Disregarding the fact that it may also convene in other months, students could write "emergencies" or "Washington, DC" and present a good defense of their answer.

2. No extraneous clues to the answer should be provided.

   2.1 Use blanks of uniform length, and without spaces to indicate that more than one word is required.

   2.2 Avoid grammatical clues, such as the use of "a" or "an" before the blank.

Essay Items

The essay item is used to determine a learner's ability to supply and organize ideas and to express himself in writing.

1. The task presented to the learner should be defined as completely and specifically as possible.

2. The scoring key should include the criteria which student responses are to meet.

Performance Rating Checklists and Scales

While they are not really types of test items, the rating checklist is useful for evaluating student performances that can only be observed at the time the student is performing (diving, singing, giving a speech, etc.). These measures are also appropriate for non-testing situations that produce a tangible "product" (painting, business letters), and can even be used in place of a scoring key for essays.

1. Each dimension of the performance or product should be defined by a specific statement or question.

2. Each statement or question can be weighted according to its importance. A sample performance checklist is provided below.

   Checklist for a demonstration:

EXAMPLE

Learning Objective: (To be stated in behavioral terms)
DIRECTIONS (To be provided)

Behaviors	Yes	No	
1. All necessary tools and equipment on hand.	___	___	(2 points)
2. Necessary tools and equipment properly arranged.	___	___	(2 points)
3. Instructor talked to class, not to tools, etc.	___	___	(2 points)
4. Instructor demonstrated only one operation at a time.	___	___	(4 points)

A rating scale is similar to a checklist; however, instead of checking "yes" or "no" the teacher would rate the student's performance on each behavior on a scale (Example: 1 = excellent, 2 = good, 3 = fair, 4 = poor, 5 = unsatisfactory)

PART II

The type of test item you will use to measure a student's performance on an objective can be determined by the verb in your learning objective. Listed below are the various verbs and the types of test items normally associated with them.

Identify	Name	Describe
True-False Multiple Choice Matching	Completion	Essay Checklist Rating Scale
Order	**Construct**	**Demonstrate**
Ordering	Checklist Rating Scale	Checklist Rating Scale

When writing test items, make sure that the type of behavior called for in the objective is the type of behavior called for by the test item related to that objective.

PART III

The conditions listed in your objective (the "given") will determine what information you will give the student on the test. Consider the following objective:

"Given a list of the Presidents of the United States, the student will order them in the sequence in which they held the office of President."

If you were to write a test item for the above objective, you would include a list of the Presidents (in scrambled order) on the test. If you did not provide the student with a list of the Presidents, your test item would not meet the conditions listed in your objective.

Summary

When writing a test item, make sure:

A. the item is well-written (meets the criteria listed in Part I of this information sheet.)

B. the item requires the same student behavior as stated in the objective to which the item is related (as discussed in Part II of this handout).

C. the item presents the same condition as described in the objective to which the item is related (as discussed in Part III of this handout).

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 10

WORKFORCE PLANNING

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. An organization's plans for the development and use of human resources should

   A. increase productivity and profitability by concentrating on the organization's needs for specific skills and abilities.
   B. develop goals which combine meeting the organization's needs with efforts to promote individual growth and productivity.
   C. define individual growth goals only in terms of organizational needs.
   D. avoid the loss of efficiency that results from attempts to interrelate individual and organizational goals.

2. The most important requirements for bringing about planned, systematic change in an organization are

   A. the recognition of felt needs and the support of influential people.
   B. budgets and personnel exclusively devoted to change.
   C. numerous personal conflicts within the organization to justify change.
   D. emotional equality and fairness currently existing in the organization.

3. The Johari window, when used as a basis for career planning process, rests on the assumption that

   A. organizational goals and individual goals are ultimately incompatible.
   B. the mutual communication of information between the organization and individuals is the least important aspect of career planning.
   C. manpower planning is a more important function than career planning.
   D. the more the individual and the organization know about each other, the better.

NOTES

4. Job posting is

   A. usually desired by management but resisted by employees.
   B. a simple and effective way to give employees more control of their career planning.
   C. a good tool for manpower planning because it gives the organization full control over who will succeed to each position.
   D. not recommended in organizations with formal career planning programs.

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Training for Human Resource Development

The University of Tennessee
Pre-test No. 11

INSTRUCTIONAL SYSTEMS

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. The most effective training programs are based on

   A. job-relevant behaviors.
   B. general principles of work effectiveness.
   C. the development of behaviors that are not specific to single defined jobs.
   D. a content analysis.

2. In the early analysis of a proposed instructional program, the most critical step is

   A. establishing the body of information trainees will be required to learn.
   B. developing a task list of the behaviors desired.
   C. deciding on the methods and techniques to be used by instructors.
   D. assessing the training potential of proposed trainees.

3. When the decision has been made to measure the trainees' level before they enter a training program, the goal should be to

   A. obtain an objective measure of potential ability.
   B. sample the entire range of aptitudes that apply to the trainees' positions.
   C. measure the extent to which the trainees possess the particular skills and knowledge dealt with in the training program.
   D. develop a measure that will accurately predict the instructional criteria.

NOTES

4. A behavioral objective is a

   A. description of the overall goals of an educational system.
   B. test used at the beginning and end of instruction to measure improvement.
   C. description of the desired behavioral action, performance conditions, and standards of attainment.
   D. thorough description of the behaviors required of instructors to put the instructional system into practice.

5. The main criterion for validating and revising instructional systems is

   A. objective measures of whether internal consistency has been achieved.
   B. performance appraisals of materials writers.
   C. performance appraisals of instructors.
   D. measures of improved performance of actual tasks on the job.

6. In attempting to control the motivation to learn, management should

   A. minimize the belief that trainees risk losing their job if they do poorly in a training program.
   B. take advantage of the trainees' fear of loss of job or loss of advancement to create strong motivation.
   C. avoid any systematic efforts to increase motivation because such efforts result in resistance.
   D. stress that the training is a job requirement and that the trainees must put forth their best effort whether they are motivated or not.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 12

THE PERFORMANCE AUDIT

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. Why might a company decide to begin using performance audits?

   A. It might wish to increase the extent to which training is relevant and helpful to employees on the job.
   B. It might wish to be able to distinguish between problems that are solvable through training and those that are not.
   C. It might be seeking solutions to genuine performance problems.
   D. All of the above.

2. The model of human performance on which the performance audit is based predicts that

   A. the consequences of behavior strongly control whether the behavior will be likely to recur.
   B. behaviors are impelled by prior circumstances and are little affected by expected consequences.
   C. difficult performances will always be avoided no matter what the consequences.
   D. the only cause of desired behavior failing to occur is poor definition of the job situation.

3. A goal of the economic aspects of a performance audit is to

   A. decide whether there will be sufficient economic benefit to justify the effort to improve specific performances.
   B. reduce the extent to which training decisions are based on economic factors.
   C. provide accurate estimates of training costs.
   D. substitute human behavior measures for previously used economic measures.

NOTES

4. When a manufacturing company had a problem of poor product quality, studies showed that machine operators did not have the skill to make the frequent adjustments needed and were not aware of the results of quality-control tests. Using the performance model, managers would probably conclude that

   A. a training program would be sufficient to solve the problem.
   B. employees needed training, feedback of results, and knowledge of management's concern about quality.
   C. quality standards would have to be changed.
   D. the problem could be solved most easily by replacing the workers.

5. Improving employee performance in a particular kind of job is most likely to have a favorable economic result when

   A. the best performer is currently much better than the worst performer.
   B. the best performer and the worst performer are currently nearly equal in performance.
   C. the contributions of different types and levels of employees cannot be determined.
   D. both the best and worst performers are very good.

6. The best kind of analysis to begin with when a training course has been proposed is

   A. level III; set course objectives and methods.
   B. level II; find causes of deficiencies and set strategies for improvement.
   C. level I; determine economic effects of various performance changes and estimate the worth of each.
   D. None of these analyses would be appropriate for a training course.

SELF-DIRECTED WORK GROUPS

Self-directed work groups represent a dramatic change from traditional work designs, which are typically characterized by their hierarchical management structures, numerous job classifications, and an adversarial union-management relationship. In contrast, self-directed work groups involve small groups of employees, functioning as integrated work teams.

The group is the basic unit around which work is accomplished. Group members assume greater responsibility and accountability for the products they produce, with less need for direct management involvement. Less restrictive job classifications allow group members to perform a broader range of tasks within a defined work process, thus alleviating the monotony commonly associated with performing repetitive tasks.

Given our cultural admiration for the traits of self-reliance and independence, improved productivity and product quality will undoubtedly result when workers are empowered to direct and manage their own work. Reports from several projects, such as the Saturn experiment, have confirmed this conclusion.

Self-directed work groups are not without their critics, however. Two related concerns have frequently been expressed. First, authors from a labor perspective argue that what is good for the organization is not necessarily also good for the individual. The organization may achieve higher levels of productivity and quality, but at a high cost to the individual employee. Schemes such as self-directed or autonomous work groups induce stress and anxiety, not unlike the old speed-up systems, thereby increasing the probability of accidents and stress-related illnesses.

Second, some organizational researchers caution that self-directed work groups may be a popular solution in search of a problem. That is, self-directed work groups may be proposed without benefit of an assessment of the situation and mutual agreement about the organization's future course. For example, consider a manufacturing company that is experiencing low productivity and high defect rates. If these problems are actually caused by simmering contractual issues, unrelated to the existing work design, then the use of self-directed work groups is not likely to improve the situation significantly. In fact, such an approach would be more apt to increase the intensity of existing problems, since **mutual trust is considered a prerequisite for planned change**.

