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Developing Individualized Instruction

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Abstract

The primary purpose of this research paper is one of contributing to the improvement of education through teacher-assisted individualized instruction as it relates more specifically to industrial education.

DEVELOPING INDIVIDUALIZED INSTRUCTION

A Research Project

Prepared in Fulfillment for

Industrial Technology (33:185g)

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INTRODUCTION

Education proceeds as a student learns. Learning is a function by which a person becomes aware of new facts and develops ideas, understands the relationships of these facts and ideas to what is already known and understood, and finally becomes able to talk about and then use related bodies of facts and related concepts. What is learned is of practical value when the student is able to use facts and concepts to guide personal behavior, to do things for and with people, and to apply facts and concepts while using specific materials and equipment to make or to do specific things. The teacher is a leader, a guide, a demonstrator, and assistant to the one who learns. A curriculum is a guide to the student in learning and to the teacher in teaching. An effective curriculum sets forth explicitly the areas of learning and defines the extent and depth of educational achievement within each area.

The school system is the bridge to increased knowledge, the vehicle which helps students bridge the problems in the learning process. It is the duty of the educator to offer experiences that will motivate students to learn, to gain dignity and to successfully compete with their fellow men. Individualized instruction is <u>one tool</u> whereby students can ford the stream of problems in the learning process. It is one method, one approach, or a concept that has been useful in developing an individual's "human potential."

Career education has a bright new future now and is being stressed anew in educational institutions all across the nation; it is imperative that the development of new learning theories conducive to this philosophy be developed which will articulate teaching techniques for reading, mathematics, and the occupational areas. The design and implementation of curricula material for learning activity packages also lays the basis for accountability that student learning has taken place.

A systematic design in developing individualized instruction lays out a blueprint for customized or personalized educational units which contain defined specific behavioral objectives. These objectives tell the educator as well as the student where he is heading, and how and when the stated destination of learning has been reached. This method of instruction further specifies what and why certain things have to be done by both parties in achieving the stated objectives. This form of learning involves the student in the coordination and development of both mental and physical skills.

The curriculum must be oriented to allow each student to move at his own pace, through a learning program custom-tailored to meet his own unique interests, needs and abilities. This individualized learning program should provide for differences in entering levels of ability; differences in rate of learning to achieve the curricular, behavioral, and attitudinal objectives; and even differences in the learning goals themselves. Such a program places more responsibility for learning on the student and provides learning activity options reinforced by a continuous process of self-assessment so that the learner becomes a

self-directed, self-oriented student as he progresses through the program.

The primary purpose of this research paper is one of contributing to the improvement of education through teacher-assisted individualized instruction as it relates more specifically to industrial education.

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It is with a debt of gratitude that I am enabled each day to work with these colleagues, realizing that their uncompromizing allegiance to individualized instruction has placed Kirkwood Community College in the forefront as a leader in an exciting new approach to learning.

May, 1974 Kenneth F. Hird

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SECTION A

INDUSTRIAL EDUCATION CURRICULUM CONSIDERATIONS

1. Historical Theory Since 1900

The manual training programs of the nineteenth century have developed into present-day industrial arts programs. During this period of development the nature of manual training programs was influenced by a series of movements or developmental stages. These included the Russian influence, the sloyd movement, the arts and crafts movement and the industrial or vocational movement. Each of these movements, some of which occurred simultaneously and all of which have overlapped to some extent, was especially prominent during the forty-year period from 1880 to 1920. Some characteristics of each of these movements are found in present-day programs of industrial arts.[1]

The organized manual training programs in the United States were first influenced by the Russian system of manual training.[2] This system had its origin about 1868 in the work of Victor Della Vos, director of the Moscow Imperial Technical School. The Russian system as proposed by Della Vos was designed to teach the fundamentals of the mechanical arts to large groups of students in the least possible time. The idea came to the United States through an exhibit of tool instruction shown at the Centennial Exposition at Philadelphia in 1876. The exhibit attracted the attention of John D. Runkle, president of

Massachusetts Institute of Technology, and as a result a somewhat similar system of shopwork was organized at the Massachusetts Institute to provide practical training for engineering students. Professor C.M. Woodward of Washington University was also impressed by the Russian exhibit and as a result formulated a shop course for engineering students at Washington University.

The Russian system of manual training was a formalized system based on the principle of a logical method of procedure in which exercises were assigned in order of increasing difficulty and were undertaken by students in this order. Each course of instruction in manual training under the Russian system consisted of a series of graded exercises without special reference to their application in the construction of useful articles. The teaching of the course involved three stages. The first consisted of a study of tools and materials, the second involved the acquisition of skill in joining together the materials under study and the third stage was the construction stage in which whole or parts of projects were made. Students learn to sharpen, care for and adjust tools and to know the nature of materials. Emphasis was placed on freehand and mechanical drawing throughout the course.

The Russian system is characterized by the same type of formalism as was present in the academic courses of the early days. The formal class method of instruction provided little opportunity for self-expression and for the recognition of individual differences. Students were told how to proceed in each step of the teacher-selected exercises. The exercise and the demonstration were used almost exclusively. Illustrations and lesson sheets prepared by the teacher were used, and

attempts were made to prepare textbooks with detailed instructions for the student. A system of teacher's marks and grades added to the formalism of the course.

The formalism and abstract exercises of the Russian system of manual training had small appeal to elementary school students who could see little reason for developing skill in the use of tools. Consequently, elementary school teachers began to search early in the history of manual training for a system more suitable to the needs and interests of elementary school students. The sloyd method, which originated in the Scandinavian countries and had attracted the attention of American educators, seemed to offer some advantages.[3] Sloyd had its origin in the home industries that occupied the time of the people of northern Europe when they were not engaged in farming. Articles such as handles, rakes, pins, benches, tools, kitchen utensils and other items were constructed for sale and for home use.

Sloyd was brought to the United States by Lars Erickson and Gustaf Larsson, both of Sweden. Erickson started a class in Anoka, Minnesota, in 1884, and Larsson organized a class and a training program for teachers in Boston in 1888.

The outstanding characteristics of the sloyd system were the individual method of instruction, the useful model and the encouragement of student initiative and self-direction. This course included not only objects that required the use of the measuring tape but also freehand work which required a sense of form through sight and touch. Special importance was attached to neatness, accuracy, finish and the desire to do good work.

The sloyd system differed in many respects from the Russian system. The sloyd system involved the use of the completed model rather than an exercise. The sloyd system also offered a greater variety of models, exercises and tools which tended to stimulate greater student interest.

The arts and crafts movement which originated in England during the latter part of the nineteenth century as a protest against poor craftsmanship exerted an influence over manual training programs of the United States.[4] This movement placed emphasis on the aesthetic and creative side of the work instead of the skilled side as stressed in the Russian and sloyd movements. The arts and crafts emphasis was introduced into the Philadelphia schools about the same time the Russian system was getting started.

The arts and crafts movement stressed the importance of industrial drawing and various types of decorative work. Activities such as drawing, modeling, carving, leather work and metal tooling made up the major part of the course of study for elementary school students. Teaching devices included demonstrations, notebooks, models, excursions and discussions.

One of the features of the arts and crafts movement was the principle of rotation of work. Students were usually required to rotate among the four departments of drawing, designing, clay modeling and wood carving. The arts and crafts emphasis was responsible for shopwork of a more artistic nature that was better adapted to the interests of youth.

The cultural trend in manual training which characterized the Russian, sloyd and arts and crafts movements was interrupted during the first decade of the twentieth century by the advocates of a vocational

emphasis in manual arts. These educators suggested that the manual arts program should contribute more directly to the vocational preparation of secondary school students. The vocational emphasis on manual training proved beneficial because it brought about a reexamination of the purposes of manual training which resulted in a restatement of its values and aims in terms of goals that were more attainable.

The manual training educators early in the twentieth century objected to the undue emphasis on skill and the formalized instruction of the Russian, sloyd and arts and crafts movements. These educators suggested that manual training courses should center more attention on a study of the industrial processes that operate in transforming raw materials into usable products. Charles R. Richards of Teachers College, Columbia University, suggested in an editorial in the October 1904 issue of Manual Training Magazine that the term industrial arts be used instead of manual training or manual arts as more descriptive of this changing point of view.[5]

The industrial arts movement has increased in popularity since the passage of the Smith-Hughes law in 1917. This law shifted responsibility for vocational education to separate schools and classes, thereby freeing industrial arts from this responsibility and enabling industrial arts educators to devote their efforts to the aims of general education. As a consequence, the school shop has become more of a laboratory in which the student may get first-hand information about materials and in which he can explore those fields which appeal to his interest.

Curriculum theory since 1900 has been greatly concerned with the delineation and clarification of objectives. An early procedure was to

analyze the things that adults needed to do to live safely and efficiently as individuals and as members of groups. Many of the early formulations were stimulated by the work of Herbert Spencer who believed that education should function for self-preservation, procuring the necessities of life, rearing one's own children, performing one's political and social obligations, and advancing one's personal culture. Of course, education had its objectives, general though they were, far earlier. The Greeks at one time had for the objective of their education the training of superior young men to fight, philosophize, and be gentlemen. The Romans planned that their talented youth be taught how to govern. The early Christian schools stressed a knowledge of Christianity.

The earliest forms of training were highly "individualized" when knowledge and skills were passed on from father to son, from craftsman to apprentice, and from tutor to pupil. Individual tutoring reached its high point with the Socratic system, in which the student was led by a series of directive questions to self-discovery of knowledge. Everything else being equal, a one-to-one tutorial situation is still probably the best means of passing on knowledge and skill.[6]

The objectives of the Greeks, Romans and Christians were neglected or regarded as secondary during the time when faculty psychology and mental discipline held sway. However, the development of educational psychology after 1900, particularly the work of Thorndike and Woodworth, and the developments in measurement, led to serious doubt about theories concerning separate faculties, mental discipline, and the direct transfer of training. It was then that Spencer's Objectives were taken as a point of departure in an attempt to determine objectives scientifically.

The procedure was to categorize human behavior into a few important segments, and to break the categories down into specific objectives by using techniques developed by Bobbitt, Bonser, Charters, and others. Thus, specific objectives were obtained through the analysis of human activity, and these objectives were then used to justify the teaching of apecific items.

About 1925, the statements of objectives began to be selected on the basis of the needs of students more than on the analysis of life activities. Thus, the objectives began to relate to the satisfaction of the present and insistent purposes and needs of the learners more than to the unrealistic assumption that the child would devote himself to preparing for the purposes and activities of future adult living. This division in the preparation of objectives was to some degree indicative of the split between the "essentialists" and the "progressives." The essentialists could not accept the idea that the interests and needs of children could be relied upon to any great extent in determining what the teacher should teach. They believed that the emphasis should be upon the knowledge, attitudes, and skills that were useful and valuable to children today and that they would need as adults in ten, twenty, or thirty years. The progressives, on the other hand, believed that meeting the current needs and interests of children would provide greater opportunities to teach the knowledge, attitudes, and skills needed in adult life. They believed that the mastery of subject matter for which there was no immediate use or no understanding would not only fail to stimulate children but would actually discourage and dishearten them. Men like Counts and Kilpatrick believed that when children work

at learning things that lack or appear to lack function, they become discouraged, lose interest, and sometimes become passively or actively rebellious. Originally, neither group had the disposition to see how much good there was in the other position. Between 1940 and 1950, however, a strong movement arose that advocated what has been called student-teacher planning and has advocated the cooperative selection of goals by students and teachers working together, sometimes joined also by parents and community leaders.

During the last 50 years, two powerful forces have brought tremendous change: the population explosion and the information explosion. Both the number of people demanding education and the amount of information demanded have been growing at an ever-increasing rate. Out of necessity, instruction of large groups by lecture and textbook was begun long ago. Recent instructional tools, such as slides, filmstrips, motion pictures, recordings, radio and television can all be used with large groups of students. These new media are all commonly used today with varying degrees of success and acceptance and, when used correctly, they add a great deal to the learning process.[7]

Recently, a combination of the Socratic method and learning theory derived from the work of behavioral psychologists has led to the development of programmed instruction, a highly promising technology for individualizing training. In programming, the content to be learned is objectively analyzed, organized, and developed into an instructional system which takes into account learning theory, the subject matter, the individuality of the students, and the means by which the content will be presented to the students.[8]

There have been numerous classifications of objectives. In 1918, the Commission on Reorganization of Secondary Education issued its report, in which it listed objectives that would have validity for all students. These objectives (areas of living) were: health, command of the fundamental processes, worthy home membership, worthy use of leisure time, vocational efficiency, citizenship, and ethical character. Since then there have been formulations of objectives and of areas of living by various committees and commissions.

Early pioneers in the field stressed the necessity for clearly stated objectives if evaluation was to take place. The budding concern for behavioral outcomes gained impetus from the 1944 report of the American Council on Education, in which the term performance was used to imply specific observed outcomes.

Since 1950, attempts have been made to state objectives in behavioral terms in such a way as to provide for the subsequent evaluation of the curriculum. These, in turn, were to provide an improved basis for the continuous improvement of content, method, and all other aspects of curriculum. Educational psychologists who sought to measure and assess what the schools were doing had become convinced that if educators could define the goals of the schools clearly in terms of observable behavior, psychologists could construct instruments to measure and, perhaps to evaluate them. Resultant studies represent broad attempts to scientize the measurement and evaluation of a telic educational program--telic because the outcomes are selected ahead of time, stated in terms of specific types of observable behavior and consciously sought after, scientized because the statements of observable outcomes comprise

hypotheses that are to be quantitatively and qualitatively checked.[9] The lists of behavior goals set forth in these studies are meant to be of use to teachers, coordinators, principals, superintendents, college teachers, lay leaders, members of parent-teacher associations, and others concerned with curriculum study, improvement, and evaluation. These studies, together with other proposed college studies and an overall integrating study that may follow them give promise of providing a basis for realistic evaluation in terms of accepted objectives, and hence a productive attack on many of the problems of method, organization, scope, curriculum content, and placement of material.

Instructional materials have usually been ready-made, rarely tailor-made. Instructional materials have not been developed to fit the great variety of needs and interests of learners. It has been assumed, even though the assumption was known to be false, that nearly all children learn best from the same textbooks and that reading and reciting are the best method for teaching. A few students were permitted to progress faster than others.

In the past, the vexatious problems thus generated partially disappeared because the students who found the curriculum irrelevant and fruitless dropped out or, perhaps more accurately, were pushed out of school. It has usually been assumed that the student has failed the school. A more candid and discerning analysis would show that the school has failed the student. The goals set were neither clear nor realistic, nor were the instructional materials carefully programmed to attain the stated behavioral objectives.

To improve the means of instruction, the ends of instruction must

be clarified, rigorously setting forth what we intend to do. Past goals have been either vague and abstract or so narrow and particularistic that little or no generalizing knowledge was created. Instructional materials will increasingly change and improve because teachers are delineating more sharply the behavioral outcomes desired and are developing instructional materials to secure these stated behavioral goals. Programmed instruction has contributed significantly to this process.

One point should be made about clarity of goals. Ambiguous goals increase the dependence of the learner upon the teacher and that, given such goals, existing dependency on any authority figures will be high. When there is adequate teacher-student planning, when goals become clear, then students are more likely to initiate their own problem-solving procedures and set their own criteria of right and wrong action. Clear goals are, therefore, a necessity in developing the independent learner. Clarity of goals is a major responsibility of the teacher.

Today there is a growing trend towards combining the techniques of group and individualized instruction to create instructional systems that are tailored to the specific needs of a particular learning situation. Training systems are now operating which combine television, film, individualized self-study, programmed materials, small-group instruction, video tape, and individualized tutoring.[10]

2. Improving Educational Goals

The psychological bases of individualized instruction are that learning is facilitated if the learning task is organized into short

sequential steps and that learning is "reinforced" and the learner stimulated by the successful performance of each step. Psychologists refer to the reward that is contingent upon or follows from the performance of a task as reinforcement.[11] Learning is reinforced by a number of things, such as information about successful results or achievements; information about progress or improvement; recognition and a sense of accomplishment; and approval, praise and attention from the teacher and fellow students.

In working on individualized material, the student is kept informed, step by step, of his successes. In the traditional teaching described earlier, on the other hand, a student hears lectures, reads assignments, and then is given an examination. By the time the teacher has corrected and returned the examination, much time has passed and reinforcement is, consequently, greatly diluted. With individualized material, however, the student responds immediately to the material presented in each step before going on to the next step. He has the opportunity to check his responses, item by item, against the correct responses. By this means, the right response is reinforced and wrong ones are eliminated. Then the student goes on to another block of learning, another response, and another check of his response.

The effectiveness of individualized instruction is tested by the consequences of its use by students, by student reaction to it, and through evaluations by teachers who use it. In short, as much feedback as possible is involved in the development and revision of programs. All teaching materials are improved by adequate feedback, but programs have a peculiar advantage in this regard: feedback can indicate

precisely the location and character of its faults.[12] This is important from the teacher's standpoint.

Individualized instruction secures the engagement or commitment of the student. It can be a much more active learning process than that which takes place in a lecture hall containing a hundred or so students or even in a class of 30 or 40 students. Individualized learning, because it requires continual responding, ensures that each student is active. A student cannot daydream through an individualized lesson; he must continually contribute.

Each student can progress at his own rate of speed through the material. The faster student is not held back to an average speed, at which he may be bored and inattentive. The slower student can work as slowly as he needs for mastery. He will not feel self-conscious about his work because the machine or programmed book will never get impatient with him. Any individual student may find himself moving rapidly on sequences in some subjects and more slowly in others, depending of course on his own pattern of abilities.

It appears that individualized instruction will be useful for all students. Since any learner using a program advances only by getting the material correct or by learning the correct answer immediately if he gives a wrong answer, everyone who has completed an individualized sequence has mastered the material it covers. This is an advantage over reading assignments or lectures; it is not possible to say that everyone who completes these learning experiences has mastered the material. The bright students complete the programs more rapidly than do the less bright, and probably the bright students are better able to generalize

from the material. There is thus far no definite research on the relative advantages of individualized instruction for slow students or for fast students. Research studies do show that learning time can be cut significantly. The most frequently cited figure is that it cuts in half the time necessary to learn a given body of material. A vocational-technical community college level welding program is currently cutting the training time by twenty-five percent using individualized instruction.[13] (See Appendix A). Probably the time saved varies with the type of material as well as with the individual student.

The essential innovation of individualized instruction may be more in the new way of presenting material to be learned than in the machines themselves: first some information is given, then a question on it, testing whether the student has learned it; then more information is added and another question to which the student must respond. Each of these steps follows directly and builds on the preceding. Some books, called programmed or scramble textbooks (see Appendix B), have been produced on these principles, and there is a division of opinion on whether the machines are essential or not. Some would argue that learning is enhanced by use of the machines.

American education has always prided itself on personalized teaching for the particular student. However, in today's crowded classrooms, it is often empossible to give as much attention to each student as would be desirable. One of the strengths of individualized instruction is the preservation and extension of personalized instruction, and thus buttresses one of the unique strengths of American education.

Individualized or programmed texts differ from workbooks in several

ways. There is obviously some similarity between a good workbook and a programmed text, in that each aim at individualized learning. When originally introduced in the 1920's,[14] the workbooks were assigned by sections to individual students to provide enrichment or to improve their work in areas where they were weak. The use of workbooks unfortunately deteriorated to the point where a whole class would sometimes be assigned the same sections and work through them at the same rate. This has lead many teachers to believe that workbooks for the brighter students are often only busy work. Programmed texts differ from conventional workbooks in many ways; they attempt to present the subject matter in far more depth and more systematically then do many workbooks, which are often supplements to textbooks. The programmed texts and teaching machines represent therefore new opportunities to individualize teaching for students of varying abilities.

Another area of service for the individualized instructional program may be with the group of children for whom the traditional way of teaching has become repugnant. Their dislike for school shows up in ways such as their poor attendance. The school's problem in relation to these students is particularly difficult when, as is often the case, parental attitudes are directly in conflict with those of the teachers, and, tend to reinforce the student's reluctance to do much homework or to do it well. Individualized programs can be designed specifically to interest these students. If these students can be effectively educated in the classroom by the use of programmed materials, it will reduce the home-school conflict if they are not assigned work to be done at home. The ultimate goal would be to prevent the onset of this kind of

antagonism to education, but there is an immediate practical problem of the school to the solution of which programmed material and some machines might be addressed.

One of the distinctive features of the programmed teaching movement is the leadership of psychologists. As a group, they have been missing from curriculum revision projects. Teachers, psychologists, curriculum specialists and subject matter people should cooperate in the production of programs. All of these people are necessary in the creation of every program from its inception. Good programs are not easy to do, and a successful textbook writer may or may not be good at creating programs.

Some programmers believe that any subject material that can be taught verbally can, in time, be programmed. Programming is not limited solely to so-called rote learning. If it is possible to specify the overt behavior which is to be the end product of a learning, it is theoretically possible to program the subject. Of course, the more difficult it is to specify the learning objectives in behavioral terms, the harder it will be to program material. Hence it is easier to program an arithmetic course to provide facility in the ordinary arithmetic objectives than it is to program an art course aimed at "appreciation," or a social studies course aimed at making a "good citizen."

The teacher who contemplates programming a course should ask himself, "Define what you want the student to <u>do</u> with your subject matter. Do you want him to manipulate things, solve problems, and develop insights? Do you want him to produce original proofs in mathematics?" Then the challenge to the teacher is to help the student achieve the objective. In some cases, this may be possible through a program only,

but it will probably also require classroom discussion, laboratory work, and other activities to achieve the total objective. Although these other learning experiences may always be needed, the teacher will try to take the student by means of the program as far as possible toward the desired behavior.

How programming is to be done is usually guided by two general considerations: how can programs do the job of imparting information that is usually borne by textbooks and lectures? and what do we know of the principles of learning that can be applied in the arrangement of programs? It has been suggested by some that a third dimension be added: observation of master teachers--masters both of their subject matter and of the art of teaching. This may eventually enable programming to evoke behavior that a master teacher now evokes through his talent and intuition. The master teacher is rarely a good observer of himself, however, and it might require observation by a psychologist trained as an acute analyst of behavior to find out just what this kind of teacher does to evoke insightful learning.

A truly individualized program must provide an opportunity for selection of individual goals, and for alternate routes to those goals, at a pace appropriate to the individual. Further, by arranging the sequence of learning experiences to progress stage-by-stage through a series of task-related job levels, "there is a chance to ensure that each student will leave school with some marketable skill, whatever his ability level, his aspirations, or, within reasonable limits, his time in school."[15]

SECTION B

SPECIFYING AND ANALYZING OBJECTIVES

1. Three Domains

The emphasis upon making educational objectives specific by defining the goals of an instructional course or program has gone through many cycles in the last thirty years. For some educators, careful attention to spelling out in detail the objectives of a course has become a kind of religion. Others, interestingly enough, seem to have heard of the practice of delineating objectives but, somehow or other, have been early inoculated against the notion and have so become immune.

Viewed both in retrospect and contemporaneously, specifying educational objectives as student behaviors seems to be a useful and powerful approach to the analysis of the instructional process. Granted it implies a particular view of the educational process. In it, "education" means changing the behavior of a student so that he is able, when encountering a particular problem or situation, to display a behavior which he did not previously exhibit. The task of the teacher is to help the student learn new or changed behaviors and determine where and when they are appropriate.

A major contribution of this approach to curriculum building is that it forces the teacher to spell out his instructional goals in terms of observable (overt) behavior. This gives new detail; in fact it yields an operational definition of many previously general and often fuzzy

and ill-defined objectives. Such goals as "the student should become a good citizen" are spelled out in terms of the kinds of behavior which a good citizen displays. There are then statements such as "the student will describe in writing the major issues and events which led to the outbreak of the Civil War";[16] or "given a list of 35 chemical elements, the student will be able to recall and write the valences of at least 30";[17] or "when provided a picture showing the front view of eight 1971 model cars, write the names for any six cars."[18] Thus the teacher knows what kinds of behavior he is to try to develop in the classroom. In addition, the problem of assessing the extent to which he has achieved his goals becomes markedly simplified. He needs only to provide the student with a situation in which the kind of behavior he is seeking to instill should be evoked and then observe to see whether indeed it appears. Spelling out the behaviors involved in an objective such as the above frequently means specifying several pages of concrete behaviors. Such specification often gives teachers a fresh perspective on their courses and new insights into ways to teach and to evaluate their teaching.

