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ABSTRACT

The Instructional Support System for Occupational Education (ISSOE) project, conducted in New York, focused on (1) review of individualized education systems, (2) selection of appropriate occupational clusters, and (3) development and field testing of a system and materials. A product of the Managing Student Progress series of the ISSOE program, this booklet aims to provide the occupational educator with a background in both theory and practice for individualizing instruction. The booklet broadly surveys five areas related to individualized education. First, current definitions of individualized education are reviewed. Second, some of the advantages of an individualized program are outlined. Then, some of the theoretical approaches to individualized instruction and individualized programs are detailed. This section is followed by a description of five individualized programs which are currently in use (Project PLAN--Program for Learning in Accordance with Needs; PLATO--Programmed Logic IGE--Individually Guided IGE.--Individually Guided Education; IPI--Individually Prescribed Instruction; and LAP--Learning Activity Package). The fifth section examines the adaptation of competency-based occupational education materials to an individualized format. (KC)

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ISSOE

Managing Student Progress

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Planning Student Programs

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"Even if thirty pupils hear the same instruction, given at the same time, by the same teacher, all thirty hear something different, because they're individuals. The effective vocational school teacher recognizes this--and allows for it."

(Anon., quoted in Fraser, 1976)

INTRODUCTION

Individualized education (I-E) has been fashionable in American education for the last decade, yet few classes in American schools offer individualized techniques. But what is individualized education? Is it when a student proceeds through materials at his or her own pace? What about the student's needs? Do students have to work alone in order for instruction to be considered individualized? These are only a few of the many questions that confront those who are involved, or wish to be involved, with individualized education.

This booklet broadly surveys five areas related to individualized education. First, current definitions of individualized education will be reviewed. Second, some of the advantages of an individualized program will be outlined. Then, some of the theoretical approaches to individualized instruction and individualized programs will be detailed; and this will be followed by a description of five individualized programs which are currently in use. The fifth section will examine the adaptation of competency-based occupational education materials to an individualized format.

The purpose of this booklet is to provide the occupational educator with a background in both theory and practice.

WHAT IS INDIVIDUALIZED EDUCATION?

Curriculum and instruction "experts" may spend hours debating whether a given program is "individualized." Many disagreements and discussions center on the differences between individualized instruction and individualized education. So, in order to avoid confusion, a distinction between the two terms needs to be made. All too often they are used interchangeably, even though they refer to different aspects of the educational process.

Individualized education (I-E) involves the development of goals, objectives, strategies, and instruction, together with provisions for evaluation and feedback, in order to cater exclusively to the needs and interests of the individual pupil. Individualized instruction (I-I) is a single aspect of individualized education, which transmits information to the pupil in ways that respect the pupil's unique characteristics. For example, in one program all students may have the same goal to achieve and similar objectives to complete, yet each one may learn the mate[illegible] by different methods. In another program, all students may set their own individua[illegible]s, receive identical instruction, and then be indivicually e[illegible]uated by their instructor. Although this latter case is less likely, it is important to note that any one component of a student's education may be individualized; but the entire process cannot legitimately be called individualized education until all the components are individualized.

The following definitions of individualized instruction will clarify the foundation upon which the philosophy of individualized education rests.

Musgrave (1975) wrote that, to some, an "open-spaced arena is synonymous with individualized instruction," and went on to say that others feel that teaching/learning machines, programmed materials, modularized components and other techniques are "individualized."

Duane (1973) argued that "individualized instruction means that the learning program for each curriculum area is organized in such a manner as to allow each child to move at his own pace under the guidance of his teacher." He further defined individualized instruction as "non-graded, enabling each child to go as far in each subject as his ability permits."

The issue was confused somewhat by Gibbons (1971), who stated that

> every program is unavoidably individualized to some degree by the perception each person has of it and the responses he makes to it. Second, when an administrator or teacher increases the number of alternatives open to every student, he may be said to have individualized instruction. Third, different aspects of individualized instruction are emphasized by different people, depending on their role in the schooling process.

He concluded that an "individualized" program can be considered as a program of instruction for each student that approaches individualized teaching more closely than previous programs.

Finally, the National School Public Relations Association declared in its booklet Individualization in Schools (1971) that

> individualized instruction means the right of every individual to acquire an education within the school system in his own way and at his own rate of learning. It means adapting the school system to the individual, rather than the other way around.

From these comments, we have developed the following definitions.

> Individualized education involves structuring the learning environment in order (1) to analyze individual preferences in learning styles, methods, needs, desires, and materials; and (2) to develop instructional plans and materials which accommodate the particular needs and desires of each student, since such developments maximize the effectiveness of the education process.

Individualized education can involve the student learning alone, with peers in a one-to-one arrangement, in large or small groups, or in

any other design provided that the criteria in the definition are met. I-E may, but does not necessarily, involve media, computers, programmed texts, and so on. The presence or absence of walls in a room, a teacher, study carrels, etc., are non-essential attributes of individualized education. The analysis of the student's needs and the application of appropriate teaching and evaluation make the program individualized.

Individualized education thus allows not only different goals for different students, but also different methods and materials for reaching each goal. There is no "standard" or "average" child for comparison when one wishes to individualize. Each pupil is considered a unique person with unique learning styles, and instructional procedures must meet the individual pupil's needs.

ADVANTAGES OF AN INDIVIDUALIZED PROGRAM

No system or plan for educating students makes work easier for the people involved, and individualized programs are no exception. In the past, some educators have voiced concerns about the extra work that individualizing instruction and education involves. But pressures, both from within education and from the outside (e.g., PL 94-142) are demanding a greater emphasis on individualization. Rather than concentrating on the problems associated with change, we shall explore some of the advantages.

Ulmer (1973) has documented the principal advantages of a student-centered, individualized program. Some of these advantages are:

1. Teachers and students become uniformly aware of the objectives of a course or the unity of a study program.
2. Much of the work of instruction is carried out by instructional support systems. These need not be geared to a specific configuration such as three 50-minute class periods per week.
3. The student schedules much of his or her own learning, and can move at his or her own pace, repeating or skipping instructional segments as appropriate.
4. The instructor has more time to devote to developing instructional techniques aimed at higher-level competencies, and does not have to deliver routine presentations repeatedly.
5. The student is engaged in a movement toward criterion competency, and is not in a race for grades with classmates.
6. More time becomes available for teacher-student interaction in small groups or on an individual basis.