Both union and non-union organizations are affected by issues related to planning and implementing self-directed work groups. Both situations require manager-employee cooperation in jointly planning and implementing changes in the work environment.

Unfortunately, no needs assessment or strategic change models presently exist to guide joint management-employee planning activities. If more can be learned about how organizations presently plan and use self-directed work groups, and if this information can be used to help develop better joint planning and implementation models, then more effective use of this work design is assured.

MEETINGS

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. For most meetings, the ideal result of planning and leadership is to

   A. accomplish the specific tasks set for the meeting, without wasting time on other matters.
   B. satisfy the needs of the individuals in the group.
   C. keep group attention centered entirely on agenda items established by the leader.
   D. facilitate satisfaction of individual and group needs while accomplishing specific tasks.

2. The number of participants who may attend a meeting without an adverse effect is greatest when the specific objective of the meeting is to

   A. inform.
   B. define and plan.
   C. create.
   D. resolve and decide.

3. The individual growth of meeting participants is most attributable to

   A. the technique used by the leader.
   B. the physical facilities selected.
   C. the dynamics which occur within the group.
   D. the agenda and minutes.

4. The best reason for holding a meeting is to

   A. discuss personnel matters.
   B. gather informed opinions for group decision making.
   C. brief the group on an issue covered in a memo.
   D. assign tasks.

MEETING TIPS

Introduction:

Like a product, a meeting should produce a return. Meeting leading is not one of the skills that people are ordinarily hired or promoted for, yet failure here is rather common. A meeting should be compared to a product or service. No company would consider investment in an item that would not produce a return. It is the same with meetings. Though the return on investment can't always be measured immediately, it can be seen through active, informed people who have a workable plan for getting some specific work done. Every meeting should produce a "return on investment".

Ten Time Tips for Meetings:

1. Issue the agenda well in advance. It should include starting time, anticipated stopping time, time allocated to each item to be discussed. Be sure to state the objective of the meeting.

2. When making up the agenda, put important items first to avoid rushing through them near the end of the meeting.

3. Invite as few people as possible.

4. Start on time regardless. And don't summarize for late arrivals.

5. Don't let people air their views unless it will help reach the meeting's objective.

6. At the end of the meeting, summarize the decision reached and the responsibilities assigned.

7. End the meeting when the objective is reached.

8. Keep minutes brief. Highlight the decisions reached and the action to be taken. Include deadlines.

9. Issue minutes promptly after each meeting while it's still fresh in everyone's mind.

10. Always evaluate the success of a meeting. Ask what could be improved the next time.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Pre-test No. 14

USING EXTERNAL RESOURCES

Directions: Each of the following items contains four (4) alternatives, one of which provides the **best answer** to the item. Circle the letter which precedes the best answer.

NOTES

1. Who has the primary responsibility for determining what changes in job performance should occur?

   A. Trainer
   B. Line organization
   C. External training resource
   D. Trainees

2. The best way for a trainer to deal with the identification of training needs is to

   A. periodically circulate check-off lists of courses available.
   B. wait for line managers to initiate requests for training because these requests will reflect true problem areas.
   C. choose technically and educationally sound courses and locate problem areas in the organization where they will help.
   D. systematically and continually collect data to help identify problem areas.

3. If, in a practical situation, time available does not permit a thorough analysis of the causes and likely remedies of performance deficiencies, the best answer usually is to

   A. give no training at all.
   B. modify an off-the-shelf package.
   C. undertake a crash internal development program.
   D. use an external source of training.

NOTES

4. Tailoring programs from external resources to specific local needs is easiest

   A. with prepackaged media presentations.
   B. for traditional courses in which objectives are not clearly and specifically defined.
   C. when both training needs and course objectives are defined behaviorally.
   D. for computer-aided instruction.

5. In deciding on class size for programs provided by external resources,

   A. it is often necessary to compromise between the small class size desired by line managers and the large classes desired by the external resource.
   B. it is often necessary to compromise between the large class size desired by line managers and the small classes desired by the external resource.
   C. facilities and equipment should not be allowed to limit class size.
   D. classes should be made as large as physically possible so all trainees can be accommodated in the fewest sessions.

INDIVIDUALIZATION OF INSTRUCTION

Pace, Content, Sequence, and Style of Instruction

Instructional systems combine organized collections of subject matter content with appropriate procedures for presenting the content to bring about learning outcomes. In individualized systems of instruction, the pace, content, sequence, and/or style of instruction are adjusted to the needs of individual learners.

Pace

Pace refers to the rate at which individuals progress through instructional content. It may be individualized in either or both of two ways. First, pace may be individualized by allowing individuals to proceed as rapidly as they can comprehend the material or as slowly as they wish through a set of instructional items.

Second, different numbers of items may be presented to different individuals. In this situation, items may be randomly generated by computer or the instruction may involve simulation of a device or situation. It may also occur when items are repeated or sampled from a fixed quantity. When different numbers of items are presented, pace may be further individualized through the rate with which new instructional content or levels of difficulty are introduced.

Content

Content is usually individualized through a diagnostic-prescriptive process. The individual's knowledge and skills are assessed prior to initiating work in any component of instruction. Components may range from the entire program of instruction, to a unit, or to a single item. Based on the results of the assessment, content is diagnostically adjusted to the individual's needs by prescribing that he/she skip the component entirely, study remedial material before working on it, or begin work in one or more "tracks" within the component itself.

The assessment and instructional stages are not necessarily distinct. In some implementations, as the individual receives instruction, procedures built into the system adjust the content and its presentation in accordance with that individual's performance and estimated knowledge.

Sequence

Individualization of **sequence** can occur at two levels. At a macro level it concerns the order of topics addressed by the instruction. Implementations at this level may involve individual control, whereby the sequence of topics is determined by each individual learner. Alternatively, the instructional sequence may be determined in conference(s) between the individual and instructor or other system coordinator, or it may be determined solely by established procedure or algorithm.

At a micro level, individualization of sequence determines the order in which items are presented. The sequencing of items may be unique for each individual, but it is not tailored to personal needs or interests. Applications at this level may simply present items in an arbitrary or random order.

Style

The manner in which different individuals receive, process, store, and recall information may differ. These differences have been called cognitive styles. Instructional systems that try to adjust to these differences are said to provide individualization of **style**. In practice, individualization of style usually involves adjusting the method of delivery. For example, instructional content may be presented using printed materials alone, audiovisual media alone, or some combination of the two that is consistent with the cognitive style of the individual.

Individualization of style is not as widely utilized as individualization of pace, content, and sequence. In addition, the literature suggests that it is less expensive and more efficient for individuals to adjust their learning style to instruction than for instruction to adjust its style to learners, but research has not yet settled the issue. Brent (1990) and Federico and Landis (1984) summarize much of the research on cognitive style and report data suggesting that individualization of style is beneficial to learners, but that **the extent of these benefits depends on the learning objectives and instructional content.**

Recapturing the Effectiveness of Tutoring Without the Cost

The practice of grouping students together in a classroom took hold during the Industrial Revolution. While **group instruction made mass education and training economically and administratively feasible**, it was at the expense of the individualized tailoring of instruction provided by one instructor working with one student. Bloom (1984) characterized this issue as the "2-sigma problem." He found that when instructional time is held constant, **students in a conventional classroom (with about 30 students and one teacher) score about two standard deviations lower than students given individual tutoring.**

Bloom defined the challenge for individualized instruction as one of recapturing the two standard deviations of achievement lost by group instruction. Accordingly, **individualized systems of instruction can be viewed as attempts to recapture the effectiveness of individual tutoring without the expense.**

Technological Contributions

Technology's first significant contribution to instruction occurred in the 1400s with Johannes Gutenberg's development of movable type and printed books. These developments made instructional content affordable to large numbers of people.

A second significant contribution of technology to individualized instruction occurred with the development of stored-program computers. Computers have made not only the content but also the interactions of effective instruction inexpensively available to large numbers of people.

Computers implement the procedures for presenting instructional content that are key to individualization of instruction. However, Clark (1983) reminds us that "computer-based instruction" is too diffuse a term to describe any particular system or approach to instruction.

The following discussion considers **print-oriented** and **computer-oriented** approaches to individualized instruction. Print-oriented approaches emphasize the use of paper (hard copy) materials, while computer-oriented systems capitalize on the promise of computer technology. Both approaches may use printed materials; the differences between the two primarily concern the amount of work performed by computers.

Individualized Instruction: Print-Oriented Approaches

Print-oriented approaches, such as modules, divide instructional content into units of instruction. Then, for each unit, they provide a pre-assessment (pre-test), an individualized prescription and presentation of instructional content based on the pre-assessment, the instruction itself, and a post-assessment

(post-test). Students must attain criterion levels of knowledge and/or performance on the post-assessment before progressing to the next unit of instruction.

Programmed Instruction

Development of programmed instruction was directly influenced by B.F. Skinner's paper, "The Science of Learning and the Art of Teaching" (1954). His "extrinsic programming" breaks instructional material into a linear series of steps requiring learners to make active responses for which they receive immediate feedback. The steps are intended to be so small that the individuals' responses are almost always correct. Neither the content, sequence, nor style of presentation are adjusted for individual learners, but individuals determine the pace at which they complete the items and progress through the material.

Despite Skinner's impact on programmed instruction, most applications of this approach are closer to the "intrinsic programming" described by Crowder (1962) and commonly used in programmed texts and tutorial computer-based instruction. Intrinsic programming is a pragmatic compromise between the difficulties and expense of devising Skinnerian extrinsically programmed materials and the inflexibilities of group instruction.