This approach to instruction fits in very well with the behaviorist school of psychology, the well-spring from which came the recent emphasis on teaching machines and programmed instruction. It is not surprising, then, that a renewed emphasis on educational objectives resulted from the development of programmed learning. The careful specification of a step-by-step procedure for the learner calls for clearly understood objectives specified at a level of detail far beyond that usually attempted. In programmed learning, such objectives have come to bear

the name of "terminal behaviors." The renewed emphasis has given new insight into and perspective on the whole problem of the level of specificity needed in objectives. It is now clear that objectives need to be analyzed at several levels of specificity depending on how they are intended to be used. At the first and most abstract level are the quite broad and general statements most helpful in the development of programs of instruction, for the laying out of types of courses and areas to be covered, and for the general goals toward which several years of education might be aimed or for which an entire unit such as an elementary, junior, or senior high school might strive.

At a second and more concrete level, a behavioral objectives orientation helps to analyze broad goals into more specific ones which are useful as the building blocks for curricular instruction. These behaviorally stated objectives are helpful in specifying the goals of an instructional unit, a course, or a sequence of courses.[19]

Third and finally, there is the level needed to create instructional materials--materials which are the operational embodiment of one particular route to the achievement of a curriculum planned at the second and more abstract level, the level of detailed analysis involved in the programmed instruction movement. Just as the second level of analysis brought into concrete, detailed form the ideas of goals and purposes that were in the mind of the good teacher as he planned at the first and more abstract level, so this kind of detailed analysis brings into focus the objectives of specific lesson plans, the sequence of goals in these plans, and the level of achievement required for each goal or objective. If successful accomplishment of the next goal in this sequence is to be

achieved adherence to this development of objectives is mandatory!

There are at least four reasons why objectives at various levels of analysis are useful and needed in the instructional processes:

1. Each level of analysis permits the development of the next more specific level.

2. Mastery objectives can be analyzed to greater specificity than transfer objectives.

3. Curricula gain adoption by consensus that what is taught is of value.

4. There are usually several alternative ways of analyzing objectives at the most specific level. Objectives at the more abstract level provide a referent for evaluating these alternatives.

It seems clear that objectives at several levels of abstraction are useful and important in the educational process. Several different structures have been constructed to aid exploration at these levels.

All educational objectives can be classified as primarily in one of three domains or large categories: cognitive, affective, and psychomotor.[20] Cognitive learning objectives involve intellectual processes including remembering, understanding, problem solving, and other kinds of learning which involve information storage, retrieval, and processing. Objectives in the affective domain involve feelings and attitudes. An example would be the learner's attitude toward a subject following the first day's introduction by the teacher. Objectives in the psychomotor domain describe behaviors which involve neuromuscular coordination--physical ability. Most instruction includes some learning in all three of the domains. Often, the cognitive aspects are emphasized most, but

cognitive learning also depends upon affective learning and psychomotor skills.

The problem of precisely identifying what is meant by these particular terms plagues many teachers. The teacher must be able to communicate the curriculum objectives into situations which the student can display in terms of behavior. Accuracy in this translation is essential. It was with this in mind that a group of college and university examiners, under the leadership of Dr. Benjamin S. Bloom of the University of Chicago, attempted to devise a framework or taxonomy that would help to hold terms in place, and provide a structure which would relate one term to another and thus provide additional meaning for a given term through this interrelationship.[21]

Educational objectives, essential to the planning of educational processes and to the evaluation of the outcomes of instruction, have been defined by Bloom as:

> . . . explicit formulations of the ways in which students are expected to be changed by the educative process. That is, the ways in which they will change in their thinking, their feelings, and their actions. . . . The formulation of educational objectives is a matter of conscious choice on the part of the teaching staff, based on previous experience and aided by consideration of several kinds of data. . . . It should be clear that objectives are not only the goals toward which the curriculum is shaped and toward which instruction is guided, but they are also the goals that provide the detailed specification for the construction and use of evaluative techniques.[22]

If objectives are to serve as the basis for systematic planning of instruction and evaluation, they must reach beyond the level of appreciation, understanding, enjoyment, realization, or similar abstractions. The objectives for a course must add specific behaviors to such broad qualitative expectations of the teacher.[23]

COGNITIVE OBJECTIVES

In Bloom's educational objectives taxonomy (cognitive domain, displayed in Appendix C), the kinds of behavior the teacher seeks to have students display as a result of the learning process are classified. The taxonomy is hierarchial in nature, that is, each category is assumed to involve behavior more complex and abstract than the previous category. Thus the categories are arranged from simple to complex behavior, and from concrete to abstract behavior. It calls attention to the fact that you can teach for more complex objectives than mere memorization and recall.

Perhaps the idea of the hierarchy is most easily gained by looking at the major headings of the cognitive taxonomy:

> Knowledge. Recall of facts, principles and recognition.
> Comprehension. Ability to restate knowledge in new words.
> Application. Application of principles to new situations.
> Analysis. Understanding well enough to break it apart into its parts and make the relations among ideas explicit.
> Synthesis. The ability to produce wholes from parts, to produce a plan of operation, to derive a set of abstract relations.
> Evaluation. The ability to judge the value of material for given purposes.

The following three examples represent cognitive objectives:[24]

1. Knowledge (to recall)

   Learner will define and give two examples of Mendel's laws.

2. Comprehension (to translate from one to another)

   Given a paragraph in Spanish, learner will write the English equivalent.

3. Application (to use what is learned in a new situation)

   Given an architect's scale, learner will measure a series of lines accurately to the nearest 1/32".

The second domain to be discussed is that of affective, and represent

feelings and attitudes the learner may be experiencing at any given time.

AFFECTIVE OBJECTIVES

Among those analyzing the affective category are David R. Krathwohl and his colleagues.[25] Their classification is presented in Appendix D and a modified version follows below. The teacher who designs an instructional system which leads to predictable achievement by learners, should not ignore the attitudes and feelings of the learner. It may be that something in the affective category will make the difference between failure and success on a particular cognitive objective. The affective classification is arranged to show increasing levels of personal acceptance.

Low Acceptance

1. Receiving or attending. Awareness (of form, color, differing viewpoints, importance of something), willingness to receive (as shown by hearing viewpoints of others or accepting differences), and controlled or selected attention (as shown by listening with discrimination or by sensing importance of details.)

2. Responding. Acquiescence or compliance, willingness to respond, and satisfaction in response (as shown by expressing pleasure.)

3. Valuing. Acceptance of a value, preference for a value, and commitment or conviction (as shown by being loyal or attempting to influence others.)

4. Organizing. Developing a value system (as shown by identifying the characteristics of something valued or by making plans concerning social problems.)

High Acceptance

1. Characterization. Developing an ethical code or philosophy of

life (as shown by consistent behavior.)

The following examples represent affective objective of low acceptance.[26]

1. Student reads newspaper editorial on freedom of speech when assigned as homework.

2. Student listens to what is said furing class discussion on freedom of speech.

The two objectives above are in the following categories: (1) Responding and (2) Receiving.

The following examples represent affective objectives of high acceptance:

1. Student defends a fellow student's right to advocate government censorship of news.

2. During class discussion student describes the history and underlying assumptions in his advocacy of free speech.

The two objectives above are in the following categories: (1) Characterization and (2) Organizing.

The outline of affective terms arranges in sequence the feelings and the emotional responses which are usually labeled interest, attitude, appreciation, and values. The range is from simple attention to the development of a value system. The two lower levels, receiving or attending and responding, are basic to all successful instruction. The higher levels are concerned with personal and interpersonal adjustment, value formation, and character development.

It is obvious that affective objectives are important to instruction. For example, it is difficult to imagine a successful instructional program

which fails to capture the student's attention or fails to make him willing to respond. Furthermore, most teachers care deeply about developing a positive attitude amond students toward the subject of instruction. Pure cognitive learning without expression in the real life of the student is a futile exercise.

PSYCHOMOTOR OBJECTIVES

Among those who have analyzed the performance of responses requiring muscular coordination (the psychomotor category) is Elizabeth Simpson.[27] Her classification is briefly outlined below and is presented in greater detail in Appendix E. She proposes that the five categories be arranged in increasing complexity, and that the first step is necessary to the completion of the second, and so on.

Least Complex

Perception. Becoming aware of a situation which may result in a muscular response.

Set. Adjustment or readiness for a particular kind of action.

Guided response. Imitation of another person performing an act or trying various responses in trial-and-error fashion.

Mechanism. Habitually correct response.

Most Complex

Complex overt response. Performing a complex act correctly with ease and without hesitation.

The following examples represent psychomotor objectives under the classification of least complex:[28]

1. Student shall grasp the tennis racquet handle as if he were shaking hands with it.

2. When hitting the ball, student shall not let the racquet head drop below the handle.

Objective 1 is labeled set and objective 2, guided response or higher, depending upon whether the student is beginning to gain this skill or is displaying the skill on a habitual basis. Objective 1 is the physical readiness necessary to hit the ball and therefore is placed in the set category.

Thus, three frameworks for analyzing learner behavior are now complete. All objectives can be classified primarily into one of three categories: cognitive, affective, or psychomotor. The cognitive category has been subdivided into six classes: knowledge or memory, comprehension, application, analysis, synthesis, and evaluation. The affective domain has been divided into five classes: receiving or attending, responding, valuing, organizing, characterizing behavior. The psychomotor classification scheme describes muscular responses at five levels of complexity: perception, set, guided response, mechanism, and complex overt response.

One factor now becomes quite clear. When the teacher fully comprehends these three frameworks as domains for analyzing learner behavior the next procedure of writing behavioral objectives becomes meaningful. There are definite guidelines for writing behavioral objectives. All objectives should lead to the desired end behaviors of course graduates, and be concise, clear, and easily understood. Also, the following three requirements exist for all well-written objectives:[29]

BEHAVIOR. Behavior is the performance exhibited by the student. This performance must be observable and measurable, such as listing, typing, defining, stating, comparing, fixing, etc. The performance may

be the actual behavior desired of a course graduate, such as changing spark plugs, or behavior designed to demonstrate an understanding, such as describing the difference between good and poor literature.

CONDITION. Conditions specify the environment within which the behaviors are to be performed. Example:

> Using a thermometer calibrated in eith Fahrenheit or Centigrade degrees, the student can read the temperature to the nearest degree.

The "Using," "Given," and "From" tell both students and teachers the conditions under which the student is to "read," "select," or "identify."

STANDARD. The standard states how well the behavior must be performed. In the example above on reading a thermometer, it must be read to the nearest degree. Two degrees off and the objective has not been accomplished. Example:

> Identify at least two of the three ways aliens may become United States citizens.

Mastery of each skill or knowledge is considered reading to the nearest degree and 2 of 3. The objective has not been attained until this level is reached.

The order of condition, behavior and standard may vary, there is no "right way." For example, the following objective is valid either of the two ways presented.

> Given access to a card catalog and library stacks, locate The Godfather by Mario Puzo with no outside help.
> -or-
> Locate The Godfather by Mario Puzo with no outside help when given access to a card catalog and library stacks.

The meaning of an objective is clear only when the objective is stated in behavioral terms. When written in behavioral terms, the

objective states exactly what the student must be able to do when he finishes the instruction. The best statement is the one that excludes the greatest number of possible alternatives to the goal. Unfortunately, there are many "loaded" words, words open to a wide range of interpretations. To the extent that the teacher uses only such words, the door is left open to much misinterpretation.[30] The following examples are representative:

WORDS OPEN TO MANY INTERPRETATIONS	WORDS OPEN TO FEWER INTERPRETATIONS
to know	to write
to understand	to recite
to really understand	to identify
to appreciate	to differentiate
to fully appreciate	to solve
to grasp the significance of	to construct
to enjoy	to list
to believe	to compare
to have faith in	to contrast

A further listing of acceptable and unacceptable words for preparing behavioral objectives is found in Appendix F.

If there is no behavior stated in the objective that can be seen or measured, then the objective is vague. Examples of behaviors that can be seen are match, list, add, diagram, state, etc. Examples of behaviors that cannot be seen are think, value, understand, really understand, be sensitive to, have an awareness of, become familiar with, etc.

The condition must be included also. If the student is to perform a lab experiment the objective should state the equipment he will be given. A math student expected to identify the intersection of two sets must be given the sets.

The standard is also helpful for good communication. This is necessary to determine accomplishment or non-accomplishment. The teacher

must state how the student is to perform: 100%, 80%, 8 of 10?, 100% within 60 seconds?

Basically, a meaningfully stated objective is one that succeeds in communicating to the reader the writer's instructional intent.[31] It is meaningful to the extent it conveys to others a picture (of what a successful learner will be like) identical to the picture the writer has in mind. Objectives that meet the specifications cited above provide the means for measuring and evaluating the outcomes of instruction in observable behavioral terms. Both the teacher and the student can easily identify what is required for successful performance in a course or a program. The measurement of learning outcome can be focused on criteria for individual performance. The student can direct his attention to an established standard rather than to a competition to fellow students for grades.

2. The Task Analysis

Consideration has been directed at the type of behavior which the learner is to develop. Perspective must now be shifted to examine the sequences of the learner's tasks as he practices for mastery of a behavior. These are the same objectives but they are viewed from a different viewpoint. Since analysis means "breaking down into simpler elements," the next step is to examine learner tasks to identify subtasks upon which mastery of the terminal task depends.

Task analysis is essential in a systems approach to instruction: it makes mastery of a subject possible by identifying small (component) learner steps, each of which can be mastered with adequate learner practice.

For example, a person who has never seen the pilot's compartment of an airplane can learn to fly the plane if the process is broken down into small enough steps, properly sequenced, so that each step can be mastered before the next is attempted. Faulty task analysis or improper sequencing can lead to learning failures. Task analysis means breaking down a learning task (an objective) into component tasks, each of which must be mastered as a prerequisite to mastery of the total task.[32]

A good example of how the task analysis is put to practical application is found in the case of an occupational program. To provide students with the preparation needed to meet the goal of successful employment in an occupation for which they are preparing, the occupation must be analyzed to determine the skills and knowledge required by its practitioners. An occupation can be analyzed in various ways. Some of the common methods used are: (1) an analysis by the teacher based on his experiences and inquiry; (2) consultative assistance; (3) advisory committee suggestions; or (4) combinations of the three methods.

The teacher can employ various methods of analyzing an occupation. In addition to relying on his past experiences, he can attend in-service workshops and industry-sponsored programs related to the occupation for which he plans to teach. He can read appropriate trade journals and literature that permit him to remain current with new industrial developments. Examples of other sources that he can use in gathering information are State Department of Employment Occupational literature and job descriptions, Dictionary of Occupational Titles and Occupational Outlook Handbook, as well as making personal contact with qualified industrial representatives.

Once the skills and knowledge required for entry jobs in an occupation have been determined, an outline for a course of instruction is developed. The outline is arranged in major units that in turn are divided into smaller topics. The outline may be organized by listing specific tasks under each major unit heading or arranged in a teaching sequence. As the outline is developed, some of the factors to be considered are: the type of student who will enter the program, the available facilities, and the expected depth of instruction.

It becomes evident early in the process of outline development that many of the tasks identified in the occupational analysis cannot be included in an instructional program. There are time considerations, equipment requirements, and industrial conditions that cannot be duplicated in the classroom. To be fully effective the program of instruction offered by the school must be presented in an environment that is similar to that of the occupation for which the student is being prepared and yet make provision for the learning processes.

Once the tasks for the particular occupation have been identified for inclusion, the teacher must further refine them in behavioral terms. To analyze a learning task, the terminal objective must be stated precisely. When phrased in terms of the learner behavior, the objective tells what the student will be able to do after the instruction. To analyze the overall task, the teacher must ask himself: What must the student be able to do to achieve the objective? What kinds of learning are involved? What prior skills are necessary? What specific knowledge is required? What concepts or meanings must be understood? What is prerequisite to ultimate success?

Any given objective can be broken down into the specific tasks needed to accomplish it. To be specific, in cognitive learning, the classification suggests the sequence in which learning tasks can be presented. For example, to apply a principle in a new situation, the learner must understand (be able to explain) the principle and recall acceptable words and phrases to use in speaking or writing about the principle. However, most learning tasks include a number of subtasks. For example, an objective in a college English class is stated like this:

> To be able to write a one-page expository paper supporting a political point of view.

Since the frame of reference here is college English, it is assumed the student already possesses the psychomotor skills of handwriting or typing; these can be ignored in the task analysis or added as objectives. Before he can write such a paper, however, the student must be able to tell the difference between a paper about some topic or political viewpoint and one which supports a political point of view. The student who has mastered this subtask (by practicing this kind of discrimination) has a clearer view of his goal and of his assignment.

What else is required to write an expository paper? To illustrate, one subtask is to write the introductory paragraph which arouses interest--which is different from other types of paragraphs. What is required to write a good introductory paragraph? If arousing interest is one of the requirements, what does interest arousal require? These might involve choice of words, length of sentences, a particular type of sentence, or the arrangement of sentences in the opening paragraph, some or all of which become subtasks to a larger task of "writing and introductory paragraph which arouses interest."

Success in any task depends upon success in the prerequisite tasks, i.e., upon attaining the prerequisite skills, knowledge, and understanding. Therefore, prerequisites for any task must be identified. The learner must have previously acquired them or be provided practice in them at the time they are needed. The learner's success in any task depends, in part, upon the instructor's planning: upon identifying the prerequisites, upon determining whether the learner does (or does not) have them, and upon assuring that the learner has mastered them. An effective task analysis, therefore includes subtasks which identify the kinds of learning essential for attainment of the objective.

SECTION C

MEASURING ATTAINMENT OF OBJECTIVES

1. Reinforcement and Motivation

To take full advantage of the concepts of individualized instruction, there are two significant functions the teacher must be aware of. First, he must abandon the group lecture, laboratory sequence. He becomes a source of information or consultant to the individual student or group of students who are faced with specific problems. In doing this the teacher recognizes that each student learns at a different rate and often by different methods. He also recognizes that there is a wide range of individual differences and he must deal separately with each one to foster the spirit of inquiry. The key is to heighten interest or motivation. The student has selected this subject for a reason, and the teacher's role is to enhance the student's interest in many ways. By treating each student as an individual, helping him evaluate his potential, and directing him into areas where he can find successful experiences, the teacher will help the student's motivation to continue.

To have a really successful individualized instructional program, the teacher must work out a way to let the students progress as nearly to their own rate as possible. There must be certain guidelines, but they should take the form of an agreement between the teacher and the student. Both have expectations. The student wants to achieve to a certain level and the teacher should be very careful to understand what the student

wants and help him be realistic and at the same time supply as much motivation as possible.

The teacher must recognize that his primary goal is to provide for the continuous intellectual, occupational, social, and emotional development of all students, without interposing artificial or arbitrary barriers to their progress. The teacher must promote the optimum development of each student, in each area, but only in relation to the student's own self-perceived potential. To succeed in these goals, the teacher must maintain a situation in which the individual student assumes major share of the responsibility for his learning and, within reasonable limits is allowed to proceed at a self-determined rate, using self-selected modes of learning to achieve self-selected and self-satisfying goals.[33] These ideas contrast directly with standard graded school organization and such practices as non-promotion, common achievement standards, graded curriculum, grading "on the curve," large-group instructional methods, graded textbooks, and instructional media and materials that provide common content to be learned at the same time by all students.

The teacher is a vital part of any instructional system; in fact, he remains the key to successful learning. Although an individualized system may typically relieve the teacher of many of his former tasks, and may change his role considerably, he is, more than ever, the person who makes the system "work."[34] He must be sure that the objectives of the training program are clear to the student, he must motivate them to actively participate in the training situations, he must guide student activity throughout the course, and he must continually assess and analyze

both student and system performance. Under the individualized concept, the teacher truly becomes a manager and facilitator of learning.

In an individualized system, the teacher has to serve in two essential roles: as course administrator and as an individual tutor and counselor. As a course administrator, the teacher must be sure that the required training supplies, tools, and equipment are available. He must monitor the activity of all students, making sure they have completed the required work and that they have done it correctly. He must administer the various evaluation devices to determine student achievement of course objectives, and he must gather and tabulate all the performance data of both the student and the system. The teacher must keep track of student progress, take attendance, help with extracurricula activities, etc.--all the myriad details involved in making sure the system keeps operating.

As important as the administrative tasks are, the teacher's role as personal tutor and counselor is certainly more important; and not incidental to that role is providing motivational reinforcement and encouragement where needed.[35]

Some teachers have thought individualized instruction should be operated like independent study. Nothing is further from the truth. The teacher needs to start the students as a group (the way the students were previously begun) and then help each student set goals and identify ways to learn. The result, after the student gains experience is that he will be able to function largely on his own. The teacher should continually encourage student-to-student instruction and teacher-student conversations. The total purpose of individualized instruction is to

increase the amount of time the teacher has to help the students.

Motivation is the key word to a successful individualized program. The teacher's first task is to help the student want to learn. Once the teacher has explored the topics with the students and they want to learn, then the process of prescribing learning packages and identifying other ways the student can learn what he wants is then initiated. The teacher is not giving up his responsibility for content and simply letting the student blindly follow his immediate interests. Rather, he is helping get the student excited about the topic and then guiding his learning. The teacher's concern for content comes through in the gentle form of guidance rather than the traditional assignments.

Individualized instruction is designed to put the student's interest at the very heart of the educational process. If the teacher can help the student identify his own interests, and then build a program by motivating and helping the student broaden his interests, the teacher and the student both have increased their chances of success.

2. Evaluating the Instructional System

Systematic approaches to the development of instructional programs invariably stress the need to define the goal or objectives, in terms of student behavior. From the behaviorally stated objectives, it is possible to derive specific measuring procedures (criterion measures) to obtain evidence of program effectiveness. Regardless of the type of desired outcome of any system, information is needed regularly on whether the predicted outcome (objective) is gradually being accomplished. Obtaining this information is referred to as a measurement process.[36]

A comparison must be made between the final performance of the student and the "terminal performance objectives." This comparison must be made one objective at a time. Measurement should be made as to what percentage of the students reached each objective. This information will indicate where improvements need to be made either in the area of training or the selection of objectives. Thus, the efficiency of the course is measured by the degree to which the student met the course objectives.

The effectiveness of the course is measured by the degree to which the course fully prepares the student for the occupation or discipline once he completes the course of instruction. The effectiveness of the course must be constantly measured because occupational and job requirements change. The objectives of the course must relate to occupational demands.

Paradoxically, the first and the last steps in the systematic approach to individualized instruction involve evaluation and feedback. At the initial stage of analysis, behavioral objectives specify what students ought to be able to do after they have completed the activities of the course. During the instructional period, and more formally at its end, close analysis is needed to establish the degree to which students have achieved the objectives, and the techniques at various stages that were effective in stimulating student learning. Evaluative input will include not only conventional examinations in subject content of the course, but also impressions and comments about the entire unit of study from members of the instructional team and from the students. Appendix G illustrates such an instrument. Then all elements must be reconsidered, to firm up the objectives that were most successful, and to rewrite or

substitute those that missed the mark. The basic purpose of the individualized approach to instruction is to enable all parts of the learning system to work together toward clearly stated and agreed upon goals, so that both instructor failure to teach and student failure to learn may be practically eliminated. Precise planning is needed if these results are to be approximated, and constant feedback, replanning and refining are essential.[37]

In the evaluation of course objectives, the teacher may learn that certain performance objectives selected are not appropriate for certain students. They may have been difficult or even irrelevant. On the other hand, input from students, employers, advisory committees, parents, and subject matter experts in the field may reveal performance objectives that are very much needed, but are not being taught in the program as currently designed. At any point during the instructional sequence, revision can be made in the performance objectives listed for any course.

