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# A model for the development of an industrial training program

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A MODEL FOR THE DEVELOPMENT OF AN  
INDUSTRIAL TRAINING PROGRAM

A Thesis  
Presented to the  
Department of Education  
and the  
Faculty of the Graduate College  
University of Nebraska

In Partial Fulfillment  
of the Requirements for the Degree  
Master of Arts  
University of Nebraska at Omaha

by  
Jimmy D. Perry  
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## PREFACE

The planning and development of an industrial training program is a complex undertaking. The purpose of this paper is to simplify the complexity of the process into discrete procedures and to present a practical model for the training director to use to accomplish the task in an efficient and effective manner. The resulting model should be easily adapted to meet the requirements of any program. It is to be assumed that modification of any or all parts of the model may be made to meet individual program needs.

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## Chapter 1

### INTRODUCTION

Vocational education has made enormous strides in recent years. Competency-based design procedures have led to a large part of the advances made. A substantial portion of the available literature has centered on vocational education in a community college or technical school setting. The techniques and procedures of program development and curriculum design were formulated with such educational institutions in mind. In the more recent past, another type of vocational training has begun to emerge and to prosper to a degree never seen before. This type is the training program developed and implemented by industrial concerns. The developmental process of such training programs has many areas in common with the developmental process of programs in community colleges and technical schools. There are, however, certain areas that are unique to the industrial setting. The available literature referenced to industrial training is dwarfed by the literature devoted to training in traditional institutions. This paper is devoted to the training program in industry.

#### Statement of the Problem

The planning and development of an industrial training program brings several questions to mind. Where does one

begin? What is the nature of the training? Where is the training to be done? What facilities are available for training? What equipment and training aids will be used? How much will the training cost? How long will the training last? Who will be doing the training? Are there any procedures that may be applied to the planning and developmental process? What constitutes successful completion of the training program? Are all aspects of the training program considered? What means of revision of the curriculum will be implemented? Questions such as these make it apparent that an enormous amount of planning is necessary. Such complexity indicates a need for a comprehensively and meticulously designed set of procedures that will ensure the success of the developmental process. This paper deals with the entire developmental process of the training program.

Sources of information will include various textbooks, pamphlets, and articles dealing with program development in technical schools and industry. The time frame for this investigation and formulation is approximately three years.

#### Theoretical Framework

The design of the model is constructed on principles of competency-based training that have been so successful in vocational programs. The substance of the model is concerned with an electronics training program for Showbiz

Pizza Place, Inc. Assumptions for the trainees in this model include prior electronics training of approximately two years, prior electronic work experience of five years, mechanical aptitude as determined by a standardized pre-employment examination, and basic managerial skills based on previous employment. The model is concerned with the planning, development, and implementation of a job specific program for electronic specialists employed by Showbiz Pizza Place, Inc. The following terms are defined for the purpose of this paper:

1. Showbiz Pizza Place, Inc. - a commercial enterprise offering food and entertainment in the form of video games, animated shows and projection television for its customers.
2. Prior electronic training - two years of intensive electronics training resulting in an A.S. degree. Equivalent military training also meets this requirement.
3. Prior electronic work experience - any combination of job related activities concerned with video games, television, and computers.
4. Mechanical aptitude - knowledge of and skills with basic hand tools and basic mechanics as measured by a standardized examination. Minimum qualifications are met by scores above one standard deviation.

5. Managerial skills - supervision of employees and corresponding administrative skills.
6. Electronic specialist - term used by Showbiz Pizza Place, Inc. to describe the person who is responsible for the maintenance of all of the restaurant equipment, video games, televisions, and animated entertainment found in the Showbiz Pizza Place restaurants.

#### Research Design

The research is analytical in nature and is confined to the review and analysis of various articles and treatises on educational and training program designs. A summarized discussion of each reference work will be given and will be followed by observations and comments. The purposes of this analysis are to determine the approaches and similarities between the various authors and to provide a foundation on which the model is to be constructed. The results of the analysis of literature, prior field experience, and the problem at hand will be synthesized into a design for the particular circumstances. Since education and training are not exact sciences, it is not to be assumed that the resulting design is the final answer for program development.

## Chapter 2

### REVIEW OF LITERATURE

The establishment of a training program is an extremely complex undertaking. Numerous factors must be considered, monitored, and controlled. Such complexity makes it imperative for the training manager to have a systematic procedure developed and followed to insure effective and efficient management. The training manager is faced with the problem of where to begin and how to proceed. The resources that the training manager may consult are previous experience and the work of others in the field. With limited personal experience, the training manager would naturally attempt to pattern the program after that of other successful training managers.

The goal of efficiency dictates that the establishment of the program should not proceed in a haphazard fashion. This implies the need for planning and organization. A sample of available literature provides a variety of methods that have been utilized in planning training systems.

#### Books

##### Mager (1967)

Mager divided course development into three phases called preparation, development, and improvement. These

broad categories do not give any indication of the activities involved and should, therefore, be investigated in detail. Mager's preparation phase consists of preparing job descriptions, identifying the target population, performing task analyses, preparing course objectives, determining course prerequisites, preparing a prerequisites test, and preparing a criterion examination. The development phase involves outlining the instructional units, sequencing the instructional topics, selecting the course content, selecting the instructional procedures, preparing the lesson plans, and implementing the pilot course. The improvement phase includes comparing student performance with the objectives, comparing the objectives with the job requirements, and revising the course.

Mager discussed several facets of vocational instruction in more detail. The topics included job descriptions, task analyses, target populations, course objectives, course prerequisites, measuring instruments, types of performance, selection of instructional procedures, sequencing instructional units, developing lesson plans, improving course efficiency, improving course effectiveness, and sources of instructional materials. These topics parallel the topics considered in the three phases, but a few have been integrated under new headings.

Mager gave several examples of job descriptions and went



on to describe a job description as a one or two paragraph narrative of the duties and responsibilities of the job. The job description should contain a comment about each of the kinds of activities that the job encompasses. It should also suggest conditions associated with the performance of the job.

Task analysis is basically a two-step process with a few embellishments for clarity. The first step is to list all of the tasks that are included in the job. Extreme care must be taken in this step to include every task. Most can be listed from memory or from thinking about the job, but a more complete listing will result from additional activities such as interviewing workers and observing them while on the job. It is extremely useful to identify the frequency of performance, the importance, and the learning difficulty of each task. These pieces of data can help in the planning of instruction. Items of low importance or of low frequency of performance may have to be omitted due to time considerations. Easy tasks will not have to have much time devoted to instructional activities. The second step of task analysis is to list each step involved in performing the task in terms of what is actually done. Care must also be taken in this step to include every step performed. If any step be left out, the resulting instructional activity could fail to achieve its objective.

Identification of the target population should be done before the course is designed in order to establish course prerequisites. This ensures that all trainees enter on a nearly equal level. Items of consideration include physical characteristics, education and training, motivation, interests, and attitudes. These items can influence the types of instructional activities, examples, level of instruction, motivational techniques, and other such considerations.

The preparation of course objectives proceeds from the task analysis. Those steps that warrant instruction provide the basis for writing the objectives. Course objectives describe what behavior is to be expected of students at the end of the course. Course objectives differ from the task analysis in that the terminal behavior of the students may not be as efficient as the behavior exhibited by skilled workers. The task analysis is derived from the behavior of those skilled workers, and the behaviors described by the task analysis would represent a significant improvement in efficiency over the behaviors described by course objectives.

Course prerequisites define the range of incoming students. The fewer the restrictions, the larger the number of qualifying students. This also implies that a higher degree of individualized instruction will be needed to allow

every student the opportunity to complete the course objectives successfully. The more restrictions placed on incoming students, the more likely the students can progress as a group. Too many restrictions will narrow the group of qualifying students significantly and may place unnecessary obstacles in the path of organizational goals. Mager suggested that course prerequisites be formulated from the description of the target population and the objectives rather than from the subject matter.

The main measuring instruments considered by Mager were prerequisites tests and criterion examinations. The prerequisites test should be constructed strictly from the course prerequisites. If incoming students should not have one or more of the prerequisite requirements, then allowances should be made for remedial instruction or for eliminating the requirement from the prerequisites and including it as part of the curriculum. The criterion examination should be constructed strictly from the objectives. The object is to compare each student's acquired knowledge and skill to the desired behaviors indicated by the objectives.

Mager listed five types of performances to be considered when deciding on procedures and materials in the training process. They were discrimination, problem-solving, recall, manipulation, and speech. It is readily apparent that

different approaches should be taken in the instruction of the various types. Testing would also take different forms, which could include written items as well as actual performance items.

Learning can be made efficient by proper selection of instructional procedures. For instance, a driver education course without some portion of it devoted to actual driving is not very efficient. Mager listed three useful guides that may be followed in this step. The technique for each objective should be the one that most closely approximates the performance conditions required by the objective, that causes the student to perform in a manner most closely approximating the performance required on the job, and that will allow the student to make the largest number of relevant responses per unit time. Unfortunately, administrative criteria may not always allow the most optimum technique to be used. In such cases a compromise will be necessary.

Consideration must also be given to the sequence in which instructional units will be presented. It would be fruitless to attempt to instruct a procedure if the trainees are unfamiliar with each component of the procedure. Mager described six guides that may be considered when sequencing instructional units. The sequence may be from general to specific, in order of student interest, in a logical order,

in terms of frequency of job performance, and in relation to total job practice.

Lesson plans are the documents used to ensure that the lesson presentation proceeds according to the sequence prescribed and to ensure that all relevant points are covered. Lesson plans may be developed according to a seven-step procedure outlined by Mager. This procedure includes outlining the learning units, identifying the types of performance involved, identifying the appropriate content, initial sequencing of units, selecting instructional procedures and materials, final sequencing of units, and completing the lesson plan details.

After the course is implemented, it is prudent to determine if the course may need revision to improve course efficiency and effectiveness. Efficiency is checked by comparing the final student performances against the course objectives. Checking effectiveness is somewhat more difficult because feedback must be solicited from the student after a term on the job and from the supervisors of the various students. Evaluation of each of the sources will point the way to possible improvements in the training program.

Comment. Mager's book is a good general work on the development of vocational instruction. There are specific examples on various topics that could assist one in the

development process, but there are other areas, such as instructional objectives and evaluation, that are not covered in much detail or are not covered at all. The training director could use this work as a general reference, but he/she would have to consult other works for more specific details.

#### Goldstein (1974)

Goldstein divided course development into three phases called assessment, development, and evaluation. Assessment is concerned with organizational analysis, task analysis, person analysis, and objectives preparation. The development phase combines learning principles with media selection to design the environment to achieve the objectives. The evaluation phase consists of the establishment of measures of success and of designs to determine what changes have occurred during training.

Goldstein listed specification of goals, resource analysis, and internal/external factors as points of consideration under the heading of organizational analysis. His approach to task analysis was essentially the same as that of Mager, but Goldstein did not go into as much detail as did Mager.

The major portion of the treatise was devoted to theoretical discussions of learning, experimental methods, and evaluation criteria. No specific course of action was

prescribed for development and evaluation.

Comment. Goldstein provided insights into the more technical and statistical aspects of training programs, but he did not offer much in the basic procedures of program development. Goldstein did not prescribe any concrete procedures, but he did describe various alternative approaches in evaluation and instructional procedures along with advantages and disadvantages of each. This work seems to be better suited for "fine-tuning" than to a "cook book" approach. The training manager will have to make personal decisions after consulting Goldstein. Problems could arise if the training manager should not be mathematically and scientifically astute.

Bass and Vaughan (1966)

Bass and Vaughan called the phases of program development assessment, design, and administration and evaluation. Assessment includes organizational analysis, job analysis, manpower analysis, and review and revision. The design phase is concerned with techniques of instruction and media. Administration and evaluation deals with the management of the program and the collection of data for revision of the program.

Comment. The format of this work is similar to Goldstein's work. It was largely devoted to theoretical

considerations and did not prescribe any specific course of action. Various techniques were discussed with accompanying advantages and disadvantages. One main difference noted was the inclusion of review and revision into the assessment phase. It is readily apparent that the authors have described similar processes. To describe a course of action requires elaboration of the processes. The training manager needs to know specifically where to begin and what to do in more detail.