Intrinsic programming permits larger instructional steps than extrinsic programming, but it still emphasizes active responding and immediate feedback to learners. All responses, correct or incorrect, can be examined and used to determine paths

for continuing instruction. Intrinsic programming requires instructional developers to anticipate the wrong responses likely to be made by individuals and the remedial material needed to correct the misconceptions and provide information they lack. In this way, intrinsic programming can support individualization of pace, content, sequence, and style.

Hartley (1977), Kulik, Cohen, and Ebeling (1980), and Kulik, Schwalb, and Kulik (1982) have all reviewed research findings on the effectiveness of programmed instruction, although they did not distinguish between extrinsic and intrinsic programming. Hartley reviewed results from 89 studies of elementary and secondary school mathematics instruction and reported an average improvement of 0.11 standard deviations through the use of programmed instruction.

In a review of 57 studies, Kulik et al. (1980) reported that programmed instruction used in higher education to present a variety of subjects improved performance by about 0.24 standard deviations over conventional instruction. In a review of 47 comparisons, Kulik and others (1982) reported that programmed instruction used in secondary education to present a variety of subjects improved performance by about 0.08 standard deviations. Overall, these **results suggest that the positive impact of programmed instruction is genuine, but limited.**

Programmed Texts and Teaching Machines

After instructional content has been programmed, it must be presented to the student by means of some type of "holder," such

as a programmed text or teaching machine. Programmed texts and teaching machines are, however, limited primarily to teaching knowledge-level material. Teaching manipulative skills requires the use of actual job equipment or a simulator. It is also important that skill training take place in an environment which duplicates the operational environment as closely as possible.

Many authorities are convinced that a programmed text is sufficient for most programmed instruction. Such texts have been developed for a wide variety of subjects, including mathematics, electricity-electronics, foreign languages, accounting, management, computers and data processing, and medicine.

A teaching machine is a mechanical or electronic device that presents instructional content to students on an individual basis. Students have their own machines and receive instruction as fast as they can absorb it. Assuming, of course, that the student needs the instruction to begin with, machines provide instruction which is both individualized and self-paced.

Teaching machines are produced with varying degrees of complexity and special features; however, they all represent some form of tutorial teaching. They present each student with problems, exercises, questions, and answers.

The difference between teaching machines and most other individual instructional methods is that teaching machines provide immediate feedback to students. Errors can be corrected immediately because students are made aware of their progress

during each phase of instruction. Thus, teaching machines differ from other media in three ways:

1. Students must respond continuously and actively, providing explicit practice and testing of each step of what is to be learned.

2. Students receive immediate feedback on their responses, so that errors can be corrected.

3. Students proceed on an individual basis at their own pace -- faster students advancing rapidly through an instructional sequence, slower students being tutored as slowly as necessary, with infinite patience to meet their special needs.

The nature of teaching machines and programmed instruction provides a channeling of student activity into a relatively narrow chain of experiences. Only a small portion of the lesson is available at any one time, so students cannot advance or regress unless that action is programmed into the lesson or machine.

In presenting a program, a teaching machine provides immediate feedback on all student responses. Unlike a programmed text, students cannot see the feedback before responding. Students are therefore obliged to subject themselves to all the conditioning designed into the programmed lesson.

Teaching machines usually maintain a record of student performance. This record can be used to analyze progress and serve as a basis for determining future studies. Collectively, a

group of student records may be used to determine what curriculum changes are required.

Some feel that the teaching machine provides a constant motivational factor to the student. The student is challenged to "beat the machine." Others claim that this fascination wears off after a time, and once it does, the machine is no more effective than a programmed text (AFM 50-62, 1984, p. 19-5).

Personalized System of Instruction

Keller's Personalized System of Instruction (PSI) was disseminated by his 1968 article, "Goodbye, teacher ...." PSI has been used primarily to replace lecture-based, classroom teaching in higher education. Keller listed five features that distinguish PSI from other instructional systems: (a) the unit mastery requirement, (b) student self-pacing, (c) student proctors, (d) reliance on written instruction, and (e) de-emphasis on lectures.

Like Crowder's intrinsic programming, Keller's PSI uses larger steps than those recommended for Skinner's extrinsic programming. It separates instructional content into content units that are presented in a linear sequence, and it requires students to demonstrate mastery of each unit before proceeding to the next.

Unlike intrinsic programming, PSI leaves most of the individualization up to the individuals. In place of the within-unit instructional items of intrinsic programming, learners receive study guides. Each study guide introduces its unit,

lists learning objectives, suggests instructional resources for attaining the objectives, and recommends study questions to help students prepare for the mastery examinations.

PSI takes a hint from peer tutoring in its use of proctors to guide students. The proctors are generally recent graduates of the course and are chosen for their "mastery of the course content and orientation ... maturity of judgement ... understanding of the special problems that confront [beginners] and ... willingness to assist" (Keller, 1968, p. 81). Keller suggests that the use of proctors is the major innovative component of his approach.

Perhaps the most comprehensive review of PSI effectiveness is a meta-analysis documented by Kulik, Kulik, and Cohen (1979a). These researchers reported that the PSI programs studied raised final examination scores by about 0.50 standard deviations over programs using conventional (non-PSI) instruction. They also found that PSI produced less variation in achievement, higher student ratings, and fewer course withdrawals, and that these favorable results occurred across a variety of subject matters and course settings.

Nevertheless, Keller, writing in 1985, was pessimistic about the future of PSI. Problems he cited as most prevalent were the investment of instructor time needed to set up PSI courses and the general lack of support from university administrators. Lloyd and Lloyd (1986) corroborated his concerns. They reported

that progressively fewer PSI courses are being taught and many of those depart substantially from the recommended PSI format.

Audio-Tutorial Approach

The audio-tutorial (A-T) approach resembles PSI in that it also modularizes instructional content into units, is mostly applied in higher education, and leaves much of the individualization up to the students. Its basic form was developed in the early 1960s by Samuel Postlethwait and later described by Postlethwait, Novak, and Murray (1972). It consists of (a) individual study sessions using audio tapes and/or other self-study media; (b) weekly group assembly sessions for lectures, films, and major examinations; and (c) small group (6-10 students) quiz sessions. In its early form, the sequence of content units was linear and each unit was intended to encompass about a week's work, limiting individualization of both pace and sequence.

In later forms, A-T evolved into the concept of mini-courses, self-contained modules of varying length that can be presented in a variety of sequences. The mini-courses resemble A-T content units in that students begin with a study guide and a list of learning objectives and then proceed to the usual A-T individual study sessions, group sessions, and small group work. After an established period of time, their knowledge of the unit is assessed by an examination given in a group session.

As with PSI, the most thorough assessment of A-T was performed by Kulik and his associates (Kulik, Kulik, & Cohen,

1979b). In summarizing the results of 42 studies, Kulik et al. reported that A-T increased overall student achievement by about 0.20 standard deviations over conventional means of instruction. This finding held up over a variety of subject matters and higher education settings. Thus, **the overall positive impact of A-T, like programmed instruction, appears to be genuine, but small.**

Individualized Instruction: Computer-Oriented Approaches

Computer-oriented approaches can provide individualization of pace, content, sequence, and style of instruction. These approaches have been reviewed and were found to be effective (Niemiec & Walberg, 1987). Fletcher (1991), however, has suggested that their effectiveness may be significantly increased by including multimedia capabilities.

Computers can be used directly to teach, as in computer-assisted instruction (CAI), and to manage instructional processes, as in computer-managed instruction (CMI). CAI and CMI are often presented as contrasting approaches. However, CMI may include CAI among its prescriptions, to manage student progress; and both may be used to support individualized systems of instruction.

Of the computer-oriented systems discussed here, Individually Prescribed Instruction (IPI), the Adaptive Learning Environments Model (ALEM), and the program for learning in accordance with needs (Project PLAN) use computer resources to help manage instruction. The strands approach, optimized

instruction, and intelligent computer-assisted instruction use computers directly to teach.

Individually Prescribed Instruction

Individually prescribed instruction (IPI) was developed in the mid-1960s at the University of Pittsburgh's Learning Research and Development Center as an individualized system of instruction. As with the PSI and A-T approaches, development and use of learning objectives are emphasized and content is modularized into units. Each content unit is preceded by a pre-test, which determines if the unit objectives have already been attained by individual students. Results of the pre-tests are then used to prescribe the instructional content that individuals are to study. A post-test is administered at the end of each content unit. As in PSI, individuals must demonstrate mastery of each unit's learning objectives on the post-test before proceeding.

Adaptive Learning Environments Model

IPI evolved into the adaptive learning environments model (ALEM), which was described by Wang and Walberg (1983). ALEM combines aspects of prescriptive instruction from IPI with independent inquiry and social cooperation from open education. It allows greater adjustment of content than does IPI for individuals with remedial needs by providing tailored learning activities for them. It allows for individualization of pace, content, sequence, and style of instruction.

ALEM includes an organizational structure to help schools implement its essential components. This structure consists of (a) a basic skills curriculum of both highly structured and open-ended activities, (b) an instructional management system that guides use of instructional time and material resources, (c) a family involvement component to integrate school and home learning, (d) a system to devise flexible grouping of students and team teaching, and (e) a staff development component to aid monitoring and implementation of the program. Its central objectives are time related. ALEM is intended to reduce learning time, while increasing the time actually spent on learning and instruction.

Program for Learning in Accordance with Needs

Like IPI and ALEM, the program for learning in accordance with needs (PLAN) used computer resources to manage instruction. It also emphasized the development of learning objectives. It was developed in the late 1960s by the American Institutes for Research, Westinghouse Learning Corporation, and 14 school districts (Flanagan, Shanner, Brudner, & Marker, 1975), but fell into disuse, for a variety of reasons, in the late 1970s.