7. More attention can be given to pupil and course evaluation.
8. Both teachers and students are involved in the educational process in a more dynamic and professional manner; the integrated and "modular" nature of their working environment is much more comfortable and effective than the traditional setting of regimented and segmented events.
9. The effectiveness and value of the curriculum can be more accurately defined and assessed, and described to all concerned parties.

Individualized education and instruction are commonly referred to as "student-centered." It appears, however, that the teacher also makes positive gains by getting involved in an instructional plan based on individualization. True, there will be additional work for the teacher at the beginning; but as the program matures the teacher's role will change from that of Authority and Teacher to that of Educator and Colleague in the learning process. The teacher or educator will learn as well; he or she will learn more about each pupil, will learn to assess each pupil as an individual and will learn how to tailor lessons to each individual pupil's needs.

THEORETICAL APPROACHES TO INDIVIDUALIZATION

Educators, researchers, and curriculum developers have typically adopted one of four approaches to student-centered programming. Examples of these four approaches will be given in the fourth section of this booklet.

1. In individually diagnosed and prescribed instruction, *the school determines what and how the child will be taught.* That is, it determines appropriate learning objectives for the student and prescribes instructional strategies in accordance with the student's unique learning characteristics.

2. In self-directed instruction, *the child determines what and how he or she will be taught.* The school and teacher determine learning objectives and broad goals.

3. In personalized instruction, *the child determines his or her own goals.* After these goals are chosen, however, the pupil is required to follow a program established by the teacher and to use specific materials selected by the school. As in other individualized instruction, the pupil determines the pace; the teacher is available to provide help and guidance.

4. In independent study programs, *the child determines both the learning objectives (what) and the strategy to be followed to meet these goals (how).*

Approaches to individualizing vocational education

Pucel (1974) believes that there are eight models of individualization that may be used for vocational education, of which only six could be considered as individualized instruction models. And of these, only one of them is recommended for vocational education.

Pucel feels that instruction centers around the content (what is taught), allotted time (how much time is available for instruction and learning) and proficiency (how well the pupil must perform to pass). Each of these components may be "fixed" or "variable." One may have fixed or variable content--everyone is taught the same material, or different students learn different material. Time may be fixed or variable--everyone has the same time to complete the assignment, or different students have different lengths of time to complete the task depending upon their needs. There may be fixed or variable proficiency--for example, all must score above 90 percent, or some may score 90 percent while others may only score 60 percent. These options may be summarized as follows:

("traditional" type)	1. Fixed-content, fixed-time, fixed-proficiency*
	2. Fixed-content, fixed-time, variable-proficiency
(recommended for vocational education)	3. Fixed-content, variable-time, fixed-proficiency
(individualized instruction)	4. Fixed content, variable-time, variable-proficiency
	5. Variable-content, variable-time, fixed-proficiency
	6. Variable-content, variable time, variable-proficiency
	7. Variable-content, fixed time, fixed-proficiency
	8. Variable content, fixed time, variable proficiency

Options 2-8 permit varying degrees of individualization. Option 2, is the traditional model, where each pupil is taught the same material in the same amount of time but each receives a different grade based on different levels of mastery.

*Pucel believes that option 1 is not feasible because there can be no concern for individual differences when content, time and proficiency are fixed.

Pucel recommends Option 3 for vocational education. All students who desire to learn a particular occupation, automotive mechanics for example, need to master the same core skills and competencies. However, students may learn these tasks at varying rates of speed; hence the model offers variable-time allotments. Proficiency levels are pre-set because employers expect a high degree of mastery of each of the competencies.

In Option 4, each pupil explores a particular body of material, with no concern for how long he or she spends or how much he or she learns. Such might be the case in career exploration.

Option 5 represents the student's selection of what will be learned and how long it will take to learn. The student understands that a set mastery level will be required.

The "tree-school model" approximates Option 6. Here the student can select what he or she wants to learn, how long it will take to learn the materials and what level of proficiency will be considered satisfactory.

Option 7 allows each pupil to choose what to study but limits the time they have to study and the acceptable levels of proficiency. This would only be used where the pupil is sure he or she can learn the material in the required time.

In Option 8, students choose what they wish to learn, but have a specific amount of time to learn the material. They move on to another assignment with little or no concern for how well they have mastered the material.

An understanding of these options is crucial to the successful individualization of instruction, not only in vocational education but in any educational program. One must understand the relationship between content, time and proficiency before one can begin to individualize instruction.

Educators must determine whether a pupil may profit from variations from the "norm" in content, time or proficiency, before an instructional strategy can be developed for the pupil. For example, some students may need a "fixed-time" requirement because they work best under pressure; others may need a "variable=content" option to allow exploration of topics related to those already under investigation.

No matter which theory one chooses to base individualization on, four components are essential to the process.

First, that the goals of learning are phrased to specify student performance and the conditions under which the performance is to be demonstrated (behavioral objectives).

Second, that the learner's capabilities before instruction are assessed (pre-assessment).

Third, that educational alternatives suited to the student's initial capabilities are presented to the learner. He or she selects or is assigned one of these alternatives and proceeds through the instructional sequence at his or her own pace (instructional strategies).

Fourth, that the student's performance is monitored continuously as learning proceeds and as units or lessons are completed (evaluation).

These four essential components carry numerous implications for vocational education.

Behavioral objectives

Behavioral objectives serve three main purposes in an I-E program. The objectives specify for teacher, parent and administrator what the student is to do, under what conditions, and what criteria will be used in determining satisfactory completion of the objective.

Behavioral objectives tell the student what he or she will be learning, what will be evaluated, and how it will be done. Learning will be enhanced when the pupil is told what will be taught and what needs to be learned. Under these conditions the pupil can concentrate on mastering identified objectives.

Behavioral objectives can assist the teaching and learning of materials that are taught sequentially. For example, in the ISSOE catalog for Machine Shop (NYSED, 1980), laying out the workpiece with a combination square (task #010101) or with a Verneir Height Gauge (task #010102) are required competencies which must be learned before the pupil can saw to layout lines (task #040203) or cut off workpiece (task #050201). Thus, by determining and sequencing specific objectives, the student will build upon previous learning and the materials will seem more coherent.