3. Criteria for Improving the Instructional System

The time has come to hold schools accountable for the success of their product.[38] Most of education has been trying to justify itself by measuring the resources that go into the system rather than evaluating the product--the graduate. The majority of evaluation reports still concentrate on comparative studies of teacher salaries, equipment lists and costs, student-staff ratios, physical plant costs, etc., paying little or no attention to the qualitative success of the students after they have left the schools.

A very important part of the job of the placement director and the

counseling staff is to plan and carry out regular follow-up studies on all students (including actual dropouts) who have left school to enter the world of work. Such studies should chart the former students' careers after a lapse of one, three, five, and ten years. The goal of the studies is to provide the school with the evaluative feedback on product performance against which to judge past system performance and with which to plan for future system adaptation to the changing needs of the community and the students.

Any such study should be as much concerned with qualitative data as with purely quantitative findings. Job satisfaction and life style are at least as important as salary and job stability in determining the quality of the system's products. The introduction of this evaluative feedback into the system completes the regenerative cycle of the entire process. Like all productive systems, an instructional system is judged finally by the quality of its product--by weighing output against input.[39]

The teacher must also make a point to talk to students who have graduated from the course to determine how well the course objectives coincide with the job. Such items as the kinds of things the student is doing on the job, things he learned in the course but does not use, strengths and weaknesses, and any problems being encountered are all valuable for measurement purposes. The teacher must also talk to the student's supervisor to determine how well the former student was able to do his job when he first began and how well he can do it now. The teacher's first concern here is how well the student is prepared for his occupation--not how the supervisor would teach the course if he were the

teacher. The teacher must determine at this point whether all or some of the objectives are being met in the course using reliable data such as described earlier.

The gathering of evidence on whether the objectives of the course have been met requires effort and determination by the teacher. Problems of confusion and learner misdirection arise if these evidence-gathering procedures are not made specific prior to instruction. For example, consider the following objective:

> The learner shall commit himself to a position with regard to Fair Housing.

There is no way to know (when later trying to gather evidence of student learning) whether the teacher wanted the student to:

- sign a petition
- write a letter to a legislator
- write an essay on Fair Housing
- raise objections in class discussion about unfair housing practice
- ask for the address of a local ACLU chapter
- volunteer to head up a committee on Fair Housing practices
- simply state in a paper-and-pencil test that he favors Fair Housing legislation

Any of these behaviors might reflect commitment. For this reason, it is important that the teacher make explicit in his plans (in advance of instruction) the criterion measures he will use to determine whether the objective has been achieved. Criterion measures allow the collection of evidence of change in behavior, thus giving evidence of instructional effectiveness.[40] Examples of criterion measures include any procedure which yields a numerical index of performance, which might include:

1. Multiple-choice or true-false test with scoring key.

2. Rating scale or scoring sheet for essay questions, constructed response, term papers, book reports, etc.

3. Check sheet, rating scale, interview schedule, or observational record form to measure a student's verbal or psychomotor performance.

4. Counts or tallies of types of observed behavior.

Teachers often focus exclusively upon the use of paper-and-pencil tests as criterion measures without taking advantage of other types of evidence-gathering procedures. To assure that a broad variety of criterion measures has been considered, two schemes are suggested.[41]

1. Product vs. process criterion measures.

2. Reactive vs. nonreactive criterion measures.

PRODUCT-PROCESS MEASURES

The product-process distinction is very straightforward. A teacher might express the distinction by saying: "I can assess a student's performance by watching him in action or by examining what he makes." This idea underlines the distinction between product and process measures.

- Product measures give tangible evidence of a learner's performance which can be stored or filed for later reexamination if desired.

- Process measures involve the collection of evidence of a learner's performance only as it occurs.

REACTIVE AND NONREACTIVE MEASURES

The reactive and nonreactive criterion measures can help generate a broader variety of criterion measures. The terms reactive and nonreactive suggest that some measures may be reactive, i.e., may change the natural response needed in prompting and measuring. For example, students often speak of the desirability of "psyching out" the teacher to know what position to take during class discussion or in answering test questions. Therefore, common standard testing procedures such as quizzes and examinations represent examples of reactive measures, at least to

the extent that the students know the kinds of responses previous teachers have looked for.

To illustrate, suppose that a teacher in a health science class asks his students to list reasons for (or against) the practice of smoking marijuana. If the students are aware that the teacher's scoring procedures will reward only those reasons given for not smoking marijuana, then this measurement via a test question represents a reactive criterion measure since it leads the students to modify the responses they might otherwise have given. A less reactive measure in this context would be: Submitting a "contemporary word meanings" questionnaire where students are asked to match words common to the marijuana smoking subculture with their meanings in everyday English.

This discussion on criterion measures points out that the teacher is able to assign a performance index (e.g., a score) or performance indices (e.g., multiple scores) to observations of student behavior. Thus, when the teacher obtains a series of scores or performance indices after instruction, he is in a position to decide whether the instructional program measures up to expectations or is in need of revisions. The decision on what the teacher will set as a standard of acceptable performance by the learner is called setting minimum performance standards. For example, assume that a teacher has decided that he wants learners:

1. To identify common insects by their scientific names.

The teacher obtains 10 pictures of common insects and tells his students:

2. Look at each picture carefully and then write in the blank on your answer sheet the scientific name of each insect. You will be given one point for each

> name that is correct according to the identifications given in your textbook.

Then the teacher decides that the instructional program shall be deemed successful if:

> 3. 80% of the students correctly write the scientific names of 90% of the insects pictured.

The conclusion can now be drawn that the first phrase represents the teacher's general objective; the second phrase describes the criterion measure; and the third phrase represents the minimum performance standard. In attempting to obtain evidence of the student's ability to perform the behavior described in the instructional objective, it is desirable to employ several different kinds of criterion measures. The use of multiple criterion measures produces a more reliable estimate of performance than any single measure.[42] Multiple criterion measures are called for especially in those cases where a measure is (1) difficult to obtain, (2) predictably reactive, or (3) obtainable only in some distant future. An instructional plan should contain several measures of criterion performance even though only one or two are ultimately used.

It is now rather obvious why criterion referenced tests are used with behavioral objectives. Students do not compete among themselves. They are tested to measure accomplishment of all course objectives. Each objective states a behavior to be performed, the conditions under which it is to be performed, and the standard for this performance. Therefore, the student either accomplished the objective, as measured by the criterion test, or he did not. This provides accurate data on exactly what has been learned by each student and what has not been

learned. Criterion refers to the fact that the level of success of each objective is prestated. Then, the job of the student, with the help of the teacher, teaching materials, etc., is to learn exactly what is required to pass the objective test. This eliminates guessing and insures that students have mastered the subject matter.

Finally, criterion tests measure instruction more than students. No longer is "x" amount of material taught and then students tested to see who learned 95% of "x" and who learned 65% of "x". The skills and knowledges (in behavioral form) for all students to learn are specified before instruction begins. Then if the students do not achieve this level, it is the instruction that needs to be revised or added to, not the students.[43]

SECTION D

INGREDIENTS OF INDIVIDUALIZED MATERIALS

1. Defining the Package

Many schools throughout the nation attempt to individualize or make their instructional program more flexible, only to eventually fall back into the rut of teaching groups of students as opposed to teaching individuals. The task of providing an individualized instructional program which meets the unique needs of every student in a classroom, using the standard textbook as the basic tool, is not only extremely difficult, but physically an impossibility for any teacher. Those schools that have attempted to individualize have usually encountered a number of problems, most of which were inherited from the traditional educational program.

It is important that the beginning exploration of course development be conducted in such a manner as to incorporate the essential advantages of individualized instruction, while maintaining maximum flexibility. Recent experimentation has proven that individualized instruction has the potential for:

1. Allowing the learner to concentrate in depth on the subject matter he needs. He can spend as much time as he needs and desires to learn a concept or master a skill.

2. Enabling the learner to move with greater speed through those activities with which he is more familiar. Many students complete

courses earlier than the traditional time allotted for them.

3. Giving the student a greater opportunity to succeed. There are no failures in individualized programs. Some students need and take more time to finish.

4. Enabling the student to increase his employability. Not only does he master each concept and skill before graduating, he enters the labor market when he is finished with his requirements--not necessarily at the end of the semester.

5. Allowing the student to grasp material from means other than the textbook and the lecture. Some students prefer other means of learning.

6. Giving the student the opportunity to receive individual consultation during school time. Students come to the instructor, as predetermined within the individualized instructional materials.

7. Identifying learning problems in students. Learning deficiencies, especially reading problems, are easily detected in an individualized program.

8. Allowing the learner to be freed from the pace of his classmates. The student is compared only with himself and he is evaluated on more accurate criteria than the traditional bell-shaped curve!

If the goal of the teacher is to individualize the program to meet contemporary demands of the students, the task remains to construct an educational instrument to direct our educational endeavors and facilitate learning and teaching. A number of suggested models have been developed, each with different names, but all containing the same basic ingredients. They are called Instructional Packages, Learning Activity

Packages, Learning Units, Unipacs, Individual Study Packets, Individual Learning Packets, and other similar names. In order that a common language is used for purposes of this section, individualized materials will be referred to as Individualized Learning Packages.

An individualized learning package is a curricular vehicle designed to translate curriculum guides and traditional teacher lesson plans into the kind of student guides which would serve as road maps to assist the student in his learning. Individualized learning packages should be designed to provide for several aspects of individualized instruction and learning. They should provide for continuous progress learning.

In other words, an individualized learning package should permit students to learn at their own unique rates, rather than at rates imposed by teachers for the purpose of group-paced instruction. Use of packages provide for a more individualized environment. The student can take as much or as little time as he needs to complete his work. He may repeat his work without fear of penalty. He can get tutorial assistance whenever he wants it or as often as necessary. The teacher is able to diagnose the problem and adapt his teaching style to the particular needs of the student being tutored.[44]

Individualized learning packages should offer the student alternative ways of achieving stated behavioral objectives; students should be able to select from teacher-prepared and commercially available media of all types. In this way, students are allowed to take advantage of and expand on their own learning strategies. Individualized learning packages should also permit students, with the help of teachers, to plan their own learning sequences, giving them the opportunity, whenever

feasible, of taking advantage of their own interests and motivations.

To summarize, the primary purpose of the individualized learning package is to assist teachers in creating a more humanized learning environment. In such environments, the teacher's role, rather than being one of presenting information, becomes one facilitating or managing a total environment for learning. In this new role, teachers spend more time talking with students as individuals, or in small groups, rather than talking at them in groups of twenty, fifty, or even one hundred.

As each student moves through the learning package, he will not only achieve the knowledge and skills inherent in the package, but he will also gain several significant side benefits: First, he will learn to accept responsibility for his own learning. The amount of learning which takes place will depend on how well he will be able to discipline himself and how quickly and efficiently he can move through the package. Second, he will learn to communicate effectively with his fellow students and with the teacher in order to gain occupational insights and understandings. Third, he will receive an immediate feedback to his work and consequently will be able to make necessary changes to improve himself.[45]

The individualized learning package provides for self-evaluations, measurable objectives or goals, a rationale, and a variety of multi-media, multi-modal learning activities from which the student may select specific learning situations for himself. There are several different formats for individualized learning packages. A brief outline of what the package should include is as follows:[46]

1. Informative title or cover page

2. Introduction or rationale
3. Any necessary definitions
4. Measurable behavioral objectives
5. Pre- and post-tests
6. Directions for sequencing through the package
7. A variety of learning activities
8. Self-tests and feedback on self-tests

(1) TITLE OR COVER PAGE

The cover of the package usually contains some type of attractive design. Near the bottom of the page, the school name and address is printed. In the middle of the page is found the course name and course number of which the package is a part. Below this is found the package title. The name of the school department follows. The preparer's name may be placed next, if the teacher prefers. The title of the package has two main functions. First, it defines and limits the contents to be covered in the package. Second, it makes the package appealing and interesting to students.

(2) INTRODUCTION OR RATIONALE

When entering into a lesson it is necessary for the teacher to establish set. By this is meant that the teacher gets the student ready to learn or tuned in to the lesson about to be presented. Terms such as purpose, reasons, introduction and orientation can be used to identify the rationale of the individualized learning unit. The introduction delineates-what the unit is about and why it is important for the student to learn the unit. The introduction is usually free of long, involved descriptions or educational jargon. It may consist of one or several paragraphs. It is meant to whet the apetite of the student so that his incentive to complete the unit is increased. The introduction delineates the "what" and "why" of the individualized learning package and outlines

the procedure the student will follow to complete the work. It should not cover the material within the unit.

(3) NECESSARY DEFINITIONS

Definitions are included near the beginning of the individualized package in order to establish a common groundwork from which the teacher and student can work. Definitions are used to explain and clarify the meanings of words associated with the subject area in terms of how they will be used in the package. This helps the student to understand more precisely what it is he will be studying. The following is an example of how definitions may be used to clarify the content of a program. A metals teacher used this definition of tempering in a package on heat treatment.

> Tempering. Reheating hardened steel to a temperature lower than that used in the hardening process and quenching the steel to remove some of the brittleness and leave it hard and tough.

After reading this definition the student will know what tempering is and why it is done. Later on in the program when he is given more information, he will be able to relate it to the general definition presented above.

(4) BEHAVIORABLE OBJECTIVES

The function of education is to change or modify behavior. Behavioral objectives are designed to indicate the desired behavior; therefore, they can be defined as a collection of words, statements or symbols which describe an educational intent in order to attempt to identify what the student should be able to do or perform at the completion of the unit or task. Behavioral objectives are utilized to expedite and

direct learning. In order to do this, clearly stated behavioral goals must be developed. The most important element in writing behavioral objectives is that they must be capable of being evaluated in observable terms. If a student reads an objective and can master it without going through the learning experience, he has completed the objective and does not have to go through the program or section of the program devoted to the objective. The student must be given the opportunity to develop his ability to satisfy the objectives without going through the content area of the package. The teacher can do this in several different ways.[47]

1. Give the student the opportunity to go to the post-test, immediately after reading the objectives.

2. Have everyone take a pre-test which is consistent with the behavioral objectives. Those who pass the pre-test are through with the package.

3. Divide the package into parts--one objective for each part--use the pre-test system (#2) for each part.

(5) PRE- AND POST-TESTS

There are several ways in which the teacher may use pre- and post-tests, including:

1. A single test that acts as both pre- and post-test.

2. Two separate tests with the same types of problems, but different examples in the problems.

3. Pre- and post-tests for each objective, allowing the student to test out of one section of the package at a time.

The tests should contain the same type of activities indicated in

the behavioral objectives. For example, if the objective states that the student will be able to perform a manipulative skill, give a performance test, not a 100 question multiple choice test. If the objective states that the student will be able to define terms, he should have to define terms on the test and nothing else. The test should cover no more and no less than indicated by the behavioral objective. For example, if the objective says the student will have to define five terms, five should be given, not two or ten. In summary, a pre-test is based on the objectives of a package, given before the student begins the package, to determine (1) whether or not the student is ready educationally to do the package; (2) whether or not the student needs to do the package. In contrast, the post-test may be given at the end of each segment or over all segments at the end of the package.[48]

(6) DIRECTIONS FOR SEQUENCING THROUGH THE PACKAGE

When developing the package, it is important to include correct directions for sequencing. Not all students will go through the package the same; that is, some students will be able to go right through the package by reading the objectives and taking the test, while others may have to cycle and re-cycle through the instructional materials in order to master the objectives. There are four main types of directions that are commonly used in individualized learning packages:

1. The "Go to____." This statement is a direction offering the student no choice. It is usually used to direct the student to substantive material or to a self-test following a learning activity. It is also used to direct the student to the page that will give him feedback on his work within the package.

2. The choice. This direction gives the student the opportunity to choose the route he will follow through the package. Often this choice is determined by the student's test result or whether the student feels competent enough to take the post-test. Another place where the choice is used is where the student is given the opportunity to choose what assignments and activities he would like to participate in as he goes through the package.

3. The recycle. When a student's test results indicate that he needs clarification on some aspect of the objective, the recycle statement is used to direct the student back to the learning activity part of the program.

4. The quest. At various points in the package the teacher may want to allow the student the opportunity for independent study. If so, the student should be given a choice between continuing with the formal program and becoming involved in independent study.

(7) VARIETY OF LEARNING ACTIVITIES

In an individualized learning package it is not necessary that all of the information be self-contained, such as might be found in the so-called Learning Activity Package (LAP) or the Scramble Book (example in Appendix H). It is highly desirable to have a wide variety of resources available from which the student can get the information. Therefore, it is the teacher's job in writing packages not only to present information, but also to direct the student to alternate sources which can supply the information or experience. Teacher presentation (verbal or written) can be an effective teaching tool in a package but should be included as one of many alternatives. The teacher's job in the learning activities

section of the package becomes one of (1) assembling resources (2) providing situations through which the student can practice the behavior specified in the behavioral objective, and (3) providing feedback on the student's work. Many package writers accomplish this by simply providing the students with a list of alternative assignments combined with immediate-feedback self-tests.

(8) SELF-TESTS AND FEEDBACK ON SELF-TESTS

As the student progresses through the various learning activities in the package he should have the opportunity to find out if he is learning what is expected of him. For this reason it may be necessary for the teacher to include self-tests in the package. The number and frequency of the self-tests will vary from package to package according to the complexity of the subject matter and the layout of the package. It is best to have self-tests on only a small amount of material at one time. As the student completes the self-test he should immediately be provided with the correct answers and, if possible, reasons why the wrong answers were wrong. At this point the student should be given the choice (based on his test results and how he feels about them) of going further in the package or recycling through the material he had just covered. With this system each student has the opportunity to master present material before going on to subsequent learning. There are a number of ways the teacher can construct self-tests and provide feedback.[49]

1. A one-page test with a series of test items (multipe choice, true-false, fill in the blank, etc.) with an answer key on the following page. This method is appropriate for low level cognitive skills but can

easily become superficial and ineffective as a learning aid.

2. Single test items with a variety of answers to choose from, such as the example below: (similar to the Scramble Book.)

> What is the sum of 2 and 3?
> (a) __8__ Turn to page 40. (page 40 tells the student his answer was wrong and why. It also tells him the right answer and why it was right and gives him the opportunity to try a similar problem. If the student fails on the second problem he is recycled for more instruction on the area.)
>
> (b) __5__ Turn to page 41. (Page 41 tells the student he has made the correct choice and directs him to the next portion of the package.)

3. Performance tests. In a performance test the student has to demonstrate the ability to accomplish a given task. Feed-back on a performance test may come from the teacher or a classmate; or the student may evaluate himself in terms of an established criteria. The directions for this type of test tell the student to do whatever it is the teacher wants him to do.

SUMMARY

The creation of individualized learning packages is the result of the ingenuity of the person preparing the materials. The teacher should feel free to make adjustments and add the variety and flexibility which are so critical to successful individualized learning packages. Only in this way can the learner benefit and succeed in the program of study. Several sample packages appear in Appendix I.

SECTION E

REFINING THE INSTRUCTIONAL SYSTEM

1. Tryout and Revision

The most important phase in the design of individualized learning materials is tryout and revision. It is at this stage that the student becomes most heavily involved. With this step, improvement in existing practice becomes possible.[50]

The teacher who seeks to attain his objectives will want to test the material on small groups of learners (two to five students) prior to its full-scale implementation. He will examine learner responses carefully and make appropriate modifications in the material to increase the likelihood of learner achievement. He will then test the modified material with a new group of learners and make further refinements until a specified level of performance is achieved by all learners.

During the tryout period the teacher will need to be sensitive to the thinking of his students. He must notice gaps, predict confusions, sense response failures, rewrite items on the spot, and get honest responses. The teacher must let the learner teach him without being defensive.[51] This humility and responsiveness comes hard to many teachers. Such a person must learn from the mistakes of one student, capitalize upon them when faced with a new student, and consistently improve upon the material's effectiveness.

In the early stages of developmental testing, a teacher can study the individual learner as he learns. Obtaining feedback from the student,

of course, is not new. Even when lecturing, a teacher may ask for questions leading to further examples, restatements, and so forth. This process may lead to a complete revision of the original lecture. What is relatively new, however, is the notion of closely observing an individual learner at work in the early stages of a program design. Rather than taking large chunks of finished material into the classroom, the teacher should test small parts of the unfinished design with a single learner. Ideally the feedback from learner to teacher begins early, proceeds word by word, element by element, and ceases only when the teacher has achieved his goal--an effective teaching tool.

Many teachers or writers of individualized learning packages insist that the first draft should fail to achieve the predicted goal if it is to make full use of data from the learner being tested. If the instruction is a total success on the first trial, the learner has been deprived of an important opportunity to contribute to the design of the instruction. Typically, the first draft will elicit learner responses of 70 percent correct by approximately 70 percent of the tryout learners.[52] The teacher is likely to find problems in any one or all of several distinct areas of (1) clarity of material, (2) interest and challenge, and (3) instructional variables.

1. Clarity of Materials. This relates to the need for rewording or rearrangement of material to improve the sentence structure, vocabulary, explanation, instruction, or questions. Examples of ways to improve clarity might be to reword the instruction in a particular unit, add a clarifying example, simplify an explanation, redefine an objective, change the vocabulary, shorten a sentence, or add a definition.

2. Interest and Challenge. This is also known as attending, which is a need to heighten interest to gain attention, arouse curiosity, and provide a challenge to distraction, boredom, or apathy. Problems in interest and challenge might be improved by adding humor, eliminating a distraction, providing a sense of purpose, or adding an arousing or attention-getting segment.

3. Instructional Variables. This area refers to a need to improve the presentation in regard to pace, sequence, organization, size of learning steps, use of prompts, opportunities for practice, and reinforcement. These variables can be improved by providing more practice activities, adding cues or prompts, rewarding the learner more frequently, shortening or lengthening the number of steps in an activity, slowing the pace, or reorganizing the sequence of activities.

Instructional technologists have developed a variety of procedures for obtaining learner responses to each element of instructional material to eliminate superfluous or confusing portions. A combination of these approaches plus others should be employed. The teacher should adopt a tutor-like approach to his learner and take notes or employ a tape recorder to record responses. This will alleviate to some degree later memory loss or selective perception. During the tryout, at least five methods for obtaining learner responses might be tried:[53]

1. Error-rate approach. The basic concept here is to collect responses to each item, question, or element in the process, and then analyze and modify those items which produce errors or do not result in the desired learner response. By locating such errors, the teacher has clues to what modifications of the material are needed. For example,

if the student responds with "I cannot answer that question," there may be a need for additional prompts and practice exercises, or the question may be poorly worded.

2. Interview technique. This method seeks reactions or comments during or following a lesson. The teacher may not necessarily want to lead the learner and invite opinions on how an element might be revised. Yet, when the learner does make an error, the teacher uses that error and candid comments of the learner to modify the materials. For example, when the learner says "I guess I wasn't paying much attention," lack of interest is suspected. The answer may be to include material which will arouse curiosity or challenge the learner.

3. Diagnostic-criterion test approach. The diagnostic test, in addition to the regular criterion test, is used to determine the degree of attainment of all prerequisite tasks or behaviors needed prior to accomplishing the criterion test. Diagnostic errors suggest which sections of a program need to be deleted, expanded, or reworked. For example, in developing a mathematics program, the teacher may wish to find out which elements of the program need expansion and more thorough treatment. Analysis of the errors on a diagnostic test will tell the teacher which tasks or concepts need to be taught more carefully before the student can be expected to master all the objectives.

4. Latency of response approach. Studies indicate that delay in responding to an item is an effective clue for identifying item deficiency. Latency of response (even when the correct response is eventually given) tells the teacher when the learner is experiencing difficulty and when parts of the material need to be revised to improve

student performance. For example, if a learner indicates he wants to "think about it for a while," the teacher has a clue as to where a modification of the material is needed. The student may be confused, the material may be ambiguous, or the material may be too difficult.