PLAN included about 6000 learning objectives for language arts, mathematics, and science in Grades 1-12. The instruction was divided into teaching-learning units (TLUs) that were developed for each learning objective. A computer facility was used to collect, store, and process information on student performance and progress.

Like most classroom systems for individualizing instruction, PLAN used diagnostic-prescriptive procedures to determine what instructional content to present. Periodically, a teacher and an individual student would decide on a subset of objectives that the student was to attain next, based on the student's school history and placement test results, which were stored in the computer system. The student was then assigned objectives and given a TLU study guide for each. Each TLU study guide identified instructional resources and activities to be used in attaining its objective. Unlike IPI, these resources were almost always commercial materials that were not specifically developed for this system. PLAN included tests to help teachers assess student progress and a program to train teachers and administrators in its proper use.

Strands Approach

Computer-assisted instruction (CAI) may be divided into four categories:

1. **Drill and practice** – primarily supported by the strands approach; involves the presentation of relatively discrete items to students for the purpose of practice

2. **Tutorial CAI** – generally based on and differs little from Crowderian intrinsic programming (described under the heading Programmed Instruction); resembles programmed instruction

3. **Tutorial simulation** – a computer is used to emulate a device or situation; typically found in training applications of CAI, but increasingly common in educational applications

4. **Tutorial dialogue** – an attempt to directly incorporate the features and benefits of one-on-one, teacher-student interaction in a computer program

Tutorial dialogues, frequently in combination with tutorial simulation, are implemented using intelligent computer-assisted instruction.

The strands approach has been widely used in computer curriculum development since it was conceived at Stanford University in the 1960s.

The term "strand" identifies a basic component skill of the instructional content. For instance, letter identification is a strand in beginning reading instruction and single column addition is a strand in beginning arithmetic instruction. Progress within strands is criterion dependent. Students proceed to a new exercise or new instructional content within a strand only after they attain some performance criterion in the current exercise, thereby providing a running assessment of their progress that can be examined by teachers and system administrators at any time. Students usually work in several strands during a single session, and branching between these strands is time dependent. Students move from one strand to take up where they left off in another strand after an individually specified amount of time. Initial entry into a strand depends on progress in other strands. The strands approach allows for individualization of pace, content, sequence, and style of instruction.

No overall review of the effectiveness of the strands approach was found in the literature, but assessments of individual CBI programs using it have reported favorable results. Suppes, Fletcher, and Zanotti (1976) showed that time spent in strands mathematics could predict instructional progress to the nearest tenth of a grade placement in standardized tests. Ragosta et al. (1982) reported an average improvement of 0.26 standard deviations in achievement for strands applications in mathematics over less-individualized instruction approaches.

Intelligent Computer-Assisted Instruction

The development of individualized programs of instruction that apply computer-based representations of knowledge to the problems of instruction has been directly supported by the emergence of cognitive science. These approaches provide powerful means for individualizing pace, content, sequence, and style of instruction.

Intelligent computer-assisted instruction (ICAI) may be as unintelligently designed as any other approach to instruction. "Intelligence", in this case, suggests an attempt to apply knowledge-based or information-structure-oriented (ISO) approaches to the processes of instruction. Carbonell (1970) contrasted these ISO approaches with ad hoc frame-oriented (AFO) approaches based on programmed instruction techniques such as intrinsic programming.

AFO approaches depend on preprogrammed blocks of static material usually called frames. These frames consist of

instructional material followed by questions. Associated with the questions are prespecified correct and incorrect answers that are matched with students' responses. Students have no opportunities to ask questions unless they match the prespecified query options provided by the system developers.

The ISO approach is based on a knowledge representation of the subject matter. A separate tutorial program operates on the knowledge representation, in order to generate instructional material, including questions and the answers to them, and responds to inquiries initiated by students. Discussions concerning the subject matter can be initiated either by the computer program or by the student. This capability for mixed initiative is characteristic of all intelligent computer-assisted instruction. This approach depends on the generation of material from the knowledge base rather than on preprogrammed material and pre-stored, anticipated student responses. To accomplish its objectives, an ICAI program must include three capabilities. It must represent

1. The relevant knowledge domain, including both a subject matter expert's understanding and that expert's ability to explain it to learners (Brown, Burton, & deKleer, 1982).

2. The student's state of knowledge, or model, of the subject matter, providing both diagnostic support for instruction and a representation of the student's misconceptions (Clancey, 1986).

3. An expert tutor, providing the means to sustain the student from one state of knowledge to another (Halff, 1988).

Wenger (1987) provided a comprehensive overview of ICAI systems and Psotka, Massey, and Mutter (1988) described many specific implementations of ICAI. Despite the number of years ICAI systems have been in development, information on their use in instructional settings is only beginning to emerge, and few conclusions can currently be drawn about their effectiveness.

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MICROCOMPUTER-CONTROLLED INTERACTIVE VIDEODISC:

A TRAINING TOOL

by Clifton P. Campbell

Apprenticeship and other forms of tutorial training have been successful modes of instruction since ancient times. Apprentices received personalized training through direct interaction with a master craftsman. The master got to know the aptitudes and abilities of each individual, and each apprentice's learning pace was determined in part by his ability. However, there were relatively few masters, and each could handle only a small number of selected apprentices.

In recent years, a number of technological innovations have made the good features of apprenticeship, i.e., one-on-one interactive learning from a master, widely available. With the advent of motion pictures, filmstrips, film loops, and videotapes, the master craftsman's demonstrations could be recorded and shown to others almost anytime and anywhere. Trainees could also watch the demonstration repeatedly in order to be sure that they "got it just right."

The microcomputer has added a new dimension to this replication of the master craftsman, an unsurpassed interactivity, simulation, and individualization of instruction. The computer can not only provide instruction tailored to the responses of the trainee, but can also facilitate practice of the skills to be learned in a safe and less costly environment. The computer is more patient than any human, permitting as much waiting time, repetition, or branching as the individual trainee requires to attain the necessary knowledge and skills. It is without parallel in remedial and tutorial applications.

Recent developments in videodisc technology have added still another dimension to the interactivity possible with the microcomputer. For some time, the primary use of videodiscs has been home entertainment. When controlled by a microcomputer, the videodisc system changes from this passive (entertainment) mode to a truly interactive technology.

A videodisc system consists of a (a) pre-recorded vinyl videodisc, resembling a phonograph record; (b) videodisc player; and (c) television monitor. The two types of videodisc technology are capacitance (mechanical) and optical. Since optical discs are read by a programmed laser beam, they are better for use with, and control by, a microcomputer (Gold, 1982).

Optical discs, although expensive, are versatile. Data on an optical disc can be read nonlinearly; thus, information from any one of the 54,000 frames per side can be retrieved rapidly, and in any order. This is not possible with the capacitance disc which must be read linearly. Because of their versatility, optical discs are suitable for interactive instruction where branching within the instructional program takes place and where the trainee needs access to the material in any order (Paris & Boss, 1982). A single program may have many beginnings, middles, and ends, for true individualization. This feature plays a major part in training and development programs, and a microcomputer-driven optical system can profoundly affect the way people learn.

Features of optical videodisc systems include automatic frame freeze and recall (for closer or lengthy study); dual audio tracks, which facilitate the use of two different languages, or remedial/basic or basic/gifted instruction; and adjustable forward/reverse speed control. These features work in unison to increase learner productivity because learners can interact with the material at their own pace and generally at a time of their own choosing.

Heuston (1977) wrote about three important technologies that education has attempted to harness — the book, the motion picture (television), and the computer. Each has its own strengths and weaknesses. He reported that the videodisc, when interfaced with a microcomputer, combines the strengths of these three technologies — excellent presentation

format and learner productivity (random access of audio and visual material, motion, freeze-frame capabilities, interactivity) — without any of their weaknesses.

The marriage of microcomputer and videodisc systems provides completely interactive audiovisual responsive learning that can bring the skills of a master craftsman to every trainee, rather than to only a few selected apprentices. It's as if each trainee is apprenticed to a master craftsman, who is also a great teacher, with abundant patience.

The Microcomputer Controlled Interactive Videodisc is not just another medium of instruction or another delivery system. Picture yourself seated in front of a television monitor. You hear a voice describing how the oxyacetylene welding trainee is to "puddle", moving the molten metal across a steel plate. You hear the sound of the torch as the master welder executes a perfect weld. Half-frame matching of completed welds shows when the torch moved too fast, too slow, or was too high or too low. The images displayed in this segment of the instructional program were originally recorded on a videotape and were then transferred to an optical videodisc.

The videodisc player, itself an impressive device, is cabled to a television monitor with a touch sensitive screen, a graphics interface, and an audio cassette recorder. These devices are all under the control of a microcomputer, thus forming a microcomputer-controlled interactive videodisc-based training system.

Following a short motion sequence which illustrates a perfect weld as well as the consequences of moving a torch improperly, a computer-generated question rolls onto the screen in print, against a colored background and a picture of one of the imperfect welds. The trainee responds by touching the screen which then branches to the next discrimination that he/she is to make, or to an appropriate remedial frame. At another point, the trainee is asked to adjust the torch by increasing the oxygen or the acetylene gas flow. When the flame is properly adjusted,

the trainee is branched to the next lesson. Sometimes, overlay graphics appear over the pictures, while at other times computer-generated drawings replace the video-image.