In an I-E system, students may, within prescribed limits, set their own goals and identify relevant tasks and objectives. Each pupil usually receives assistance from the teacher to clarify these limits and to select short and long range goals. I-E systems encourage flexibility in student-initiated learning. If a student using the ISSOE Auto Mechanics materials successfully completes the task "Lifting a Vehicle," provisions may be made for the student to learn how to lift not only an automobile (the major objective) but also a pick-up truck or a camper. These supplementary competencies will largely depend on the interests and needs of the students. The purpose of individualized education is to expand the learning options available to each student; therefore, deviations from the standard or norm should be expected and encouraged. Deviations show

that the pupil is interested in what is being learned and is interested in learning more than the required basics.

For teachers using ISSOE materials, the task of preparing behavioral objectives has been completed. Through workshops and other methods such as task analyses, specific competencies have been identified and listed in order to detail the necessary skills for successful employment in a specific job. These competencies have been sequenced; behavioral objectives for each competency have also been prepared. Thus, the tasks of preparing behavioral objectives for individual vocational students have been greatly reduced.

Pre-assessment

Although pre-assessment is highly desirable in all I-E programs, it is not required. The purpose of pre-assessment is to measure the learner's knowledge about the assignment to follow. Pre-assessing allows the student to show mastery of the content and concepts to be learned, thus avoiding being taught ideas that he or she already knows. Pre-assessing can also be used as a means for grouping students. Those who are deficient in particular competencies can be grouped together, if desired, for purposes of teaching and administrative efficiency.

It is crucial that the pre-assessment always test the specific objectives of the unit or lesson. Otherwise, test information will not estimate student knowledge reliably. In some classes, or with some subjects, pre-assessment may not be necessary. There are two occasions when this may be true. First, if the pupil obviously has no knowledge in the area to be studied, a pre-test would be useless. For example, consider a student who has never had any training in adjusting a carburetor on a car, is taking a first course in auto mechanics, and admits to knowing nothing about the topic. In this case, pre-assessment would waste both teacher and student time.

The second example involves a student who has worked at a garage for several years and knows automobile engines "inside and out" but is currently enrolled in his or her first auto mechanics class. The teacher may wish to administer the post-test first to see if the student can "test out" of particular components of the course. The components selected would be those in which the student feels most confident. This happens in some college entrance placement tests, where students may receive credit in college for scoring above a predetermined level on the placement test. However, educators involved in training pupils in subject or content areas that are potentially hazardous, such as auto mechanics or industrial arts, should exercise extreme caution in allowing any pupil to proceed on his or her own no matter what the pupil claims regarding experience and expertise. Even if a pupil has worked for several years at a garage, close supervision should still be offered until the student can show that he or she knows and follows approved procedures and safety requirements.

As with the other components of I-E, pre-assessments should use a variety of modes, such as multiple-choice tests, essay tests, verbal tests, work sampling, etc. Variety will allow the student to show mastery of the content or skill through the medium in which he or she is most comfortable.

For ISSOE teachers, pre-assessment of student interests and goals is also crucial for effective individualization. ISSOE researchers have developed a form to assist ISSOE teachers in these types of pre-assessment activities. This form, "Student Program Planning Information/Teacher Planning Worksheet" (Form 1--see pages 32-34), is divided into three sections. First, the student completes the Student Program Planning Information portion, indicating (1) occupational preferences after graduation, (2) future employment plans, (3) individuals who helped in the selection of goals, (4) self-evaluation of academic abilities, and (5) work experiences and additional informaton.

The teacher then completes the Teacher Planning Worksheet indicating (1) the program recommended for the student, (2) agreement or disagreement with the student's occupational choice(s), (3) additional student services that may be needed (e.g., counseling, tutoring), (4) the date that the Individualized Education Plan (IEP) was prepared and when it should be reviewed and (5) additional comments.

The third section contains individual sheets reflecting the actual IEP, which will be used to guide the student's learning.

More information regarding this form is included in the last section of this booklet. For now, however, ISSOE teachers should be aware that procedures for pre-assessment have been developed.

Instructional strategies

A system that adapts to individual differences requires instructional alternatives to match specific abilities and interests with learning activities. The primary task is to assemble a curriculum in which individual differences help to define alternative instructional paths that move toward occupational competence. At the core is the need to attend to the particulars of each student's learning, and to bring all or most students to an acceptable level of competence, wherever they start from and however diverse the routes they travel. The educator thus faces considerations of pacing and grouping, media and learning style.

Pacing and grouping Individualized instructional systems are designed to remedy some of the problems of different achievement and ability levels among class members In instructional terms, each student must take the time she or he needs to reach the criterion level for particular school tasks.

In traditional education programs differences in student ability are shown in levels of achievement and ability, which vary widely when equal school time is available to all students (Barr and Dreeben, 1977,

Each student is presented with the same material and allowed the same amount of learning time. Individualized instruction and education offer alternatives to this traditional pattern of classroom learning. Here, students may progress through the course material at a pace which is comfortable and rewarding. Burns (1973) contends that there is a variety of reasons why learners learn at different paces. These reasons include intelligence differences, study habits, prior learning, motivation, competitive pressure, social and family pressure, and physical and physiological status.

An issue closely related to pacing is that of grouping. Many educators have argued against individualized instruction on the grounds that it is based on the notion of student isolation--that students work independently in isolated learning cubicles. Grouping is often appropriate in individualized instruction, however, and is an integral part of the individualized system. Many grouping patterns are congenial to the educational and administrative efficiency of individualized instruction. Learning groups are typically arranged in terms of interest, ability, or common tasks; in terms of tutorial, small-number or large group instructional efficiency; or in terms of socially or academically supportive conditions.

Media. Currently media and instructional aids of many types contribute to learning. Researchers have made several attempts to systematize the selection of media to match learner characteristics, type of objective and the assumed learning environment.

For ISSOE teachers, the use of media can stimulate both student interest and learning. All instructional aids, from chalk and blackboard to computer terminals with multi-colored displays, are educational media. Each medium offers unique teaching opportunities for the teacher and caters to unique learning styles among pupils. Assignments using particular types of media, however, should be based upon the individual student's characteristics and needs.