5. Blackout rate procedure. This method eliminates extraneous parts within a lesson by deleting or covering (with paper, black crayon, or ink) all learner activities or expository material deemed nonessential in producing a desired response. In this manner, the teacher has a guide to determine how much might be deleted without increasing errors. Therefore, if the teacher has an idea that certain material or activity is superfluous, he might try deleting it to see whether it makes a difference. It has been demonstrated that over 50 percent of existing material may be blacked out without significant increase in errors. This means the teacher may delete half of his instruction and cut his teaching time in half without decreasing learning.[54]

REVISION DATA SHEET

Thus far, five approaches for obtaining learner responses have been pointed out. Another method is used to collect error-rate and interview data from students using the packages. A Revision Data Sheet is employed by the learner to record his errors and let the teacher know exactly which practice exercise and post-test item caused him problems. In addition, the student can let the teacher know why he missed the items and what led him to make the mistake in the first place. In short, the Revision Data Sheet is prepared by the teacher to suit the particular package or materials. It should be designed to pick up all the data that might be of help to the teacher when revising. It should be collected

from each student and filed in a folder until the teacher is ready to make revisions. The Revision Data Sheet can be used to have the students tell the teacher about:

1. Errors on practice exercises
2. Errors on the post-test
3. Suggestions for improving the package
4. Responses to interview questions
5. Comments about the material

SUMMARY

The teacher must do more than observe, make a tape recording, and take notes. He must be sensitive to overt expressions of thinking by the students. The teacher must recognize gaps, predict confusions, sense response failures, rewrite items on the spot, and elicit honest responses from the students while at the same time attempting to avoid certain pitfalls of individualized instruction. Appendix J contains a listing of pitfalls. He must let the learner teach him without being defensive. This humility and responsiveness to criticism comes hard to many teachers. Such a person must learn from the mistakes of one learner, capitalize upon them when faced with a new learner, and consistently improve upon the materials and their effectiveness. Modification and refinement does not cease in the development and use of individualized learning packages.

SECTION F

Summarization

Instructional materials have usually been ready-made, rarely tailor-made. Instructional materials have not been developed to fit the great variety of needs and interests of learners. It has been assumed, even though the assumption was known to be false, that nearly all students learn best from the same textbooks and that reading and reciting are the best method for teaching. Educators salved their conscience by permitting some pupils to progress faster than others.

In the past, the vexatious problems thus generated partially disappeared because the students who found the curriculum irrelevant and fruitless dropped out or, perhaps more accurately, were pushed out of school. Indeed, even today, one-third of those who enter public school do not graduate from high school. About one-third of the college freshman class drops out of those state-supported universities where all high school graduates are permitted to enter. It has usually been assumed that the student has failed the school. A more candid and discerning analysis would show that the school has failed the student. The goals set were neither clear nor realistic, nor were the instructional materials carefully programmed to attain the stated behavioral objectives.

To improve the means of instruction, teachers must clarify the ends of instruction, rigorously setting forth what he intends to do. Instructional materials will increasingly change and improve because

teachers are delineating more sharply the behavioral outcomes desired and are developing individualized instructional materials to secure these stated behavioral goals. Programmed instruction has contributed significantly to this process.

Clear goals are, therefore, a necessity in developing the independent learner. Clarity of goals is a major responsibility of the teacher. However, students must also learn how to clarify ambiguous goals since they will not always have a teacher at hand to clarify them. It is evident that if clear-cut goals are to be matched with learning resources, much more varied materials of instruction will be required than are now available. And if we wish to differentiate the kinds of materials used to fit types of objectives--cognitive, affective, and psychomotor--a basic change is needed in the way learning experiences for students are arranged.

Because of differences in students' physical abilities, mental abilities, talents, interests, and past experiences many schools are implementing programs of individualized instruction. Such schools must be oriented to allow each student to move at his own pace, through a learning program custom-tailored to meet the student's unique interests, needs and abilities. This individualized learning program must provide for differences in entering levels of ability; differences in rate of learning to achieve the curricular, behavioral and attitudinal objectives; and even differences in the learning goals themselves. Such a program places more responsibility for learning on the student and provides learning activity options reinforced by a continuous process of self-assessment so that the learner becomes a self-directed, self-oriented

student as he progresses through the program. In the final analysis, individualized programmed instruction is just another tool which, if used intelligently, can add to the value and productivity of the program.

FOOTNOTES

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30. Mager, p. 11.

31. Mager, p. 10.

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33. Butler, p. 150.

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45. Suburban Hennepin County Area Vocational-Technical Schools. Handbook: "How to Write Individual Learning PAKS," 1972, p. 2.

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52. Johnson and Johnson, Developing Individualized Instructional Material, p. 80.

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APPENDIX A

SECTION I

INTRODUCTION

This section attempts to describe the Welding Module in general terms and some of our results. Specific research completed is presented in Section III.

Description

MODULAR APPROACH TO LEARNING
(Welding)

PURPOSE

For many years, vocational education has been concerned about its ability to accept students at varying times, with varying skill levels and experience, and varying learning rates. Vocational education is not unique in these concerns. Many other areas of education have similar concerns. The difference is that vocational education has been considered to be the one field of education whose content was coterminous with the interests of the student and the public.

Teacher intervention in the learning process has been crucial in vocational education., i.e., it takes a master auto mechanic to train others in this field and it must be hands on. As a result, vocational education has been hampered by being forced to start everyone together and keeping them together because of teacher demonstrations on various pieces of equipment. Harried instructors and patiently waiting students have been the result.

The purposes of the modular approach, from the student/teacher standpoint are:

A. To enable students to start their learning at any time.
B. To be able to recognize skills gained from previous experience in an objective way.
C. To allow students to progress at their own rates.

These are not new concerns or objectives of education. They have been impractical because of the arrangement of curriculum, administrative structures, and finances. The only way to achieve thse objectives has been to proceed toward the ultimate in teaching: a one to one ration. This, of course, is fiscally and administratively impossible.

FUNCTIONS & ACCOMODATIONS

The traditional approach to learning has contained these elements:

A. A chronological curriculum totally dependent on the teacher. In other words, the curriculum was arranged over the calendar. Unit one was taught only from September 1 to October 1. Secondly, movement through the curriculum was dependent on the teacher to schedule the next unit on the calendar.
B. There was a single time span in which all students were expected to achieve the learning objective of the unit, i.e., Unit I, which was scheduled only once a year from Sept. 1 to Oct. 1, was to be completely learned by all students by Oct. 1. Any variations received different grades (A,B,C,D) and any students who strayed drastically from the time schedule on the negative side received an "F".
C. The traditional approach was served up in packages in which a fixed cost could be calculated easily and a student record maintained easily.

D. Obviously, the instruction tended to be teacher-centered and institutional-centered.

The following changes had to be made in the elements of rational teaching if the three objectives of an open curriculum were to be attained:

A. All of the curriculum in a program or a course had to be available to the student every day.
B. Reliance on a standardized time schedule had to be eliminated.
C. A method of determining skill level attained by informal experience had to be determined.
D. An acceptable and manageable method of fiscal and student accounting had to be developed.

DESCRIPTION

The tasks outlined above were successfully achieved through the employment of two recent developments: teaching by behavioral objectives and the use of data processing equipment and video tape recording equipment.

The program used for a pilot project was Welding I, a vocational program consisting of 360 hours of instruction over 12 weeks and intended to produce a welder employable by local industry on production projects in both arc and gas welding.

The first task was to determine what the overall objective of the course was. Secondly, the major units, thirdly, the larger components of the units, and finally, the smallest steps toward the achievement of the units had to be identified. (This actually was accomplished by the welding instructor over a three year period of constant trail and error.) The result of this analysis are shown on the next two pages. The three major units are:

I Basic Arc Welding (BAW)
II Heavy Industrial Welding (MIW)
III Metallic Inert Gas Welding (MIG)

The charts are read from the bottom of the page to the top.

After the program was analyzed into small units, materials and activities had to be prepared and a means of determing when the student had attained sufficient skill in the unit devised.

The results of attaining skill in welding are very tangible. Each unit has a welding sample for inspection by the teacher. There are also written objective tests. A student attempts the performance and written tests when he has performed all the activities in the unit. If he is not successful in the tests he simply returns to the unit for more work. There is no grade except passed.

The modular test-outs also provide a means for entry at any point in the curriculum simply by taking the test-outs of the previous module.

The second group of developments necessary to achieve objectives were concerned with the use of video tape recording equipment and data processing equipment.

A. Video Tape Recording Equipment
The chief problem of converting to a modular curriculum remaining after analysis and preparation of materials was to free the teacher

from any obligation for direct teaching of students. In welding education, teacher demonstrations of equipment use and techniques is very important. It also complicates a teacher's time, especially in a modular curriculum where a student may want a demonstration from any part of the curriculum at any time.

A decision was made to film the demonstrations and place them in cassettes which students could use at any time. The cost of film production was prohibitive. Video tape was less expensive both in production costs and equipment costs. In addition constant modification is possible.

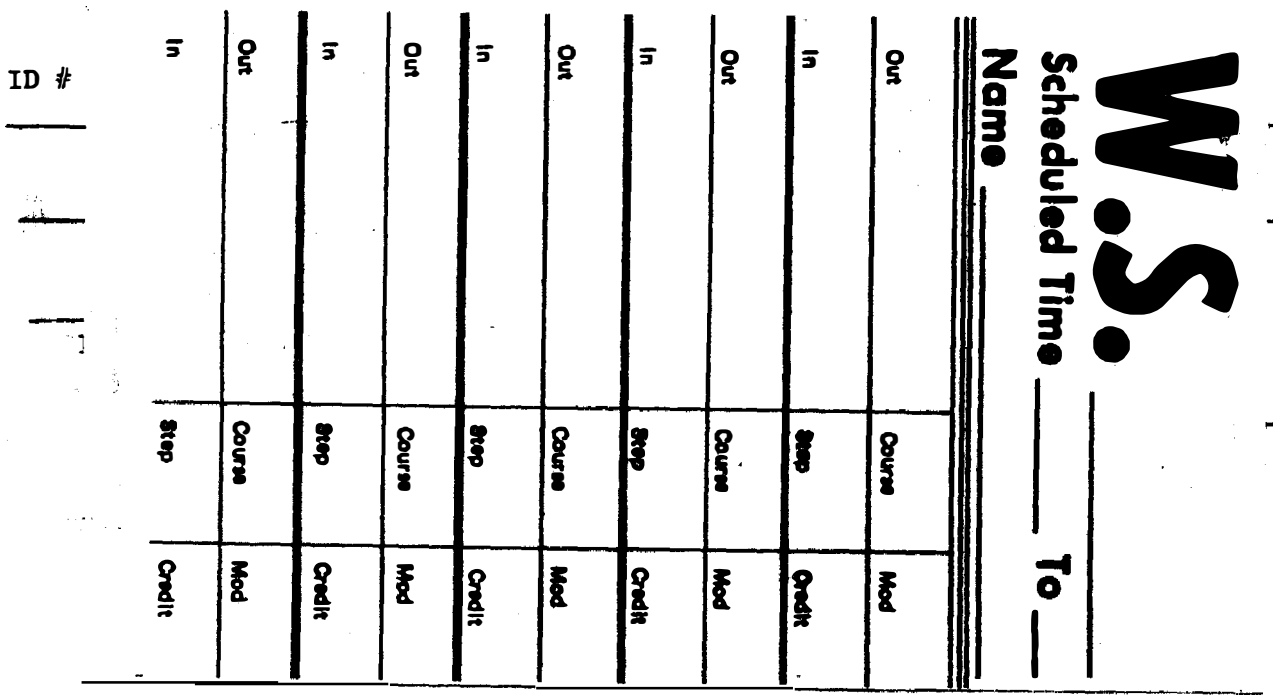
The state of video tape recording technology is not highly developed in terms of automatic cassettes. There are still none on the market. There are very satisfactory play-back units of a reel to reel type available. Work study students were employed to handle the units. Eventually, as other programs come into modular curriculum, this institution will go to central play-back units connected by cable to the various laboratories.

The use of the video tapes allows students to see demonstrations at the precise time they need them and it also allows repeats to clarify points missed in the first presentation. Additional clarification is possible from the teacher.

B. Data Processing Equipment
The task of monitoring student progress toward widely varying goals scattered over the entire curriculum is very complicated and could get in the way of instruction tasks. Since we no longer have neat content packages, old approaches no longer are operable.

The process devised was:

A. Students use a time clock to "punch-in" for instruction. The time card is shown below.



Students no longer buy courses or packages, they buy hours of time in the module. Our current price is $1.00 /hour. They schedule appointments for the hours purchased. Their fiscal status is printed at the bottom of the weekly report.

RESULTS

1. Our experience so far, which is limited, indicates that most students can complete 12 weeks of traditional work in 7 to 9 weeks.

2. Students enjoy the opportunity to be totally responsible for their own learning and rate of learning. There are a few who are frustrated by not being able to blame their slow progress on someone else, but most are willing to accept that, especially when no value is any longer placed on their completing in an arbitrary length of time.

3. Fiscal and student accounting are greatly simplified.

4. Opportunities for learning are greatly expanded. The modules are open from 8:00 AM to 11:00 PM. Anyone can enter for any purpose at any time.

Copies of student instruction sheets and learning sheets are attached.

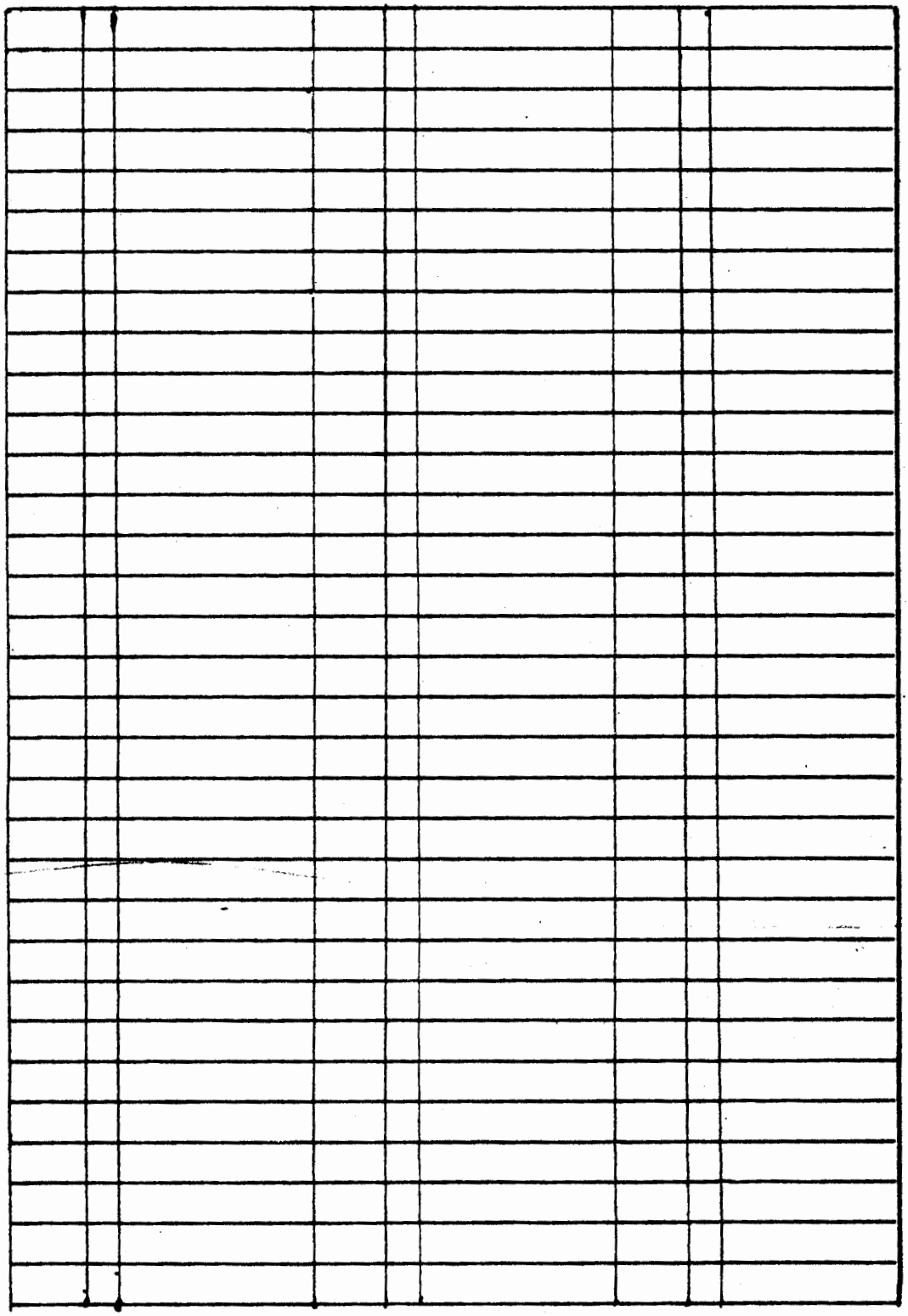
ACHIEVEMENT RECORD

E_____ WELD SHOP NO._____

rt Date_____ M T W R F S Credit Hrs._____

ing Date_____ Time Purchases_____

MA COMB



BAW

___ MM011V ___

___ MM025V ___

___ MM028V ___

___ MM026V ___

___ MM027V ___

HIW

___ MM029V ___

___ MM030V ___

___ MM031V ___

___ MM032V ___

___ MM033V ___

MIG

___ MM017V ___

OAW

___ MM035V ___

___ MM036V ___

___ MM037V ___

___ MM038V ___

___ MM039V ___

TIG

___ MM019V ___

AAW

___ MM020V ___

Math & BP

___ MA011U ___

___ MA003U ___

___ MM034V ___

BASIC ARC WELDING

Learning Module-1

OBJECTIVES

1. To be able to work safely and control arc welding equipment.
2. To be able to strike and maintain an arc.
3. To be able to make, and recognize a good bead of weld in the flat position that meets accepted standards.

USE	DO
I. A. Welding Skills & Practices 4th ed. B. Study Guide	1. Read Chapter 1. 2. Answer Study Guide Worksheet Self-check Test 1. 3. Read Chapter 3. 4. Answer Study Guide Worksheet Self-check Test 4. 5. Read Chapter 5. 6. Answer Study Guide Worksheet Self-check Test 6. Hand in Study Guide for checking before proceeding. ☐
II. A. MAW Film no. 1 B. MAW Job Sheet no. 1.	1. View Film 2. Select welding power supply and do Job Sheet 1. 3. Compare your work with sample on display board. Turn in a sample for evaluation. ☐
III. A. Welding Skills & Practice B. Job Sheet MAW-2.	1. Read pages 67, 69, 72 2. Do Job Sheet 2. ☐
IV. A. Welding Skills & Practice B. Job Sheet no. MAW-3.	1. Read page 73, Depositing a Pad of Weld 2. Do Job Sheet 3. ☐
	You may test out of this module by doing Section I & IV. ○

Running Continuous Beads

OBJECTIVES:

1. To gain skill in setting up a welding machine.
2. To become skilled in controlling the width of beads.
3. To become skilled in welding in the flat position.
4. To gain skill in restarting an arc.

EQUIPMENT:

Same as Job Sheet No. 1

MATERIALS:

1. Mild steel plates
2. E-6012 or E-6013 electrodes

PROCEDURE:

1. Secure a steel plate, and with soapstone, draw a number of straight parallel lines approximately ¾" apart.
2. Starting on the left and working to the right, weld continuous beads on these lines. After the plate is full remove the slag and examine you work.
3. While welding, watch your penetration, adjust arc length until you get a crater 1/3 to 1/2 the bead thickness.
4. Adjust your current and travel speed to produce a good bead, with no overlap or undercut.
5. Repeat the above exercise until your instructor approves your work. Use both sides of the plate.
6. Take a plate and draw lines on it as shown in Figure 1.

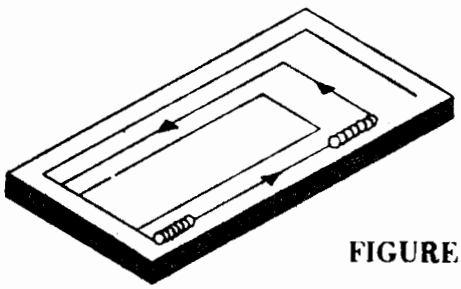


FIGURE 1

7. Start on a line and weld a continuous bead. This exercise provides practice in moving the electrode in several directions.
8. Repeat this exercise until your instructor approves your work.
9. Get another plate and lay it out as shown in Figure 2 (shown on the next page)

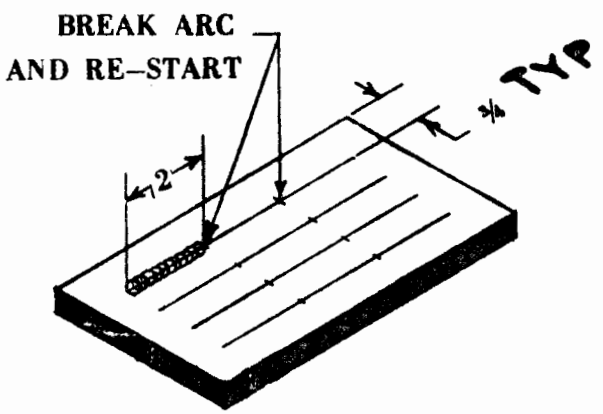


FIGURE 2

10. This exercise is to develop skill in restriking an arc while making a continuous bead. Run a bead on the first line until you reach the first 2" cross line, break your arc, clean the slag off and restart your arc, making sure you have filled in the crater. To fill the crater, you start welding about ½" in front of where you stopped.

11. Follow this procedure until you have mastered the skill of making good tie-ins on continuous bead. Show your work to your instructor.

POINTS TO REMEMBER

1. Use an arc about as long as the diameter of the electrode.
2. Maintain the correct welding current.
3. Move the electrode just fast enough to produce evenly spaced ripple pattern.
4. Keep penetration a depth equal to 1/3 to 1/2 total bead thickness.
5. Always restart the electrode 1/2" in front the previously made crater.
6. Clean the slag away fron the weld, always chip away from your body to prevent slag from flying up into your face.