At first view, use of a microcomputer-controlled interactive videodisc system as a training tool seems almost too good to be true. With properly designed software and courseware, it can:

- present accurate material at an appropriate level for each trainee
- function as a tutor with infinite patience
- permit trainee control of the learning
- provide the trainee with an understandable expert's demonstration or description of the skill and/or knowledge to be learned
- actively involve the trainee throughout the training program
- provide opportunities for the trainee to perform the skill or use the knowledge in a simulated environment under conditions approximating reality
- motivate and encourage trainees because they learn at their own pace, enjoying a one-to-one relationship with the computer and monitor, and without group evaluation and judgment
- enable trainees to test themselves on the knowledge and skills taught, and provide immediate and appropriate feedback
- provide certain alternative learning strategies to meet the range of individual learning characteristics found in most trainee populations
- measure performance under simulated conditions and provide results to both the trainee and the instructor

Presently, videodisc technology has some shortcomings: (a) developing effective interactive software is difficult; (b) there is a critical shortage of technical instructional developers (Fletcher,

1979); (c) disc production is expensive, especially when producing only a limited number of discs; (d) the initial cost of a videodisc player is expensive; (e) the selection of interactive discs is limited (Berger, 1981); (f) revisions require remastering the original disc; (g) presently, the disc cannot be recorded by individuals — it is only a playback medium, but in time this should change (Haugbey, 1983).

However, this marriage of microcomputer, videodisc player, television monitor, and a videodisc is beginning to have major implications for training and development programs. It has great potential for delivering instruction not only in the more traditional interactive formats but also in various discovery learning modes in which trainees may explore the "training territory", discovering and exploring their way to competence. Videodisc technology represents a quantum leap forward in providing quality apprenticeship training to large numbers of students.

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A POINT OF VIEW ON INDIVIDUALIZED INSTRUCTION

It has been said that to individualize instruction fully, instructional materials must be prepared for all "learning styles." Some individuals prefer to learn by reading, while others prefer listening or seeing visual images.

Ideally, individualized instruction would offer instruction in an unlimited variety of media. Print, video and audio tapes, CD-ROMs, slides, and other media would all be available. The purpose of the variety is to allow trainees to choose the medium or media that they prefer. Notwithstanding learning style and media preferences, the simple but profound fact is that most **people learn best by doing.**

Providing instruction in all possible media is unrealistic. Such an approach would require that each (a) lesson be developed in every possible medium, and (b) trainee receive a custom-tailored course. Few, if any, organizations can or would provide the unlimited resources involved in such custom tailoring.

As trainees go from assignment to assignment, they should have some choice of media; however, the choice need not be unlimited. Instead, media options are best designed into the course based on learning objectives, content, and projections about the nature of the trainees. Considerations like these allow course developers to prepare optimum media mixes that provide most learners with the media that will serve them best. Offering media choices that would be used by only a small number of trainees would not be cost-effective.

Human Resource Development Department
Training for Human Resource Development

The University of Tennessee
Job Performance Aid

CHECKLIST FOR PRESENTATION SKILLS

Answer "yes" or "no" to all questions.

____ 1. Did you prepare an introduction which includes a statement of the purpose of your presentation?

____ 2. Does the introduction orient learners to the subject matter of your presentation?

____ 3. Have you chosen a presentation format or instructional strategy appropriate for your learners' education, experience, and level of comprehension?

____ 4. Is the type of presentation (lecture, demonstration, role play, etc.) right for the size of your group and the subject matter?

____ 5. Are you comfortable with this kind of presentation? Whether formal or informal, does it fit your natural delivery style?

____ 6. Is the nature and amount of your material suited to learners' levels of education, experience, and comprehension?

____ 7. Is the material relevant to learners?

____ 8. During your presentation, do you ascertain whether learners are listening to and understanding your message? To make your determination, do you note verbal and nonverbal (gestures, facial expressions, etc.) cues from learners?

____ 9. Are these cues also useful in determining the length, focus, pace, activities, and illustrations of the presentation?

____10. During the presentation, do you provide visual or verbal illustrations of the main points?

____11. When you use analogies, do you select them to illustrate or clarify a particular point? Do you select analogies to compare known and unknown variables or two similar entities? Do your analogies fit logically into the context of your presentation? Are they well matched to learners' levels of comprehension and experience?

____12. If you establish frames of reference during the presentation, do they relate directly to a point you are making? Are they instrumental in relating the subject matter to the learners? Are they well matched to learners' levels of comprehension and experience?

____13. At the end of the presentation, do you provide summaries of key points?

____14. Do you apply feedback from learners to evaluate the presentation?

____15. Do you speak clearly and loudly enough for the group to hear everything you say? Is your tone of voice relaxed and natural? Are your mannerisms and expressions engaging rather than distracting? Do you maintain eye contact with your learners?

____16. Are you enthusiastic about the subject of your presentation and do you project this excitement? Do you also communicate the credibility of your subject?

____17. Do you show learners that you respect their background and previous experience?

Note. Adapted from How to Create a Good Learning Environment by M. Callahan (Ed.), INFO-LINE, Number 506, 1985, Alexandria, Virginia: American Society for Training and Development.

TECHNOLOGY TRANSFER: MODEL PROGRAMS IN EUROPE

Introduction

The problems and challenges facing manufacturing industries in the United States are not unique. European countries are tackling similar problems -- how to become more innovative in the process and organization of production in order to make their manufacturing sector more competitive.

While much of the world's attention is focused on the Asian nations, Western Europe is gearing up for a unified effort to establish itself as the major industrial player. With the approach of the unified Economic Community of 1992, Europe is already beginning to pool its knowledge and resources in support of its industrial base.

The foundation for industrial competitiveness as viewed in Western Europe is much the same as that proposed in American plans. It is built on automation, management innovation, and entrepreneurship, as well as a competent work force. Public policies introduced to achieve these ends, however, vary considerably among nations. The differences are in part due to culture and economic situations. They are also due to different approaches to and priorities for science and technology policy for economic development.

This analysis is based on visits to Denmark, Italy, Sweden, and West Germany. The purpose was to learn how technology is advanced in, transferred to, and used in manufacturing, with a particular emphasis on small- and medium-sized enterprises (SME). Activities surveyed include (a) research and development (R&D), (b) special technology support and advisory services, (c) brokering, (d) technology information dissemination, and (e) education and training. Particular attention is paid to networking -- means by which SMEs can both remain small and flexible to retain economies of scope and working collaboratively still achieve economies of scale.

General Observations

The overall impressions of attitudes and policies toward science and technology throughout the visits were that of optimism, activism, and affluence. Each country believed that technology development ought to be market driven, but with **a strong boost from the public sector**. They all placed a high premium on the skills and support structure for technology transfer. They also are investing large amounts of money into science and technology programs relative to their populations and revenues.

Ten specific observations are provided about the way in which Western Europe addresses the technology needs of its industrial sector.

First, each of the states is working toward closer relationships with businesses and, in some instances, programs becoming largely, if not entirely, **economically self-sufficient**. Programs were designed to rely more and more on contracts with and support from industry and less on government support. For example, both the Steinbeis Foundation and the Danish Technological Institutes derived at least 75% of their budgets from private sector R&D and consulting contracts and the Stuttgart Microelectronics Institute, after just 5 years, gets 60% of its budget from contracts.

Second, collaboration and networking among businesses is not only considered desirable but given a high priority in policy formulation. Policies for joint ventures ranged from demonstration programs in Sweden to priorities for cooperative ventures in funding proposals in Denmark to absolute requirements (five or more firms working together as a consortia) for funding eligibility by the regional government of Emilia-Romagna in Italy. Networks are encouraged for marketing, contract bidding, design, R&D, testing, process development, and even production in order to give SMEs a better chance to compete in world markets.

Third, a feature that seemingly runs counter to U.S. trends, **is to separate theoretical education and basic research from applied education,**

developmental research, and technology transfer. The former takes place in universities and the latter usually takes place in technical institutes/colleges or independent agencies. Rather than asking the universities to do both, some of the nations keep the two missions separate. One reason is that science and technology policies are carried out under different agencies -- ministries of education and industry and commerce.

Fourth, each country has targeted the technological support of **small and medium-sized manufacturers**. Although the definition of "small and medium sized" varies from less than 50 employees in Italy and Denmark to less than 500 in Germany, the general feeling is that the large firms can take care of themselves and have sufficient resources for R&D projects and product development. **It is the smaller firms that need to be stimulated.**

Fifth, the countries have similarly structured and **good educational systems**. A common primary system serves all youth up to age 10-14 and then various tracks lead to higher education (gymnasium), further education for technical occupations, education for business and commerce, or into the work force, either as an apprentice or entry level employee. All the countries require more intensive schooling.

Sixth, each nation recognizes and acts on the fact that many innovations and technology transfers are incremental and continuous improvements on existing processes and products and take place through ideas passed on from person-to-person. Many of the programs encourage close and **long-term working relationships** between businesses and technology programs personnel. Moreover, workers are integral and important parts of that process and expected to contribute to innovation, a point stressed most emphatically in Sweden.

Seventh, information is valued, and systems aimed at providing databases designed for the needs of SMEs are major elements of European programs. In Italy, the CNA

has a data file of the capabilities, capacities, and production potential for its member manufacturers for use by firms seeking subcontractors, Germany's information technology transfer center maintains a data file of all the technology resources available to SMEs, and Denmark funds local technology information offices throughout the country, which are in the process of computerizing their information bases.

Eighth, recognizing the investments in new technology depend on stable and growing markets, the agencies that take responsibility for technology diffusion also had **market development and export promotion** programs. The Technological Institutes in Denmark, the Steinbeis Foundation in Germany, and ERVET in Italy all had major market information and export initiatives.

Ninth, many of the programs are involved in some way in **international cooperation**. Most of the technology transfer programs reviewed have projects funded through the European Communities ESPRIT or EUREKA. The vocational-technical colleges have international projects in both other European and developing countries.