#### Tracey (1971)

Tracey described an extensively detailed process for training program development. The components listed were identifying needs, performing job analyses, writing training objectives, constructing criterion measures, constructing evaluative instruments, selecting training strategies, selecting and sequencing course content, producing training documents, determining equipment requirements, selecting training aids, selecting instructors, selecting trainees, conducting the instruction, administering and analyzing criterion measures, evaluating the training system, and following up on graduates. Each of these components contain several activities and considerations that require attention to detail to ensure success of the development of the program.

The identification of training needs is a complex



process that requires consideration of many factors. They include goals, objectives, and plans of the organization. It is almost self-evident that the training program should be consistent with the goals of the enterprise. The training must also be consistent with company policies. Other such considerations include composition of work force, training staff, facilities, and costs. In the case of technical training, the program must be flexible enough to adapt to technological change.

The types of training to be provided must be considered and analyzed. The types of formal training programs commonly provided in-house are orientation, safety, technical, sales, human relations, presupervisory, middle management, executive development, and special training programs. There are also informal in-house training such as on-the-job training, coaching, job rotation, understudy, and committee assignments. Usually the organization encourages external training for self-development. This can range from seminars and workshops to correspondence courses and college classes.

In surveying training needs, Tracey listed comparing job descriptions and applicant specifications with skills of employees, analyzing job performance ratings, analyzing personnel records, analyzing any other company records, analyzing operating problems, and analyzing long-range plans

and forecasts. The analysis of job descriptions, applicant specifications, and skills of employees can identify areas in which training may be needed. Performance ratings and personnel records can also help to identify any specific individuals who require training. Operating problems, other company records, and long-range plans will provide the information necessary for planning revisions, additions, and deletions to existing programs.

Training in industrial and vocational schools differ from academic educational programs in that the training is geared toward the performance of specific job activities. To eliminate unnecessary expense and to maximize the efficiency of the training program, it is necessary to restrict the program to those areas actually required in the performance of the job activities. This implies the need to analyze the job to determine the activities to be included in the training program. Job analysis is involved with the collection, recording, tabulation, interpretation of data, and analysis of the duties and tasks, description of the conditions surrounding the performance of these duties and tasks, identification of the skills, knowledge, and abilities required to perform the duties and tasks, and the determination of acceptable standards for the performance of the duties and tasks.

Differentiation is made between four categories of job

activities. These categories arranged in descending order of scope are job, duty, task, and element. A job is a specific unit in the hierarchy of work such as an electronics technician. A duty is a component of a job. The duties of an electronics technician may include maintenance of assigned equipment, organization of the shop, and completion of administrative paperwork. Tasks are components of duties. Tasks for electronic specialists in the duty of maintenance could include performing preventative maintenance, performing corrective maintenance, and troubleshooting. An element is a component of a task. Troubleshooting is involved with the elements of symptom determination, faulty block location, faulty circuit isolation, and faulty component isolation. The categories encompass a broad range that becomes progressively restricted and more specific as the levels descend. Job analysis, then, proceeds with the identification of the broad areas first and leads to the description of specific elements by the narrowing process.

Careful planning must be done to perform a job analysis to ensure accuracy and completeness. The planning includes the selection of job analysts, the selection of operating units to be observed, the training of job analysts, the preparation of data-gathering instruments, and the coordination and administrative arrangements. In the case

of a large organization with widely dispersed operating units, it may not be feasible for one person to conduct the job analysis. A team of job analysts may be assigned to observe and to record data in the operating units simultaneously. This has the advantage of minimizing the time required. A disadvantage is the possibility of individual differences of the job analysts' methods affecting the data collection. For this reason, the data collecting process must be explicitly designed and administered.

The operating units to be observed must be selected. Ideally, all operating units would be observed. This may not be feasible in a large organization. Careful selection must be made to ensure a true representation of the job to be analyzed.

The job analysts must be thoroughly trained in regard to their assignments and duties. This training can help to minimize the possibility of incorrect or inconsistent data collection methods. A schedule or checklist could be developed to aid the analysts to this end.

The data-gathering instruments should contain identifying information, details of duties, tasks, and elements, equipment information, and any general information necessary for the process. In preparing the instruments, the training manager should consider standards of

performance, daily work records, and the interview techniques to be used. Each duty, task, and element is described by behavior, conditions, and standards. Behavior is the directly observable performance. Conditions are factors affecting performance such as available tools, equipment, job aids, and supervision.

After the job analysis is completed, the training objectives must be developed. Training objectives are statements of expected trainee performance at the conclusion of part or all of the training program. These objectives are derived from the job analysis. A standard format for objectives has been developed over the years which is especially applicable for job training.

Tracey prescribed a detailed procedure for writing performance-centered objectives. The first step is to identify the desired behavior. The required conditions of the performance are then stated. The conditions include what the trainee will be given, what restrictions are placed on the activity, what tools and equipment will be used, what references or job aids will be used, and what special physical or environmental conditions exist. Finally, the criterion of acceptable performance is stated. This criterion must be realistic and attainable, be relevant to the job, specify the minimum acceptable level of performance, avoid imprecise words, and be measurable.

Once a list of training objectives has been established, the training manager may find that incoming trainees may possess some of the skills specified by the objectives. It is then necessary to select which of the objectives will be incorporated into the training program. Tracey listed a group of criteria to be considered for selecting objectives. These criteria are rated on a scale of 0 to 5, and the scores are added to obtain a composite score. The decision to include or to exclude an objective is based on the composite score.

The criteria to be rated are universality, difficulty, cruciality, frequency, practicability, achievability, quality, deficiency, retainability, and follow-on training. Universality refers to the percentage of workers that can satisfy the performance of the objective. Difficulty refers to the ease at which the objective may be learned on the job. Cruciality refers to the actual need for the performance on the job. Frequency describes how often the performance is accomplished on the job. Practicability refers to the proficiency comparison between formal training and on-the-job training for the objective. Achievability refers to the ability of the trainees to learn the performance to the required degree of proficiency in the allotted time. Quality describes how useful the objective is to various types of performers. Deficiency refers to how

frequently the desired performance is not present in workers. Retainability describes the time interval between training and actual work. Following-on training refers to degrees of additional training needed for the performance after the trainee leaves the formal training program.

Tracey listed the categories of evaluation as task not taught (0-10), introduce if time permits (11-20), all trainees introduced to task (21-30), some training provide with demonstration but not mastery of task (31-40), and complete, thorough training with demonstrated mastery of task (41-50). Tracey did not discuss the basis for selection of the cutoff scores.

When the training objectives have been written and selected, the training manager may turn his attention to the areas of evaluative instruments, criterion measures, course content, training strategies, and training documents. Evaluative instruments consist of methods and procedures to evaluate the training system. Criterion measures are the means by which achievement of learning the objectives is determined. The course content should be selected and sequenced for optimum results. Training strategies also have to be selected. Training documents include the course of study, lesson plans, etc. Each of these areas will be covered in the listed order.

The design and development of training systems is by no

means an exact process that achieves perfection on the first attempt. Modifications have to be made as a result of errors, organizational change, new technology, etc. The need for modifications demands that the system be evaluated regularly. Some sort of evaluative instrument will be needed to perform this evaluation. A rating method can give mathematical statistics that indicate relative superiority among various criteria to be evaluated.

In the broadest sense, there are two types of rating methods. Ratings can be given on a relative scale or on an absolute scale. The relative scale may contain descriptive adjectives as poor, fair, average, good, excellent. A disadvantage of this method is that different evaluators may have different conceptions of what constitutes each of the descriptives. The absolute scale may consist of percentages of the total possible score. The scores would be awarded according to precise instructions. Ideally, the absolute scale is superior to the relative scale. However, the precise instructions may be exceedingly difficult, if not impossible, to construct in order to avoid all subjective judgments on the part of the evaluator.

Other methods of evaluation include checklists, questionnaires, and interviews. Checklists are primarily pass/fail instruments. They fail to differentiate between the quality of the passing marks and between the quality of



the failing marks. Questionnaires are extremely difficult to design for maximum benefit. Another danger is that the respondents may misinterpret the questions or may not follow directions precisely. Interviews are also difficult to design. The interviewer needs to be proficient in the interview process. These methods can yield some useful information in spite of their disadvantages.

Criterion measures are constructed with reference to the training objectives to determine if learning described by the objectives has occurred. Criterion measures may be administered in a variety of tests. The tests may be written, objective oral, objective essay, performance, or rating exams. Whichever type is used, it should be properly constructed. The tests are usually based on a set of characteristics that can be used to determine if a test is acceptable. These characteristics include validity, reliability, objectivity, administrability, standardability, comprehensiveness, and economy.

Validity is concerned with whether the criterion item actually tests what it is designed to test. A test is reliable if trainees would score the same on a retest of the same items. An objective test would not permit subjectivity of grading on the part of the examiner. Administrability refers to the ease with which the test may be given. A standardized test may be given to all trainees without

discriminating unfairly among selected groups. A comprehensive test covers all objectives included in the training. Economy refers to the costs of materials and administration of the exam.

The training manager must construct the test with the characteristics in mind and should proceed with some sort of planned sequence. The first step could be planning the test. The items to be used in the test should be selected and drafted. Sequencing and formatting the selected items should be done. Directions should also be written for the trainee and for the examiner. Finally, the test should be administered, evaluated, and revised, as necessary. This last step is crucial for program effectiveness.

The next major step in Tracey's process is to select and to sequence course content. Selection is done on the basis of considering subject matter characteristics, sources, and types of tasks. Sequencing may be done according to logical order, to problem-centered organization, or to psychological order.

Closely related to course content is the selection of training strategies. Close attention should be given to objectives, course content, trainee population, instructors, space, facilities, equipment, materials, time, and cost. These factors must be considered in relation to the various methods available for instruction.

Some of the basic methods include lectures, conferences, demonstrations, performance, programmed instruction, study assignments, computer assisted instruction, and combinations of the methods. Special participative methods include case studies, incidents, role playing, sensitivity training, simulations, games, models, in-basket exercises, buzz sessions, committees, field trips, panels, and group interviews. Each method should be examined and evaluated in terms of the factors listed above to determine the feasibility of utilizing that particular method.

In addition to the factors and methods, the types of trainee and instructor organization and the types of mediating devices to be used must be considered. Trainee and instructor organization may take the forms of random grouping, homogeneous grouping, team teaching, and team learning. Mediating devices include teaching machines, closed circuit television, student response systems, and computer-based instructional systems.

Training aids should be selected to enhance and to reinforce learning. Training aids may include printed materials, graphic materials, three dimensional objects, and auditory materials. Printed materials may be job sheets, information sheets, assignment sheets, and supplemental handouts. Graphic materials could be included in the printed materials as well as in projection materials.

Models and mock-ups are examples of three dimensional materials. Projection materials include slides, films, filmstrips, transparencies, videotape, and videodisc. Auditory materials include tape recordings, records, and some of the projection materials. It is apparent that there are many different types of training aids. Unless the budget is large, the training director may have to limit the training aids to a portion of the total available. The selection must be done carefully to optimize the learning process.

Training programs involving practical hands-on performances require an inventory of equipment to be used in job performance. The types and number of equipment pieces used for training must be determined. The training manager needs to answer several questions and to consider various factors in determining what equipment will be used.

Questions concerning objectives, target population, class size, location, and training strategy must be answered. The training manager must consider the factors of what current equipment is being used on the job, of possible future equipment requirements, of the availability of equipment, and of costs. Considerable care is needed for this process because of the potential expense involved. The need to make timely and accurate decisions implies that the training manager needs to have efficient lines of

communication established throughout the organization.

The next step in the training process is to produce the training documents. Tracey described only programs of instruction and lesson plans. A program of instruction is a document that describes the training program. The contents of a program of instruction are title page, preface, job performance requirements, training performance objectives, performance evaluations, sequence of instruction, classroom requirements, and a master list of skills. The lesson plan may be divided into four broad areas containing identifying information, authentication, body, and enclosures.

One important aspect of a training program that needs considerable attention is the selection of instructors. Factors to be considered in the selection process are subject-matter expertise, professional knowledge and skills, communication skills, and personal qualities. It is extremely helpful to establish prerequisites in order to evaluate the applicants. Prerequisites for subject-matter expertise may include enterprise knowledge, job knowledge, and skills. Instructors must be able to communicate well in order to enhance learning. Evidence of communication skills can be obtained from review of educational background, prior experience, and interviews. Personal qualities include intelligence, interests, and temperament. Evidence of professional knowledge can come from work experience,

training background, military experience, and interviews.