Learning style. Psychologists and educational researchers have become concerned about the relationships between measures of individual differences and learning variables. In response to this concern, they have set out to determine the variety of ways in which different students learn best, to measure the basic processes that underlie various kinds of learning and to assess the performance capabilities needed for learning a new task.

Cronbach and Gleser (1957) have called for a theory of learning that would prompt educators to search for the most effective instructional strategy, media utilization, or sequencing of objectives for groups of students with given sets of learning-related characteristics.

Responding to this call, educational psychologists have been active in what is known as Aptitude Treatment Interaction (ATI) or Trait Treatment Interaction (TTI). These emphasize determining whether certain aptitudes or traits interact with one or several instructional strategies. That is, studies have found that students with different traits (e.g., high motivation and low motivation) might find the same course unrewarding. ATI and TTI researchers have argued, therefore, that in planning individualized programs, teachers must continually accommodate individual traits or aptitudes. ("Aptitude" is defined as the sum of a student's individual differences that will affect his or her learning.)

For ISSOE teachers, concern for aptitudes should be reflected in two areas. First, when completing Form I, the teacher should indicate any learning styles that the student prefers. These may include: prefers to work alone, prefers to work "hands on," or works best with audio-visual aids. Second, these aptitudes or traits should be recognized and included in the process of selecting appropriate instructional materials to assist the teaching and learning process.

Pupil evaluation. All educational programs have mechanisms for evaluating pupil progress. I E is no exception. In traditional pro-gra

all students are tested by a similar, if not identical, instrument on the same day, often at the same time. I-E views this as another failure to accommodate differences. A variety of methods for evaluation should be offered to each pupil, the most appropriate being chosen after pupil and teacher have discussed the student's needs.

Again, we might draw examples from the ISSOE Machine Shop catalog. The first lesson requires the student to "layout workpiece with combination square." The catalog suggests evaluation by actually performing the layout. But equally satisfactory would be making a poster, film or filmstrip of the steps one would go through in laying out the work; layouts; and a host of other activities. Although these options require more work than most students are willing to do, creative alternatives to traditional evaluation should be provided for those who want them. Furthermore, all students may not be prepared to be evaluated on the same day. Thus, in I-E programs, provisions should be made for students to be evaluated when they feel they are ready. Evaluation should not take place simply because it is time for evaluation, it should occur because the student is ready for evaluation.

ISSOE teachers should refer to the ISSOE booklets "Reporting Student Progress," "Developing Student Profiles," and "Using Student Profiles" for more information about reporting individual evaluation and achievement.

Pre-assessment, specific behavioral objectives, a variety of alternative learning strategies and various evaluation techniques form the foundations upon which most I-E and I-I programs are based. The following section describes some I-E and I-I programs already in use.

PRACTICAL APPLICATIONS OF INDIVIDUALIZED PROGRAMS

There are many different types of individualized programs. Some are designed for particular subject areas, others for entire school systems. This section outlines some of the most promising individualized programs. The programs concerned are Project PLAN, PLATO, IGE, IPI and LAP.

Project PLAN-Program for Learning in Accordance with Needs

Project PLAN is a massive venture to devise a system for individualizing instruction. Begun in 1966, Project PLAN involves private research (American Institutes for Research), private industry (Westinghouse Learning Corporation), and public schools in California, New York, Pennsylvania, Massachusetts and West Virginia. In 1971, over 15,000 students in grades 10-12 at more than 75 schools were using PLAN materials (Education U.S.A., 1971).

The computer is essentially for instructional and administrative support. It is programmed to score tests, maintain and produce student records and progress reports, and provide options for the next teaching learning unit (TLU) the student should attempt.

TLUs contain specific behavioral objectives for the pupil, each requires about two weeks to complete. Each TLU also offers alternatives to provide a variety of learning strategies for students of different abilities and interests. All 2,700 TLUs assist the student in learning the objectives of the unit by guiding him or her through a variety of resource material.

Project PLAN also contains a guidance component which offers the pupil information about the world of work, goal formation and proposed programs of study.

Project PLAN has four main components (Westinghouse Learning Corporation, 1972). These components are:

1. Teaching-Learning Units (TLUs) and other printed support materials. Each TLU contains specific behavioral objectives which indicate what the student should have mastered by the end of the unit. Each TLU also contains specific learning activities which relate to the stated objectives. With a variety of activities offered for each objective, the student is free to decide how he or she is going to learn the objective. Also, each TLU contains a variety of objectives so the student has options as to what to study in the TLU. Students are pre-tested in each subject area before beginning any unit.

2. Computer Accountability System. The computer performs three basic functions in the PLAN Project. First, it performs clerical tasks, such as scoring tests, and maintaining records. Second, the computer assists the teacher and student in the planning of daily or weekly activities. Third, the computer produces an Initial Program of Studies (POS) for each student and produces progress reports on each student when needed.

3. Teacher Training. The computer assists in training teachers for their new role in the PLAN system.

4. Evaluation. The computer scores each student's tests and monitors the pupil's progress. The student and teacher can obtain almost immediate reports on the pupil's progress and status.

Project PLAN contains the basic components needed for individualized instruction. Each student is pre-tested to determine present levels of competence. Specific TLUs are offered, each unit containing specific behavioral objectives, learning activities, evaluation procedures and feedback provisions.

PLATO-Programmed Logic for Automated Teaching Operations

Developed by the Computer-Based Educational Research Laboratory at the University of Illinois-Urbana, PLATO allows each student to work through a variety of subject areas at his or her own pace. Some of the subject areas programmed in PLATO are Biology, Economics, Foreign Languages, Statistics, Geography, Psychology, Political Science, and Veterinary Medicine (Education, U.S.A., 1971). Lessons have been prepared by a variety of individuals and generalizations regarding their content and structure are difficult to make.

There is no pre-testing, since PLATO is used for students who elect to take each course. Some of the units contain behavioral objectives; others do not. The content and activities vary from course to course. Evaluation and feedback provisions also vary: some testing is offered by the computer and some is administered in other ways.