Tenth, all of the four countries give **science and technology policy high visibility and priority as an economic development strategy** -- and fund the programs accordingly. In Denmark, for example, S&T accounts for a full 60% of the program funds under the Ministry of Industry.

Country/Regional Profiles

The following headings provide a summary of some of the ways the four countries are organized to address the challenges of industrial competitiveness. Vignettes of various parts of their industrial policies are included.

Denmark

Denmark is a nation of about 5.1 million inhabitants, which is a little smaller than the state of Georgia. Like Georgia, it has one large city, Copenhagen, which contains a large part of the population and serves as the economic hub. Only one third of the

population lives in cities of 50,000 or more. Most reside in rural but densely populated areas.

In Denmark, levels of taxation, educational attainment, and social services (free education and health care) are high. While high taxes may constrain growth, the strong education and comprehensive services -- made possible by high taxes -- actually spur growth.

Manufacturing accounts for about 20% of the nation's gross domestic product (GDP), agricultural about 6%, services about 47%, and the public sector about 22%. The manufacturing sector is comprised of mostly small- and mid-sized firms (SMEs): only 5% of the firms and 43% of the work force were employed in businesses with more than 200 people. The small size of the various industrial sectors, however, makes it difficult to compete with larger European nations. "There are few 'industrial locomotives'." One exception is the Leggo Corporation, producer of one of the world's most successful toys. Most small firms do not use new technologies, aren't aware of the possibilities, and don't do strategic planning. One of the problems, according to an official, is that too many firms are too small to afford the special services the state provides.

The responsibilities for science and technology policy are shared by the Ministries of Education, Industry, and Labor. Education supports the scientific and technical education and university-based research, Industry supports the Academies of Technical Sciences, Technological Institutes, and various national agencies, and Labor supports retraining of the workforce. This presents problems similar to those often encountered in the U.S., due to poor coordination of policies and programs. Efforts to improve coordination have not proved successful.

Education in Denmark. All children go to primary school from ages 7 to 10. Here they get a common education, which includes five years of English and three years of

German. Denmark has a voucher program whereby parents can choose to send their child to a private school and the state pays 80% of the costs. About one-fourth of all children go to these independent schools. After primary school, children go into one of three types of institutions (a) the gymnasia or "college prep" (60%), (b) business schools (10%), (c) or technical schools (30%). The gymnasium has a three year foundation after which graduates go on to either a university (6 years), an engineering university (6 years), or an engineering/technical school (4 years). Students who go into the business or technical schools get a one year program of theory and practice followed by 1-4 years of applied theory and practice required to become mid-level technicians or business people.

National policy. The major elements of Denmark's industrial policy are increased basic technological development in large enterprises, technological advisory services to SMEs, and improved export promotion. The ministry's budget is distributed among technology programs (60%), regional development (10%), and export promotion (30%).

Technology promotion is administered by a National Agency of Technology, and it has seven sets of policies: a Council of Technology, which funds the technological institutes; productivity and consulting services that can be provided by employers' associations or trade unions as well as the private sector; industrial R&D risk capital funds that normally cover 50-75% of the total costs; product development support; industrial liaison with the public sector; the National Testing Board; the National council of Metrology; and Technological development to diffuse information technology.

The Council of Technology under the Minister of Industry, composed of representatives of universities, industry, and finance and appointed for terms of 3 or 4 years, oversees the technology institutes. It has a staff of 280 people. The government sees its role as providing the framework necessary for the private sector to transact business effectively and efficiently. It is careful to make sure that it does not overlook

the demand side, and consequently programs also support various aspects of marketing and management.

Jutland Technological Institute. Two technological institutes serve the country: the Technological Institute of Copenhagen and the Jutland Technological Institute in Arhus (JTI). Over the years, the Institutes have moved away from training and toward services to industry. At present, the distribution of the functions of JTI are about 40% for consulting, 25% for R&D, 15% for testing and 20% for training -- mostly at a relatively high level. About 20% of the Institute's budget comes from the Ministry of Industry, 75% from contracts with the private sector, and 5% from contracts with the European Community.

Each department of the JTI is operated as a profit center and must justify itself with contracts. Departments include wood products, acoustics, EDP, building and construction, production technology, plastics, chemical, product development, quality systems, testing and materials, energy, food technology, and management development and planning. Some are specialized and others, such as product development and testing, are functions that cut across many industries and specialities.

The R&D programs of the institute are applied, mainly in collaboration with industry. One department, for example, is part of the Tribology Center of Arhus. It is a cooperative project of the University of Arhus, JTI, and a Danish firm, Danfysik. The purpose is to develop, test and demonstrate prototypes.

Consulting services are paid for by the client at an hourly rate, although small firms get subsidies for the first 100 hours of assistance from each institute. They can call on either a generalists or a specialist, depending on their needs.

The JTI and TI manage 14 government-funded Technological Information Centers. These are located throughout the country and operate much as agricultural extension services in the U.S. A main difference, however, is that these offices serve as sources

of information and brokers, including coordinating education and training, and do no consulting themselves. Instead, they call on JTI personnel or university experts as needed. The staff, however, try to get to know each of the businesses in their area. The center in Arhus, for example, which has the largest staff (6 people) visits about 800 to 1,000 industrial firms in Arhus each year.

The 23 **Academies of Technical Services** are focused research centers, each with an area of specialization. The three largest are electronics and computer technology; welding and materials; and standards. Others concentrate on, for example, biology and water quality. Most are small, with fewer than 30 employees.

A local technology program: NordTek. A visit to Nordjyllands amt (North Jutland county) and to the city of Aalborg, seat of government of the county, provided information about a program supported by the JTI but instituted by local government. The rural county, which has a population of about 482,000 and 27 municipalities, is in the most northernmost are of Denmark. Its economy has about the same proportion of manufacturing as the nation, but has more agriculture (12%) much of which consists of the fishing industry. Its work force is less skilled and less educated and has more self-employed people than the nation as a whole.

The city is home to Alborg University, established in 1974 in part to stimulate development. The recently established university has links to the private sector. The country also receives loans and aid from the national government. Only one of these involved a business moving into the area, however. Two technological information centers serve the amt, forging the ties to SMEs.

In 1985, the county began an intensive technology development program named NordTek for small and medium-sized businesses in order to improve its economy. The amt received a five-year grant of $14 million from the European Fund to which it added $9 million in local money and $1.5 million from SMEs. The programs are operated by a

secretariat under the County Council, a governing body chaired by the mayor of Alalborg.

Nordtek is intended to use new technologies to strengthen local business, improve the skills of the work force, develop new products, and attract new investments. The funds were used for three types of projects (a) motivational (12%), (b) local initiatives (65%), and (c) direct support (consultancies) for businesses (23%). The first is primarily information dissemination, selling the Nordtek program to industry. The second is to encourage local innovative programs, and the last to find the funds needed to carry out the programs.

The local initiatives best describe the range of activities being tried. TekNord is a technology management program operating out of the town of Sindal. Its goal is to develop technologies from within companies over time by providing long-term consulting to small business. They have 7 "technology managers" (TMs) mature professionals who have industrial experience and technical degrees. The contracts with each company must be for at least 2 1/2 years, for anywhere from a minimum of 10% to a maximum of 20% of the manager's time. The costs are subsidized initially, but with a declining scale so that for the first six months the company pays only 30% of the costs but by the fifth six-month period pays 70% of the cost (which is about $78,000 per year). Even though the program began in January 1988, five of the 7 managers are fully subscribed. They do not compete with private consulting firms, and do not work in SMEs where private consultants are used. In fact, a TM may recommend the use of a private consultant in specialized areas. One TM also will not work with two competing companies. The TMs meet regularly and one of their goals is to create networks among small companies and look for ways they can cooperate.

Another new project in Alborg in conjunction with the university, in space adjacent to the county building, is a new science and technology park. Although just getting

started, it expects to eventually house manufacturers, financial institutions, accountants, lawyers, and computer systems companies.

Arhus Technical College. Another part of the technology policy is the nation's system of 27 technical colleges. Although called colleges, they are the alternative to the gymnasia and serve a population that corresponds to the upper levels of U.S. high schools and community colleges. These colleges are increasingly involved in transferring technology, working with SMEs and doing R&D.

The technical college in Arhus is one of 55 technical schools that students can attend after completing the compulsory part of their education (at about age 16). About 12-13,000 students enroll in one of more than 100 different programs each year, 80% of whom attend full-time. There are 500 teachers, 430 are full-time. These teachers may have one of three types of appointments (a) basic and continuing training only, (b) basic and continuing education, and (c) special projects.

Even though the primary mission of the college is training, the staff feels it needs to work on special industrial projects to understand the E&T needs of the students. Many of the special projects are international: a distance learning project with Portugal as well as joint projects with Indonesia, France, and the Netherlands. Ties to manufacturing are relatively new for the schools. The school has regular communications with the JTI and industry. Another project, in-service training for supervisors and managers, is called AIDA. Working with the supervisor's unions, school officials interview company officials to identify trends in technology, society, the work force, and their own company. Then they work with supervisors on defining personal educational needs and strategic plans.

A typical curriculum is 40% theoretical and 60% applied (hands on). The theoretical component is half applied math, physics, and chemistry and half courses such as economies of the firm, language including technical English, cooperation, and consumer

rights/unions/laws/ living skills. The first year is introductory. After that students alternate 10-20 weeks periods in industry and in school, in a cooperative arrangement. The company pays for the student worker, but is partly reimbursed. Students, however, are expected to find their own employment and only about half are successful.

There is a new program called HTX, which is somewhat like the U.S. 2+2+2 programs. Students get one year that combines the traditional gymnasium program with technical skills, goes on to 2 years of applied theory, and then 3 years of engineering school (a "1+2+3" program). The result is an engineering degree for the graduate.