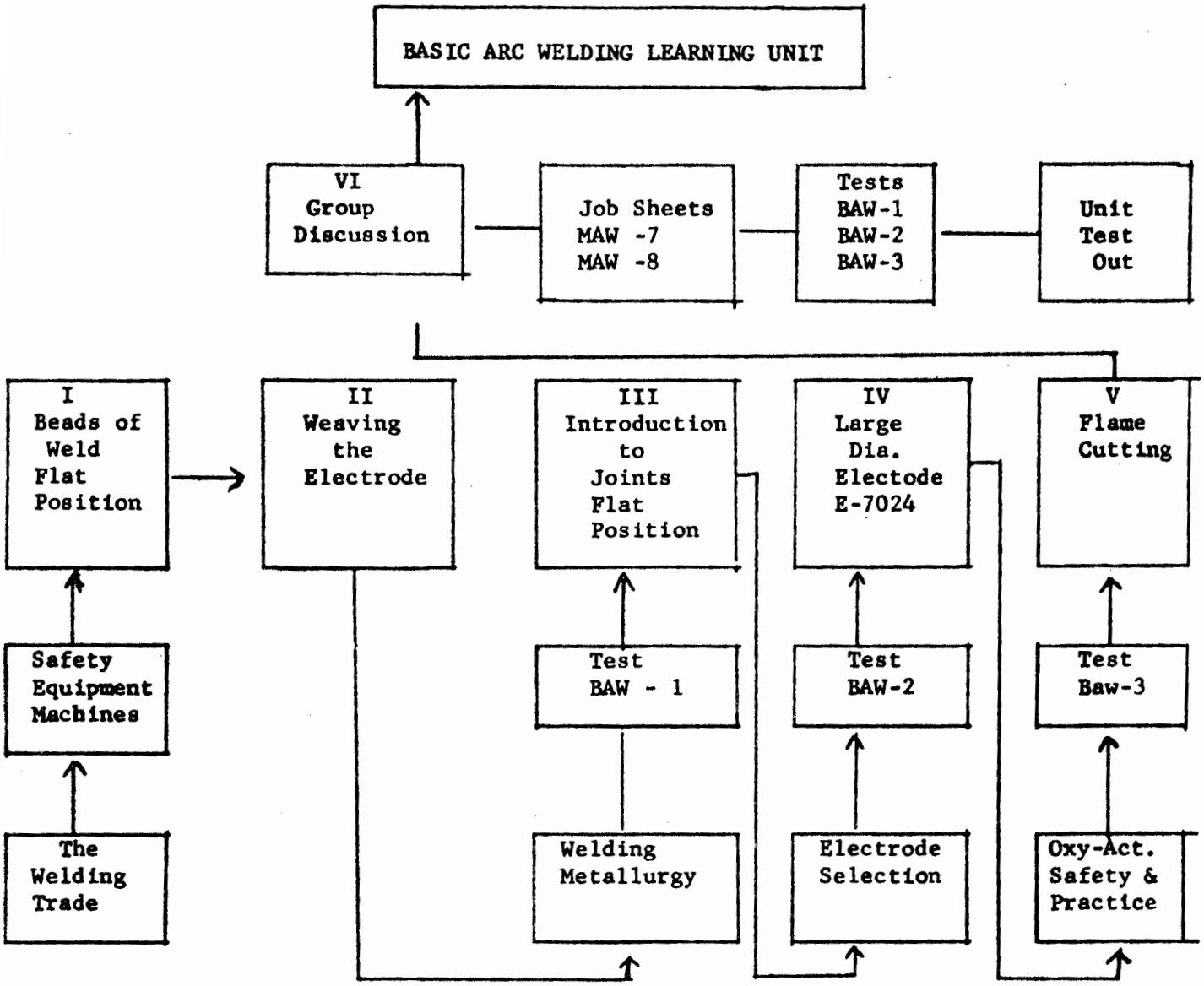
KIRKWOOD COMMUNITY COLLEGE
Trade and Industry Department
WELDING PROGRAM

12/72

	FIRST AND SECOND QUARTERS:	credit	class hrs. lab hrs.	total hrs.	running total
MM011V	Introduction to Arc Welding	1	2/24	26	26
MM025V	Weaving the Electrode	.5	0/12	12	38
MM028V	Flame Cutting	1	6/12	18	56
MM026V	Introduction to Joint Welding	1	4/24	28	84
MM027V	Powdered Iron Weld Methods	1	4/24	28	112
MM029V	Butt Joints - Flat	1	6/24	30	142
MM030V	Horizontal Weld Techniques	1	0/24	24	166
MM031V	Vertical Welding Techniques	1	0/24	24	190
MM032V	Overhead Welding Techniques	.5	0/12	12	202
MA011U	Mathematics I	3	36/0	36	238
MM034V	Blue Print Reading for Weldors	3	36/0	36	274
MM033V	A.W.S. Test - Low Hydrogen Electrodes	3.5	6/70	76	350
MM017V	Semi-automatic Welding	3	6/54	60	410
MM035V	Oxy-acetylene - Light Gauge Steel Welding	1	4/16	20	430
MM036V	Oxy-acetylene - Heavy Steel Welding	1	4/16	20	450
MM037V	Brazing and Silver Solder	1	4/16	20	470
MM038V	Oxy-acetylene - Cast Iron Repair	1	4/16	20	490
MM039V	Oxy-acetylene - Non-ferrous Materials	1	4/16	20	510
MM019V	Heliarc Welding	[illegible]	6/108	114	624
MM020V	Special Arc Welding Techniques	[illegible]	6/54	60	684
MA003U	Mathematics II	3	36/0	36	720
		36.5	174/546	720	

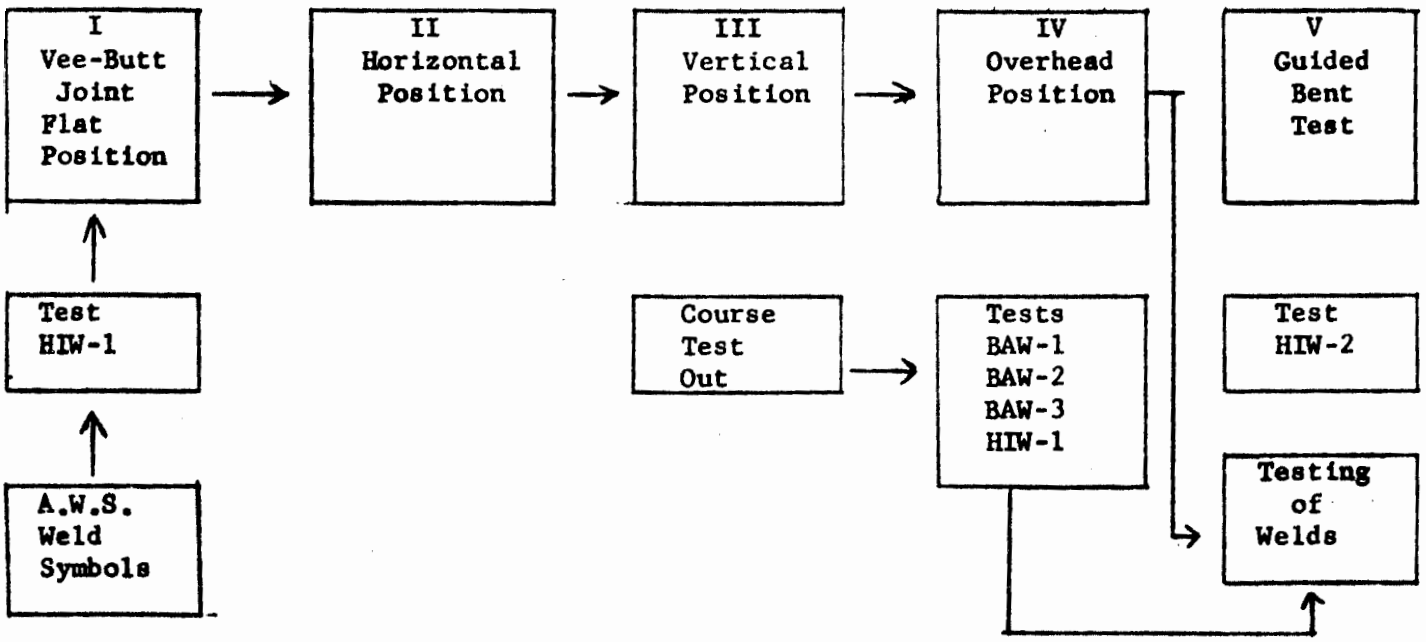
THIRD QUARTER:

MM009V	Production Machinery	2	0/56	56	
MM022V	Welding Inspection	2	0/56	56	
MM023V	Student Project	2	0/56	56	
MM024V	Welding Technology	4	60/0	60	
GR001V	Graphic Skills	2	12/24	36	
MA004U	Mathematics III	2	24/12	36	
CM002U	Communication Skills	2	24/12	36	
PY001V	Human Relations & Shop Supervision	1	12/12	24	
		17	132/228	360	
	TOTALS:	53.5	306/774	1080	


BASIC ARC WELDING LEARNING UNIT
VI Group Discussion
Job Sheets MAW -7 MAW -8
Tests BAW-1 BAW-2 BAW-3
Unit Test Out
I Beads of Weld Flat Position
II Weaving the Electrode
III Introduction to Joints Flat Position
IV Large Dia. Electode E-7024
V Flame Cutting
Safety Equipment Machines
Test BAW - 1
Test BAW-2
Test Baw-3
The Welding Trade
Welding Metallurgy
Electrode Selection
Oxy-Act. Safety & Practice

METALLIC ARC COURSE

HEAVY INDUSTRIAL WELDING UNIT



cheaper and faster, with feeling --

— that's how Kirkwood teaches welding in an exciting new modular approach.

ybody care to guess which department at Kirkwood is
g the way in developing new, economical and efficient
ng methods?

Welding -- the stodgy old craft that got its start back in
ark ages and hasn't changed a whole lot since.

welder at work today looks essentially the same as one did
ears ago -- a bit grubby, frankly, behind those aprons and
y goggles. He'll probably look the same in another 30
.

ut welding has put on a new face at Kirkwood.

's called modualr instruction, and lo and behold, it fits
ing beautifully.

here are indications that modular welding will suit the tax-
r nicely, too. One study already shows that the cost of in-
tion per hour was cut by almost 25 percent at Kirkwood.
lodular methods appear to have effected an important re-
ion in the amount of time it takes to produce competent
ers. That may be the most important consideration of all,
it makes that learning process shorter, simpler and more
ble for the student.

irkwood's excursion into modular instruction has been led
Derrell Lockhart, chairman of the school's welding programs.
ockhart, working with a layman advisory committee, set a-
the task of breaking Kirkwood's metallic arc welding pro-
into ten identifiable teaching units, or modules. The next
was to break down each module into the basic steps need-
o complete that phase of the welding task.

inally, printed and visual materials were designed to match
modules and the modules were arranged in a teaching se-
ice. To measure the progress of students, objectives were
ten for each module.

ounds easy. But a final complicating element was injected
Kirkwood's plan -- video tape.

Video tape is the key to

The video tape idea adapts beautifully to welding instruction. The camera can move in tightly to help explain equipment adjustments and welding procedures. It's far superior to large groups of students watching a demonstration from a distance of five to 20 feet.

Lockhart had help from Bill Anton, head of the Kirkwood audio-visual department, who set up a makeshift TV studio in a corner of the welding shop in Linn Hall. Pat Melroy, who heads related communications instruction for trade and industry students at Kirkwood, worked as a cameraman and production critic.

With no experience to draw from, the Kirkwood group had many failures as it attempted to put metallic arc welding on video tape. Gradually, though, the team improved its work until there wasn't much wasted time or effort in a taping session.

Finally, the job was done -- 15 video tapes accompanied by narration. The tapes range from five to 40 minutes in length. Lockhart, meanwhile, had written a 38-page instructional guide consisting of job sheets teaching each step in metallic arc welding.

The next task was to devise time standards for the learning process. Partly from experience and partly from observing the new system in operation, Lockhart and his staff determined an "average" time for students to learn each step or module.

Enter the computer, the much cussed and discussed element of modern society. At all stages of learning, the Kirkwood welding student punches an electronic time card and marks on it the module he is working on. A computer print-out then shows how much time a student has spent on a given module. If he is running far above the predetermined time standard, he gets help in the form of individual instruction.

Before modular instruction, TV and all, the metallic arc welding program at Kirkwood was a conventional one consisting of 12 weeks, or one school term. That meant a total of 300 hours required in the welding shop and classroom before the student could graduate.

Wonder of wonders -- Lockhart and his staff found that it took the average student only 171 hours to complete the full program of instruction using the modular methods.

There's no hocus-pocus to it. Lockhart knows that the 171-hour exposure is producing competent welders because they are successfully passing the standard tests required by the American Welding Society. That was the goal in the conventional program, and it is the goal now that modular teaching is on the scene. Dr. Vernon Pickett, associate superintendent for education at Kirkwood, calls the new welding program "an educational breakthrough" for the college. "Students are at the center the learning process now. Teachers are no longer in the middle. The instructors now have become resource people ready to help when snags develop," says Pickett.

Another beauty to the modular approach is that it encourages students to enter at any phase of the instruction. An already-employed welder who wants to obtain new skills can simply step in at, say, module six of the program and progress from there.

The apparent success story does raise some questions. The question of tuition for instance. Should the student pay tuition based on the amount of time spent in the program, or based on the amount of knowledge he absorbs?

How about grading students? How can grades be attached to student work when it is no longer important how long the student stays in the program to accomplish his goals?

Lockhart believes the need for grades is eliminated by modular instruction. The object is to permit each student to learn the same amount, no matter how long it takes. In other words, nobody fails in the Kirkwood welding program.

But convention is hard to overcome. The college registrar still must have his grade to record, and Lockhart dutifully follows form. But he looks forward to the day when there are no more grades given in the welding program.

The instructors believe modular instruction has improved morale and attitudes in the welding program. Fast-learning students aren't slowed down and slow learners can learn at their own pace. There's always the video tape to plug in if a fellow wants to run through something a second or third time.

Modular instruction appears to be good news for the taxpayer. Since the average student spends less time in the program than under the old system, the cost of instruction dropped from $198.95 per student to $105.97. The savings of $93 per student represented 47 percent. Broken down to a per-hour cost of instruction, the modular experiment cut costs from 82.5 cents per hour to 62.7 cents. That's 24 percent.

The study also shows that the modular system caused a drop in the rate of drop-outs in the program. Slower learners apparently are responding to the opportunity to learn at their own pace by staying in the program longer.

Modular techniques apparently produce graduates in less time than the conventional method. But at the same time, they seem to be stimulating enrollment. When Lockhart took over the program four years ago, there were nine fulltime students. There

were 134 students in the winter term of 1971,not includi high school age students in Kirkwood's afternoon pre-c program.

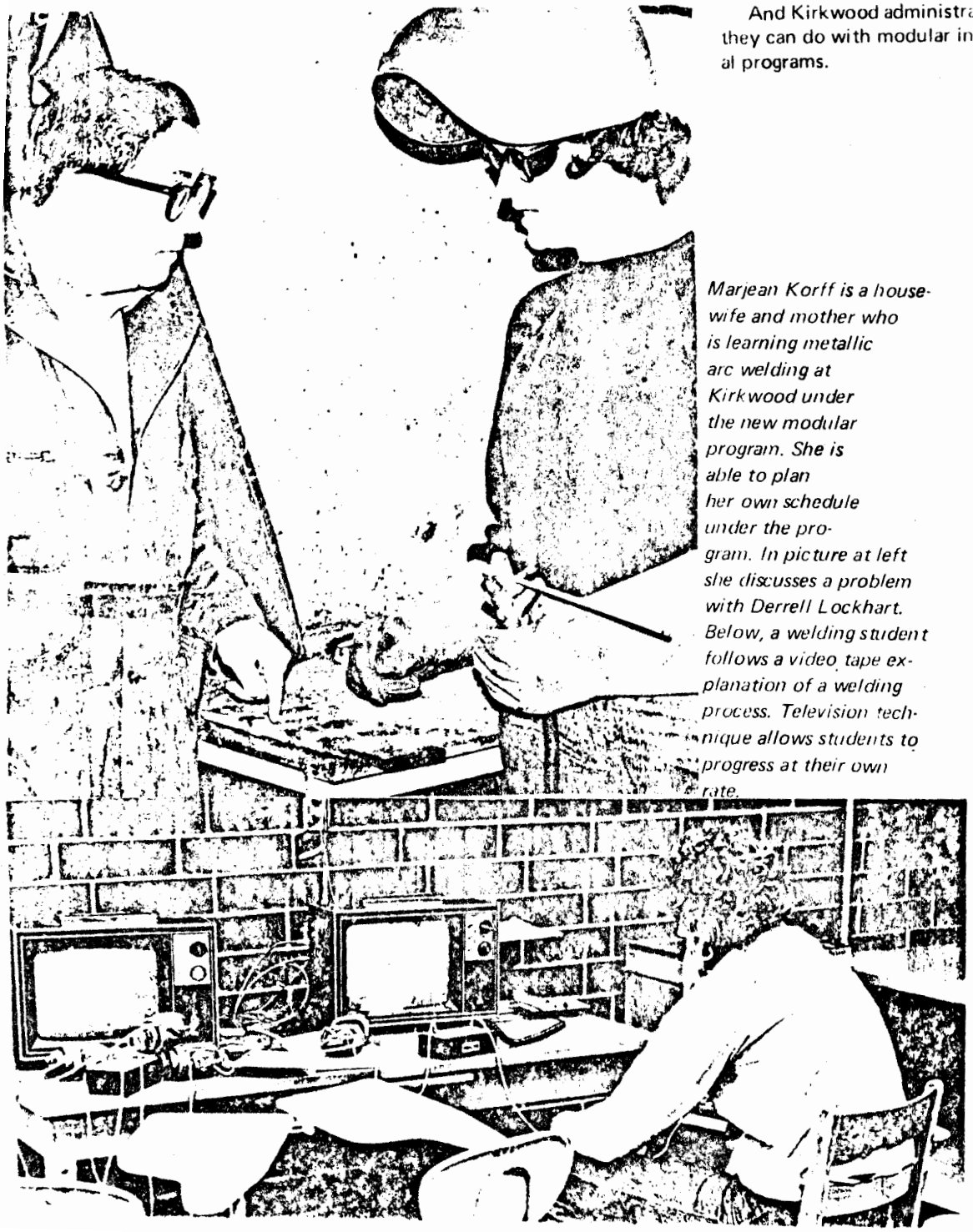
The modular experiment began in the part-time evening ing program in the fall of 1970. It has now been moved the fulltime daytime program.

Modular welding is popular among adults who want to the trade on a part-time basis. Of the 134 winter-term stud 92 were taking their instruction in the evening and on S day mornings. "Beginning at 6 o'clock in the evening we people crawling all over in the shops," says Derrell.

Metallic arc welding is the first phase of the three-part we program at Kirkwood. The second phase is combination ing and the third phase is welding specialist.

Encouraged by their experience with the metallic we program, Lockhart and his staff are pushing ahead with ularizing of the combination and specialist phases.

And Kirkwood administrators are taking a hard look at they can do with modular instruction in several other voca al programs.



Marjean Korff is a housewife and mother who is learning metallic arc welding at Kirkwood under the new modular program. She is able to plan her own schedule under the program. In picture at left she discusses a problem with Derrell Lockhart. Below, a welding student follows a video tape explanation of a welding process. Television technique allows students to progress at their own rate.

APPENDIX B

THE CALIFORNIA JOB CASE

A

SCRAMBLE BOOK

FOR

SELF-INSTRUCTION

Prepared by Kenneth F. Hird

INSTRUCTIONS

This is a programmed text. Learning from programmed instruction is probably different from anything you have ever done. To learn the most from this program, follow the directions given below.

1. Each page is numbered at the top. On each page you will find a series of numbered paragraphs. As you proceed through this scramble book, you will be guided by the paragraph and page numbers.

2. At the end of each paragraph there is a direction telling you to what new paragraph and page you should turn.

3. When you have turned to the new paragraph and page you will have a choice of two answers. After selecting the answer you believe to be correct, turn to the page your selected answer indicates.

4. Upon turning to the new page, you will find out if your answer is correct.

5. If your answer is incorrect, you will be given further instruction as to what to re-study.

6. If your answer is correct, you will have new information to read.

7. You continue progressing through the book until you have read the entire book and answered all the questions. When you feel thoroughly familiar with the material in this book, ask the instructor for a copy of the post-test.

8. Turn to page 1, paragraph 1 and begin reading.

1. In the early days of printing, when most of the typesetting was for the text or body matter of books, magazines, and newspapers, printers had to have large quantities of type and, therefore, used two cases for each size.
   Turn to paragraph 30, page 3.

---

2. You have selected an incorrect answer, re-read paragraph 20, page 2.

---

3. You are correct; typesetting machines were invented in the latter part of the nineteenth century. Since then many different type cases have been invented, the most common being the California job case which has positions for capital letters, lower-case letter, figures, special characters, and punctuation marks for one size and face of type in one case.
   Turn to paragraph 31, page 3.

---

4. "Lay of the case" refers to location of letters in the type case.
   If the answer is true turn to paragraph 22, page 2.
   If the answer is false turn to paragraph 60, page 6.

---

5. Any part of a letter which extends over the edge of the body of a type is said to be kerned.
   If the answer is true turn to paragraph 45, page 4.
   If the answer is false turn to paragraph 62, page 6.

---

6. You are correct; the student must memorize the "lay" or position of every letter in the job case before attempting to set or distribute any type.
   Forty-five minutes should be plenty of time to learn the case by first drawing a diagram of the type case and marking your diagram with the letters shown in their proper places. The marking of the diagram will help you memorize their positions.
   Turn to paragraph 35, page 3.

---

7. The correct procedure in memorizing the job case is: (1) lower case, (2) figures, (3) capitals, (4) punctuation marks and spaces, (5) review.
   If the answer is true turn to paragraph 72, page 7.
   If the answer is false turn to paragraph 37, page 3.

20. You are correct; early-day printers did use two type cases for each size of type.
The cases were arranged on the top of a frame, with the capitals in the upper case and the small letters in the lower case. This positioning of the cases accounts for the fact that we call capital letters "upper-case" and the small letters "lower-case".
Turn to paragraph 50, page 5.

---

21. Type setting machines were invented in the first part of the nineteenth century.
If the answer is true turn to paragraph 51, page 5.
If the answer is false turn to paragraph 3, page 1.

---

22. You are correct; "lay of the case" refers to location of letters in the type case.
The capital letters are ordinarily used much less than the lower-case letters, so their arrangement is not so important. They are arranged alphabetically, except for the J and U, which come after the Z.
Turn to paragraph 43, page 4.

---

23. The capital I is followed by the capital K in the California job case.
If the answer is true turn to paragraph 33, page 3.
If the answer is false turn to paragraph 44, page 4.

---

24. You have selected an incorrect answer; re-read paragraph 45, page 4.

---

25. The position of all lower-case letters must be memorized first.
If the answer is true turn to paragraph 64, page 6.
If the answer is false turn to paragraph 36, page 3.

30. Two type cases for each size of type were used by early-day printers.
If the answer is true turn to paragraph 20, page 2.
If the answer is false turn to paragraph 40, page 4.

---

31. The type case in most common use today if the California job case.
If the answer is true turn to paragraph 52, page 5.
If the answer is false turn to paragraph 42, page 4.

---

32. You have selected an incorrect answer; re-read paragraph 22, page 2.

---

33. You are correct; the capital I is followed by the capital K in the California job case.
Accordingly, the letters following the capital K are: L, M, N, O, P, Q, R, S, T, V, W, X, Y, Z, J, U, &, ffl. Ligatures (two or more letters on one body of type) are sometimes included in a particular type style or face. The ligatures include: ff, fi, ffi, fl and ffl.
Turn to paragraph 53, page 5.

---

34. You are correct; ligatures do contain two or more letters on one body of type. Their use is necessary to avoid breaking off the end stroke which hangs over the edge of the type at the top of the "f". In most well-designed types the end stroke or "kern" as it is called in the trade comes in contact with the dot of the "i" and the top of the "l". Any part of a letter which extends over the side of a type body therefore, is said to be "kerned."
Turn to paragraph 5, page 1.

---

35. The student must start memorization of the job case by first studying a printed diagram for 45 minutes.
If the answer is true turn to paragraph 54, page 5.
If the answer is false turn to paragraph 71, page 7.

---

36. You have selected an incorrect answer; re-read paragraph 71, page 7.

---

37. You have selected an incorrect answer; re-read paragraph 64, page 6.

40. You have selected an incorrect answer; re-read paragraph 1, page 1.

---

41. You are correct; upper-case and lower-case is a carry-over from early-day type case positioning.
Type setting machines were perfected in the latter part of the nineteenth century, and as body type could be set much cheaper on the machines than by hand, most printers changed over to machines. Double cases are rarely found in print shops today.
Turn to paragraph 21, page 2.

---

42. You have selected an incorrect answer; re-read paragraph 3, page 1.

---

43. Capital letters run in alphabetical order except for the J and U which come after the Z.
If the answer is true turn to paragraph 61, page 6.
If the answer is false turn to paragraph 32, page 3.

---

44. You have selected an incorrect answer; re-read paragraph 61, page 6.

---

45. You are correct; any part of a letter which extends over the edge of the body of a type is said to be kerned.
Ligatures, which are a direct outgrowth of certain kerned letters, are in no particular order or scheme in the type case. They, along with the other letters, figures, punctuation marks, and spaces must be memorized as to the "lay of the case" by the beginning graphic arts student. This is necessary so that type can be set quickly and accurately and also put back into the proper compartments when no longer needed. Putting the type back into the case is called "distribution".
Turn to paragraph 63, page 6.