Instructors may come from various sources. The sources may include trained educators, operative employees and technicians, line supervisors and managers, staff training specialists, and outside experts. All possible sources should be examined to obtain the best possible instructors to ensure efficient and effective training.

Different instructional skills are required by different training strategies. This must also be considered in the selection process. Various training strategies include lecture, conference demonstration, performance, programmed instruction, combination instruction, team teaching, and special participative methods. Each should be analyzed to determine what skills will be needed by the instructor.

A selection process for trainees also needs to be considered. The personnel department has a set of criteria against which prospective employees are evaluated. The efforts of the training department and of the personnel department must be closely coordinated to ensure that the optimum match of employee prerequisites and trainee prerequisites is made. Without this match, the training program may be too broad or too restrictive in design. Both extremes can result in waste of time and people. Similar categories of prerequisites may be established for the trainees as were established for the instructors.

Since training systems are designed and operated by humans, perfection is not to be expected. To provide an optimum system, it is necessary to be able to identify weaknesses, to correct them, and to scrutinize the system on a continuous basis. Evaluation is one of the most important components of a training system and includes such areas as trainees, instructors, course content, sequence and time allocations, instructional strategies, materials, equipment, and facilities.

There are several approaches to evaluating the various areas, and a composite synthesis of all of the approaches may lead to extremely useful feedback data. Observation may be used to evaluate each area. For observation to be effective, it must be specific, systematic, quantitative, and recorded. Ratings supply the quantitative aspect. Ratings may be applied to trainee performance and to instructor performance quite easily. Designing a rating system for the other areas is possible but may be more complicated. Surveys and interviews of both instructors and trainees may yield useful data. These must be carefully designed and conducted to accomplish an effective evaluation.

After all of the methods are applied, the data must be organized, tabulated, and interpreted. This step should be done carefully to avoid errors that could have detrimental

effects on the system. The results would form the basis of recommendations to modify the system.

The primary method of evaluating trainees is by the use of tests. Tests may take the form of written exams or of performance exams. These must also be evaluated for their effectiveness and usefulness in the program. Effective administration of tests requires that clear directions be given and that suitable conditions exist for the students to take the test. Detailed procedures should be established and followed to insure consistency. The types of scores to be reported and who will receive the score results should also be established.

After the test is administered, it should be analyzed and critiqued. A critique of the exam with the class may reveal deficiencies or errors. A careful analysis of the exam can reveal if it is doing what it was designed to do.

The final step to the training process involves the follow-up on the graduates of the program. This is an integral part of the evaluation process. Data collected can be used to determine weaknesses in the training. There are three basic methods of collecting data. Personnel may travel to the job sites to collect data, operating supervisors may submit reports, and the training facility may send out questionnaire surveys. Probably the best method is to send personnel to the job site for data



collection. This method is quite expensive, but the other two methods are less reliable. Reports and surveys may not be submitted by those asked.

Detailed planning is required for each of the data collection methods. The on-site method requires selection of team members, training, job site selection, scheduling, rehearsing, and arranging travel prior to the actual collection of data. Supervisory reports require the design of the reporting system in detail from the first draft to the revision of the program. Questionnaire follow-up requires construction of the questionnaires, design of the method of tabulation, analysis, and utilization of data.

Comment. This work is a detailed treatise with numerous charts and checklists. The training manager may choose which of the examples to include in the training program. The models may also be easily adapted to meet individual needs. The work is somewhat overwhelming in content, but it is an excellent reference work. It is, unfortunately, out of print and may be difficult to obtain. It appears to have been written for a large organization and may not be totally applicable to the small concern, but the training manager has the option to choose appropriate sections to apply to his/her program. Extremely useful may be the checklists provided with or without individual modifications.

### Pamphlets

#### The Center for Vocational Education (1977)

This work is a series of one hundred pamphlets devoted to vocational education in a community college or vocational school setting. The pamphlets are arranged in ten groups of modules described as program planning, development, and evaluation, instructional planning, instructional execution, instructional evaluation, instructional management, guidance, school-community relations, student vocational organizations, professional role and development, and coordination of cooperative education.

Program planning, development, and evaluation are concerned with community surveys, advisory committees, program goals and objectives, occupational analyses, courses of study, long-range program plans, student follow-up studies, and vocational program evaluations. Community surveys are similar to organization analyses in the industrial setting. Advisory committees play an important role in community colleges, and their equivalent industrial entities could prove to be quite helpful in achieving the goals of the training program. The development of program goals and objectives forms the first specific step of actual program development. Goals are written statements that describe what results are desired from the training program.

Goals are broad statements that are used as a basis for the development of the more specific objectives. An occupational analysis is the equivalent of a job analysis. The course of study is essentially an outline of the training program. It generally contains a title, course description, course objectives, a description of course content, materials, equipment, time allocations, and references. Long-range program goals are important to consider, and extreme care must be taken to do adequate planning to avoid frequent alterations of these goals. The training manager must also plan the procedures for the evaluation of the training program. A follow-up study of graduates is a necessary step to assist in the evaluation. Improvement of the training program depends on the conduction of a valid evaluation.

Instructional planning is concerned with the needs and interests of students, student performance objectives, units of instruction, lesson plans, and instructional materials. The training program must serve the needs of the students to be effective. Knowledge of these needs and also of the students' interests can enhance effective program design. The results of the occupational analysis are used as a basis for developing the student performance objectives. The objectives are developed according to the procedures discussed earlier in this paper. Units of instruction are

developed by grouping the objectives into cohesive, related areas. The time frame for a unit may extend to one or more days of instruction. The units are then subdivided into individual presentations. Each of these presentations requires a lesson plan to be developed. The lesson plan provides an outline and a sequence for the presentation. It also can help to avoid the omission of relevant and/or important points of instruction. Instructional materials may be selected from available sources or may be developed by the instructor. Production of instructional materials may be done by a variety of means that include, mimeographing, photocopying, drafting, computer-designed graphic production, and audio-visual methods.

Instructional execution includes such topics as field trips, group discussions, brainstorming, simulation techniques, laboratory training techniques, problem-solving techniques, projects, lesson introductions, lesson summaries, questioning techniques, reinforcement techniques, demonstrations, individualized instruction, team teaching, models, overhead and opaque projection techniques, audio-visual techniques, programmed instruction, and chalkboard techniques. Each topic contained examples and exercises to develop a degree of familiarity with the technique described. The training director must decide which techniques are most effective in presenting the

subject matter within the constraints of time and budget.

Instructional evaluation begins with the establishment of student performance criteria. Procedures for the assessment of knowledge, skills, and attitudes were outlined in some detail. Grades are determined from the results of these assessments. Finally, instructional effectiveness must be evaluated to pave the way for program improvement.

Instructional management covers the areas of resource projections, budget management, facilities improvement, filing, safety and first aid, and management of the vocational laboratory. Not included in the instructional management area were items as scheduling classes, arranging travel, controlling class size, and scheduling instructor assignments.

The other groups of modules were concerned with vocational schools in areas that were not related to the industrial program or were not directly related to the development process. For these reasons, a discussion of these areas will not be made.

Comment. These pamphlets can be instructional tools for the training manager and can serve well as models in the various aspects of the development process. It seems somewhat illogical that program evaluation modules were not grouped together. Evaluation is an integral part of any training program and probably deserves a separate section.

Many sample forms were included in the various modules and could be used with little or no modifications. The modules are rather expensive and could be prohibitive for the budget of a small training department.

### Articles

#### Becker (1980)

Becker listed ten steps of the training developmental process. He called them organizational performance analysis, training needs integration plan, competency descriptions, learning objectives, participant analysis, learning design, evaluation and measurement, learning program administration, reporting individual progress, and assessing organizational achievement. These steps will be analyzed in detail in order to clarify the content.

Organizational performance analysis involves examining operational data, identifying problems and their causes, and deciding on solutions to the causes. This description implies that a training program already exists, and this step would be a part of the revision process.

The training needs integration plan is a statement of responsibility and accountability. It addresses the basic questions of who, what, when, and how much.

The competency description identifies the essential characteristics of a competent performer. This is done by

examining the job and by describing basic knowledge and skills the performer must possess. This step is important in industrial training programs because of the nature of such programs. The industrial program exists to provide the enterprise with individuals who can perform clearly defined jobs. To avoid waste of time and resources, the training program must provide the individuals with the required skills to perform the job. Identification of the required skills provides a basis for the design of the program.

Creation of learning objectives follows from the competency description by enumerating each individual performance component of the competency description. Learning objectives are descriptions of each individual skill or knowledge component to be learned.

Participant analysis describes who will be trained and in what order they will participate in the training. The entrance knowledge skills must be identified to maximize learning. Too broad of a range of entrance prerequisites will prevent an optimum design of the training program. The less experienced participants may not succeed, while the more experienced participants may become bored. The truly individualized program may be too expensive and time consuming to warrant consideration.

Learning design is the process of arranging time, methods, materials, media, equipment, and instructor

resources. This step allows the training manager to determine what will be needed in the training program. Although each of the components is relatively simple when taken individually, the interrelationships among them makes learning design an extremely complex undertaking.

Evaluation and measurement are related but are not the same. Evaluation is concerned with determining how much the trainees have learned and whether or not the course has met its objectives. Measurement is concerned with the procedures used to make an evaluation. This step is crucial to the success of a training program. It provides the vehicle by which discrepancies in the program may be corrected. Valid evaluation can also predict the probable success or failure of the trainees.

Learning program administration encompasses contingency planning to identify potential problems with the learning design. It includes such items as travel arrangements, hotel accommodations, food service, schedules, equipment failures, and learning reinforcement. It is apparent that lack of contingency planning could result in a condition of disorganization should something go wrong.

Reporting individual progress is concerned with the various types of reporting formats that may be used. Different formats may be required for reporting to various levels within the organization. Other considerations such



as confidentiality, organizational politics, and affirmative action laws also play a part in this step.

Assessing organizational achievement assesses the results of training in relation to other activities of the organization. This step provides a basis for improvement and revision of the training program. Completion of this step leads back to the first step in the process and implies that the training program must continually be adjusted.

Comment. Becker's article refers to several relevant points of concern in the developmental process of a training program. The length of the article did not allow much elaboration into specific details and should be viewed only as a general guide. More detail is needed to provide a more clearly defined approach. Further discussion into such items as objectives and evaluation could prove useful.

#### Heines (1980)

Heines' article was concerned with the preparation of objectives. He cautioned against over-behavioralism and wordiness when writing objectives. Over-behavioralism occurs when an objective is worded in such a way that the objective and a test item would be exactly the same. Wordiness may be avoided by eliminating unnecessary phrases such as "the student will be able to." Another suggestion to avoid confusion by wordiness was to break the objective

into two sentences with the action stated first. The given conditions could then be placed in the second sentence. A final suggestion was to avoid repetitious phrases such as "without references." Phrases such as this could be placed in a student guide.

Comment. While this article contained some useful ideas, it could primarily be considered as cosmetic improvements. The comments on wordiness and over-behavioralism are niceties that really do not contribute substantial developmental impetus to the program.

Limon (1980)

Limon suggested the approach of presenting the objectives in teachable parts. Even though objectives are the units of behavior as related to training, each objective may be divided into sub-units of activity. For example, if the trainee is to accomplish the objective of measuring voltage with a meter, he/she must accomplish several activities to demonstrate achievement of the objective. The meter leads must be connected to the meter correctly, the proper controls must be set accurately, the meter leads must be connected to the circuit properly, and the reading must be taken. The behavior to be demonstrated should be analyzed by performing the action and by rating each activity involved. This analysis provides the basis for

ensuring that completeness is achieved in the presentation.

Comment. This article provided valuable insights into effective training presentation design. It is by such methodical and detailed analyses that excellent training programs are constructed.

Trader (1980)

Trader went into more detail than Limon and provided a checklist for teaching an objective. The checklist was divided into the main areas of planning for instruction, instructing, and evaluating. Planning included analysis of the objective, integration of the objective into an existing plan, assessing resources, and scheduling the instruction. Instructing included sharing the objectives with students, providing activities related to instructional timing, providing instructional variety, presenting the objective, and providing extending activities. Evaluating consisted of matching the evaluation to the objective, trying a variety of evaluative techniques, and reporting the results of the evaluation.