The college has equipment and a number of programs for advanced manufacturing. A new Computer-Integrated Manufacturing (CIM) project is being developed with IBM-Denmark and they have a small flexible manufacturing cell; they have programs in CAD/CAM, CNC equipment, and technology planning and documentation. Students are prepared to manage technical projects as well as operate equipment.

Italy

The Emilia-Romagna (E-R) region of northern Italy is an area whose economic resurgence was built on the growth of very small manufacturing businesses. The success story is in part the reason that so much attention is now being given to small manufacturers. The region rose from next-to-last in per capita income (pci) and employment rates to first in the nation in pci in just one decade.

Education in Italy roughly follows the European model: compulsory education in primary schools for all children from ages 6-11, three additional years of standard education, and then three tracks, two leading to universities, classical or scientific, and technical/vocational.

The region, with about 4 million inhabitants, is highly industrialized. About 38% work in manufacturing, 44% of those work in firms with fewer than 20 employees. The

success is based on many factors, but two were particularly important. First, the region was among the first to understand and act on the industrial changes taking place and the shift from mass production to more diversified products, which require greater flexibility and responsiveness. This, they found was better handled in smaller, vertically decentralized firms.

Second, is the rise of trade union power, which led the large Italian firms to outsource to smaller, nonunionized firms in order to avoid union agreements. Many of the small firms can avoid the wage minimums and even taxes.

The flexibility and growing competition demanded that the small firms become more and more productive, which meant taking advantage of the latest technologies. Doing this is time consuming and was only possible because of the unique support structure and cooperative arrangements among businesses that took shape in E-R which enabled the small manufacturer (artisan) to concentrate on what he or she knew best -- production. The technology and small size provided economies of scope and the networks provided economies of scale. The key to successful networking and cooperative services is consensus building, and that requires close cooperation among the supporting agencies and trade organizations, labor and business groups.

National Confederation of Artisans. Perhaps the most important element of the support structure is the Confederazione Nazionale Dell'Artigianato (CNA) or National Confederation of Artisans. CNA is an autonomous organization of member companies with fewer than 20 employees, supported by membership fees. Each firm pays about $100 per year plus 1% of their payroll and for any additional special services. In E-R alone there are 80,000 CNA members. Its role is to protect the interests of the small businesses, but it also provides important and needed services to the firms.

For example, the CNA prepares payrolls for 18,000 of its members and annual taxes/reports for 60,000 members. It also provides assistance in getting financing and

has its own finance company. The CNA helps in marketing, through an export consortia, and with training -- customized, skill upgrading, and displaced worker programs. In the case of the latter, however, it provides mostly a brokering service. The actual training takes place either at schools or other local agencies. And, importantly, the CNA acts as an early warning system, providing firms with information about changes in markets, government regulations, or new technological developments.

In E-R, the CNA has 2,400 employees dispersed among 9 provincial offices and 217 municipal offices. The member firms are organized (a) along sectoral lines or (b) geographically, by province. The CNA is a critical player in the formation of networks among firms. For example, it operates a computerized data base of subcontractors, and large companies can log into the system and locate an E-R firm that can produce the part they need. Further, they plan a role in brokering small firms, promoting firm cooperatives. The cooperatives do research, financing, purchase raw materials, market, and solve production problems.

ERVET. ERVET is a regional organization created by the regional government in cooperation with the chambers of commerce, CNA, and banks to provide a system of service centers for SMEs. Initially, centers were established for specific industries: for textiles (CITER, 1979), agricultural machinery (CESMA, 1983), shoes (CERCAl, 1983), construction (QUASCO, 1985), metalworking (CERMET, 1985), and metallurgical (RESFOR, 1987). These service centers find bottlenecks in the industries and remove them. In practice, the centers are small and thus somewhat restricted in the range of activities they can provide. As a result, each has developed a special niche. For example, CERMET does primarily materials testing for metalworking firms; CITER concentrates on market information and design; and RESFOR is primarily a data bank describing the qualifications, abilities, and capacities of its members to promote subcontracting with other firms.

CERMET: The service center for metalworking industries, located among a large number of small metalworking firms, is primarily a laboratory for testing materials (e.g., corrosion, fatigue, microstructural analysis) and providing quality assurance for the products of its approximately 70 members. It is authorized by the state to verify whether the materials artisans use meet the specifications of customers, an official "stamp of approval". Much of the impetus comes from large companies who want to use the smaller firms as subcontractors, but are concerned about meeting the European standards expected after 1992.

Each firm pays $300 to join, which entitles it to a 25% discount on all services. It is staffed by about 10 professionals and technicians. CERMET undertakes some joint projects for particular groups of firms, but mostly works for individual firms. The center also documents procedures for the artisans and conducts some education and training seminars.

CITER: The service center for the textile firms, the first established by ERVET, is located in Carpi, about 30 miles from Bologna. This area includes some 2,000 textile firms, only 17 of which employ more than 50 people. The average firm size is six people. About 400 of the firms produce products for final markets and the remainder are "stage" or "phase" producers, supplying the 400 and other "final" producers. The knitwear industry blossomed shortly after World War II, but increased by 300% during the 1960's. Firms are evident everywhere, often with the workspace on the first floor and living quarters for the family upstairs.

The service center, CITER, has three main areas of intervention, (a) fashion design, (b) marketing, and (c) technology. It began as an experimental center for information services (a need identified by the businesses) in 1977, growing from 20 firms at its first meeting, to 80 at its second, to 400 by its fifth. Information is crucial in this industry which must stay abreast of both rapidly changing fashions and technologies.

Regional council of industry. The regional government is another player in the industrial policies of E-R. The regional agency identifies service needed and provides the funding to get them started. ERVET, for example, is supported by the regional government. The regional council also has programs to fund technology and innovation, training, facilities, marketing, equipment, product development and business startups. The laws require that only a consortium may apply (except for new business startups or product development). At least five firms must join together to make application. If, for example, even though one firm wants funding to participate in an industrial show, five must apply. The money however, may be spent by only one of the firms making application. All of the programs are aimed at the smallest firms that might have trouble raising the funds themselves. All grant applications must be submitted by one specified date per year and go through a rigorous review process. The budget for grants for 1988-89 is about $90 million.

Networking. Just how the networks form and dissolve is not easy to understand or describe. Even though a structure exists, much of it is ad hoc, based on special circumstances and personal contacts. A small metalworking firm provides an example of the process. The 15-person company produces very intricate and sophisticated molds for firms that cast metal parts. The firm is located in a small, job shop with one large production area and two office areas. Despite its small size, it is quite modern, with computers for CAD/CAM and three CNC machines.

The owner and founder (who is a member of CERMET) wears work clothes just like the employees on the shop floor (and works on the floor with them). The owner said that he prefers to hire directly from the technical/vocational schools rather than seeking more skilled workers so he can do the job-specific training himself. The owner explained that five of his most skilled and oldest workers had just left the firm to start their own companies. Although he was sorry to lose them, he understood their

entrepreneurial desires. He also needed their skills. Therefore, he helped them get started by providing some funds for equipment and by giving them subcontracts from his firm. Eventually, he said, they will be self-sufficient but at present about 80% of their business comes from him.

Thus, there is a network formed, which has arrangements with casting firms to subcontract with him for molds, and with the new business, to take on the work overflow. He, however, owns about 25% of the new firms as a result of his financial support.

Sweden

Sweden is a highly industrialized nation with many high-tech firms. Two auto manufacturers, Volvo and Saab, provide a large number of jobs, directly and through suppliers. At the same time, the more rural areas have large numbers of SMEs. Sweden is often noted as the world leader in improvements in the workplace with an eye toward democratization, flexibility, and innovation. The nation's goal, which it believes it has achieved, is "flexibility in production, security for individuals."

About 75% of the working-age women in the country and 94% of the men are in the labor force. Everyone in Sweden belongs to a trade union and all policies and programs are designed jointly by government, business, and labor. Because of the changes Sweden is introducing into the workplace, technological innovation in industry is supported by the unions and viewed as an opportunity, not as potential for redundancy and thus a threat to employment. The right of every person to a job is considered a moral obligation by the nation and thus the highest priority for the government.

Sweden is noted for the quality of its education and training system. It spends more of its budget for education than any other European country, and only one percent of parents choose private schools. Every child receives nine years of compulsory education (7 to 16) and then goes on to a three-year theoretical gymnasium

in preparation for a university, an applied gymnasium in preparation for two-year vocational school followed by a one-year apprenticeship, or to work, in which case they can later go to an adult school. More than 90% go on to further education. Moreover, each year 2.5% of the entire adult labor force is being trained.

Adult training institutions. The programs for training adult workers, age 20 and over, are carried out through 100 training centers operated by the National Employment Training Board (Ministry of Labor) at facilities called AMUs, which stands for (Arbets) Market (Marknads) Education (Utbiblning). During the 80s, about 100,000 adults have been trained at these centers. The AMUs are part of a comprehensive training policy that includes, under the Ministry of Labor, 24 Regional Labor Market Boards, 300 Employment Offices, 25 Regional Tripartite AMU Boards (one in each county), and 100 Skills Centers (AMUs).

A national policy enacted in 1986 put the AMU in an entrepreneurial position, competing with private training firms and the public vocational school system. The law now requires the NLMB to purchase its services from the AMU. Students are paid while taking training -- about $37 per day. The requirements for admission are 20 years or more of age, unemployed, in risk of being unemployed, or underemployed.

About 1000 students attend the Liljeholm AMU, 70% of whom are recent immigrants who lack some of the basic skills and an ability to communicate effectively in Swedish. Therefore, most take anywhere from 8 to 30 weeks of preparatory (compensatory) programs before enrolling in one of the technical programs. If entrance exams in both math and Swedish reveal that they will need more training, the state will provide up to 40 weeks of education in math, social, and language skills.