Presently there are about 150 subjects with over 6,000 lessons being taught through the PLATO systems. It is "individualized" in that students can proceed through the lessons at their own pace. But all students who take a particular course will have the same goals, study the same content and be evaluated in the same way.

I.G.E.-Individually Guided Education

IGE is a relatively recent introduction to the field of education. Developed by the Wisconsin Research and Development Center for Cognitive Learning, the Institute for Development of Educational Activities and a variety of educational institutions, IGE is a total educational plan for elementary schools (Education, U.S.A., 1971).

IGE, like PLAN, does not require the purchase of special materials. The system is designed to work with a school's present curriculum and materials. However, some types of books, reading series and supplemental materials seem to work better than others with IGE.

Students are grouped on the basis of ability, not age. Groups typically have a 2-4 year age span. All modes of learning, whether individual, with one or two peers, or in small and large groups, are used within the school as needed, in order to maximize individualization. Each entering pupil is thoroughly evaluated by tests and the staff to determine entering knowledge with respect to the subjects to be learned. Frequent staff meetings are held by all teachers of each student to assess progress and to identify new directions for the child to pursue. Provisions are available for each student to select his or her own goals and progress in his or her own direction. Normally the staff determines goals, with the student selecting the means from among several options. As with objective and goal formation, evaluation procedures may be determined by the pupil but typically are set by the teacher(s). New goals depend upon the successful completion of previous work.

IGE is a form of individualized education in that the student's goals, instruction, activities and evaluation are almost always keyed to the student's interests and learning styles. Teachers need to offer many objectives for the student to select from, as well as a variety of techniques and methods to satisfy the objectives. Finally, several means of evaluating pupil progress for each goal, unit, lesson or objective need to be devised in order to provide a true reflection of what the pupil knows.

Pupils are not assigned to grade levels, nor are grades given for work completed. Students and parents are told of "areas of progress" and of areas where remedial work is needed. There is no beginning and no end to the educational plan for an IGE school. The student begins where he or she is presently "at" in each subject area and continues through that subject until the end of the school year. At the beginning of the subsequent year, most pupils pick up at the level where they had left off previously.

The main components of the IGE model are:

1. Assessment-This is used to determine if the student has learned the necessary information to begin the level, unit or lessons.

2. Behavioral objectives-These are developed by the students, staff and/or parents to identify specifically what is to be learned.

3. Instructional variety-There are many different options and activities offered for completing each goal. Selection of the activity is based upon student wishes and needs.

4. Evaluation and feedback-Here again, variety in evaluation methods is required, to provide an accurate record of pupil accomplishment. Some of the methods used are paper and pencil tests, student constructed projects, reports (oral and written), oral examinations and daily workbooks. Feedback to the pupil related to the evaluation is crucial in IGE. It provides reinforcement, evaluates previous success and offers guidance for future content and instructional method.

IPI-Individually Prescribed Instruction.

IPI was developed in 1964 by the University of Pittsburgh's Learning Research and Development Center. The program assumes that children have a variety of learning styles. The goal of education is seen to be to structure learning activities to complement the student's learning style in order to yield the highest chances of a rewarding learning experience for the pupil. Thus, diagnostic information provided by pre-tests and teacher observation form the backbone of an effective IPI program.

IPI programs are based on specific behavioral objectives. These are either grouped by content areas (e.g., multiplication, fractions) or by

sequences (e.g., learn addition prior to subtraction). Each objective can typically be completed by the student in one or two class periods.

IPI maximizes student responsibility for his or her own learning (Education U.S.A., 1971). After the lesson plan is developed, the student is expected to collect the materials needed and return to his or her desk. Pupils are encouraged to attempt to master all tasks and assignments before seeking teacher assistance (Education U.S.A., 1968). Students are also encouraged to evaluate materials and their own progress before the post-test. Finally, pupils are stimulated to start writing their own "prescriptions" by the end of the fifth grade, and eventually to set their own goals and objectives. For the student for whom this occurs, IPI moves from indivudualized instruction to individualized education. This closely approximates the complete systems approach of an IGE school.

LAP-Learning Activity Package

Since 1966, Nova High School in Florida has developed specially designed booklets which have since been named Learning Activity Packages (Cardarelli, 1972). Originally conceived for mathematics, LAPs are now available in almost any subject/content area. Each LAP relates to one given topic. Within the LAP are seven components:

- subtopics-these relate to the topic
- rationale-this explains the reason for studying the topic
- behavioral objectives-these communicate goals to the student and identify minimal levels of acceptable performance
- pre-test-this identifies present student knowledge relating to the objectives
- activities and self-evaluations-these offer a variety of strategies for mastering the objectives and evaluating their completion
- quiz(zes)-given frequently, they assist the student and teacher in determining progress and the planning of future activities

LAPs assume that each student is a unique individual and has a right to receive educational materials congruent with his or her needs, interests and capabilities. The teacher's role thus changes from that of a leader in the class to one of facilitator, guide, prescriber or educator. The pupil's role also changes, from being a passive recipient of information to an active and independent person capable of making decisions and taking personal responsibility for education. Finally, the school also changes. From a highly structured institution aimed at accommodating the average pupil, it becomes an open and creative system geared to helping each individual student meet his or her needs, goals, interests and educational desires (Cardarelli, 1972).

These five major individualized programs currently in use have many elements in common. Each of the programs places a heavy emphasis on pre-assessment. That is, the educator must first determine each pupil's needs, interests, objectives, learning style, motivational factors and other areas related to successful teaching and learning. Instructional strategies are then chosen to meet both the course objectives and the student's unique characteristics. Finally, an evaluation scheme is determined to address course and student objectives, unique student characteristics and course content.

A GUIDE TO INDIVIDUALIZING ISSOE MATERIALS

In all occupational classes there are great variations in students' abilities to learn the material for the course. Each pupil is an individual and has unique ways of learning. To accompany these differences are unique motivational and interest patterns, which affect the teaching and learning process. Likewise, there are as many different ways to teach as there are ways to learn. For every unique learning style, there is an instructional style or strategy that will match the pupil's needs and maximize both teaching effectiveness and learning success. The challenge, therefore, is directed toward the teacher: to discover each pupil's unique characteristics as they relate to learning and to develop a strategy of teaching that accommodates them.

