DOCUMENT RESUME

ED 097 879 IR 001 241

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TITLE Planning and Operating an Individualized Learning Center.
INSTITUTION Cook Christian Training School, Tempe, Ariz.
PUB DATE 74
NOTE 114p.
AVAILABLE FROM Cook Christian Training School, 708 South Lindon Lane, Tempe, Arizona 85281 ($5.00)

EDRS PRICE MF-$0.75 HC-$5.40 PLUS POSTAGE
DESCRIPTORS American Indian Culture; *American Indians; Individualized Curriculum; *Individualized Instruction; *Individualized Programs; *Instructional Materials; *Instructional Materials Centers; Language Arts; Manuals; Mathematics; Media Selection; Post Secondary Education; Problem Solving; Reading; Teaching Methods
IDENTIFIERS Arizona; *Cook School; Individualized Learning Centers

ABSTRACT

Information useful for the initiation and operation of an individualized learning center (ILC) is provided in this manual which also includes an evaluation of the ILC for the American Indian students of the Cook School in Arizona. The recommendations in the manual are based on the experience gained in operating the ILC at the Cook School. The manual details in great depth aspects of an ILC; the processes of planning, staffing, and organizing an ILC are described along with the important areas of institutional support, finance, and selecting objectives. The administration of an ILC and the processes of monitoring and grading student progress are also described. The evaluation concluded that students using the ILC at the Cook School made statistically significant gains in reading vocabulary and comprehension, mathematics computation and problem solving, and language arts, but not in spelling. An attitude inventory indicated a positive feeling toward the ILC. The extensive appendixes contain many of the forms and descriptions of the material used in the ILC. (WH)

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PLANNING AND OPERATING AN INDIVIDUALIZED LEARNING CENTER

David Campbell
Gary Kush

COOK CHRISTIAN TRAINING SCHOOL

TEMPE, ARIZONA

AUGUST, 1974

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Popham, W. James. An evaluation Guidebook. Los Angeles: The Instructional Objectives Exchange, 1972.

PREFACE

When adult Indian students in a post-secondary education program are making three to five years academic gains in such areas as reading, language arts, and mathematics in only three or four months; when the average rate of attendance is over 98%; and when the grade point average for the institution is raised one whole grade point, in our opinion these results and procedures should be shared.

The Individualized Learning Center at Cook Christian Training School i Tempe, Arizona has now completed its second year of operation. Thanks to a grant from Lilly Endowment, Inc., a lot of hard work by staff, and a considerable amount of student enthusiasm.

This Manual has been developed for persons working in the areas of Indian adult basic education, college preparatory and/or remedial education, and church career development. Other persons may profit by using this Manual because an Individualized Learning Center is more than, and not necessarily dependent upon, a "place." Persons working in the area of secondary education among Indian people may find individualized instruction a useful alternative or supplementary instructional system.

As these two years come to an end, special appreciations are rightfully due to Lilly Endowment, Inc., for their cooperation and support; to Jeanne Smith, John Hogue, Roberta Yazzie, and Bill DeBoer, who as full or part time teachers have helped not only in the development but also in the operation of the ILC; to Carolyn Ray, who for a year and a half as a secretary, handled much of the paper work; to Dr. Cecil Corbett, Executive Director of Cook School; and to the

other staff members who were trusting enough to give us a chance and supportive enough to make the ILC possible; and to the many visitors who at the right time (when we were discouraged) told us that the ILC had promise.

David Campbell, Director
Developmental Learning Laboratory

Gary Kush
Dean of Instruction and
Project Supervisor

July 1974

INTRODUCTION

What do you do as an educator when you are faced with any or all of the following conditions:

1. WIDE DIFFERENCES IN STUDENT ACADEMIC BACKGROUNDS. What do you do when students educational backgrounds vary from grade school to college so that the differences among students are greater than the similarities which make it difficult if not impossible to have traditional classes?

2. SCHEDULING DIFFICULTIES. What do you do when, because of the many student differences, as well as factors such as academic programs, employment, illness, and family situations make it a nightmare if not an impossibility to schedule the right classes for the right students at the right times?

3. NEGATIVE STUDENT ATTITUDES TOWARDS THEMSELVES AND EDUCATION. What do you do when, because of past negative experiences in school, students are hesitant to learn because of their fear of failure?

4. LIMITED INSTITUTIONAL RESOURCES. What do you do when there are insufficient funds and personnel to solve the above mentioned problems with usual educational methods?

Cook School was confronted with these conditions and others. For us, "individualized instruction" provided in an "Individualized Learning Center" helped us find a partial solution. This Manual was developed in order to disseminate our procedures and results with others in similar circumstances who might learn from our experience and/or want to replicate our experiment.

Background of Cook School

Cook School is a private, church-related, post-secondary institution which has for over 65 years prepared Indian leadership for the Indian church and community. Students have come to Cook School in the past from over 65 tribes and from 27 states and provinces of Canada. The school, located in Tempe, Arizona, (a suburb of Phoenix, Arizona) is governed by a predominately Indian Board of Trustees which widely represent the various denominations and institutions working in education among Indian people.