Comment. Trader's article provided a handy checklist for teaching objectives, but it also touched upon areas outside the stated title. The outside areas were related to the objective and served to illustrate the necessary cohesiveness of the various elements of the training

function.

Schwartz (1980)

One of the newer techniques for presenting instruction is the use of the microcomputer with other types of audio-visual media or by itself. Schwartz described the use of the microcomputer with video tapes. Video tapes can present moving, colorful, visual materials and can utilize spoken descriptions as well as other sounds. The microcomputer can offer programmed instruction, generate text and graphics, bypass materials the user already knows, score responses, and interface with the video player.

Disadvantages of this system include the cost of the variety of equipment used, production of the video tapes, and possible complications during set-up of equipment. It is possible to avoid these disadvantages by utilizing sound and graphics that are generated by the computer. An experienced programmer or a language such as PILOT would be needed to accomplish this.

Comment. This article is representative of the type of literature that is surfacing concerning the advent of the computer into training programs. The computer offers the promise to revolutionize education and training. Until recently, the cost was prohibitive, but recently prices have begun to plummet. There are many software packages devoted

to training in individual subjects and to authoring systems. Since most of the other presentational techniques were covered by various authors, a view into this technique is in order. The field of computer-assisted learning is still in its infancy, and further developments are to be expected.

Cornwell (1981)

Cornwell discussed the abilities of "target trainees" and actual trainees. Sometimes the actual trainees have lower skill and knowledge levels than the target trainees, and sometimes they have higher levels. He suggested testing trainees before conducting the training. The target trainee should be specifically defined in terms of prerequisite learning abilities and learning needs. The abilities are measured by prerequisite testing and pretesting. Finally, a plan of action is needed to respond to differences revealed by the testing. Remedial instruction and exclusion from training are two possible responses in this area.

Comment. This article covered the specific area of pretesting in a general way. Cornwell did talk at some length about objectives and their relationship to pretesting. The general guidelines are helpful, but the article was too short to provide any specific details.

Cornwell (1980)

This article provided examples of post-training surveys

designed for the student and for the supervisor. These surveys were designed to assess how accurately the training program addressed the job requirements, how successfully the students are performing the tasks learned, and what unintended consequences have occurred as a result of the training program. The surveys provided spaces to rate each of the questions asked and also provided directions for completing the surveys. The information gathered by the surveys may be used in evaluation and revision of the training program.

Comment. This article supplied specific useful information that may be implemented into any job training program. The training manager will have to decide on necessary modifications to the examples provided. Whether or not the training manager decides to use the types of surveys provided, he/she should include some type of similar assessment in the training program. Reference to this article would provide valuable assistance in that event.

#### Review Summary

The books, pamphlets, and articles reviewed represented only a portion of the literature consulted. The purpose of the selected review was to reveal the general direction of the thrust of modern training programs. This review also revealed that the books and pamphlets, in most cases,

provided more specific information than did articles. The main reason for this was due to the restricted length of the articles. In general, all the authors take the same type of approach to the development of training programs. Some of the authors presented complex and detailed procedures, and other authors gave only a broad outline with few specific details. To have included every explicit detail in this review may possibly have clouded the issue at hand. This issue was to become familiar with the scope of the problem of developing a training program and to compare the approaches of the various authors.

## Chapter 3

### THE MODEL

The subject of this chapter is the actual model that may be used for program development. This model has been prepared with the goals of practicality and flexibility in mind. No attempt has been made to ensure that the model contains all possible factors which, in itself, is probably impossible. Rather, the model is an attempt to present the essential components of the developmental process to enable the training director to produce a workable training program in a minimal amount of time. The embellishments may easily be added gradually in the course of program revision. This approach seems to be flexible in that it allows the training director to select which modifications are to be added to the model. Limiting the model to the essential elements should result in minimal revisions to the structure.

#### Setting

The model is concerned with the development of a technical training program for Showbiz Pizza Place, Inc. A training program was needed to orient newly hired electronics technicians to their duties and responsibilities in Showbiz Pizza Place restaurants throughout the country.



The restaurants provide, in addition to food, entertainment in the form of video games, children's rides, and animated robot entertainment controlled by a computer. The decision to develop a training program had been made, facilities were available for the training, and no limit was placed on the budget. It is from this starting position that the model is to be applied.

#### Plan of Action

The development of a training program should be a systematic process. The process used in the model proceeds from the general to the specific. The overall process is described in general terms first. The model is then divided into individual components, and each component is discussed in some detail along with illustrative examples. This type of approach is based on simplicity. It is somewhat easier to build upon simple structures, and it is also easier to comprehend the process by using this approach. Additions and enhancements may be made at any level in the structure and elaborated upon as the situation warrants. This provides the model with a degree of flexibility and an ease of expansion.

#### System Process

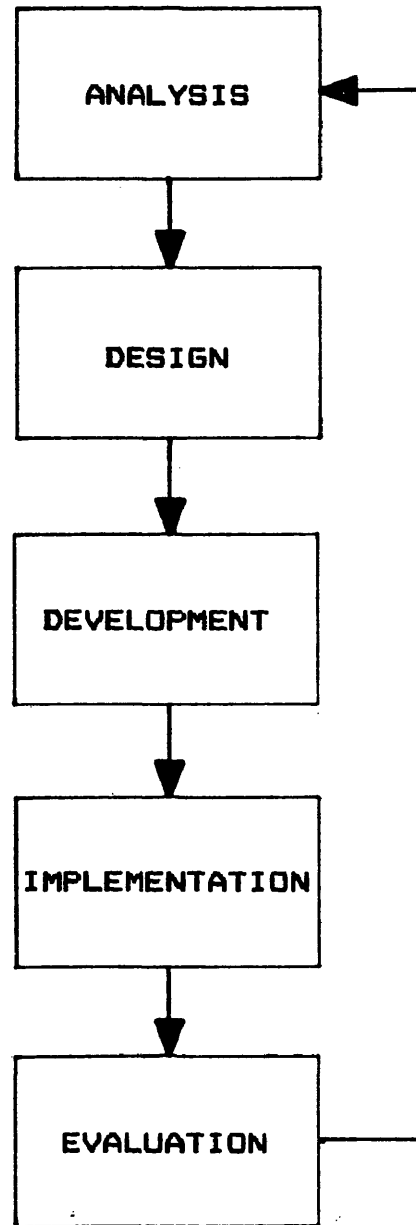
The overall design of the model consists of five basic

activities. The activities include analysis, design, development, implementation, and evaluation. The activities form a cycle which proceeds in the order listed and leads from evaluation back to analysis. Figure 1 is a flow diagram of the overall process which represents the most general structure of the process. The process is closely related to problem-solving or systems design procedures. This relationship can be explored by considering the general characteristics of the individual activities in comparison to the procedures of problem-solving.

The first step of problem-solving is to analyze the problem. The known data are collected along with the question that is to be answered. For training programs, analysis involves similar collection of data and questions. A description of what is to be accomplished and the establishment of the initial foundation are necessary to perform the analysis.

After the analysis of the problem is completed, possible hypotheses or solutions are formulated. This relates to the design activity of program development. In this activity, an outline of instruction is proposed to accomplish the objectives of the training program.

The method of testing the possible hypotheses is established in the next step of problem-solving. The development of curriculum and program materials is analogous



**Figure 1**  
**Program Development Cycle**

to this step.

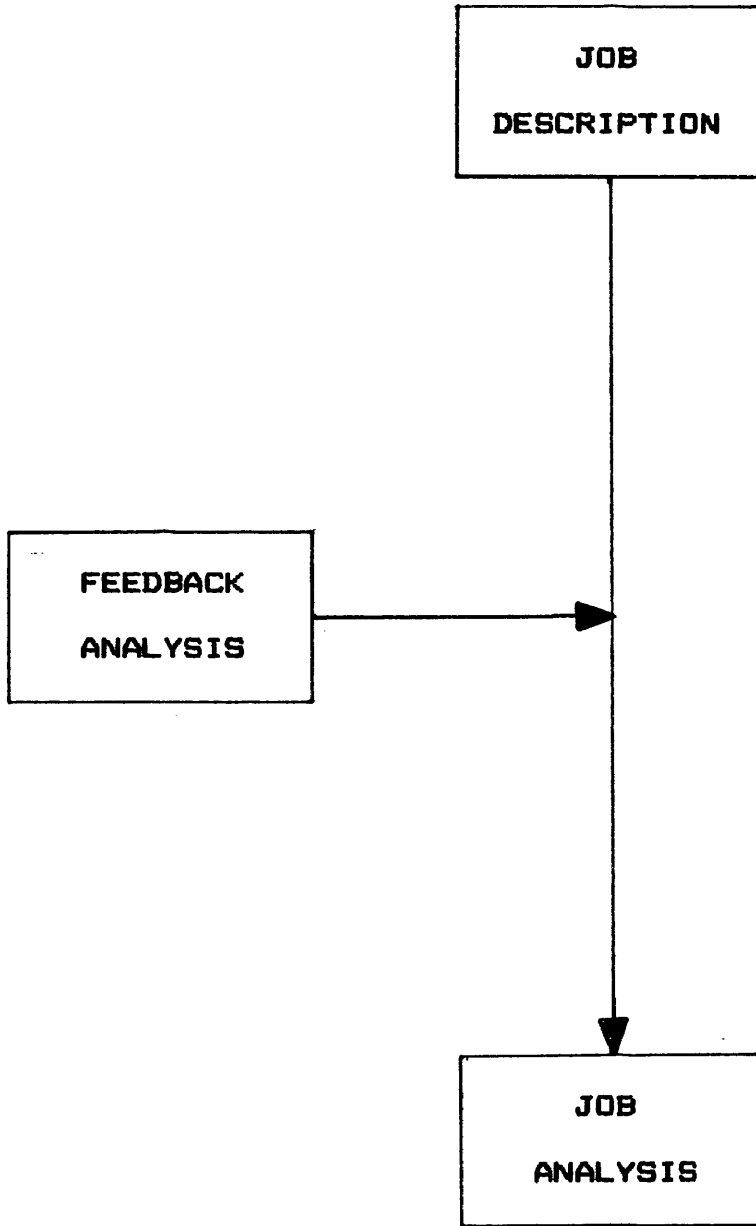
The first hypothesis is then tested in the next step of the problem-solving procedure. In the training program, a pilot course would be conducted. This is the implementation phase of the training program cycle.

Finally, the results of hypothesis testing is analyzed to determine if further testing will be needed. This is related to the evaluation phase in training programs. The evaluation phase identifies what additions, changes, deletions, or enhancements are needed in the training program.

It can be seen that problem-solving and program development are not exactly identical processes, but the overall procedures do have similarities. Each activity may now be investigated in more detail.

### Analysis

The essential components of this activity include job descriptions, job analysis, and feedback analysis. Feedback analysis does not constitute a feature of the analysis activity until the pilot course has been conducted. It then comes into consideration for all revisions thereafter. Figure 2 represents the basic elements of the analysis phase.



**Figure 2**  
**Analysis Flow Diagram**

### Job Description

The first step of the analysis phase is to obtain a job description. In most corporations, job descriptions may be obtained from the personnel department. The job description is a summary of the requirements of the position. Table I shows the job description used in the model.

### Job Analysis

The job analysis activity may be divided into four components. An initial listing of duty statements must be prepared. An inventory of tasks must be developed from the duty statements. A listing of performance elements must be prepared for each of the tasks. Finally, the performance elements must be rated according to importance. This procedure follows the main design of proceeding from the general to the specific. The results of the job analysis will be used in the development phase. Figure 3 shows the main procedure of job analysis.

Duty statements. The listing of duty statements may be prepared by consulting the job description, by conferring with technical experts in the organization, by observing workers on the job, and by reviewing company policies and procedures that concern the job. Table II is an initial listing of the duty statements for an electronic specialist at a Showbiz Pizza Place restaurant.

**Table I**  
**Electronic Specialist**  
**Job Description**

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**Technical duties**

---

Maintain the animation to standards specified by the Director of Electronics and the manufacturer.

Maintain the equipment in the playroom and sportsroom to the standards specified by the Director of Electronics.