A typical technical department is the Mechanical Engineering program. The Department head works with a board that includes a representative of the NLMB, two unions, and two employers. It is a modular program that begins with skills that are

common to large numbers of manufacturing occupations and specializes with each new module. Each week a student receives 32 hours of practical lessons and 8 hours of theory. One of the more interesting aspects of the programs are that they are tightly structured and completely individualized, providing continuous entry. A student can begin any module at any time.

Another program, Electrical and Computer Engineering, eventually specializes into, for example, Automation (Further broken down into robotics, control engineering, and NC machines), industrial electricians, computer Technology, and Commercial or Consumer Electronics. The newest innovation, in part stimulated by the need to sell its services, is to make the AMU an international training center, consultant service, and source of advanced management education. This new program will conduct special studies for schools or businesses, develop curricula, assess equipment needs, do shop or lab layouts, with an emphasis on international projects and for developing countries.

Work environment fund. The Work Environment Fund was established in 1972 to do research on workplace issues. In 1982 the government appropriated about $11 million for a five-year program for the development and utilization of new technology based on balancing the objectives of the business, the interests of the individual, and the technology; expanding worker involvement; and eliminating environmental risks. The purpose was to document the experiences in these projects and disseminate the results to other organizations. Nearly 300 workplaces were visited and 40 were followed for long periods of time to see what competencies were needed to work with new technology and how technology ought to be introduced.

One criteria for selection of projects included special attention to small businesses. The Government Bill on Industrial Renewal mentions the lack of knowledge and educational opportunities in small businesses. A stated objective of the project was networking and other means of exchanging information between small firms. Two

projects followed networking developments, one a regional model and the other a sectoral model. The first was carried out through the Technology Center of a university in Ostergard, north of Stockholm. Six small technologically advanced firms which were not in competition with one another joined to discuss common production and management problems, and do planning. Although the network was created for a specific period of time, it has remained together after the funding ended. The other was a group of rural small firms in the wood products industry, with the focal point being a woods products technology center at Jonkoping.

There are a number of places where small firms share advanced equipment or facilities. A regional technology center at Skelleftea, for example, operates a facility equipped with advanced production systems that nearby companies can use for training or production. A similar system is operated by a vocational school at another location.

West Germany

The state of Baden-Wurttemberg, located in the southwestern corner of the Federal Republic of Germany, is heavily industrialized and the most prosperous region in Germany. The state's economy is a mixture of high-tech industries concentrated around the capital city of Stuttgart and smaller traditional (textile, apparel, and wood products) firms located in the more rural areas.

The key to the state's economic vitality and modernity seems to be its educational system and the re-organization of the Steinbeis Foundation in 1982 as a state agency to promote technology transfer and economic development. Small- and Medium sized firms are given special attention in the programs of the state, however, the criteria for "SME" is much larger than in other countries. The big firms are Siemens and Mercedes, and all firms with fewer than 1,000 employees are considered medium-sized.

Education and training. The state prides itself on its technical human resources and a strong and technically-oriented educational system. Every child goes to Kindergarten

for three years, primary school for four years, from age 6 to 10. At that juncture they go either to a mid-level academic gymnasium for five years, an applied gymnasium for six years, or a lower level school in preparation for less technical work. From the gymnasia, most students go to either a university or a technical college (Fachhochsholer). But some, along with those from the applied gymnasia, go to vocational-technical schools.

The universities lead to the equivalent of a doctoral degree and concentrate on applied research. The technical colleges, for engineering, business, and more applied fields, are three years of class work and one year in the field. Faculty of these schools are required to have five years of industrial experience and many work as consultants to industry, often through the Steinbeis Foundation Technology Transfer Centers.

Steinbeis-Stiftung (Foundation). In 1982, a commission studying the economic development of Baden-Wurttemberg and representing the State, the Association of Chambers of Industry and Commerce, and the Federation of B-W Industries concluded that a private organization would more effectively support small- and medium-sized enterprises. In 1984, the state put aside 16 million Marks to endow a private Steinbeis Foundation an instrument of the state to (a) strengthen the research potential in key technologies, (b) strengthen the transfer of technology, and (c) promote business projects and offer financial assistance. The Steinbeis Foundation operates today on the interest from that endowment (1.5 million marks) and grants from the state (3 million Marks), but is overwhelmingly supported by contracts with industry (35 million Marks). Despite the large number of major corporations in Stuttgart, about three out of every four contracts were with businesses with fewer than 500 employees. The head of the SF, even though a private foundation, reports to the Minister for Economics.

The technology transfer services are located at the polytechnics, directed by professors from the schools, and work with students. Each has a specific area of

expertise and is a profit center, and if it cannot generate enough contracts, it is closed. About 1,000 professors at the state's colleges are working with various centers. More than one center usually operates at a single college. There are two categories of work, one called general consulting and the other services for the state. The form includes providing market information, R&D, special problem solving, and state-of-the-art development. The latter includes promoting cooperative ventures among companies, assessing programs, new product development, and new business start-up.

Consulting: The first five hours of consulting work with a firm are subsidized by the state, but after that must be paid for in full. A typical contract is about $6,000, and there have been about 10,000 contracts in B-W in the past two years. Forty percent of the income goes to the Seinbeis Foundation and the remainder is for the salaries of the consultants, special equipment or supplies -- and generally an amount added for future equipment needs.

Incubators: The Foundation operates 10 incubators for technology related businesses. They now house 110 companies, which can remain for up to 5 years but no longer. All are located near universities, offer reduced rent, and special services.

The Microelectronics Institute. Integrated circuits are a major need of the high-tech sector of Baden-Wurtemberg, and Baden-Wurttemberg responded with a Microelectronics Institute (MI). The MI, is a not-for-profit research foundation. It is located on the edge of the campus of the University of Stuttgart, though not formally connected to the University, and just down the road from the Max Planck Institute for physics.

The Institute has about 100 corporate affiliates, at varying levels of participation (which affects the number of votes they can cast on policy matters) mostly SMEs. Affiliates can send their staff to the Institute for periods of residency for training, receive priority service in design and fabrication of chips, and undertake joint projects

with staff. The MI develops protype ICs for clients and produce wafers in small production quantities (less than 5,000) with a one-week turn-around.

The Mi staff has abut 30 working in technology, 30 in design, 20 in management, and graduate students from the university as needed. There are few support staff: professionals and technicians do all their own maintenance and service work. About 60% of the $6 million annual budget comes from the private sector, acquired with the help of the Steinbeis Foundation and the Chambers of Commerce, and 40% from the state.

A private vocational school: The Chemical Institute. Once the German youth has completed the prescribed four years of primary school and one of the three secondary school systems, a number of options are open. Those not going onto the universities (about 20% of all youth) can choose further education in a technical school. In Germany, both public and private schools are available, but unlike the American private vocational schools which are geared for quick and immediate employment, the German schools are as academically rigorous as the public schools and provide as solid a technical education.

There are approximately 30 private schools, each of which specializes in either physics, chemistry, biology, or electronics. Despite the fact that the private schools require tuition, about 70% of the students go into one of the private schools, about 25% go to public schools, and about 5% go into factories as apprentices. These two-year programs, with short holidays and 40 hours of class per week, are more akin to an American three- or four-year program in intensity. Students who apply are the non-university bound who come from the middle high school track (30%), those who have completed the first phase of gymnasium and decided not to go on to university (40%), and those who have completed the full gymnasium program and decided not to go to university (30%). A student completing the compulsory years can go to one of the

schools and spend a day in the classes in order to help make a choice for further education.

The Flad Chemical Institute, established by a Dr. Flad in 1951, is a modest looking building in the heart of Stuttgart, with crowded but well-equipped scientific labs and classrooms. The school was very active at 4:30 PM on a Friday, lectures, small group discussions, and laboratory work in progress. The program includes 20 hours of theory, which includes physics, German, English, and analytical, physical, and organic chemistry and 20 hours of practice, which includes shop work, instrumentation, and technical analysis. A commercial testing lab on site gives students access to the most advanced equipment and a chance to see what the work is really like.

Cooperation and working relationships are stressed in the school. Each new class begins by going to a country horse farm together for one week to get to know each other and build a cooperative spirit among the members of the class. About 60% of all entrants complete the rigorous two years and go on to become technicians in laboratories, universities, and industry.

ANSWER KEY FOR PRE-TESTS

Pre-test No. 1

1. C
2. D
3. A
4. A
5. C
6. D

Pre-test No. 2

1. D
2. C
3. D
4. B
5. C
6. A

Pre-test No. 3

1. A
2. C
3. B
4. D
5. C
6. A
7. C

Pre-test No. 4

1. D
2. B
3. C
4. A
5. D
6. C
7. D

Pre-test No. 5

1. B
2. C
3. C
4. D
5. C
6. D

Pre-test No. 6

1. D
2. D
3. A
4. B
5. D
6. A
7. B

Pre-test No. 7

1. B
2. D
3. B
4. A
5. B
6. A

Pre-test No. 8

1. D
2. A
3. D
4. B
5. C
6. A

Pre-test No. 9

1. D
2. B
3. B
4. C
5. D
6. A
7. A

Pre-test No. 10

1. B
2. A
3. D
4. B

Pre-test No. 11

1. A
2. B
3. C
4. C
5. D
6. A

Pre-test No. 12

1. D
2. A
3. A
4. B
5. A
6. C

Pre-test No. 13

1. D
2. A
3. C
4. B

Pre-test No. 14

1. B
2. D
3. A
4. C
5. B

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