---

46. You have selected an incorrect answer; re-read paragraph 72, page 7.

50. The positioning of early-day type cases accounts for the term "upper-case" and "lower-case."
    If the answer is true turn to paragraph 41, page 4.
    If the answer is false turn to paragraph 2, page 1.

---

51. You have selected an incorrect answer; re-read paragraph 41, page 4.

---

52. You are correct; the most common type case in use today is the California job case.
    The case has 89 compartments of various sizes and shapes. The largest compartment is for the lower-case e, as this letter appears more frequently in our language than any other. Likewise, small compartments are provided for the k, z, j and other letters used the least. The location of the letters in the case is called the "lay of the case," and the lay is made so that the most used letters are grouped together within convenient reach of the person working at the type case.
    Turn to paragraph 4, page 1.

---

53. Ligatures contain two or more letters on one body of type.
    If the answer is true turn to paragraph 34, page 3.
    If the answer is false turn to paragraph 70, page 7.

---

54. You have selected an incorrect answer; re-read paragraph 6, page 1.

---

55. A thorough knowledge of the "lay" of the California job case is the logical outgrowth of a planned system of memorization.
    If the answer is true turn to paragraph 73, page 7.
    If the answer is false turn to paragraph 46, page 4.

60. You have selected an incorrect answer; re-read paragraph 52, page 5.

---

61. You are correct; capital letters do run in alphabetical order except for the J and U which come after the Z.
The alphabet used by the early printers had no J and U, so it was only natural that when these letters were added to our alphabet the printers placed them in the empty compartments following the other capitals. Had they put them in the regular alphabetical position, it would have been necessary to change the position of all the letters following the I in all the cases in use.
Turn to paragraph 23, page 2.

---

62. You have selected an incorrect answer; re-read paragraph 34, page 3.

---

63. The student of graphic arts must memorize the "lay of the case" before attempting to set or distribute type matter.
If the answer is true turn to paragraph 6, page 1.
If the answer is false turn to paragraph 24, page 2.

---

64. You are correct; the student must first learn the position of all lower-case letters.
After memorizing the position of the lower-case letters, memorize the location of the figures. Then learn the position of the capitals. Next, learn the position of the punctuation marks and spaces. Finally take a blank diagram of the type case and fill it in from memory.
Turn to paragraph 7, page 1.

70. You have selected an incorrect answer; re-read paragraph 33, page 3.

---

71. You are correct; do not begin memorization of the type case by first studying a printed diagram for 45 minutes.
First, draw a diagram of the type case and find on your diagram the lower-case alphabet from a to z, noting the location of each letter as you find it. Repeat several times until you know the exact location of each of the lower-case letters.
Turn to paragraph 25, page 2.

---

72. You are correct; the procedure in memorizing the type case is: lower-case, figures, capitals, punctuation marks and spaces, review.
The student of graphic arts must memorize the type case as quickly as possible because his type setting assignments in the laboratory will require a thorough familiarization with the type case in order to complete the required assignments correctly and within the time limit specified.
Turn to paragraph 55, page 5.

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73. You are correct; a thorough knowledge of the "lay" of the California job case is the logical outgrowth of a planned system of memorization.
When this takes place the student of graphic arts is now ready to explore the exciting realm of typesetting.

APPENDIX C

TAXONOMY OF EDUCATIONAL OBJECTIVES

Cognitive Domain*

1.0 Knowledge. Recall of specifics, pattern, structure, etc.

- 1.1 Knowledge of specifics. Specific bits of information.
- 1.2 Knowledge of ways and means of dealing with specifics. Organizing.
  - 1.2.1 Knowledge of conventions. Usages, styles, practices, forms.
  - 1.2.2 Knowledge of trends and sequences. With respect to time.
  - 1.2.3 Knowledge of classification and categories. Arrangements, classes.
  - 1.2.4 Knowledge of criteria. Judging facts, principles, opinion, criteria.
  - 1.2.5 Knowledge of methodology. Techniques, methods of inquiry.
- 1.3 Knowledge of universals and abstractions. Theories and generalizations.
  - 1.3.1 Knowledge of principles and generalizations. Particular abstractions.
  - 1.3.2 Knowledge of theories and structures. Body of principles, range of specific systematic view.

Intellectual Abilities and Skills

2.0 Comprehension. Relating knowledge to other material or seeing the full implication.

- 2.1 Translation. Paraphrasing or restructuring ideas.
- 2.2 Interpretation. Summarization, reorganization.
- 2.3 Extrapolation. Extension of trends beyond given data.

3.0 Application. Use of abstractions in concrete situations.

4.0 Analysis. The breaking down of information into its elements.

*Adapted from Benjamin S. Bloom et al., Taxonomy of Educational Objectives, Handbook I: Cognitive Domain (New York: McKay 1956).

4.1 Analysis of elements. Distinguish: facts from hypothesis, etc.

4.2 Analysis of relationships. Connections and interactions of parts of a structure of knowledge.

4.3 Analysis of organizational principles. Organizational systematic arrangement.

5.0 Synthesis. Putting together of elements and parts to form structure.

5.1 Production of a unique communication. Communicating to others.

5.2 Production of a plan or proposed set of operations.

5.3 Derivation of a set of abstract relations. Formulating hypotheses or propositions.

6.0 Evaluation. Quantitative and qualitative judgments, using standards of appraisal.

6.1 Judgment in terms of internal evidence. Logical accuracy, internal consistency, etc.

6.2 Judgment in terms of external criteria. Evaluation of internal data in relation to outside influences and selected criteria.

APPENDIX D

TAXONOMY OF EDUCATIONAL OBJECTIVES

Affective Domain*

1.0 Receiving. Attending.

- 1.1 Awareness. Conscious of a situation, object, state of affairs.
- 1.2 Willingness to receive. Giving attention but neutral toward the stimulus.
- 1.3 Controlled or selected attention. Selection of stimuli to be attended to: attention controlled by the learner.

2.0 Responding.

- 2.1 Acquiescence in responding. Compliance or obedience.
- 2.2 Willingness to respond. Voluntary response: proceeding from one's own choice.
- 2.3 Satisfaction in response. Behavior accompanied by a feeling of pleasure, zest, or enjoyment.

3.0 Valuing.

- 3.1 Acceptance of a value. Shown by consistency of response to the class of phenomena with which a belief or an attitude is identified.
- 3.2 Preference for a value. Sufficient commitment to a value so the individual will pursue, seek out, or want it.
- 3.3 Commitment. Belief involves a high degree of certainty bordering on faith; includes layalty to a position, group, or cause; shown by effort to convince others.

4.0 Organization.

- 4.1 Conceptualization of a value. Shown by attempts to identify characteristics of an object or position valued and by expression of judgments about a value.
- 4.2 Organization of a value system. Bringing together a complex of values into an ordered relationship.

*Adapted from David R. Krathwahl, et al., Taxonomy of Educational Objectives, Handbook II: Affective Domain (New York: McKay, 1964).

5.0 Characterization by a value or value complex.

5.1 Generalized set. The individual acts consistently in accordance with the values he has internalized.

5.2 Characterization. Having developed a consistent philosophy of life or a code of behavior which becomes characteristic of the individual.

APPENDIX E

THE CLASSIFICATION OF EDUCATIONAL OBJECTIVES

Psychomotor Domain*

1.0 Perception. The essential first step: the process of becoming aware of objects, qualities, or relations by way of sense organs.

1.1 Sensor stimulation. The impingement of a stimulus upon one or more of the sense organs.

1.1.1 Auditory
1.1.2 Visual
1.1.3 Tactile
1.1.4 Olfactory
1.1.5 Kinesthetic

1.2 Cue selection. Identification of the cue or cues and associating them with the task to be performed.

1.3 Translation. Relating of perception to action in performing a motor act: the mental process of determining the meaning of the cues received for action.

2.0 Set. A preparatory adjustment or readiness for a particular kind of action or experience.

2.1 Mental set. Readiness in the sense of having made the anatomical adjustments necessary for a motor act to be performed.

2.2 Emotional set. Readiness in terms of attitudes favorable to the motor acts. Willingness to respond is implied.

3.0 Guided response. An early step in the development of skill. Emphasis is upon the abilities which are components of the more complex skill.

3.1 Imitation. The execution of an act as a direct response to the perception of another person performing the act.

3.2 Trial and error. Trying various responses, usually with some rationale for each response, until an appropriate response is achieved.

4.0 Mechanism. The habituation of a learned response. At this level, the learner has achieved a certain confidence and degree of skill in performance of the act.

*Adapted from Elizabeth Jane Simpson, "The Classification of Educational Objectives, Psychomotor Domain" (Project Report, University of Illinois, 1966).

5.0 Complex overt response. The individual can perform a motor act that is considered complex because of the movement pattern required; a high degree of skill has been attained; the act can be carried out smoothly and efficiently.

5.1 Resolution of uncertainty. The act is performed without hesitation; the individual knows the sequence required and so proceeds with confidence.

5.2 Automatic performance. The individual can perform a finely coordinated skill with a great deal of ease and muscle control.

APPENDIX F

Acceptable Words for Preparing Unit Objectives

. adjust	. list	. name
. select	. describe	. sketch
. identify	. compare	. outline
. write	. contrast	. measure
. recite	. choose	. operate
. pronounce	. specify	. perform
. differentiate	. compose	. read
. solve	. draft	. draw, etc.
. construct		

Unacceptable Words for Preparing Unit Objectives

. understand	. grasp	. acquaintance	. working knowledge
. know	. enjoy	. learn	. be aware of
. appreciate	. believe	. recognize	. familiar with, etc.

Adding adverbs to these words does not improve their usefulness; that is, to really understand, to fully appreciate; to grasp the significance, etc.

Well-stated objectives are those that are stated in terms of behavior which the learner will be able to accomplish upon completion of the content.

APPENDIX G

PROJECT ABLE

INSTRUCTOR REACTION FORM

(PERFORMANCE EVALUATION SET & LEARNER ACTIVITY GUIDE)

INSTRUCTIONS

This checklist is designed to assist in identifying problems in learning units and performance evaluation units. Most items will require only a check mark (√) to give your answer. Please answer all items ACCURATELY. Your comments will be most valuable.

Thanks for your help.

Name _____ School _____ City _____

Job Family Area and Level _____

Group or Grade _____ Date _____

Unit Number — Learning Unit No. _____

Performance Evaluation No. _____

NOTE: YOU MAY CHECK MORE THAN ONE ANSWER.

UNIT OVERALL EVALUATION

- ☐ The objectives and units are not sequenced correctly (specify).
- ☐ Requires extensive teacher help.
- ☐ Needs a greater variety of learning activities.
- Reading level within unit too difficult for my students. (Select appropriate one.)
  - ☐ Better ☐ Average ☐ Poor
- ☐ Please revise as indicated on the attached copy of the unit.
- ☐ This unit should be deleted from the program. (Why)
- ☐ There is not enough difference in the units. (How should they be modified?)
- ☐ The typical student requires too long to complete the unit.
- ☐ Acceptable as is.
- ☐ Acceptable with minor revision.

OBJECTIVE

- ☐ Acceptable.
- ☐ Needs to be written in simpler language for the student.
- ☐ Not in correct sequence. (Where should it be?)
- ☐ Does not tell student what he is supposed to learn.

OVERVIEW

- ☐ Acceptable.
- ☐ Needs to be written in simpler language for the student.
- ☐ Not related to the objective.

INSTRUCTIONAL AND/OR RESOURCE MATERIALS

Where more than one reference is used in the step, indicate which reference a specific comment is directed toward.

- ☐ Acceptable.
- ☐ Instructional materials not related to the objective.
- ☐ Instructional materials require extensive teacher help.
- ☐ Reading level is too difficult for my students.
- ☐ Please revise as indicated on the form or on the attached unit.
- ☐ There is a mistake in page reference, title of book, etc. Correct as indicated on the form or attached unit.
- ☐ Instructional materials not available in our school. (Which materials?)

EQUIPMENT AND TRAINING AIDS

- ☐ Acceptable.
- ☐ Not related to objectives.
- ☐ Requires too much teacher help.
- ☐ Too difficult for my students.
- ☐ Too dangerous – safety problems (specify).
- ☐ Too difficult to build.
- ☐ Revisions and modifications needed as indicated on form or attached unit.
- ☐ Too difficult or expensive to buy.

TEST QUESTIONS

- ☐ Acceptable.
- ☐ Not related to objectives.
- ☐ Too difficult for my students.
- ☐ Takes too long.
- ☐ Reading and words too difficult.
- ☐ Students dislike them.
- ☐ Revisions needed as indicated on attached unit.

PERFORMANCE ACTIVITY

- ☐ Acceptable.
- ☐ Activities not related to the objective, or they are irrelevant to overall development. (Point out on attached unit.)
- ☐ Objective needs additional activities as indicated on the form or on attached unit in order to prepare students adequately for the achievement of the objective.
- ☐ The activities are not in the correct sequence. Please revise as on the form or attached unit.
- ☐ Activities require extensive teacher help.
- ☐ Too much reading required.
- ☐ Additional activities are needed. (What activities?)
- ☐ Activities are too complicated for students.
- ☐ Activities take too long to complete.
- ☐ There are too many activities.
- ☐ Activities create shop problems. (What problems?)
- ☐ Revisions needed as indicated on attached unit.

STOP_____ Instructor Check
Initials

- ☐ Acceptable.
- ☐ Too frequent.
- ☐ More needed as indicated on attached unit.
- ☐ Please revise as indicated on attached unit.

CRITERION CHECKLIST

- ☐ Acceptable.
- ☐ Needs to be written in simpler language. (Indicate vocabulary or structure causing difficulty.)
- ☐ Does not appear to be related to the objectives.
- ☐ Format is confusing – needed teacher explanation.
- ☐ Insufficient information is given in order to know what is intended. (Specify.)
- ☐ Too much reading – too much detail.
- ☐ Requires too much time for the student.
- ☐ Requires too much time of the instructor.
- ☐ Please revise as indicated on the form or on the attached copy of the checklist.

PROJECT ABLE

STUDENT REACTION FORM

(PERFORMANCE EVALUATION SET AND LEARNER ACTIVITY GUIDE)

INSTRUCTIONS

Most items will require only a check mark (√) to give your answer. Please answer all items ACCURATELY.

Thanks for your help on this important study.

Vocational area _____ School _____ Date _____

Unit Number — Learning Unit No. _____ / Performance Evaluation No. _____

NOTE: YOU MAY CHECK MORE THAN ONE ANSWER.

---

1. Which statements describe the activities in this unit?
   - ☐ Interesting
   - ☐ Easy
   - ☐ Hard
   - ☐ Fun
   - ☐ Too much reading.
   - ☐ Useful
   - ☐ New material (Things you did not know).
   - ☐ Too much theory.

2. Describe the help you received on the unit.
   - ☐ I received no help. (Go to number 4.)
   - ☐ I didn't need help.
   - ☐ I received help from another student.
   - ☐ I received help from my instructor.
   - ☐ I received help from others.

   (Go to No. 3.)

3. If you needed help – why?
   - ☐ I was unable to understand what I was to do.
   - ☐ The words were too difficult.
   - ☐ It did not cover what was to be learned.
   - ☐ The objectives did not explain what was to be learned.
   - ☐ The activities were too difficult.
   - ☐ I needed help to locate materials, or tools, or aids, etc.

4. Did you have problems?
   - ☐ following directions?
   - ☐ understanding charts or graphs?
   - ☐ getting supplies or equipment?
   - ☐ using the audio-visuals?
   - ☐ using the training aids?
   - ☐ working on your own?

5. How might we change or improve the unit?

VOCATIONAL EDUCATION IN UNITED STATES

An AMERICAN INSTITUTE FOR RESEARCH Survey

INSTRUCTIONS

Most items on this questionnaire require only a check mark (√) to give your answer. Please answer all items ACCURATELY. The information will be STRICTLY CONFIDENTIAL.

Please return the questionnaire in the postage-paid, pre-addressed envelope provided.

THANKS FOR YOUR HELP ON THIS IMPORTANT STUDY

1. Your Name _____ 2. Your High School's Name _____

3. Year Graduated from High School: Mo _____ Yr _____ 4. High School Course Studied _____

5. Below are ways students are influenced to select a vocational course. Mark those that influenced you to choose the course you took in high school. CIRCLE THE NUMBER OF THE MOST IMPORTANT INFLUENCE

- ☐ 1. Books and magazines
- ☐ 2. Parents
- ☐ 3. Brother or sister
- ☐ 4. Relative
- ☐ 5. Neighbor (adult)
- ☐ 6. Friend your age
- ☐ 7. Job opportunities
- ☐ 8. Part-time job
- ☐ 9. School teacher
- ☐ 10. School counselor
- ☐ 11. School principal
- ☐ 12. Course graduate
- ☐ 13. Other, specify below. _____

6. Did your school offer the vocational course you really wanted to take?

- ☐ 1. Yes → If Yes, did you get to take it? → ☐ 6-1.1 Yes, I took the course I wanted.
- ☐ 2. No → If No, what course did you want to take that was not offered? _____
  - ☐ 6-1.2 No, I could not take the course I wanted because _____

7. How long after leaving high school did it take you to get your first full-time job? _____ months

8. How did you get your first full-time job after leaving high school? (Mark all that apply.)

- ☐ 1. By answering a want-ad
- ☐ 2. Private employment agency
- ☐ 3. State employment agency
- ☐ 4. Help of school teacher
- ☐ 5. Help of school counselor
- ☐ 6. Help of school principal
- ☐ 7. Help of school placement service
- ☐ 8. Help of friend or relative
- ☐ 9. Through school coop program
- ☐ 10. Other than above

If you never had a full-time job, mark here – ☐ SKIP TO ITEM 12

9. Was your first full-time job in the trade or field for which you were trained in high school?

If Yes: Indicate how well your vocational course prepared you for your first full-time job.

- ☐ 1. Exceptionally well-prepared; training covered all essentials required by first job
- ☐ 2. Well-prepared on the whole, but there were some important gaps in training
- ☐ 3. Poorly prepared; much that I needed to know was not covered in vocational course

If No: Mark reason below.

- ☐ 1. No job available in area of training
- ☐ 2. Learned new job by continuing school
- ☐ 3. Learned new job in military service
- ☐ 4. Decided I liked other work better
- ☐ 5. Not accepted as apprentice in trade
- ☐ 6. Other (specify) _____

10. How did the: (1) tools and equipment, (2) work methods, and (3) work materials used on your first full-time job compare with those used in your vocational shop courses? If a sub-item is not applicable, mark the box NA to the right. Otherwise, mark your answer.

TOOLS & EQUIPMENT ☐ NA	WORK METHODS ☐ NA	WORK MATERIALS ☐ NA
☐ 1. Identical or almost so	☐ 1. Identical or almost so	☐ 1. Identical or almost so
☐ 2. Little real difference	☐ 2. Little real difference	☐ 2. Little real difference
☐ 3. Very much different	☐ 3. Very much different	☐ 3. Very much different

If you marked 3 above (Very much different), did it take long to learn what was new?

☐ 1. Only about a few weeks	☐ 1. Only about a few weeks	☐ 1. Only about a few weeks
☐ 2. Less than three months	☐ 2. Less than three months	☐ 2. Less than three months
☐ 3. About three-six months	☐ 3. About three-six months	☐ 3. About three-six months
☐ 4. About six months-a year	☐ 4. About six months-a year	☐ 4. About six months-a year
☐ 5. More than a year	☐ 5. More than a year	☐ 5. More than a year

11.

For each of the skill areas listed below, answer the four questions at the right. Indicate your answers by marking appropriate boxes.	1 How important is this skill for your present job?				2 How much of this skill was learned in high school?				3 Where did you learn the most about this skill?					4 Do you feel the need for more instruction or training in this area? (Mark either Yes or No)
	1 Of No Real Importance	2 Slightly Important	3 Considerably Important	4 Of Critical Importance	1 Almost Nothing	2 Some, But Not Much	3 Large Amount	4 Almost All	1 High School Coop Program	2 High School Shop or Class	3 Apprentice Program	4 On Regular Job	5 Elsewhere	
1 MANUAL JOB SKILLS. Refers to skill at using or operating tools, equipment, materials, machines, etc., in your work.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No
2 JOB PRACTICAL KNOWLEDGE. Refers to practical everyday knowledge of work processes, methods, procedures, etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No
3 JOB THEORETICAL KNOWLEDGE. Refers to knowledge of basic principles and concepts underlying the practical trade work.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No
4 MATHEMATICAL SKILLS. Refers to ability to use arithmetic or higher mathematics to solve work problems.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No
5 COMMUNICATION SKILLS. Refers to skill at speaking, writing, drafting, sketching, etc., to communicate ideas.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No
6 READING AND INTERPRETIVE SKILLS. Refers to skill at reading printed matter, blueprints, tables, diagrams, etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No
7 CLERICAL SKILLS. Refers to skill at keeping records, making out reports, and other types of routine paper work.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No
8 PERSONAL RELATIONS SKILLS. Refers to skill at dealing with people, such as customers, co-workers, other trades, etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No
9 SUPERVISORY SKILLS. Refers to skill at supervising others, e.g., instructing, directing, evaluating, planning, organizing, etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No
10 OTHER SKILLS. Add what you feel applies to your job and is not covered by the above. _____	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	1. Yes 2. No

12. Please give your frank opinion about the following items concerning your high school education. (Mark one answer for each item.)

	ON THE WHOLE: 1. Poor	2. Satisfactory	3. Good	4. Excellent
1. Quality of instruction from shop instructors	☐	☐	☐	☐
2. Quality of instruction from academic teachers	☐	☐	☐	☐
3. Condition of shop facilities and equipment	☐	☐	☐	☐
4. General physical condition of school	☐	☐	☐	☐
5. Vocational counseling given to students	☐	☐	☐	☐
6. Help given students to find jobs	☐	☐	☐	☐
7. Opportunity for extra-curricular activities	☐	☐	☐	☐
8. Interest shown by teachers in student problems	☐	☐	☐	☐
9. Reputation of the school in community	☐	☐	☐	☐
10. Strictness of school in maintaining discipline	☐	☐	☐	☐

13. Please mark all kinds of education obtained since leaving high school, and provide the information requested about each. Put an asterisk (*) behind those you are presently attending. If you have not had any additional education since high school, mark here → ☐
Estimate your average hours per week over the total period attended. →

Mark Here	Type of Education	Major Subject or Course(s)	Dates Attended (Give Month & Year)	Leave Blank	Avg. Hrs. Per Wk. in School	Leave Blank
☐ 0	Two-year or junior college		Fr: To:			
☐ 1	Four-year college/university		Fr: To:			
☐ 2	Post-college graduate school		Fr: To:			
☐ 3	Private trade/technical school		Fr: To:			
☐ 4	Public trade/technical school		Fr: To:			
☐ 5	Business-commercial school		Fr: To:			
☐ 6	Adult continuation school		Fr: To:			
☐ 7	Military specialties school		Fr: To:			
☐ 8	Company course or school		Fr: To:			
☐ 9	Correspondence courses		Fr: To:			
☐ 10	Other (specify)		Fr: To:			

14. JOB HISTORY SINCE HIGH SCHOOL. Start with your **FIRST** job after leaving high school. List **ALL** full-time jobs. List **ONLY** part-time jobs held six months or more, except if your present job is a part-time job. List the jobs in the order that you held them, up to and including your **PRESENT JOB.** (If self-employed, give **NET EARNINGS**, not **GROSS INCOME** of your business.)