Maintain miscellaneous assigned equipment to the standards specified by the Director of Electronics.

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**Administrative duties**

---

Complete all required reports promptly.

Maintain an inventory control system.

Maintain an ongoing safety program

Maintain effective communications throughout the assigned areas of responsibility.

Train, motivate, and supervise all personnel throughout the assigned areas of responsibility.

Maintain strict adherence to all company policies and rules.

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**Relationships**

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The electronic specialist reports directly to the restaurant manager.

The electronic specialist may be required to provide assistance and/or cooperation with the assistant manager, the district electronic specialist, the regional electronic specialist, and the animation manufacturer's support personnel.

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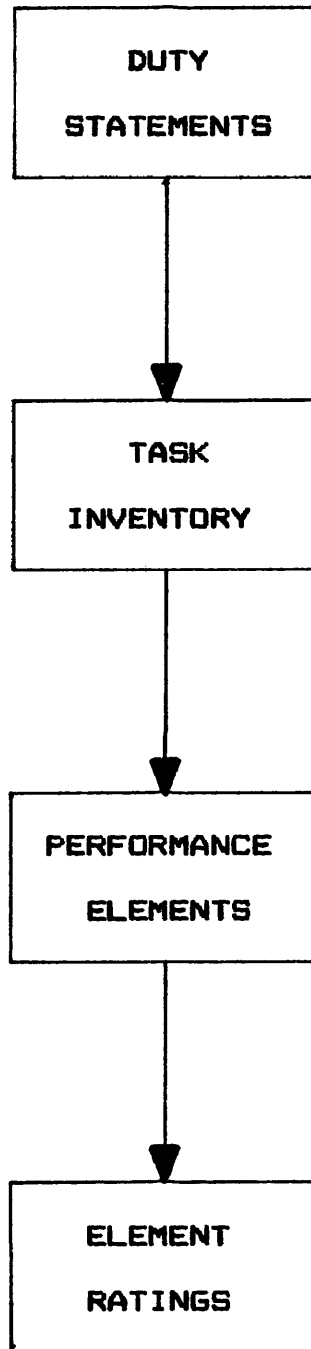


Figure 3

Job Analysis Flow Diagram



**Table II**  
**Electronic Specialist**  
**Duty Statements**

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**Technical duties**

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Maintain the animation electronics system.  
Maintain the animation pneumatic system.  
Maintain the animation mechanical system.  
Maintain the video games.  
Maintain the children's amusements.  
Maintain the kitchen equipment.  
Maintain the register system.  
Maintain the television system.  
Maintain any miscellaneous equipment.

---

**Administrative duties**

---

Supervise subordinate personnel.  
Complete all required paperwork.  
Maintain an ongoing safety program.  
Maintain an organized work area.  
Maintain effective communications.  
Maintain an inventory control system for assigned areas.  
Follow all company policy and rules explicitly.  
Perform any other assigned duties as required.  
Assist corporate personnel as required.

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Task inventory. The task inventory is developed from the duty statements. Most of the tasks may be obtained by using prior experience in analyzing the duties, but a more complete listing will result from observation of workers on the job. The task inventory is more specific than the duty statements, but it is more general than the performance elements. Table III shows the inventory of tasks for the electronic specialist.

Performance elements. Each task statement may contain several individual activities. These activities are called performance elements. The analysis is now concerned with preparing a listing of performance elements for each task. Table IV shows a listing of the performance elements for preventative maintenance on video games in Showbiz Pizza Place restaurants.

Performance element ratings. It may not be necessary to include all performance elements in the training program. The decision to include performance elements should be based on their importance to the job. This decision may be expedited by rating each of the elements according to the importance to the job. A rating form with a listing of performance elements along with spaces for ratings may be distributed to field personnel and other technical experts in the organization. The rating form should be accompanied

**Table III**  
**Electronic Specialist**  
**Task Inventory**

Preventative maintenance	Corrective maintenance
Animation mechanics	Animation mechanics
Animation electronics	Animation electronics
Animation pneumatics	Animation pneumatics
Video games	Video games
Amusements	Amusements
Television	Television
Kitchen equipment	Kitchen equipment
Register system	Register system
Music system	Music system
Cleaning equipment	Cleaning equipment

**Administrative**

Inventory parts, tools, and equipment.

Order parts, tools, and equipment.

Train assistants.

Supervise assistants.

Maintain files on equipment, animation, games, etc.

Maintain security program.

Maintain safety program.

Obey company policies and rules.

**Table IV**  
**Electronic Specialist**  
**Performance Elements**

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**Game preventative maintenance performance elements**

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Clean the video screen.

Clean the front panel.

Clean the cabinet externally.

Touch up nicks on cabinet with paint.

Apply new decals to cabinet.

Apply new overlays to front panel.

Adjust front panel controls.

Adjust coin mechanism.

Vacuum the cabinet internally.

Vacuum the internal circuit boards.

Check all internal connections and cables.

Adjust the computer power supply.

Adjust the monitor power supply.

Adjust the game sound level.

Adjust the video colors.

Adjust the picture brightness.

Adjust the monitor purity.

Adjust the monitor convergence.

---

by instructions concerning the method of rating and the time limit for completing the form. Table V is a sample rating form for the performance elements.

Each of the categories of importance may be assigned a value. For example, the point values could be essential(4), important(3), useful(2), nice to know(1), and unnecessary(0). When all of the rating forms are collected, the total point values for each performance element are calculated. These values are then divided by the number of respondents to yield a rating average for each performance element. These averages may be compared to cutoff scores to determine which performance elements are to be included in the training program. Figure 3 demonstrates the process of calculating the performance element average ratings.

### Feedback Analysis

Feedback analysis is conducted after the pilot course has been implemented. It is concerned with instructor evaluations, student critiques, graduate surveys, supervisor surveys, test analysis, organizational change, and any other information that may have an effect on the training program. The results of feedback analysis will reveal deficiencies in the training that need to be corrected that may range from job analysis to testing. Changes might include additions, deletions, or modifications to the existing curriculum or materials.

**Table V**  
**Performance Element**  
**Rating Form**

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**Purpose:** To determine which of the elements below should be included in the training program for the position of electronic specialist

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**Directions:** Please score the performance elements listed according to how important you feel they are in the performance of the job.

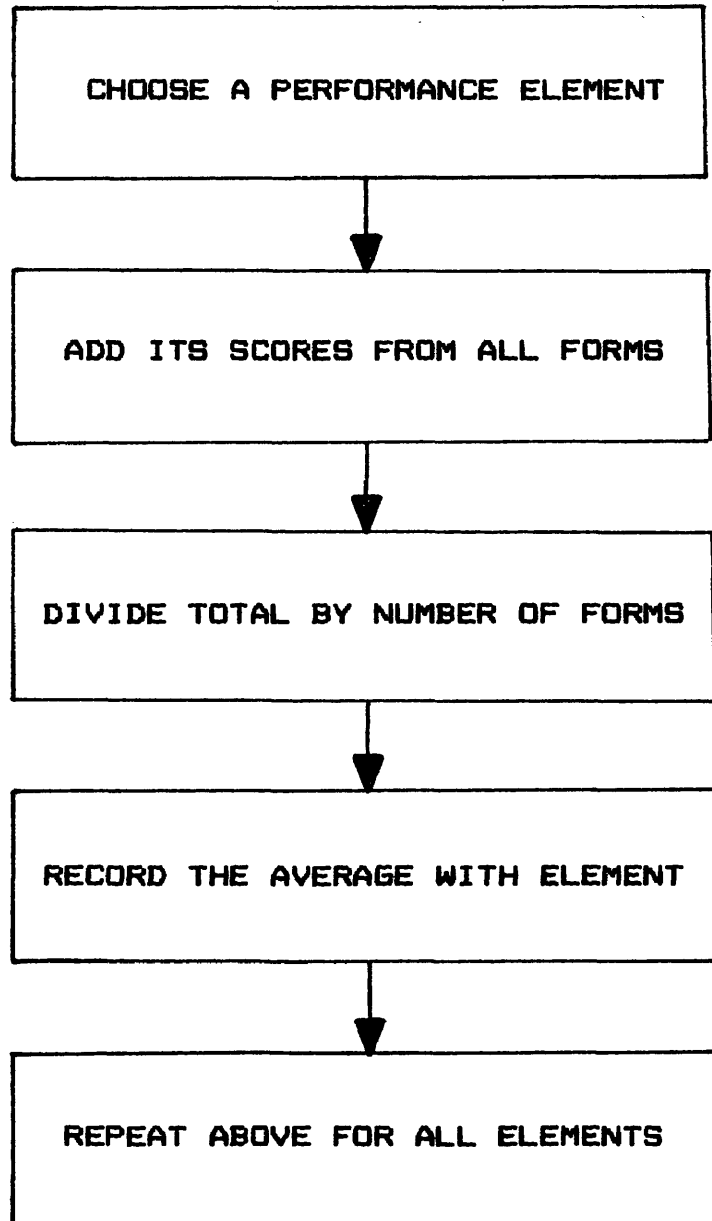
Score each performance element according to the following scale --

- 4 = essential
- 3 = important
- 2 = useful
- 1 = nice to know
- 0 = unnecessary

Return this rating form within one week to  
 Showbiz Pizza Place College  
 3333 Finley Road  
 Irving, TX 76021

Performance element	Score
Adjust the game computer power supplies	
Adjust the monitor power supplies	
Adjust the game sound levels	
Adjust the video colors	
Adjust the picture brightness	
Adjust the monitor purity	

---



**Figure 4**

**Average Rating Calculation Procedure**

### Design

This phase in the process involves preparing a course of study, preparing instructional objectives, and preparing units of instruction. These three activities form the foundation on which the actual development of the specific instructional elements depend. The activities in this section are more general in nature than the activities in the development section, and, thus, they form the overall design of the program. Figure 5 depicts the sequence of the design activities.

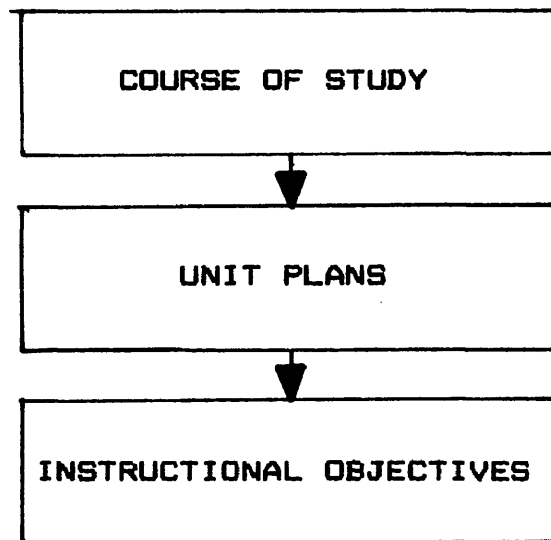


Figure 5

Design Phase Flow Diagram



### Course of Study

The course of study contains a course description, a listing of the course contents with time allocations, a listing of course objectives, a listing of references and audiovisual materials, and a listing of tools, equipment, supplies, and facilities required. It is convenient to prepare the items in the order listed and, then combine the items into one written document.

Course description. The course description is a narrative that describes who will be taught, what will be taught, what degree of skill will be attained, where the training will be used, and possibly any general employment conditions. The course description will generally be from one to three paragraphs in length.

Course content. The course content is a listing of the major areas of instruction included in the course. Frequently, the list is equivalent to a unit list. Time allocations are included with each unit for later planning. Initially, the time allocations must be estimated by using prior experience. After the course has been conducted for some time, the allocations should be revised to reflect the actual time required for each unit

Course objectives. The course objectives specify the general objectives to be achieved. They focus on the

overall abilities or competencies to be acquired by the students. Instructional objectives are more specific and are discussed later in the design section.

References and audiovisuals. This listing contains all references used in the course and include<sup>s</sup> textbooks, handouts, manufacturers' manuals, and company manuals. The listing of audiovisuals may contain transparencies, video tape, films, filmstrips, audio cassettes, slides, and computer-generated audiovisuals. Compiling this listing requires the analysis of each unit area to determine which audiovisual materials are appropriate, readily produced or accessible, and cost-feasible.