Which variables affect pupil learning? First, there are variations in interest and ability with respect to particular courses. Each teacher must ask: Why are students taking the course? Are they enrolled because they want to be secretaries, clerk typists or mechanics after graduation? If so, their interest levels will probably be high. Or are they taking this class because their friends are in it; because the course they really wanted was filled and this was their second or third preference; because the counselor advised them to "give it a try," or they heard that it was easy? These pupils' interest levels will most likely be low.

Along with this concern for levels of pupil interest, one needs to consider levels of ability. How many pupils in the class do not know the difference between a disc brake and a drum brake? How many students could change brake shoes with little or no teacher assistance? How many pupils are mechanically able and how many are not? How do they differ in their abilities to perceive, analyze and diagnose a problem?

Second, how do students vary with respect to learning style? Do some of the students learn better by "doing," while others succeed by reading and watching first and "doing" much later? If so, then the

teacher must expect the latter group to take longer to learn a given task or competency than the former.

Third, educators need to consider each student's academic skills as they relate to the task(s) to be completed. Students who are competent in math would most likely find success in auto mechanics and many aspects of office management; a student who was weak in math might find similar job-related tasks difficult and frustrating. Differences in reading ability, ability to follow directions, ability to locate and retrieve information and other academic skills will also greatly influence pupil success.

Finally, vocational educators need to assess individual physical and mental variations that may influence pupil learning. A new population of students has entered American schools in the last decade. Orthopedically handicapped, the visually and hearing impaired, behaviorally disturbed and mildly retarded pupils are now active participants in most public schools. Many teachers think these pupils a burden, but the exceptional child should be considered an asset. Adapting current instruction to meet the unique needs of these pupils makes individualization for the remaining pupils a much easier task.

In summary, therefore, pre-assessment of each pupil becomes a very important element in modifying competency-based vocational education (CBVE) materials for individualized instruction. Most CBVE materials contain behavioral objectives and evaluation schemes. The educator's challenge is to determine the unique characteristics of each pupil. These influence the appropriateness of objectives and the pupil's ability to master them. The aim is to develop appropriate instructional strategies to meet these needs.

Form I: Student Program Planning Information/Teacher Planning Worksheet/Individual Education Plan

ISSOE researchers have developed a form to assist ISSOE teachers in

ISSOE Individual Education Planning Notice

Date _____

Dear _____:

Under the new federal law, P.L. 94-142 (Education for all Handicapped Children Act) each handicapped student must have a written Individualized Education Plan (IEP). This plan, to be developed by school personnel and parents, will include statements of your child's present level of educational performance, short and long term goals and objectives, specific education services to be provided, and criteria to measure your child's progress.

Your son/daughter's Individual Educational Plan will be developed (date) _____

at _____ o'clock at the _____ (place and room).

Please circle your response and return the bottom portion of this form to your son/daughter's teacher.

A. I will be able to attend the IEP meeting as scheduled.

B. I will not be able to attend at the date and time indicated, but I could attend _____ (date) at _____ (time).

C. I will not be able to attend, but please send me a copy of the completed Individual Educational Plan.

Date: _____ **Signature:** _____

SISSOE

Student Program Planning Information

(1) Indicate whether you would want and/or expect to become employed in each of the jobs listed below after graduation from high school. Mark the appropriate response.

Job Title	I would like	I would consider	I would dislike
Plumber			
Apprentice Plumber			
Plumber Service Helper			
Maintenance Plumber			

(2) Five years from now, I would like to be employed as

First choice: ..... (Job title or kind of work)

Second choice: ..... (Job title or kind of work)

(3) Who helped you select your job goal? Check all those that apply.

___ My father
___ My mother
___ My teacher
___ My counselor
___ My friends
___ Others (please specify) _____

(4) Indicate how you think your grades compare to your classmates in each subject below:

Subject	Above ave.	Ave.	Below ave.
Reading & lang. arts			
Mathematics			
Science			
Social studies			

(5) Briefly indicate your experience in working in areas related to the jobs marked in Sections 1 and 2. Include paid and unpaid work. Also, indicate any additional information which you think may help in the planning of your program.

Teacher Planning Worksheet

(1) I recommend that the student prepare for the following job titles.

Title or area | Title or area | Title or area

(2) I concur with the student's choice(s) of occupational area(s). Yes ___ No ___

(3) List any additional student services you would recommend for this student.

Counseling _____
Career information _____
Academic Tutoring in _____
Reading _____
Math _____
Other (Specify) _____

(4) This IEP was prepared on ___ and should be reviewed in ___ weeks.

(5) Comments _____

Teacher's Signature Date Student's Signature Date Parent(s) Signature Date

ISSOE

a.m. p.m. Instructor Student No. First Name Last Name

Student Program Planning Information

(1) Indicate whether you would want and/or expect to become employed in each of the jobs listed below after graduation from high school. Mark the appropriate response.

Job Title	I would like	I would consider	I would dislike
Plumber			
Apprentice Plumber			
Lawn Sprinkler Installer			
Maintenance Plumber			

(2) Five years from now, I would like to be employed as:

First choice: .....
(Job title or kind of work)

Second choice: .....
(Job title or kind of work)

(3) Who helped you select your job goal? Check all those that apply.

____ My father
____ My mother
____ My teacher
____ My counselor
____ My friends
____ Others (please specify)

(4) Indicate how you think your grades compare to your classmates in each subject below:

Subject	Above ave.	Ave.	Below ave.
Reading & lang. arts			
Mathematics			
Science			
Social studies			

(5) Briefly indicate your experience in working in areas related to the jobs marked in Sections 1 and 2. Include paid and unpaid work. Also, indicate any additional information which you think may help in the planning of your program.

Teacher Planning Worksheet

(1) I recommend that the student prepare for the following job titles.

_____ (Title or area) _____ (Title or area) _____ (Title or area)

(2) I concur with the student's choice(s) of occupational career(s). Yes ____ No ____

(3) List any additional student services you would recommend for this student.

Counseling _____

Career Information _____

Academic Tutoring in _____

Reading _____

Math _____

Other (Specify) _____

(4) This IEP was prepared on ____ and should be reviewed in ____ weeks.