	1	2	3	4	5	6	7	8	9	10
EXAMPLE	Starting Date Mo. 7 Yr. 53 Leaving Date Mo. 10 Yr. 54	What type of work did you do? MACHINIST APPRENTICE	Did job require move to new city? 1. ☐ No 2. ☒ Yes How many miles? 20	Full Time 1. ☐ Yes 2. ☒ No If part-time, how many hours per week, on average? 15	Self Employed 1. ☐ Yes 2. ☒ No	Was the work related to vocational course you took? 1. ☒ Same trade studied. 2. ☐ Highly related 3. ☐ Slightly related 4. ☐ Completely unrelated	On the whole, were you satisfied with the work? 1. ☐ Very satisfied 2. ☒ Satisfied 3. ☐ Dissatisfied 4. ☐ Very dissatisfied	Earnings at Starting Give $ per hr., wk., or mo. $ 1.25 per HR Earnings at Leaving Give $ per hr., wk., or mo. $ 1.50 per HR	Reason For Leaving Job NO WORK	Were you unemployed after leaving job? 1. ☒ Yes 2. ☐ No If Yes, how long? 5 MONTHS
1st JOB	Starting Date Mo. ___ Yr. ___ Leaving Date Mo. ___ Yr. ___	What type of work did you do?	Did job require move to new city? 1. ☐ No 2. ☐ Yes How many miles	Full Time 1. ☐ Yes 2. ☐ No If part-time, how many hours per week, on average?	Self Employed 1. ☐ Yes 2. ☐ No	Was the work related to vocational course you took? 1. ☐ Same trade studied 2. ☐ Highly related 3. ☐ Slightly related 4. ☐ Completely unrelated	On the whole, were you satisfied with the work? 1. ☐ Very satisfied 2. ☐ Satisfied 3. ☐ Dissatisfied 4. ☐ Very dissatisfied	Earnings at Starting Give $ per hr., wk., or mo. $ _____ per _____ Earnings at Leaving Give $ per hr., wk., or mo. $ _____ per _____	Reason For Leaving Job	Were you unemployed after leaving job? 1. ☐ Yes 2. ☐ No If Yes, how long?
2nd JOB	Starting Date Mo. ___ Yr. ___ Leaving Date Mo. ___ Yr. ___	What type of work did you do?	Did job require move to new city? 1. ☐ No 2. ☐ Yes How many miles?	Full Time 1. ☐ Yes 2. ☐ No If part-time, how many hours per week, on average?	Self Employed 1. ☐ Yes 2. ☐ No	Was the work related to vocational course you took? 1. ☐ Same trade studied 2. ☐ Highly related 3. ☐ Slightly related 4. ☐ Completely unrelated	On the whole, were you satisfied with the work? 1. ☐ Very satisfied 2. ☐ Satisfied 3. ☐ Dissatisfied 4. ☐ Very Dissatisfied	Earnings at Starting Give $ per hr., wk., or mo. $ _____ per _____ Earnings at Leaving Give $ per hr., wk., or mo. $ _____ per _____	Reason For Leaving Job	Were you unemployed after leaving job? 1. ☐ Yes 2. ☐ No If Yes, how long?
3rd JOB	Starting Date Mo. ___ Yr. ___ Leaving Date Mo. ___ Yr. ___	What type of work did you do?	Did job require move to new city? 1. ☐ No 2. ☐ Yes How many miles?	Full Time 1. ☐ Yes 2. ☐ No If part-time, how many hours per week, on average?	Self Employed 1. ☐ Yes 2. ☐ No	Was the work related to vocational course you took? 1. ☐ Same trade studied 2. ☐ Highly related 3. ☐ Slightly related 4. ☐ Completely unrelated	On the whole, were you satisfied with the work? 1. ☐ Very satisfied 2. ☐ Satisfied 3. ☐ Dissatisfied 4. ☐ Very dissatisfied	Earnings at Starting Give $ per hr., wk., or mo. $ _____ per _____ Earnings at Leaving Give $ per hr., wk., or mo. $ _____ per _____	Reason For Leaving Job	Were you unemployed after leaving job? 1. ☐ Yes 2. ☐ No If Yes, how long?
4th JOB	Starting Date Mo. ___ Yr. ___ Leaving Date Mo. ___ Yr. ___	What type of work did you do?	Did job require move to new city? 1. ☐ No 2. ☐ Yes How many miles?	Full Time 1. ☐ Yes 2. ☐ No If part-time, how many hours per week, on average?	Self Employed 1. ☐ Yes 2. ☐ No	Was the work related to vocational course you took? 1. ☐ Same trade studied 2. ☐ Highly related 3. ☐ Slightly related 4. ☐ Completely unrelated	On the whole, were you satisfied with the work? 1. ☐ Very satisfied 2. ☐ Satisfied 3. ☐ Dissatisfied 4. ☐ Very dissatisfied	Earnings at Starting Give $ per hr., wk., or mo. $ _____ per _____ Earnings at Leaving Give $ per hr., wk., or mo. $ _____ per _____	Reason For Leaving Job	Were you unemployed after leaving job? 1. ☐ Yes 2. ☐ No If Yes, how long?
5th JOB	Starting Date Mo. ___ Yr. ___ Leaving Date Mo. ___ Yr. ___	What type of work did you do?	Did job require move to new city? 1. ☐ No 2. ☐ Yes How many miles?	Full Time 1. ☐ Yes 2. ☐ No If part-time, how many hours per week, on average?	Self Employed 1. ☐ Yes 2. ☐ No	Was the work related to vocational course you took? 1. ☐ Same trade studied 2. ☐ Highly related 3. ☐ Slightly related 4. ☐ Completely unrelated	On the whole, were you satisfied with the work? 1. ☐ Very satisfied 2. ☐ Satisfied 3. ☐ Dissatisfied 4. ☐ Very dissatisfied	Earnings at Starting Give $ per hr., wk., or mo. $ _____ per _____ Earnings at Leaving Give $ per hr., wk., or mo. $ _____ per _____	Reason For Leaving Job	Were you unemployed after leaving job? 1. ☐ Yes 2. ☐ No If Yes, how long?
6th JOB	Starting Date Mo. ___ Yr. ___ Leaving Date Mo. ___ Yr. ___	What type of work did you do?	Did job require move to new city? 1. ☐ No 2. ☐ Yes How many miles?	Full Time 1. ☐ Yes 2. ☐ No If part-time, how many hours per week, on average	Self Employed 1. ☐ Yes 2. ☐ No	Was the work related to vocational course you took? 1. ☐ Same trade studied 2. ☐ Highly related 3. ☐ Slightly unrelated 4. ☐ Completely unrelated	On the whole, were you satisfied with the work? 1. ☐ Very satisfied 2. ☐ Satisfied 3. ☐ Dissatisfied 4. ☐ Very dissatisfied	Earnings at Starting Give $ per hr., wk., or mo. $ _____ per _____ Earnings at Leaving Give $ per hr., wk., or mo. $ _____ per _____	Reason For Leaving Job	Were you unemployed after leaving job? 1. ☐ Yes 2. ☐ No If Yes, how long?

ATTENTION: If you held more than six full and part-time jobs, please continue on the page enclosed. Be sure to include your present full-time and/or part-time job. Thank you.

15. YOUR PRESENT JOB. (Please give this additional information.)

1. Present Earnings? Give $ per hour, week, or month. $ _____ per _____
2. Your Employer: _____
   Street Address: _____
   City-State: _____

16. Did you have any military service? ☐ 1. No ☐ 2. Yes → How many months?_____ Nature of work? _____

17. Were you unemployed for reason of health or hospitalization? ☐ 1. No ☐ 2. Yes → How many months? _____

Part of our study concerns the interests, activities, and associations of high school graduates. We hope you will not regard this information too personal to give us. All is confidential. Please weigh your answers carefully.

18. How frequently do you talk about the following topics when you get together socially with others?

	ALMOST NEVER 1	INFREQUENTLY 2	FREQUENTLY 3	ALMOST ALWAYS 4
1. Your work	☐	☐	☐	☐
2. Religion	☐	☐	☐	☐
3. Politics	☐	☐	☐	☐
4. Business conditions	☐	☐	☐	☐
5. World affairs	☐	☐	☐	☐
6. National affairs	☐	☐	☐	☐
7. State affairs	☐	☐	☐	☐
8. Community problems	☐	☐	☐	☐
9. Your hobbies	☐	☐	☐	☐
10. Sports and athletics	☐	☐	☐	☐
11. Music, art, literature, etc.	☐	☐	☐	☐
12. Government matters	☐	☐	☐	☐
13. Labor union matters	☐	☐	☐	☐
14. Your family	☐	☐	☐	☐
15. Other (specify) _____	☐	☐	☐	☐

19. How frequently do you engage in the following types of leisure-time activities?

	ALMOST NEVER 1	INFREQUENTLY 2	FREQUENTLY 3	ALMOST DAILY 4
1. Reading newspapers	☐	☐	☐	☐
2. Engaging in craft hobbies (model building, jewelry making, etc.)	☐	☐	☐	☐
3. Reading professional or trade books and periodicals	☐	☐	☐	☐
4. Attending athletic events as a spectator	☐	☐	☐	☐
5. Attending plays, concerts, ballets, etc.	☐	☐	☐	☐
6. Watching television programs	☐	☐	☐	☐
7. Gardening (raising flowers, fruit trees, vegetables, etc.)	☐	☐	☐	☐
8. Reading general magazines (LIFE, LOOK, READERS' DIGEST, etc.)	☐	☐	☐	☐
9. Working at home shop activities (woodworking, metalworking, etc.)	☐	☐	☐	☐
10. Attending educational courses for self-improvement	☐	☐	☐	☐
11. Engaging in team sports (softball, football, etc.)	☐	☐	☐	☐
12. Engaging in performing arts (acting, singing, instruments, etc.)	☐	☐	☐	☐
13. Visiting or entertaining friends	☐	☐	☐	☐
14. Reading non-fiction books (biography, history, travel, etc.)	☐	☐	☐	☐
15. Collecting stamps, coins, rocks, or other items	☐	☐	☐	☐
16. Attending educational lectures and discussion groups	☐	☐	☐	☐
17. Engaging in individual sports (swimming, hunting, fishing, etc.)	☐	☐	☐	☐
18. Listening to music at home for pleasure	☐	☐	☐	☐
19. Going to the movies	☐	☐	☐	☐
20. Other (please write in) _____	☐	☐	☐	☐

20. Below is a list of different type organizations and associations. Mark the space which best describes your membership status in each type of organization, association, or club.

	NOT A MEMBER 1	INACTIVE MEMBER 2	ACTIVE MEMBER 3	PRESENTLY AN OFFICER 4
1. A church or a religious organization	☐	☐	☐	☐
2. Political organization	☐	☐	☐	☐
3. Service organization (Rotary, Lions, Kiwanis, etc.)	☐	☐	☐	☐
4. Sports club or athletic organization	☐	☐	☐	☐
5. Labor union	☐	☐	☐	☐
6. Fraternal organization (Elks, Masons, K. of C., etc.)	☐	☐	☐	☐
7. Veterans' organization	☐	☐	☐	☐
8. Business or trade association	☐	☐	☐	☐
9. Music or other cultural association	☐	☐	☐	☐
10. Local civic association	☐	☐	☐	☐
11. Youth organization (Scouts, Y.M.C.A., etc.)	☐	☐	☐	☐
12. Professional association	☐	☐	☐	☐
13. Other (specify) _____	☐	☐	☐	☐

21. Marital Status
☐ 1. Single
☐ 2. Married
☐ 3. Other

22. Race
☐ 1. White
☐ 2. Negro
☐ 3. Other

23. Religion
☐ 1. Protestant
☐ 2. Catholic
☐ 3. Jewish
☐ 4. Other
☐ 5. None

24. Do you have any disability or health condition that limits your employability?
☐ 1. Yes ☐ 2. No

THANK YOU FOR YOUR TIME AND EFFORT

PROJECT ABLE
VOCATIONAL GRADUATE FOLLOW–UP

INSTRUCTIONS

Most items on this questionnaire require only a check mark (√) to give your answer. Please answer all items ACCURATELY. The information will be STRICTLY CONFIDENTIAL.

Please return the questionnaire in the postage-paid, pre-addressed envelope provided.

THANKS FOR YOUR HELP ON THIS IMPORTANT STUDY

Company or firm _____ Supervisors of employee _____

Employee's Name _____ Your Name _____ Date _____

Please evaluate the person in question in terms of the characteristics indicated below by checking the appropriate spaces.

For each of the skill areas listed below, answer the four questions at the right. Indicate your answers by marking appropriate boxes.	1 How important is this skill for his present job				2 How would you evaluate him on this skill				3 How does he compare with others of about his age who had other training?				4 Does he need more instruction or training in this area? (Mark either Yes or No)
	1 Of no real importance	2 Slightly important	3 Considerably important	4 Of critical importance	1 Needs much improvement	2 Generally satisfactory	3 Generally above average	4 Outstanding	1 Have no one to fairly compare him with	2 Does not do as well as others doing same work	3 Does about as well as others doing same work	4 Does better than others doing same work	
1. **MANUAL JOB SKILLS.** Refer to skill at using or operating tools, equipment, materials, machines, etc., in your work.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No
2. **JOB PRACTICAL KNOWLEDGE.** Refers to practical everyday knowledge of work processes, methods, procedures, etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No
3. **JOB THEORETICAL KNOWLEDGE.** Refers to knowledge of basic principles and concepts underlying the practical trade work.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No
4. **MATHEMATICAL SKILLS.** Refers to ability to use arithmetic or higher mathematics to solve work problems.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No
5. **COMMUNICATION SKILLS.** Refers to skill at speaking, writing drafting, sketching, etc., to communicate ideas.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No
6. **READING AND INTERPRETIVE SKILLS.** Refers to skill at reading printed matter, blueprints, tables, diagrams, etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No
7. **CLERICAL SKILLS.** Refers to skill at keeping records, making out reports, and other types of routine paper work.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No
8. **PERSONAL RELATIONS SKILLS.** Refers to skill at dealing with people, such as customers, co-workers, other tradesmen, etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No
9. **SUPERVISORY SKILLS.** Refers to skill at supervising others, e.g., instructing, directing, evaluating, planning, organizing etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No
10. **ATTITUDE TOWARD WORK.** Refers to such behavior as absenteeism, rule violation, concern for quality work, cooperation, etc.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐ 1. Yes ☐ 2. No

APPENDIX H

Chapter 1 - Percentage

PROJECT SHEET #105

Business Math
Course Title

804-158
Course Number

Objectives: Upon the completion of this project, you will be able to interchange fractional and decimal equivalents to simplify arithmetic.

Learning Activities for Handout Sheet #6:

A. Read the Section on Fractional and Decimal Equivalents.

B. Work through Example 12.

C. Work out Exercise Sheet #6.

D. Go to your Instructor for Quiz # 15

Chapter 1 - Percentage

HANDOUT SHEET #6

Unit III - Fractional and Decimal Equivalents

The following table gives the decimal equivalents of some common fractions.

1/8 = .125 or .12 1/2	1/ 5 = .2
1/4 = .25	2/ 5 = .4
3/8 = .375 or 37 1/2	3/ 5 = .6
1/2 = .5	4/ 5 = .8
5/8 = .625 or .62 1/2	1/ 6 = .16 2/3
3/4 = .75	1/12 = .08 1/3
7/8 = .875 or .87 1/2	1/16 = .06 1/4
1/3 = .33 1/3	
2/3 = .66 2/3	

These can be used to simplify arithmetic when multiplying or dividing.

Example 12:

Find 33 1/3% of $3.00

Solution

33 1/3% = .33 1/3

From the table, .33 1/3 = 1/3

Then: 1/3 X $3.00 = $1.00

Chapter 1 - Percentage

EXERCISE SHEET #6

Work the following problems using the table of fractional and decimal equivalents.

1. 28 X 25% =

2. 160 X 0.625 =

3. 222 ÷ 0.75 =

4. 210 X 0.33 1/3 =

5. 360 X 16 2/3% =

6. $48 X 3/5 =

7. 360 X 66 2/3% =

8. 880 X .875 =

Chapter 1 - Percentage

PROJECT SHEET #100

Business Math
Course Title

804-158
Course Number

Objectives: Upon the completion of this project, you will be able to convert percentages to decimals and percents to fractions.

Learning Activities for Handout Sheet #1:

A. Read the Introduction to Percentages.

B. Read the Section on Rounding Off and understand the examples.

C. Read the Section on Converting Percents to Decimals.

D. Work through Examples 1, 2 and 3.

E. Work out the first half of Exercise Sheet #1 and check your answers

F. Read the Section on Converting Percents to Fractions.

G. Work through Examples 4 and 5.

H. Finish Exercise Sheet #1 and check your answers.

Chapter 1 - Percentage

HANDOUT SHEET #1

INTRODUCTION

Percentage is used to express relationships in terms of a common unit of measure. Percent means hundredths. In other words, a quantity is divided into 100 equal parts, each part being one percent. For example, 100 pennies = 1 dollar. Therefore, each penny is one percent (written 1%) of a dollar.

Section A. Rounding Off

In Business Math, to round off follow the following rules:

1. Go to the position you are to round off to.
2. If the first digit to the right is 5 or more, add one (1) to the position you are to round off to.
3. If the first digit is 4 or less, drop these digits.

Examples:

A. $1.6248 = $1.62. Since digit to the right is 4, drop the 48.

B. $1.315 = $1.32. Since digit to the right is 5, add one cent.

C. $1.2578 = $1.26. Since digit to the right is 7, add one cent.

Round off to the nearest thousandth.

D. 1.007524 = 1.008. Since digit to the right is 5, add one thousandth.

Round off to the nearest tenth.

E. 1.2486 = $1.2. Since digit to the right is 4, drop 486.

Chapter 1 - Percentage

HANDOUT SHEET #1

Section B. Converting Percents to Decimals

Since 1% = 1/100 = .01 and .01 = 1%, the % sign takes the place of two decimal places which denote hundredths. Then, in order to convert a percent to a decimal:

1. Remove the percent sign.
2. Locate the decimal point.
3. Move the decimal point two places to the left.

Example 1:

Convert 80% to a decimal.

Solution:

80% = 80.% = .80

Example 2:

Convert 5% to a decimal.

Solution:

5% = 5.% = .05

Example 3:

Convert 1/5% to a decimal.

Solution:

1/5% = .2% = .002

Chapter 1 - Percentage

HANDOUT SHEET #1

Section C. Converting Percents to Fractions

Since percents are fractions with the denominator of 100, to convert a percent to a fraction:

1. Remove the percent sign (%).
2. Make a fraction with the percent as the numerator and 100 as the denominator.
3. Reduce the fraction to lowest terms.

Example 4:

Convert 85% to a fraction.

Solution:

$85\% = 85/100 = 17/20$

Percents may also be used to express values greater than one. In such cases, a percent may be converted to a mixed fraction.

Example 5:

Convert 140% to a fraction.

Solution:

$140\% = 140/100 = 1\ 40/100 = 1\ 2/5.$

Chapter 1 - Percentage

EXERCISE SHEET #1

Convert to decimals.

1. 76% =

2. 126% =

3. 10% =

4. .001% =

5. .0004% =

Convert the following percents to fractions.

1. 42% =

2. 125% =

3. 45% =

4. 5% =

5. 425% =

APPENDIX I

Graphic Arts

COLD TYPE PROCESSES
Course Number GR-011U

Learning Package Number 2

Instructor:	Kenneth Hird
Institution:	Kirkwood Community College
Course:	Cold Type Processes
Topic:	Introduction to Copy Preparation
Estimated Time:	LP: 11 hours Post-Test: 15 minutes

INTRODUCTION

A paste-up or mechanical is a combination of the type, drawings, hand lettering, illustrations, and all its other elements placed in position to be copied photographically and reproduced as a printed page or job. It is the completion of the final layout pasted up into a single unit ready for the copy camera.

The job is "pasted-up" either in actual size or in a logical multiple of the actual size. Actual size is always preferable. The job should be laid out with generous margins in order to provide adequate room for registration marks, instructions, etc. The outline size is first ruled with T-square and triangle, using a well-sharpened light blue pencil. The size should be exact; a thirty-secondth of an inch is a critical factor in mechanical art, especially where accurate registration is required.

The mechanical artist or paste-up artist is responsible for the execution of mechanical art. Such an artist should be a meticulous craftsman and should be familiar with production of printing.

OBJECTIVES

When you have successfully completed this learning package, you will be able to:

1. Identify the basic paste-makeup tools and their uses.
2. Identify the major layout guidelines used for paste-makeup.
3. Perform preparatory and basic paste-makeup operations using a rough layout.

(Turn to Page 2)

Student's Name_____ Course Number GR-011U
(Last) (First)

COLD TYPE PROCESSES
Introduction to Copy Preparation

SOURCE	ACTIVITY
1. Learning Package 2	1. Take Pre-Test, p. 3
2. Modern Graphic Arts Paste-Up, Silver	1. Read pp. 1-7
3. Comprehensive Graphic Arts, Dennis and Jenkins	1. Read Units 41-42, pp. 111-116 and Unit 44, pp. 124-126
4. A/V-GA:1 "Line Copy for the Process Camera"	1. View audio-visuals
5. Learning Package 2	1. Read "Layout and Guidelines for Paste-Up", p. 5
6. Modern Graphic Arts Paste-Up, Silver	1. Read p. 33 2. Do Project 4 3. Compare your work with the sample and the Project Evaluation Check List, p. 8. Ask your instructor for a final OK on the board.
7. Learning Package 2	1. Answer Self-Study questions, p. 7
	You may test out of this Learning Package by completing the following: 1. Turn Project 4 and Learning Package 2 in for instructor evaluation. 2. Take Post-Test COLD-I-2

PRE-TEST

Complete the following questions by writing your response in the blank provided.

1. How many points equal one pica?_____

2. How many points equal one inch?_____

3. What are the dimensions of an area 2"x3" expressed in picas?_____x_____

4. 1 point equals_____of an inch.

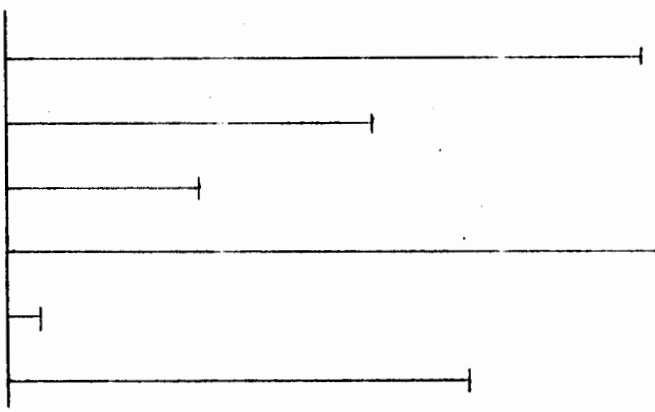
5. 6 picas equal_____inch.

6. One nonpareil equals_____points.

7. ½ pica equals_____points.

8. _____agates equal one inch.

Measure the following lines to the nearest half pica and write your response in the space provided at the right.



9. 9 (_____)

10. 10 (_____)

11. 11 (_____)

12. 12 (_____)

13. 13 (_____)

14. 14 (_____)

TURN PAGE FOR ANSWERS.

ANSWERS TO PRE-TEST

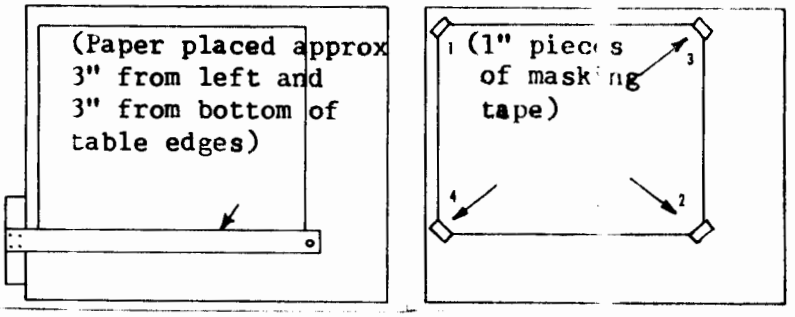
1. 12
2. 72
3. 12x18
4. 1/72
5. 1
6. 6
7. 6
8. 14
9. 20
10. $11\frac{1}{2}$
11. 6
12. $26\frac{1}{2}$
13. 1
14. $14\frac{1}{2}$

If you miss <u>any</u> of the Pre-Test questions, ask your instructor for additional help. OTHERWISE CONTINUE THROUGH THE PACKAGE EVEN THOUGH YOU MAY HAVE PASSED THE PRE-TEST.