Facilities, equipment, tools, and supplies. The facilities are described in terms of classroom requirements, laboratory requirements, and storage requirements. The equipment and tool requirements must be determined in relation to what is to be taught and what are used on the job. Supplies include paper, writing instruments, parts, and other expendables used in the training program.

After the preceding components are prepared, they are assembled into a single document. Table VI is a finished course of study for the electronics training program at Showbiz Pizza Place, Inc.

**Table VI**  
**Electronic Specialist Training Program**  
**Course of Study**

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**Course description**

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The course is a two-week program that provides initial orientational training in the duties and responsibilities of the electronic specialist in Showbiz Pizza Place restaurants throughout the country. The course covers all maintenance and administrative responsibilities of the position and is conducted in the corporate training facility in Irving, Texas. The course is designed for students with a two-year degree in electronics or the equivalent military/industrial training, with a minimum of five years of electronic work experience, and with demonstrated mechanical skills. The graduates of the course will possess entry-level skills for the electronic specialist position and will be able to function with minimal supervision and assistance.

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**Course objectives**

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- A. Maintain and repair the animation system.
  - B. Maintain and repair the amusement equipment.
  - C. Maintain and repair the restaurant equipment.
  - D. Maintain and repair the miscellaneous equipment.
  - E. Perform administrative duties.
- 

**Course content**

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A. Orientation	4 hours
B. Animation maintenance	24 hours
C. Amusement maintenance	20 hours
D. Restaurant equipment maintenance	12 hours

---

Table VI (continued)

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E. Miscellaneous equipment maintenance	12 hours
F. Administrative duties	4 hours
G. Review	4 hours

---



---

References and audiovisuals

---

- A. References
1. Showbiz confidential operations manual
  2. Creative Engineering R & M manual
  3. Trainee guide
- B. Audiovisuals
1. Transparencies
  2. Video tapes
  3. Flip charts
  4. Films
  5. Audio cassettes
  6. Chalkboard
  7. Movie screen
- 

Tools, equipment, supplies, and facilities

---

- A. Tools
- Standard tool chest complement
- B. Equipment
1. Test equipment
  2. Animation system
  3. Amusements
  4. Video tape system
  5. Overhead projector
  6. Film projector
- C. Supplies
1. Chalk
  2. Writing instruments
  3. Paper
  4. Binders
  5. File folders
  6. Equipment parts
-

Table VI (continued)

- 
- D. Facilities
1. Classroom
    - a. tables (4)
    - b. chairs (8)
    - c. bulletin board
  2. Laboratory
    - a. work bench
    - b. file cabinets (2)
    - c. shelves (8)
  3. Storage
    - a. closet
    - b. parts bins (50)
- 

#### Units of Instruction

A unit of instruction is an outline of instructional activities that are clustered together because of logical relationships or similarities to one another. The basis for developing units of instruction can be found in the course content section of the course of study. The results of the job analysis are also used in the development of units of instruction.

The contents of a unit of instruction are title, course name, description, topics, objectives, learning activities, required resources, and evaluation. The title is the name of the unit, and the course name refers to the instructional program. The description provides a general overview of the unit. The instructional activities are listed as topics. The objectives are general performances of knowledge and

skills that relate to the topics. These objectives are not as specific as the objectives that are the basis for the instruction of performance elements. The sections that list the learning activities and required resources are combined into one section. This section is centered on what the student will be doing and should be carefully sequenced. The evaluation section describes how the assessment of student knowledge and skills will be accomplished. Table VII is a sample unit of instruction.

#### Instructional Objectives

Instructional objectives are the basis from which the individual lessons are developed. They are derived from the performance elements of the tasks identified in the analysis phase of the model. Instructional objectives specify the intended outcomes of student performances. The objectives are specific in regard to the performances and should be easily measured. An objective contains the elements of performance, conditions, and standards. The performance component describes what the student will be doing. The condition component may describe what equipment, supplies, or materials will be given to the student, what information will be given to the student, what type of environment will be provided, and what amount of time will be allowed for the performance. The standards, or criterion, component will describe the level of mastery or degree of proficiency to be

Table VII

**Electronic Specialist Training Program  
Unit of Instruction**

**Title**                    **Animation Maintenance**

**Course**                   **Electronic Specialist**

**I. Description**

The maintenance of the animation system in Showbiz Pizza Place restaurants is one of the prime areas of responsibility of the electronic specialist. It is necessary to be thoroughly familiar with the operation of the system as well as all maintenance procedures associated with the system in order to maintain the system according to company standards. This unit is concerned with the entire scope of animation system maintenance responsibilities.

**II. Topics**

- A. Operation of the animation system
- B. Electronic subsystem maintenance
- C. Pneumatic subsystem maintenance
- D. Mechanical subsystem maintenance

**III. Objectives**

- A. Describe the operation of the animation system.
- B. Perform preventative maintenance on the electronic subsystem.
- C. Perform corrective maintenance on the electronic subsystem.
- D. Perform preventative maintenance on the pneumatic subsystem.
- E. Perform corrective maintenance on the pneumatic subsystem.
- F. Perform preventative maintenance on the mechanical subsystem.
- G. Perform corrective maintenance on the mechanical subsystem.

**IV. Learning Activities**

- A. Listen to instructor presentation on the operation of the animation. Take part in discussion.

**Resources**

Handout: "Animation System Operation"

Table VII (continued)

---

B.	Read Section 16000 in text.	Text: Showbiz Manual
C.	Watch demonstration on start-up procedure. Perform start-up.	Handout: "Animation Start-up"
D.	Watch demonstration on electronic preventative maintenance. Perform preventative maintenance.	Handout: "Animation Electronics"
E.	Watch demonstration on electronic corrective maintenance. Perform corrective maintenance	
F.	Watch demonstration on pneumatic preventative maintenance. Perform preventative maintenance.	Handout: "Animation Pneumatics"
G.	Watch demonstration on pneumatic corrective maintenance. Perform corrective maintenance.	
H.	Watch demonstration on mechanical preventative maintenance. Perform preventative maintenance.	Handout: "Animation Mechanics"
I.	Watch demonstration on mechanical corrective maintenance. Perform corrective maintenance.	
V.	Evaluation	
A.	Homework assignment on operation and maintenance	
B.	Quiz on operation and maintenance	
C.	Performance exam on operation and maintenance	
D.	Final exam questions	

---

exhibited in the performance. The standards may be stated in terms of speed, percent, maximum errors, accuracy, degree of excellence, or combinations of items. Table VIII is a sample listing of some of the instructional objectives for



corrective maintenance instruction on the animation system at Showbiz Pizza Place restaurants.

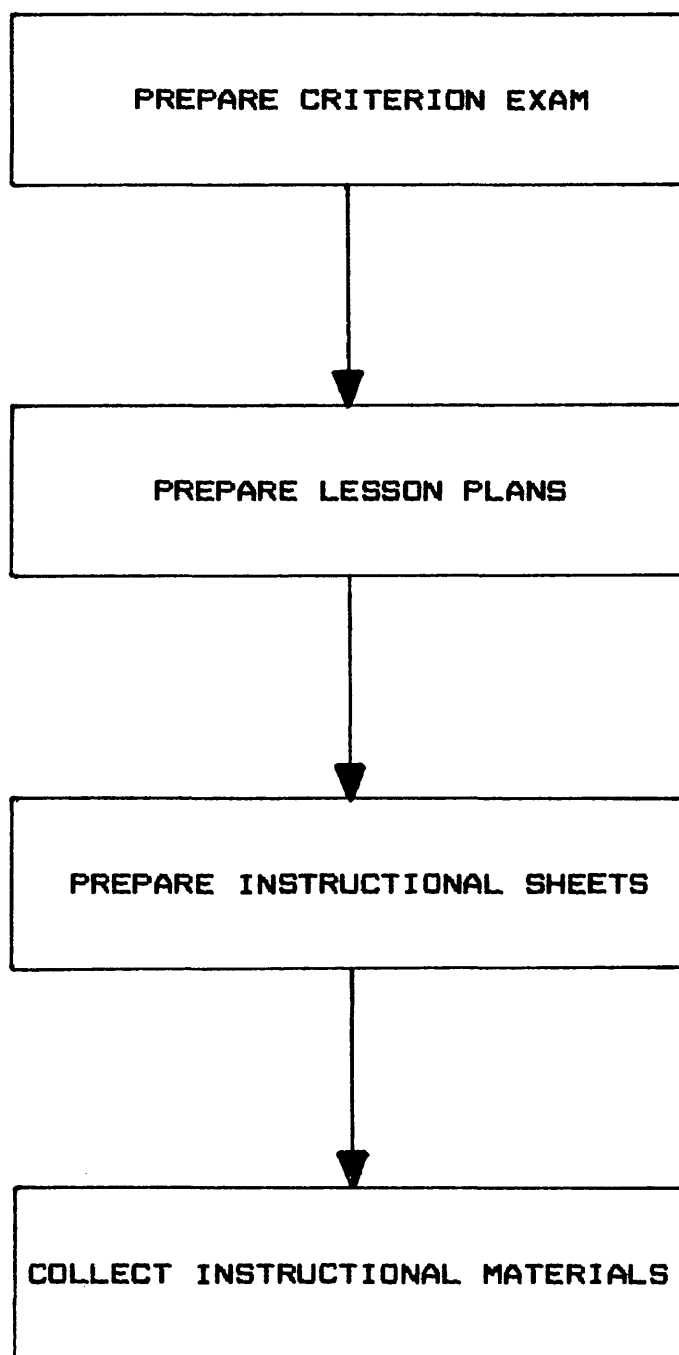
Table VIII

Animation Corrective Maintenance  
Sample Instructional Objectives

- =====
1. Given a malfunction in the animation system, isolate the malfunction to the subsystem level using a block diagram within 5 minutes.
  2. Given a malfunction in the electronic subsystem of the animation system, an oscilloscope, and a meter, isolate the malfunction to a unit within 15 minutes.
  3. Given an electronic malfunction in the animation system, isolate the malfunction to the board level within 30 minutes by using an oscilloscope and a meter.
- =====

Development

This phase is the one in which the actual instructional materials are produced. Specific planning for the lessons and the final touches on the program are also accomplished during this phase. The activities in this phase include the preparation of the criterion examination, the preparation of lesson plans, the preparation of instructional sheets, and the collection of all training aids, materials, tools, and equipment. Each of these activities require considerable planning and will be discussed in turn. Figure 6 shows the overall development phase that was used in developing the training program for Showbiz Pizza Place, Inc.



**Figure 6**  
**Development Flow Diagram**

### Criterion Examination

The criterion examination is developed from the instructional objectives and may be a written test, a performance test, or both. In most training programs, both types of criterion examinations are given. The written exam may be comprised of essay, true-false, completion, matching, and multiple-choice items. Each type of test item has advantages and disadvantages that must be considered when constructing the exam. The essay item is easy to construct, but it may be difficult or time consuming to grade. The true-false items are also easy to construct, but they allow guessing to play an important part. Completion and matching items are easy to construct, but they are difficult to analyze. The multiple-choice items are somewhat more difficult to construct, but they are easy to analyze and to grade. They also allow a degree of guessing, but it is substantially less than that of true-false items. The written exams in the electronic specialist training program are composed entirely of multiple-choice items.

A procedure for minimizing the guessing factor of the multiple-choice exam has been developed for use in the model. The procedure involves calculating a correction factor to be used in determining the minimum passing score. The minimum desired percentage of correct answers was established at 80. The multiple-choice items each had four

possible choices. Pure guessing would yield an average score of 25. The remaining 75 percent of the items were multiplied by 0.80 to yield 60 percent. This figure was added to the 25 percent to yield a final score of 85 percent. This new figure is the revised minimum passing score for the program. This procedure is, by no means, absolutely perfect, but it does establish a high standard. There are other procedures that could be applied as well.

The performance exam is easier to construct than the written exam. The objectives state exactly what is to be done, what will be supplied, and what standards will be applied. Additional components of the performance exam are directions and any supplemental information the instructor may deem necessary. The performances may be rated on a pass/fail basis or on a point system.

There should be at least one exam item for each objective. The number of test items per objective could be based on the importance rating obtained in the job analysis. One method could be to divide all importance ratings by the least importance rating. These ratios could indicate the proportion of test items for each objective compared to the least rated objective. This method can provide examinations that emphasize the knowledge and performance items in the approximate relationships that are found on the job. Tables IX and X show samples of written and performance exam items.