(5) Comments: _____

Teacher's Signature **Date** **Student's Signature** **Date** **Parent(s) Signature** **Date**

this pre-assessment and planning process. Form I (see pages 32-34) should be given to the student after the ISSOE Individual Education Planning Notice (page 31) has been completed. The student should first complete the upper portion of the form: "AM/PM, Instructor, Student Number, Name." Then the student should complete the appropriate parts of the other five sections.

When the student completes "Student Program Planning Information" (SPPI) (page 33), the teacher collects the form and scans the information provided. Question #3, "Who helped you select your job goal?" should receive immediate attention from the teacher. The teacher must determine if the student received adequate job and career-related information before making a career choice. For instance, if the student indicated that he or she discussed his or her decision with no one, the teacher might wish to advise the student, send the student to a counselor, or request the student sample some of the materials available in the ISSOE booklet, "Student Decision Making." The point here is not that students are inept at making career choices; on the contrary, many are fairly skilled and successful at this task. Students are often not decision-makers, however, because others (parents, teachers, etc.) have always made decisions for them. Thus some career and self-exploration, along with an improvement in decision-making, might better help the student in selecting his or her job goal.

If, however, the student has discussed career goals with parents, teachers and counselors, the teacher might simply let the matter rest.

Assuming that the decision is close to being finalized, the student either has sought or refuses to seek additional assistance and the teacher has done his or her best to offer guidance, the educator should next scan the remaining parts of the SPPI. The instructor should begin to complete the "Teacher Planning Worksheet" (TPW) (page 34). The teacher should answer items 1, 2 and 3 as frankly as possible. For item 3, "additional student services," the teacher should feel free to indicate

any help, whether remedial or informative, that he or she feels the student needs. The teacher should temporarily skip item 4 and proceed to item 5 wherein he or she indicates additional information regarding the pupil, his or her unique learning characteristics (e.g., traits, aptitudes) and any other information that may be needed for designing an Individual Education Plan.

Individual Education Plan (I.E.P.)

Three different styles of Individual Education Plan sheets have been developed. Each one has its unique advantages to the teacher who wishes to individualize instruction in his or her classes.

The first style is an I.E.P. arranged by Dictionary of Occupational Titles (D.O.T.) job titles. An example of this option is shown on page 37. This option permits instruction to center directly around preparing a student for a specific job.

ISSOE educators should note that the I.E.P. by D.O.T. is the preferred style. This identifies competencies under specific D.O.T. job titles. The main purpose of the ISSOE program is to prepare students for specific job positions, whence the preference. The other forms, however, offer advantages over the I.E.P. by D.O.T. in certain situations. All three styles are designed to allow the teachers maximum flexibility in designing an individual program. Each of the three styles will be explained in detail in the following section. Instructions for completing each of the three styles will also be given.

No matter which I.E.P. style is selected, it should be noted that the forms are designed to fit easily into the SPPI/TPW folder. The inside, pre-printed sections of the folder provide the teacher with the necessary planning information to successfully design an I.E.P. The individual sheets become the actual I.E.P. This will allow all pre-assessment and program planning information to be contained in a one form/one folder combination.

IEP by D.O.T.

Student's Name

UNIT: STOCK CLERK: CHECKING INCOMING MERCHANDISE

COMPETENCIES		Date Assigned	Date Completed	Proficiency Level
020101	Check quan/cond of cart/contnt			
020102	Com. tracer, claim/msng, dam.			

UNIT: STOCK CLERK: STOCK CONTROL

COMPETENCIES		Date Assigned	Date Completed	Proficiency Level
020201	Com. stock rec. crd/mer. rec.			
020202	Prep. price tag			
020203	Take physical count			
020204	Fill order requests			
020205	Ver. perpetual inventory			

I.E.P. by D.O.T. (page 37) As noted previously and shown on page 37, the I.E.P. by D.O.T. may display several job titles. Immediately beneath the job title (Stock Clerk is shown in the example) are listed the various ISSOE competencies that must be completed before the student may receive endorsement for that specific title.

Next to each competency are spaces where the teacher can indicate the date the specific competency was assigned and completed by the pupil along with the proficiency level that the student obtained. The teacher might then wish to indicate either on the sheet or on separate pieces of paper the instructional materials that will be used to teach and learn the competencies. It is at this point, in the assignment of specific instructional methods and materials, that the teacher should address the individual's unique learning style identified on the SPPI and the TPW.

Should the teacher desire to teach additional competencies other than those specifically required for the D.O.T. job title, he or she should use the "open" format as shown on page 41 of this booklet and described on pages 40 through 42 of this guide.

Finally the teacher and student, and preferably the parents as well, should sign and date the folder in the spaces provided on the outside of the folder. The teacher should then open the folder and indicate on item 4 of the Teacher Planning Worksheet when the I.E.P. was prepared and when it should be reviewed.

I.E.P. by ISSOE Competency (page 39) This style has been titled I.E.P. by ISSOE competency. As the example from the Machine Shop catalog shows (see page 39), this form lists all the competencies for a given unit on one sheet of paper. Although the format of the page appears identical to the I.E.P. by D.O.T. it should be noted that on the D.O.T. version the job title "Stock Clerk" is typed prior to the unit title "Checking Incoming Merchandise" whereas on the ISSOE competency sample the unit of "Shaper: Horizontal" is indicated with no indication of the job title to

IEP by ISSOE Competency

Student's Name

UNIT: SHAPER: HORIZONTAL

COMPETENCIES		Date Assigned	Date Completed	Proficiency Level
080101	Shape plan surface			
080102	Shape angular surface			
080103	Serrate workpiece			
080104	Contour cut workpiece			
080105	Shape keyway			

which this particular competency is attached.

After both teacher and student have completed their respective sections of the SPPI and TPW, they determine together which D.O.T. Job Title will be pursued. The teacher should then sort through the individual I.E.P. sheets for their program area (i.e., Cosmetology, Conservation, etc.) choosing those sheets which have the competencies listed on them for that particular job title. As with the other options for I.E.P.s, the dates of assignment and completion, with the level of proficiency attained, should be indicated where appropriate.

Again, the teacher should list on the I.E.P. sheet or on separate sheets of paper the instructional materials to be used for teaching each individual competency. The student, teacher and parents should sign the outside of the SPPI/TPW folder at the bottom, and, as before, the teacher should complete item 4 on the TPW.