On the average there are 100 Indian students, 18 years of age or older, who are in residence at Cook School and of these students, approximately 50 are taking courses full or part time. In addition to the resident program, Cook School offers education by extension in various forms to an additional 1,500 persons.

The programs of Cook School are in three general areas: adult basic education, college preparatory, and church career development. These three areas of programs, which are distinct for many Indian educational institutions, are combined at Cook School. Cook School has, therefore, served as a useful laboratory for the development of educational programs which could be applicable to persons working in Indian adult basic education, college remedial education programs, and church leadership development projects.

The Nature of the Problem

In 1971 Cook School conducted an educational needs assessment using the Iowa Test of Educational Development to determine present student status in the various basic study areas. It was discovered that on the average, student abilities were at the grade school level despite the number of students who had completed high school and that the differences in backgrounds were greater than the similarities, thus making the traditional approach to education an impossibility. While these measures were being taken, faculty and administrators were considering the educational levels which students should have for entering programs and at the time of completion of programs. It was decided by the school that students should have an eighth grade level of reading and language arts and a sixth grade level in mathematics before entering the school resident programs or beginning college studies.

Once we had determined present student status and desired student status, we had to consider how, with limited resources, we could bridge the gap. We

considered three basic options.

The first option we examined was to "change the student body." It is at least tempting, if not possible, to consider changing the nature of the student body when their entry level is far below the desired study academic level, but this option proved to be illogical. Studies have shown that on the average Indian students reach but the eighth grade and that their educational background as measured by standard tests is often below the eighth grade level.

The second option we considered was to add more staff and classes, but to do this could have meant a student-faculty ratio of two to one (two faculty for each student) in order to have the number of specialists needed for the student body. By adding more staff and classes we would have proliferated the number of courses making it impossible to provide a logical schedule of classes. It was clear to us that the traditional approach to learning was an impossibility as long as we maintained our primary concern for student learning.

After considering the third option (to find other employment), we gave careful consideration to the feasibility of individualized instruction and an Individualized Learning Center. After a careful review of literature was done and many discussions were held, a proposal was conceptualized and submitted to Lilly Endowment, Inc., in the spring of 1972 and was funded in August 1972.

The remainder of this manual explains and illustrates the questions which we considered, the answers to our questions, the steps which we went through, the resources which we used, and the results which we experienced.

The manual is in two parts. Section I is designed as a "How to do it" booklet for those who would like some answers to the problems indesigning, equipping, and operating an Individualized Learning Center.

Section II contains a description of the evaluation procedures used to answer certain questions we had about our particular learning center and the student population we served.

Since the sections may be considered or used independently, we have provided a separate appendix for each.

SECTION I

PLANNING, STAFFING AND OPERATING AN INDIVIDUALIZED LEARNING CENTER

PLANNING, STAFFING, AND OPERATING AN INDIVIDUALIZED LEARNING CENTER

OBJECTIVES

Some of us who had been singing the praises of individualized instruction for years suddenly found ourselves in a position to start practicing what we had been preaching.

One happy day in August 1972, we learned that Lilly Foundation was funding our plans for an Individualized Learning Center.

We discovered quite early that moving from the concepts and theories of individualized instruction to the nuts and bolts of actually putting a center into operation is a sizable step. We longed for a comprehensive "how to do it" manual. If there was such a publication around, we never found it; so we have written one of our own.

It occurred to us that there may be others who want to put together a learning center and who would appreciate some suggestions from those who have been there.

Our experience in designing, staffing, equipping, and operating an Individualized Learning Center (I.L.C.) is limited, and therefore so is our expertise. However, if we had known two years ago what we know now, our trip would have been a lot easier. We don't have all the answers; but we do have some, and we would like to share them with you.

The objective for our manual is that those who use the manual will:

1. Know the major steps involved in designing, staffing, equipping, and operating an I.L.C.
2. Be able to accomplish the necessary first steps of establishing institutional and faculty support for this approach to learning.

3. Be able to produce a flow chart or program calendar as a guide for making decisions and meeting deadlines.
4. Be more knowledgeable about designing, building, and/or purchasing furniture and equipment.
5. Have a list of learning packages which we have found to be successful (and some which were not).
6. Have examples of some tested procedures for:

   scheduling students

   writing contracts

   monitoring student progress

   grading

   reporting to students
7. Have a description of some evaluation procedures, including the instruments which were used.
8. Have some sample attitude surveys for students and staff.
9. Have samples of some of the many forms (instructions, recording data, student progress, etc.) we found helpful.
10. Have an estimate of the time and costs involved in accomplishing these things.

INSTITUTIONAL SUPPORT

Putting the most modest I.L.C. into operation is impossible without the support of those who make the decisions about capital outlay, budget, and personnel. This institutional support must necessarily be more than a nodding approval of an idea. It will usually involve a firm commitment on money, staff for planning, space, and time. To the extent that other teaching staff

will be involved or affected, their approval is certainly important.

Whether you are a faculty member going through the "proper channels" to the board or a spokesman for a group of interested parents, you will need to do your homework. This homework, or planning, will be much the same in either case.

After offering some convincing (we hope) arguments for this approach, you should be ready to offer some practical suggestions about how to do it.