Table IX  
Written Criterion Examination

---

---

Directions

---

Read each question carefully, and choose the best answer from the alternatives given. Darken in the appropriate choice on the answer sheet. Be careful to mark the answer sheet carefully.

---

1. The electronic specialist reports directly to which of the following persons?
    - a. director of field operations
    - b. district technical manager
    - c. assistant manager
    - d. manager
  
  2. Under which division of the preventative maintenance schedule is "ordering missing inventory items" found?
    - a. daily PM
    - b. monthly PM
    - c. weekly PM
    - d. quarterly PM
  
  3. Which office listed is the final authority in the chain of command for the electronic specialist?
    - a. director of field operations
    - b. director of development
    - c. director of electronics
    - d. director of operations
  
  4. Coins such as brass or zinc fall into which category?
    - a. they have high magnetic properties
    - b. they can be detected by the magnetic test
    - c. they must be tested by the bounce test
    - d. they cannot be tested by the coin mechanism
- 
-

**Table X**  
**Performance Criterion Examination**

---



---

**Directions**

---

A problem has been inserted into the animation system for you to find by using standard troubleshooting techniques and the test equipment provided. You have 30 minutes in which to find the problem. Fill in the form below with the tests that you perform in finding the problem. Do not begin until the instructor directs you to do so.

---

**Symptoms**

<b>Tests</b>	<b>Points</b>

**Faulty Block**

<b>Tests</b>	<b>Points</b>

**Faulty Unit**

<b>Tests</b>	<b>Points</b>

**Faulty Component**

<b>Tests</b>	<b>Points</b>

---



---

### Lesson Plan

A lesson plan should be developed for each instructional topic to guide the instructor through the activity. To achieve consistency in training, it is necessary to follow the lesson plan each time the topic is presented. The development of a lesson plan takes into consideration items as instructional strategies, training aids, training sequence, and instructional sheets. These items may not have to be completed at the time of development of the lesson plan, but individual decisions about their content and design should be made before producing the lesson plan. The components of a lesson plan for the model are topic, objectives, materials, introduction, presentation, application, summary, test information, and assignment information. Table XI shows a sample lesson plan for the electronic specialist training program.

Topic. The topic is the name of the lesson. The instructor should keep all lesson plans in a binder for easy reference. Including the topic as a component of the lesson plan allows easy identification of the lesson plan for the presentation.

Objectives. The instructional objectives for the lesson are included as a separate component of the lesson plan. This allows the instructor to inform the students of

the content of the lesson during the introduction to the lesson.

Materials. This section lists the materials needed for the learning activities to be conducted in the lesson. The instructor should consult this section when preparing for the lesson. The necessary materials may be collected prior to the presentation to allow the proceedings to occur in a smooth, organized manner.

Introduction. This is the beginning phase of the lesson. The instructor endeavors to capture the attention and interest of the students during this phase. The introduction should inform the students what is to be accomplished during the lesson and why the activities are important to them.

Presentation. The presentation section is an outline of the sequence of the learning activities. It describes what is to be covered and what the instructor and students should be doing during these activities. Instructors may wish to include notes to prompt themselves to emphasize points or to ask questions during the presentation.

Application. This section is concerned with the activities of the students that provide reinforcement of the activities of the presentation section. The activities of



this section could include written exercises, discussions, or practice performance activities. Since the presentation and application sections may be closely related, there could be overlapping of the two sections.

Summary. This section reiterates the main points of the lesson. Normally, the instructor would involve the class in this section by asking questions about the main points covered. There could also be some overlapping of the summary with the application section.

Test information. This section provides information for the students on what the test will cover and when the test will be administered.

Assignment information. This section provides information to the student concerning the assignment for the lesson. This information would include the names of the assignment sheet, information sheet, and any other references that may be consulted.

### Instructional Sheets

Instructional sheets are handouts materials that supplement the instruction. They may be information sheets, assignment sheets, operation sheets, or job sheets. Tables XII, XIII, XIV, and XV are examples of the respective instructional sheets.

Table XI  
Lesson Plan

Heading	
Topic:	<u>Coin Mechanisms</u>
Objectives:	<ol style="list-style-type: none"> <li>1. Describe the operation of a coin mechanism.</li> <li>2. Adjust the coin mechanism to accept tokens and to reject quarters.</li> </ol>
Materials:	<ol style="list-style-type: none"> <li>1. Transparencies on coin mechanisms</li> <li>2. Overhead projector</li> <li>3. Coin mechanisms</li> <li>4. Adjustment tools</li> </ol>
Introduction	
<ol style="list-style-type: none"> <li>1. Motivate students to learn</li> <li>2. Introduce topic</li> <li>3. Review the objectives</li> <li>4. Relate the value of lesson to students</li> </ol>	
Presentation and Application	
Outline	Activities
<ol style="list-style-type: none"> <li>1. Describe the operation of coin mechanisms.</li> <li>2. Adjust coin mechanisms to accept tokens and to reject quarters.</li> </ol>	<ol style="list-style-type: none"> <li>1. Use the transparencies to show the operation. Involve the students by asking questions.</li> <li>2. Demonstrate the method of adjusting coin mechanisms.</li> <li>3. Distribute coin mechanisms to the students, and have the students adjust the coin</li> </ol>

Table XI (continued)

Outline	Activities
	mechanisms to the desired specifications. Monitor the students' progress and assist where necessary.

---

Summary

1. Review the operation of coin mechanisms, and ask the students questions during the review.
2. Review the procedure for adjusting the coin mechanisms, and ask the students questions during the review.

---

Test Information

The exam will be given on Friday morning and will be in two parts. The first part will be a written exam on the operation of coin mechanisms, and the second part will be a performance exam on adjusting coin mechanisms.

---

Assignment Information

The assignment is in two parts. The first part is to read the section in the manual on coin mechanisms from page 16500 to page 16505. The second part is to complete the written assignment sheet on coin mechanisms.

---

Table XII  
Information Sheet

---

---

Title

---

Basic Animation System Information Sheet

---

Introduction

---

This information sheet provides an overview of the structure of the animation system at Showbiz Pizza Place restaurants. The system is discussed only at the sub-system level. More detailed technical explanations of the system will appear in other information sheets.

---

References

---

1. Showbiz Electronics Manual
  2. Creative Engineering R & M Manual
- 

Discussion

---

The animation system is composed of three sub-systems. The first is the electronics sub-system. This sub-system controls the entire system. The second sub-system is the pneumatic sub-system. This sub-system maintains air flow which causes the robots to move. The third sub-system is the mechanical sub-system. This sub-system is composed of the robots.

---

Summary

---

The electronic specialist needs to understand the overall structure of the animation system. This sheet provides the basic introduction to the animation system.

---

---

Table XIII  
Assignment Sheet

---

---

Title

---

Game Raster Monitor Assignment Sheet

---

Directions

---

1. Refer to your notes on the video tape presentation on raster scan monitors and to section 16700 in the manual.
  2. Answer each of the questions below by writing your answer in the space provided.
  3. Turn in this sheet by 8:00 tomorrow morning.
- 

Questions

---

1. What is the approximate horizontal frequency of a raster scan monitor?  
\_\_\_\_\_  
\_\_\_\_\_
  2. What is the approximate vertical frequency of a raster scan monitor?  
\_\_\_\_\_  
\_\_\_\_\_
  3. How is video produced on a raster scan monitor?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
  4. What are the primary colors that are used in the color monitor systems for the raster scan monitor?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- 
-

Table XIV  
Operation Sheet

---

---

Title

---

Tape Deck Operation Sheet

---

Introduction

---

This operation sheet covers the front panel controls that are used to operate the tape deck used with the animation system. Familiarization with these controls is essential when operating the system in a manual mode.

---

Controls

---

1. Play ----- this button is marked with one arrow that points to the right. It is depressed when it is desired to play the tape deck.
  2. Rewind ----- this button is marked with two arrows that point to the left. It is depressed when the tape comes to the end of the regular playing cycle. It causes the tape deck to rewind itself to the start of the tape.
  3. Fast forward - this button is marked with two arrows that point to the right. It is depressed if it is desired to skip over a section of tape to get to a particular segment.
- 

Summary

---

Knowledge of these controls is imperative to the normal operation of the tape decks. This sheet may be kept for reference near the tape decks for those persons who may not be familiar with the function of each button.

---

---

Table XV  
Job Sheet

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Title

---

Game Sound Level Adjustment Job Sheet

---

Introduction

---

This job sheet provides the procedure to be used when checking the sound level in the game room. Completing this job sheet will prepare you to perform the sound level measurement in your own game room.

---

References

---

1. Showbiz Electronics Manual
  2. Sound level meter manual
- 

Materials

---

1. Sound level meter
  2. Video game
- 

Procedure

---

1. Set the dial on the sound level meter to 90.
  2. Set the "Weighting" to "A."
  3. Set the "Response" to "Slow."
  4. Hold the sound level meter three feet from the game speaker. The loudest sound should cause the meter to point to minus 5.
- 
-

Information sheets. Information sheets are narrative materials that supplement the lesson presentation. It is convenient to have a standard format for the development of the sheets. For the model, the sections of an information sheet are the title, introduction, references, body, and summary.

Assignment sheets. Assignment sheets are written exercises to be completed by the student away from the normal training activities. These sheets reinforce the learning activities by requiring the student to do research to complete the exercises. The sections include the title, introduction, references, and, exercises.

Operation sheets. Operation sheets are special information sheets that are concerned with the operational procedures for a particular piece of equipment. The sections are the same as those for information sheets, except the body is entitled "procedure."

Job sheets. Job sheets are special assignment sheets that are concerned with job performances. The sections are the same as those for assignment sheets, except the exercise section is entitled "procedure."

### Instructional Materials

This step involves collecting all of the tools,



supplies, equipment, and training aids that will be used in the training. Collecting the tools, equipment, and supplies require knowledge of the number of trainees. Tools and equipment are generally purchased according to a maximum number of trainees permitted in each class. The training aids are purchased or produced after the final selection of the aids is made. This eliminates the unnecessary expense of bulk-purchasing all types of aids with the selection to be made later. Types of training aids include slides, films, transparencies, filmstrips, audio cassettes, video tape, video disks, computer audiovisuals, opaque projection materials, and models. Factors to consider when making the final selection include time limitations, cost, ease of production, stability of subject matter, and effectiveness of the aid.

### Implementation

Implementation is concerned with the actual operation of the training program. The training manager has to coordinate schedules, make travel and lodging arrangements, and manage the day-to-day operations. In addition to the immediate concerns, the training manager must not lose sight of the larger perspective of the entire training program. Some training managers tend to concentrate on instructional activities only. The remaining phases of the training

process are forgotten. The training program is a constantly evolving entity, and the whole program suffers if one or more phases are neglected.

It is convenient to view the implementation phase in terms of the relative positions of the training classes. There are incoming classes, classes in progress, and graduate classes.

#### Incoming Classes

There should be a method by which the range of incoming students is limited. Individualization of instruction was too expensive and required too much time to develop for Showbiz Pizza Place, Inc. The program was designed according to the job description and job requirements. If the trainees do not meet the prerequisites for the job profile, then the training program will not be effective. Personnel who have been on the job for considerable time may not gain much benefit from the training program. Another factor that needs to be controlled is class size. This is especially relevant when job training is to be done. As the number of students increase, the individual contact time with the instructor decreases. This causes a decrease in the quality of the training.

Scheduling is extremely important in this phase. Travel arrangements, class schedules, and instructor assignments must be made. Time must be set aside to prepare the

classroom and materials. Class files must be established, name badges must be ordered, and graduation certificates must be prepared. Students must also be notified of the schedule in a timely manner.

Instructors without class assignments may do curriculum revisions, participate in staff development activities, or prepare instructional materials. Participation in such activities helps to ensure that the program progresses as it should, and the change of routine also inhibits instructor "burn-out" that results from back-to-back classes.

#### Classes in Progress

This part is concerned with the actual training and all associated activities. The schedule should be followed closely to avoid an appearance of disorganization. Such lack of consistency tends to create a negative attitude in the students which inhibits the learning process. The lesson plans should also be followed closely by each instructor. Deviations can cause inconsistency in training.