I.E.P. "Open Format" (page 41) This optional I.E.P. form has two purposes. First, it may be used to list additional competencies required for a particular job title other than those listed on the I.E.P. by D.O.T. or on the I.E.P. by ISSOE competency form. Second, and probably more importantly, the form can be used for development of a total program in accordance with individual pupil needs; it is a valuable tool for cross program planning. The form does not list any objectives or competencies. To use this form, the teacher must first have the student complete the inside of the folder (SPPI) as was done with the other options. Then, based on the student's interests and needs, the competencies that are needed for training must be listed under the heading "Competencies" and their respective ISSOE task number included in the blank prior to the competency name. As the competencies are assigned and completed, the appropriate columns are filled in; the respective proficiency level also must be indicated when the training for each competency is completed. Finally, specific instructional materials and methods that will be used to teach and learn a competency need to be identified (as was done with

IEP - "OPEN FORMAT"

Student's Name

UNIT: _____

	COMPETENCIES	Date Assigned	Date Completed	Proficiency Level

the previous examples).

When the I.E.P. has been completed, the student, teacher and parents should sign the form. The teacher should also, at that time, complete item 4 on the inside of the folder, as was done with the previous example.

An example will clarify the value of this format. On page 43 you see an example of a SPPI and the TWP. Notice that the student has discussed this job goal with her parents and counselor. She has selected eventually to become the owner of her father's automobile body shop and therefore not only needs automotive body repairs training but business training as well. Her I.E.P. might look like Example 2 (page 44).

As stated earlier, this form is extremely valuable for cross-program planning. That is, when a student selects to receive training in a variety of programs leading either to a variety of skills or to proficiency in several specific D.O.T. Titles, this form will probably work best.

Developing an effective I.E.P. for each student requires consideration of all factors affecting his or her learning capabilities. Variations in motivation and aptitudes methods by which the pupil learns best, mastery of relevant academic skills, and possible physical or mental disabilities must all be accounted for. By using pre-assessment materials, and the various program planning forms available, the educator can design I.E.P.s individually suited to each student.

Sample SPPI/TPW

SISSOE

A.H.L. R. FRANK 1458970 EVA KAUFMAN

Student Program Planning Information

(1) Indicate whether you would want and/or expect to become employed in each of the jobs listed below after graduation from high school. Mark the appropriate response.

Job Title	I would like	I would consider	I would dislike
Auto Body Repairer	X		
Shop Estimator		X	
Auto Painter	X		
Auto Bumper Straightener			X
SHOP OWNER	X		

(2) Five years from now, I would like to be employed as:

First choice: AUTO BODY SHOP OWNER (Job title or kind of work)

Second choice: AUTO BODY REPAIRER (Job title or kind of work)

(3) Who helped you select your job goal? Check all those that apply.

X My father
My mother
X My teacher
My counselor
My friends
X Others (please specify) BROTHERS

(4) Indicate how you think your grades compare to your classmates in each subject below.

Subject	Above ave.	Ave.	Below ave.
Reading & lang. arts	X		
Mathematics	X		
Science		X	
Social studies		X	
AUTO MECHANICS - 1 SEMESTER		X	
WELDING	X		
SECRETARIAL PRACTICES	X		

(5) Briefly indicate your experience in working in areas related to the jobs marked in Sections 1 and 2. Include paid and unpaid work. Also, indicate any additional information which you think may help in the planning of your program.

I HAVE WORKED IN MY SPARE TIME IN MY FATHER'S AUTO BODY SHOP. I WOULD REALLY LIKE TO BECOME OWNER OF HIS SHOP WHEN HE RETIRES IN FIVE YEARS.

Teacher Planning

(1) I recommend that the student prepare for the following job titles.

AUTO BODY REPAIRER (Title or area) SHOP ESTIMATOR (Title or area) AUTO PAINTER (Title or area)

(2) I concur with the student's choice(s) of occupational career(s). Yes X No ___

(3) List any additional student services you would recommend for this student.

Counseling ___

Career Information ___

Academic Tutoring in ___

Reading ___

Math ___

Other (Specify) BUSINESS OFFICE COURSES TO ACQUAINT EVA WITH ACCOUNTING PROCEDURES

(4) This IEP was prepared on 9/1/80 and should be reviewed in 6 weeks.

(5) Comments: Eva seems extremely interested in pursuing a ca[illegible] shop ownership. I highly recommend some cross-program planning between auto body repairs and [illegible] courses to help her fulfill her career aspirations.

Teacher's Signature Date Student's Signature Date Parent(s) Signature Date

IEP - "OPEN FORMAT"

EVA KAUFMAN
Student's Name

UNIT: AUTO BODY SHOP OWNERSHIP

COMPETENCIES		Date Assigned	Date Completed	Proficiency Level
050501	ESTIMATE COST OF REPAIRS			
050502	WRITE REPAIR ORDER			
010101	ALIGN HOOD/DECK PANEL			
010102	ALIGN DOOR			
010103	RMV/RPLC BUMBER			
010104	RMV/INST. (NEW) DOOR			
010105	RMV/INST. (USED) DOOR			
010106	RMV/INST. FENDER			
010107	R&OUT DAMAGED BODY			
010108	RMV/RPLC RADIATOR			
020101	RECEIVE VISITORS			
030401	LOG INCOMING DOCUMENTS			
020301	PROCESS INCOMING COMM.			
040201	ALPHABETIC FILING			
040301	NUMERIC FILING			
040501	SUBJECT FILING			
040602	CORRESPOND. FILING			

CONCLUSIONS

This teacher's guide to individual program planning surveyed five areas related to individualized education. First, definitions of terms were offered. This was followed by a description of some of the advantages that individualized systems offer to teachers and pupils. Third, theoretical approaches to individualized instruction and education were presented. These were succeeded by descriptions of five individualized programs currently in use. The final section examined the adoption of competency-based occupational education materials into an individualized format. In this section specific guides for completing ISSOE Form 1 were offered.

It is hoped that this information will assist occupational educators in individualizing this teaching to accommodate pupil needs. Should teachers or other educators have questions related to either this booklet's contents or the completion of Form 1, please do not hesitate to call the Cornell Institute for Occupational Education (607)256-6515.

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