LAYOUT AND GUIDELINES FOR PASTE-UP

The paste-up artist should have an understanding of basic techniques which will produce the desired results with the greatest ease and least chance of error.

The first step in preparing a paste-up is to fasten the paste-up paper or board squarely and smoothly to the table work surface. Place the T-square over the paper, holding it firmly against the left-hand edge of the table and line up the lower edge of the paper so it is parallel with the upper edge of the T-square. Tape the upper left-hand corner of the paper to the table. Then draw the paper smoothly and tightly to the lower right-hand corner, and tape it there. Now smooth out the paper from the center to the upper right-hand corner and fasten with tape. Smooth the paper from the center to the lower left-hand corner and tape that corner. (See illustration below.) Remember to use the same T-square for all future work on the same paste-up sheet.



The major guidelines used in paste-up work include:

Printed Page Size. Guidelines should be drawn in light blue on the paste-up which accurately outline the size of the printed page. Outlining helps everyone involved in evaluating the spatial relationships of the job. They also guide the pressman in positioning the image properly on the sheet. These lines must show the relation between page size and image size exactly. Page size should not be confused with sheet size. The larger offset presses can print several pages on each sheet that is run through the press.

Center Lines. These lines are drawn in light blue pencil horizontally and vertically through the center of the image area. These lines help in centering paste-up composition within the image area and aid in positioning copy on the camera copyboard.

Image Area Lines. This is a set of broken guidelines, usually drawn within the page size area, that indicates the maximum size of the image. They are drawn outside the paper area if the image is to extend to the edge of the trimmed paper. This is called a "bleed." Image area lines are drawn in light blue.

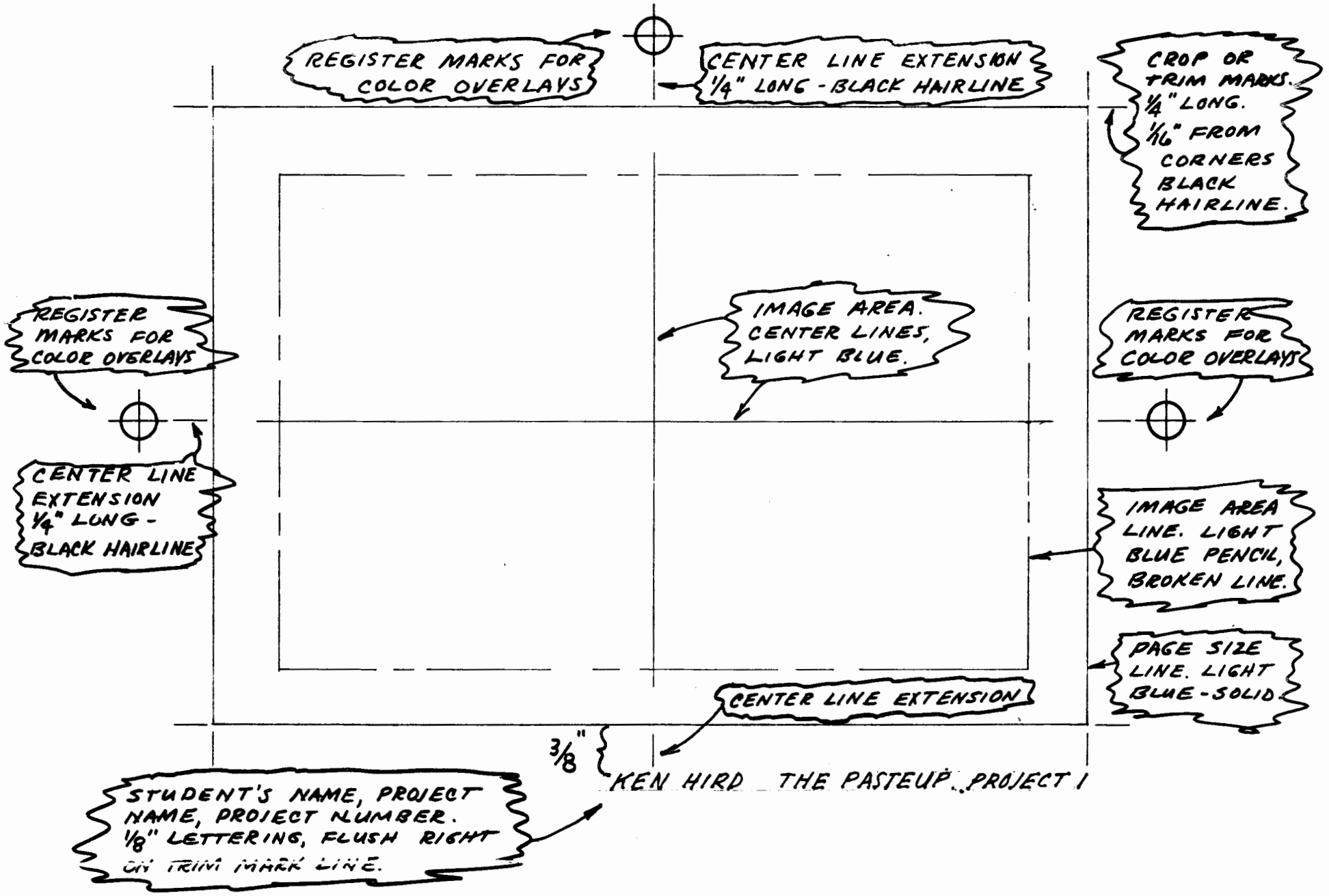
Corner Marks/Trim Size. This is the area marked to show the final size of the job after it is trimmed. Thin black ink lines (¼" long) at right angles in the corners of the paste-up are used, in addition to the blue lines, to indicate the finished trim size.

Register Marks. When two or more colors are used in a piece of printing, each color must be printed from a separate plate. The proper alignment or positioning of each color is called register. The paste-up will contain the base color arrangement on the board and additional colors will be arranged on overlays of acetate. All overlays must be in register with the base color. Register marks should be positioned on the precise centers of the item or image. Use only three: one at the top and one at each side (centered up and down of course). The simplest register mark is a cross (+). Other types are illustrated below.

For film negatives.

For film positives.

LAYOUT AND GUIDELINES FOR PASTEUP – MODEL



SELF-STUDY QUESTIONS

1. What is the primary function of a paste-up?

2. List three adhesives used to attach paste-up elements to the board.

3. What color is used to draw guidelines on a paste-up? Why?

4. What color is preferred for paste-up images? Why?

5. What color is preferred for the paste-up board upon which images are affixed?

6. Draw an example of the following guidelines and symbols which appear on a paste-up and specify whether it is drawn in ink or pencil.

   (a) Corner mark/trim size.

   (b) Printed page size.

   (c) Image area.

   (d) Center line extensions.

   (e) Simple register mark.

PROJECT EVALUATION CHECK LIST

Project 4: The Point System

TO THE STUDENT

This checklist is designed to assist you in identifying the specific points upon which this project will be evaluated. Your instructor will indicate by use of a check mark (✓) those items requiring correction.

PASTE-UP PLANNING

_____ 9" x 12" paper area (blue pencil) solid line

_____ 8" x 10" image area (blue pencil) broken line

_____ Guidelines (blue pencil)

_____ Centerlines (blue pencil)

_____ ¼" centerline extensions (ink)

_____ ¼" corner marks (ink)

PASTE-UP PREPARATION

_____ Elements trimmed smoothly

_____ Elements trimmed to correct dimensions

_____ Elements positioned as shown on rough layout

_____ Alignment of elements

_____ Uniform application of adhesive

_____ Overall cleanliness of paste-up

_____ Protective covering attached

_____ Project identification, 1/8" lettering correctly positioned

_____ Proofreading

APPENDIX J

PITFALLS OF INDIVIDUALIZED INSTRUCTION[1]

by

Dr. Roland L. Roy

In the development of individualized learning units there are certain recurring pitfalls that need to be noted, for they are important factors often ignored in our anxiety to develop learning experiences for our students. They are important factors that need consideration if the development of individualized instruction is to be a successful venture.

The school system is the bridge to increased knowledge, the vehicle which helps students bridge the problems in the learning process. It is the duty of the educator to offer experiences that will

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Presented at the American Technical Education Association National Clinic, Milwaukee, Wisconsin, March 29, 1973.

[1]This paper is drawn from a copywrited text by the author. Individualized Instruction: A Systematic Approach to Career Development; Authored April 1, 1962, Re-written July 3, 1972.

Dr. Roy has worked in industry for eighteen years in numerous capacities. He is presently doing consulting work for industry as well as local, state, and national elementary, secondary, and post-secondary systems in developing curriculum materials and other supportive areas for career education. He is developing and conducting seminars and workshops in the development of learning performance objectives for learning activities packages for individualized self-pacing audio-video tutorial instruction (software and hardware). Has authored numerous papers on career education, individualized instruction, vocational and technical education, occupational education, education and the learning process and its application to student, community, and industrial needs. He has been a businessman, teacher, lecturer, a state supervisor, and assistant superintendent of a consolidated school system. He is presently employed as educational consultant at Central Piedmont Community College in Charlotte, North Carolina.

motivate students to learn, to gain dignity and to successfully compete with their fellow men. Individualized instruction is one tool whereby our clientele can ford the stream of problems in the learning process. It is one method, one approach, or a concept that has been useful in developing an individual's "human potential."

Career education has gained a new concept and is being stressed anew in educational institutions; it is imperative that the development of new learning theories conducive to this philosophy be developed which will articulate teaching techniques for reading, mathematics, and the occupational areas. The design and implementation of curricular material for learning activity packages also lays the basis for accountability that student learning has taken place.

A systematic design in developing individualized instruction lays out a blueprint for customized or personalized educational units which contain defined specific behavioral objectives. These objectives tell the educator as well as the student where he is heading, and how and when the stated destination of learning has been reached. This method of instruction further specifies what and why certain things have to be done by both parties in achieving the stated objectives. This form of learning involves the student in the coordination and development of both mental and physical skills.

PITFALLS

This then brings us to the pitfalls that inhibit the development and implementation of individualized instruction. This paper will by

no means present a remedy for existing pitfalls, but merely attempts to point them out for consideration, as they need to be weighed in planning for successful learning. Too many times the pitfalls are ignored in our haste to develop new methods. Because of today's technological and social demands, as so many times in the past, educators confront the necessity for an immediate change, so what happens? Without taking time out for much-needed positive planning, we grasp at straws, hit the panic button, and simply try to come up with "something." We don't always know what this "something" is, but we surely can get it down on paper. Why is it so difficult to implement planning and design a program that will mesh into a positive solution for career education, and why is it that with all of the expertise at hand we so often use a hit-and miss approach? Could it be that by developing just"something" or "anything" we can hide our inability to design a learning strategy that is conducive to student needs, interest, aspirations, attitudes, and economic pressures? Isn't it about time educators faced this situation with honesty, putting aside tradition and really sitting down to design a model that is applicable?

Once again the panic button has been activated in developing program needs for career education, and many are off on wild tangents of getting things moving with only limited amounts of planning, design, definition, and funds. Whatever definition and planning are being done should not be one-sided; if career education is to mean total

education to the student's needs so that he can be competitive in the world in which he lives, then finances as well as philosophy must be forthcoming from all areas of the academic world, as well as the occupational world. It means the activation of a total team effort toward one ultimate goal: to bring to the student a process of learning designed for his interests and capabilities. This team consists of administrators, guidance counselors, teachers, and the total community. Thus, an understanding of developmental procedure, application, and implementation must have a common meaning to all members of the team. The vocabulary used in communicating must have a common factor or definition, whereby career education, accountability, individualized instruction and the learning process must be clearly understood. With this in mind, let us pinpoint some of the often ignored or overlooked pitfalls.

1. In the development of individualized instruction and the implementation of in-service education, it is necessary to define what is meant by a measurable behavioral objective. Ambiguity reigns! Are we possibly using this word "objective" in the same context as "objective," meaning an educational goal or a <u>teacher's</u> objective that sets the pace for procedure? Or are we setting measurable objectives to reach a desired student goal? There is a major difference between the setting of an educational goal and a student's educational objective. The total vocabulary, such as "concept," "unit package," and others, should be de-

fined and uniformly understood.

2. Many of the learning activity packages that are now being developed are too large; the objectives are too broad and often not clearly defined. Packages should be kept at manageable size; the objective should be specific and carefully defined.

3. Many of the packages use the old program learning materials approach, whereas a customized development for students' needs with a combined mental and skill application might be more applicable.

4. Many programs now being developed tend to eliminate the teacher, whereas they ought to reinforce him and make it possible for him to give more individual attention to students. The teacher as one of the most important factors of individualized instruction should not be de-emphasized. This underscores the pitfall of the teacher who may develop the program and then become complacent about being involved and leave students to fend for themselves.

5. Administration is not always part of the development of individualized instruction:

   a. It does not become informed or knowledgeable about efforts in this direction.

   b. Administrators often do not participate in in-service programs that involve the development of packages; thus they do not truly understand them. In-service is usually scheduled for the teacher or someone else;

administrators often skip it.

c. Administrators often permit staff to develop packages but lend very little assistance either in budgeting or policy development. Sometimes they will make token adjustments which may make matters worse.

6. Guidance and counseling (student services personnel) are rarely involved in the development of these programs or participate in in-service programs. Yet information gleaned from their contact with students would be an important input.

7. It seems, as previously mentioned, that the initial development of individualized instruction is based on a hot-line emergency approach as opposed to the calculated and systematically designed approach to include necessary manpower, materials, equipment, and facilities.

8. Too many times the development is assigned to teachers without consideration of their other duties; i.e., nothing is reduced from their assigned workload. To make matters worse, most teachers are assigned the job of constructing learning packages prior to receiving proper in-service instruction in precedural techniques.

9. Experience shows that whenever individuals are participating in an in-service program, they often find it is not designed to allow participants to build on their past educational experiences, but must implement just the new ones without having sufficient knowledge of

what is being presented. The use of lesson plans, as well as syllabi, should be designed to dovetail in the development of student learning activities. What the teacher does is pertinent to what the student must achieve.

10. The development of packages too often is designed to meet the teacher's needs instead of student needs. The program or package is often designed as strictly a procedural unit that tells what the teacher is going to do. It is more a lesson plan than a behavioral unit for student learning.

11. The packages are too often developed with little or no consideration given to the type of audio or visual equipment necessary.

12. More often than not, facilities planning is not considered and special equipment needs are ignored.

13. Often the decisions for equipping laboratories or classrooms with hardware are not made through a team effort, but through the decision of outside "experts."

14. The development and redesign of learning units for individualized instruction necessitates input from two important factors:

a. Total community

b. Students

15. To follow Number 14 above, community and students should be made fully aware of the methodology involved in individualized instruction so that they thoroughly understand the process. This is why the success of such programs is dependent upon continued teacher involvement;

we must not divorce the human element from the technical component.

16. Experience indicates that many initial programs or workshops of in-service education present too large a quantity of educational material; too much is expected from one session, and the participants leave the workshop frustrated and confused.

17, Experience also shows that the majority of indivuduals participating in an in-service program have had little or no experience or background in behavioral science; yet it is often taken for granted that they understand the procedures and nomenclature for behavioral change. They are led to become involved in behavioral facets of the learning process with which they are quite unfamiliar, and confusion is the result. Initially, the participant should clearly understand the definition of measurable objectives. He should not try to cope with the psychology of learning until he has reached an advanced stage. He should become associated with different learning theories as his knowledge of behavioral science develops.

18, Another major pitfall is the absence of an evaluation process that will give specific information on the success or failure of the program. Without this we cannot know whether it is necessary to redesign learning units. Many times this evaluation procedure is not used for the workshop, nor is it made part of the learning unit by the teacher in developing materials.

19. More often than not, most learning units are designed for con-

tinous use instead of being open-ended and subject to frequent redesign to fit changing needs. This dilemma often exists with industrial or commercial products.

20. Very few educational organizations have a systematically designed plan of in-service education to keep their personnel updated for change in individualized instruction or any other area for that matter. It is left to chance, to voluntary involvement, or any random opportunity that may present itself. If some plan exists, it rarely involves all the personnel from the organization. It is strongly recommended that all organizations, state and local, design a systematic plan for in-service education. Those systems which have exerted that energy have found it rewarding.

21. Teachers of different disciplines (academic and vocational) seldom are afforded the opportunity to work together to articulate subject matter in the development of learning units, whether in an in-service workshop, or in developing learning activities.

22. A major pitfall: How often is the student allowed to participate in the development of a learning activity? Student input into the development of the program is essential for if he is not motivated to participate voluntarily, then learning truly has not taken place. For the program to be successful, the student must want to participate; it cannot be forced upon him, for he may reject this form of an educational approach as much as any other.

In addition to these pitfalls, there must be an awareness of simi-

lar conditions that need to be considered in the methodology. In any discussion of the pitfalls of individualized instruction, it is necessary to soundly question methodology of development and implementation. Even if assumed to be totally sound theory, the implementation of such a concept holds the potential for (a) loss or dilution of the theoretical advantages claimed; or (b) the emergence of hazardous by-products whose disadvantages might outweigh the merits otherwise attendant to the method. In the methodological context, the following pitfalls of individualized instruction are enumerated for consideration by those who become involved in this process. It is pertinent to the sense of this article, however, that these pitfalls are not suggested as insurmountable. Contrariwise, awareness of their presence should motivate both administration and instructor to design the safeguards necessary to preserve the educational gain which will properly be expected from well-directed efforts to individualized instruction.

The major pitfalls, from the methodological point of view, are:

1. The competitive motivation factor, which is often deemed necessary to stimulate the student, may be lost.

2. The "canned course" often loses it appeal. It may be viewed as a mere correspondence course causing students to lose interest.

3. The teacher may "teach his tests," and thus dilute himself into thinking he has developed a learning process.

4. The student may not assimilate his learning; thus the learning process would lose its vitality.

5. Interaction with other students is often an essential part of the learning process and may be lost if the individualized program is developed without consideration for interaction. For example, can you imagine a public speaking course being individualized? Any speech teacher knows the value of a live audience in the teaching of public speaking. Thus, the definition of "individualized" means the use of one person or one group of persons; and consideration must be given to the design of the program to "gear" the learning process to the "individuals involved."

6. In the absence of "deadlines" for completion of certain units or for whole courses, the student may procrastinate, leaving all of his work until the eleventh hour or not completing it at all. The enforced "pacing" of the traditional class procedure is lost and may not be replaced when the course is individualized without consideration for designing a method that will show the student how to conduct his pacing effectively or budget his time wisely.

7. Some educators state that the theory of individualized instruction assumes quality as the constant, recognizing quantity (learning rate) as the only variable. This view could encourage mediocrity by causing students to attempt to meet only the minimum acceptable goals of the course, thus precluding any effort by the

student to exceed the bare minimum requirements. It also leaves to chance what the student may decide to eliminate from his lesson, thus exposing the possibility that he will eliminate major factors that are necessary for him to know.

8. The methods of evaluation of learning outcomes (in many individualized instruction schemes) may become stereotyped, rigid, and impersonal.

While it is not within the scope of this article to prescribe safeguards against each of the aforementioned pitfalls, it is imperative that all who are involved in the development of program needs in the learning process consider each pitfall and assess its potential for nullifying the educational gains he expects for his student when he "individualizes" his course(s) without systematic planning and designing for an effective learning environment.

The above list some of the pitfalls that educators should consider in planning for individualized instruction; it should be realized that simply because the student has been taken through a procedural experience, it does not necessarily mean that he has learned anything from his experience. Thus, the advice to those who produce learning units is -- be aware of the pitfalls:

A. Your package must contain important elements for measurable change.

B. It must specify exactly what the student will have learned after he has taken this unit of learning.

C. It must specify what activity must be performed to provide proof that learning has taken place.

D. The measurable objective must be clearly stated as a student learning objective and not a teacher's objective.

E. Though it needs to be designed for the student to learn at his own pace, and he should be able to proceed without the teacher if necessary, it must never be designed to eliminate the combined effort of teacher and student.

F. Of utmost importance, the program must be designed to meet the needs and challenge of student acceptance, since it is designed to fit their learning needs, aspirations, attitudes and elicit their participation. For if it is rejected by the student, it is as worthless as any other program of learning that is being criticized.

bjd

APPENDIX K

DEFINITIONS OF TERMS*

Affective Objective. An objective dealing with emotions or feelings indicated by words such as interest, appreciation, enthusiasm, motivation and attitudes.

Behavioral Objective. Description of the form of behavior that instruction is to produce, stated in terms of what the student is to be able to do (explain, describe, discuss, solve, manipulate, etc.), the conditions under which the action is taken, and where appropriate, a standard of accuracy or speed. In some cases the product of the student's actions rather than the actions themselves are described (e.g., essay, types page, object produced, setting on a gauge, etc.) the desired characteristics of the product defining what the student is to do. The behavior described, or its consequence, is observable and measurable.

Cognitive Objective. An objective which deals with the thought processes (knowledge, understanding) rather than with the affective or psychomotor behaviors.

Conditions. That part of an objective which identifies the situation or circumstances (when, what, where and how) under which the behavior stated in the objective is to occur.

Criterion Test. An examination used to evaluate the attainment of each instructional (behavioral) objective and to validate the course. Used also as a design document.

Criterion Test Item. A written and/or actual performance item which is used to measure the achievement of an objective.

Entry Level Performance (ELP). The level of performance the student brings with him that is relevant to the course requirements.

Individualized Learning Pak (ILP). The ILP is a systematic learning plan, adaptable to the needs of students. It also provides for self-evaluations, measurable objectives or goals, a rationale, and a variety of multi-media, multi-modal learning activities from which the student may select specific learning situations for himself.

Objectives. The ultimate goals in the development of skills, knowledge, attitudes and appreciations, to be reached through a particular instructional course. Objectives are, of course, usually more broad and all-inclusive than aims of a lesson.

Overt Performance (Response). Visible behavior (e.g., audible or observable) which is measurable.

Performance (Change). A change in student behavior capability from the

beginning of instruction to the end of instruction; a modification of students' performance capability.

Standard. The part of an objective which specifies the speed, accuracy, or ability required for a terminal performance. Frequently implied rather than specified.

Stimulus. The event, situation, condition, signal or cue to which a response must be made.

Validation. The process of developmental testing, validation testing, and revision of instruction to be certain that the instructional intent is achieved.

Validation Testing. A late stage in the validation process, following developmental testing, which involves testing the instruction on a relatively large group of students and under class conditions.

Validated Instruction. Instruction which has been shown to do what it was intended to do, to change performance capability according to the specifications included in the instructional objectives.

Validity. The degree to which a measuring instrument measures the thing it purports to measure.

*Adapted from course "Methods of Teaching Trade and Technical Subjects," Department of Industrial Arts and Technology, University of Northern Iowa.

TERMS SPECIFIC TO PROGRAMMING

Enabling Objective. A specific learning objective described in behavioral terms for an individual lesson within a unit of instruction.

Evaluation Criterion. A description of student performance which will be accepted as evidence of successful accomplishment of the training objective.

Learning Style. That unique pattern of learning, frequently changing, which affords a learner maximum learning at a given time.

Multi-level. The opportunity for students to work at chosen levels of difficulty.

Multi-media. The many audio, visual, and manipulative ways a student may learn.

Multi-mode. Interpersonal communication between the student and others. Examples are student-teacher conferences, small-group discussions, listening to a specialist, and demonstrations.

Pre-test. A test based on the objectives of a learning package, given before the student begins the package to determine (1) whether or not he is ready educationally to do the package; (2) whether or not he needs to do the package.

Program Evaluation. The appraisal of the effectiveness of program execution.

Rationale. An explanation to the learner of where the particular learning package fits into the learning scheme.

Specific Objective. A goal that identifies expected student outcomes in behavioral terms for a unit of instruction.

Task. A specific action occuring in an occupation in performing a segment of the job. It has identifiable starting and ending points resulting in a measurable performance.

Task Inventory. A detailed list of all tasks comprising a specific job.

Terminal Test (Post-Test). A test which may be given at the end of each sequence or over all segments at the end of the package.