The instructors must have the qualifications to instruct efficiently and effectively. To maintain the highest standards of professionalism, the training director should maintain an ongoing staff development program. Those instructors not involved with teaching activities could participate. The staff development program could include in-house activities as well as external seminars. One

effective means of staff development is by the use of video tapes. The instructor is taped during a presentation, and he/she may view the tape to evaluate personal techniques.

The collection of feedback data is an important activity in this section. The instructor provides feedback data on how the students are performing via quizzes, assignments, and personal observations. The students provide feedback data by means of the course and instructor critiques. Individual instructor critiques conducted by the training manager also supply feedback data. All of the data collected are used in the evaluation phase.

#### Graduate Classes

A training program is not complete unless there is a method of following up on the graduates of the program. This follow-up is another way to collect feedback data to be used in the evaluation phase. The graduates should be surveyed three to six months after graduation to find out how appropriate the training was to them. Probably three months is an optimum time to conduct the surveys because of possible memory degradation. The supervisors of the graduates should also be surveyed in regard to the abilities and job performances of the graduates. These surveys can help to evaluate the validity of the measuring instruments used in the training.

The training director needs to manage the activities in

each of the sections described as well as the day-to-day activities of the training center. This places strong demands on time and abilities. For this reason, the training director must master the art of time management. The priorities assigned to various projects must be realistic, and each of the projects should be accomplished according to its priority.

### Evaluation

This phase of the training is perhaps the most important of all. Without evaluation there can be no improvement of the program. Every possible aspect of the program should be evaluated. The program content, the instructors, the students, the exams, the facilities, and even the evaluation procedures should be reviewed and evaluated. Weaknesses identified in this phase may be corrected in the other phases of the cycle.

### Student Evaluation

There are three main areas in which students may be evaluated. Knowledge may be evaluated by written exams, skills may be evaluated by performance exams, and attitudes may be evaluated by rating scale questionnaires and observations. Of the three areas, attitudes are the most difficult to assess objectively. Students may be able to answer questionnaires in the manner that management desires.

Ratings by observations always allow the possibility of subjectivity on the part of the examiner. For this reason, attitude assessment did not contribute to student grades in the electronic specialist training program. Observations concerning attitudes were distributed to supervisors to indicate the instructor's judgment and to allow the supervisor to assist and to guide the graduate.

Since the written and performance exams were based on the relative importance of the objectives, the student grades were determined by adding the total scores of written and performance exams. This sum was then divided by the maximum possible total score. The grade reflected a percentage of the total possible achievement in relation to the job performance. The scores for each area were tracked to discover low areas of performance or knowledge. Once these areas were identified, it was necessary to determine whether instruction, the instructor, the student, or external factors caused the low performance. Corrective action could then be taken to improve the weak areas.

#### Instructor Evaluation

Sources of instructor evaluation data were obtained from student critiques, video tape evaluations, self-evaluations, and supervisor evaluations of the instructor. Weak areas were identified, and corrective action was initiated by staff development programs.

### Content Evaluation

The course content was evaluated by using field supervisor surveys, student follow-up surveys, student course critiques, and feedback from technical experts in the corporation. The exams were evaluated by statistical methods to identify weak or bad items. The weaknesses were modified or replaced. The training director and instructors assessed and discussed the data to formulate a plan for corrective action.

Any training program can be improved and should be improved. The goal of perfection may never be attained, but it should still be the goal of every training program. A good evaluation program can help to bring the goal closer to fruition.

Table XVI  
Instructor Critique

Item	Poor	Fair	Average	Good	Excellent
Appearance					
Voice					
Eye Contact					
Gestures					
Attitude					
Knowledge					
Questions					
Introduction					
Presentation					
Application					
Summary					
Management					
TOTAL					
$\text{AVERAGE} = (0 (\text{FAIR}) + 1 (\text{POOR}) + 2 (\text{AVG}) + 3 (\text{GOOD}) + 4 (\text{EXCELL})) / 12 =$					



**Table XVII**  
**Course Critique**

<b>Item</b>	<b>Poor</b>	<b>Fair</b>	<b>Average</b>	<b>Good</b>	<b>Excellent</b>
<b>Course length</b>					
<b>Comprehension</b>					
<b>Assignments</b>					
<b>Handouts</b>					
<b>Exams</b>					
<b>Animation</b>					
<b>Games</b>					
<b>Administration</b>					
<b>Equipment</b>					
<b>Amusements</b>					

**Comments**

---

**Table XVIII**  
**Graduate Survey**

---



---

**Purpose**

---

The purpose of this survey is to solicit your feedback concerning the practicality of the training program in reference to the actual job requirements of your position. The results of this feedback will be used to improve our training program.

---

**Directions**

---

Mark the box that you feel applies to the area in which you were trained. The mark should indicate how closely the training prepared you for the tasks you are now performing in the area.

Item	Poor	Fair	Average	Good	Excellent
Animation					
Games					
Administration					
Equipment					
Amusements					

**Comments**

---



---

**Table XIX**  
**Supervisor Survey**

---

**Purpose**

---

The purpose of this survey is to solicit your feedback on the quality of the electronic specialist's work in the areas listed. This feedback will be used for the purpose of improving the technical training program.

---

**Directions**

---

Please mark the appropriate box for each work area that represents how well the electronic specialist can perform the duties required in that area.

Item	Poor	Fair	Average	Good	Excellent
Animation					
Games					
Administration					
Equipment					
Amusements					

**Comments**

---

## Chapter 4

### SUMMARY

The model has been divided into five distinct phases. This division was expedient in order to discuss the activities in an organized manner and to keep the discussion as simple as possible. In practice, these phases are not so precisely defined. There may be considerable overlapping of the phases so that the demarcation lines are obscured.

The approach used in developing the model is perhaps more significant than the model itself. The model is only a blueprint for the development of the training program. It can serve to act as a guide in the process. It had been developed for a particular application and may need some modification to fit individual needs. The model is also greatly simplified to stress only the essential areas in the initial development of the program. No assumption of comprehensiveness was made because of the evolving nature of the training program. Enhancements, revisions, and additions will continually be made to the program. The model was designed to allow the training manager to develop a workable program in a minimal time frame. The overall approach can be used in developing the enhancements to the program in addition to developing a program from the beginning.

The developmental process followed a top-down procedure. The overall project was divided into individual components. Each of the components was divided into simpler units, and this process was continued until the resulting items were in the simplest form. The process began at the most general stage and proceeded to the most specific and detailed stage.

The phases of the model were analysis, design, development, implementation, and evaluation. This division was not the only one by which program development could be done. Other researchers have different divisions or different names for the phases, but the overall cycle is essentially the same. The phases are similar to the phases of problem-solving and computer programming methods. These methods have proved to be effective in their respective disciplines and offer similar prospects for training.

The analysis phase was divided into the activities involving job descriptions, job analysis, and feedback analysis. Obtaining a job description was the first step of the analysis phase. The job description was necessary to perform the job analysis. In the model, the job description was assumed to be unchanging. This may not always be true in every situation. In the case that the job description is modified, some means of feeding the change into the analysis phase would be needed. This was not provided in the model.

The job analysis step was subjected to the top-down

approach to divide the job into duty statements, task inventory, and performance elements. The performance elements were the simplest items in the chain and were rated according to their relative importance to the job. The importance ratings were used to determine what elements were to be included in the training and what emphasis was to be placed on each one. No minimum rating standard was established for inclusion into the program. The decision was left to the training manager. The normal procedure was to include as many elements as time permitted. The elements were chosen from the highest rated and then in descending order. A possible improvement to the selection process might be a mathematical method that takes into account all of the relevant factors for selection.

Feedback analysis was included in the analysis phase to provide the impetus for program revision. The training program must be constantly reviewed and improved if it is to be effective. Feedback is an integral part of the improvement process.

The design phase was divided into the activities of preparing a course of study, preparing unit plans, and preparing instructional objectives. These activities were performed in sequence and gradually became more specific as the sequence progressed.

The course of study was the document on which the

program was developed. It was essentially a compact outline of the training program. It contained a course description, a listing of the course units, a listing of the course objectives, a listing of references and audiovisuals, and a listing of required tools, equipment, and supplies. The training manager may wish to include other items as may be necessary to individual situations. The course of study served as a constant reference source during the development phase.

The units of instruction were developed from the course content section of the course of study. A unit of instruction is an outline of instructional activities that are centered around the same or similar topics. It has a listing of objectives, resources, and topics. It also described the learning activities and the method of student evaluation.

The instructional objectives were derived from the performance elements of the job analysis. They were the means by which the lessons were developed. They described what the student would be able to do, what conditions would be imposed on the performance, and what standards would apply to the performance. They also served to assist in the development of written and performance exams.

The analysis and design phases were preliminary preparations for the actual development of the instructional

activities. The training director may wish to modify these phases to suit individual needs, but the general process could still be utilized to provide for the modifications.

The development phase was divided into the activities of preparing the criterion examination, preparing the lesson plans, preparing the instructional sheets, and collecting the instructional materials. These activities were also performed in sequence as were the activities in the design phase.

The criterion examinations were developed from the instructional objectives. The examinations were both written and performance tests. For the written examination, the items were multiple-choice questions. This was done because of ease of grading and administration. The minimum passing score was adjusted to compensate for the possibility of guessing. The method used was designed for the worst-case event of total guessing, and, as a result, it penalizes the student who does not guess. The penalty, however, is no more than 5 percent on the average. This was deemed acceptable in view of the error of measurement inherent in any examination. One advantage of this method was to establish a high standard. The performance exam was developed from the exact wording of the performance objectives. The objective states precisely what is to be done, what conditions are to be imposed, and what standards



are to be applied. There was a minimum of one test item for each objective on each of the types of examinations. The number of items per objective was determined by the relative importance of the performances. This approach was taken to attempt to provide a representative examination in relation to the actual job performances.

The lesson plan was developed to provide a detailed outline of the instructional activities of each of the instructional areas. The lesson plan was useful in providing consistency of instruction from one instructor to another and from one class to another. Following the lesson plan each time allows the instructor to present the same material and to cover all of the relevant points. The lesson plan consisted of the topic name, the instructional objectives, the required materials, an introduction section, the presentation section, the application section, the summary, the test information section, and the assignment information section.

Instructional sheets were prepared to supplement the instructional activities and to provide the student an additional reference source. Instructional sheets were divided into information sheets, assignment sheets, operation sheets, and job sheets. It would have been possible to have combined operation sheets with information sheets and assignment sheets with job sheets, but it was

felt that the specific nature of the operation and job sheets required a separate type of sheet for each.

The last activity in the development involved collecting the necessary instructional materials. Some of these materials had to be produced, and others were purchased commercially. Items in this section included slides, films, transparencies, filmstrips, audio cassettes, video tape, video disks, and computer audiovisual materials. The selection of these materials were based on cost, ease of production, effectiveness, and time considerations.

The implementation phase was divided into activities that centered around incoming classes, classes in progress, and graduate classes. During the preparation time for incoming classes, many activities may be accomplished. The travel and lodging arrangements were made, schedules were prepared, staff development activities were conducted for off-duty instructors, course revision activities were conducted, and management of the day-to-day operations was performed. Instruction was conducted for the classes in progress as well as data collection concerning the students' progress, instructor performance, and course critiques. Graduate classes were surveyed three to six months after graduation to obtain feedback data on the relevance of the training to the actual job requirements. The supervisors of the graduate students were also surveyed to provide data on

the job performances of the graduates. All of the feedback data was used in the evaluation phase to identify weaknesses in the program and to formulate a plan for revision. The implementation phase contains numerous activities that may or may not be directly related. For this reason, it is to be assumed that many other divisions of activities may be developed.

The evaluation phase provides feedback data to be used in the evaluation of course content, instructor performance, and student performance. In this phase each aspect of the program could be evaluated to provide data for analysis and improvement of the program. The importance of this phase cannot be overemphasized. The entire evolution of the program depends on an effective evaluation phase.

The model presented in this paper does not provide excessive detail in all areas. It was felt that too much detail would obscure the total perspective. The model has worked well in practice and could use more practical tests. The actual program for Showbiz Pizza Place, Inc. is being continually refined and revised. The top-down approach has been applied for these refinements and revisions. Since training programs will never be perfect, it is to be assumed that further progress in the field of program development will continually be made.

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