Why an I.L.C.?

Here are some benefits from this approach to learning which might be used as arguments, if needed.

1. We all pay lip service to "individual differences" in students. Our traditional "cells and bells" approach to schooling, however, makes it nearly impossible to do anything about it.
2. An Individualized Learning Center allows for individual differences because:
   - students enter a learning sequence at their level of ability and understanding,
   - students move through instruction as fast as their interests and abilities permit,
   - students exit when and if they have demonstrated mastery, not because the period is over or the teacher's lesson plan dictates that the next unit must be started,
   - an instructor and/or teaching aide in an I.L.C. can provide personal help to a student when he or she needs it. This is not always possible in the traditional classroom.

- the tensions of competition (and the inevitable failing grades for many) are reduced. It is now possible for almost all students to succeed by making time the variable. This simply takes advantage of the fact that any reasonably normal youngster can master the tasks required in a typical public school. It just takes some longer than others.

Some additional benefits -

3. Students will have more opportunity to practice those behaviors we label "self-motivating," self-propelling," and "self-directing." We do want this, don't we?
4. An I.L.C. allows for great flexibility in scheduling not possible in the "cells and bells" routine.
5. The number and variety of courses or subjects offered is limited only by the availability of well-designed instructional systems - not by the availability of additional rooms and teaching staff.
6. Because the chances of failing are reduced, the needed to cheat to survive or succeed is also reduced. The student's grade is determined by what he or she accomplishes as he or she works through the material, not by how he or she compares to others.
7. The number and quality of programmed and other kinds of self-instructional products is increasing.
8. And last, but certainly not least, this approach to learning seems to make a lot of sense to students. This is the case with the older students we have surveyed.

Arguments such as these should make sense to board members, parents, teaching staff, students, or anyone else who believes that schools should be in the

business of learning.

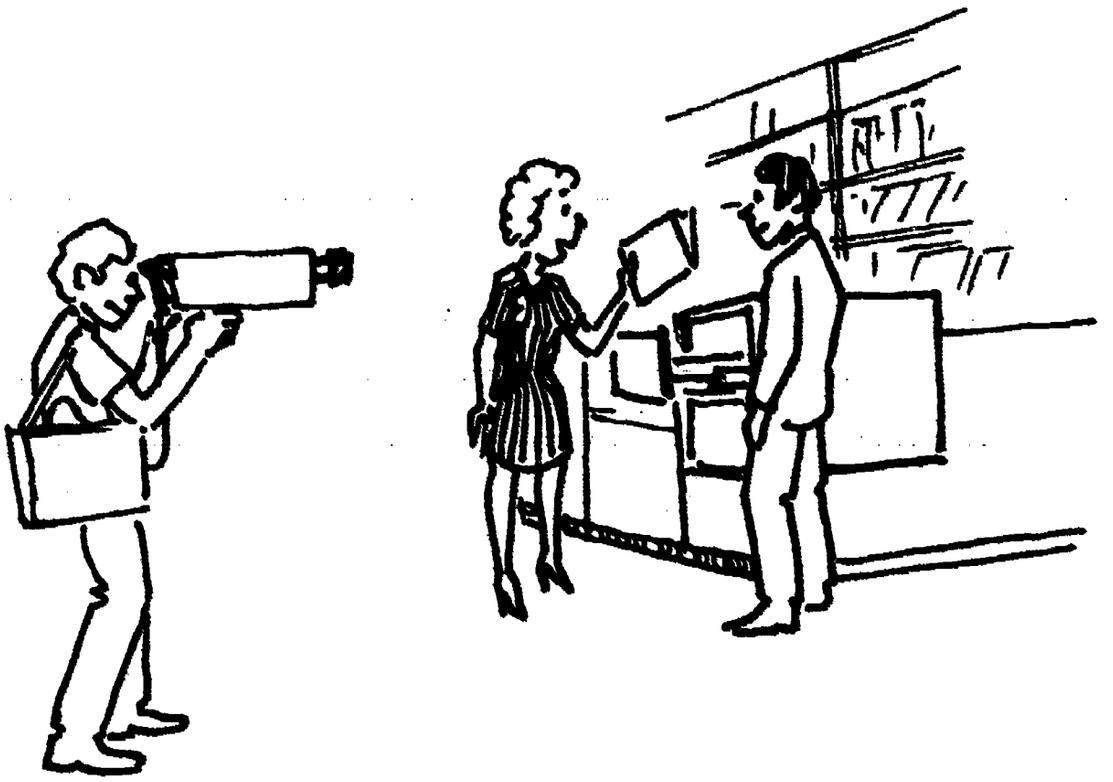
An I.L.C. cannot do everything. One important kind of learning is that which occurs during group interaction. This is not easily accommodated in an I.L.C. and must be provided for elsewhere.

Personnel

A commitment to start planning an I.L.C. should include at least one staff person full time for this effort. Others will be involved part time as particular talents are needed (such as someone to do the working drawings for remodeling an existing space or designing a new facility).

Tactics

To gain staff support and understanding, a visit to an I.L.C. may be helpful. There are those who seem to have trouble dealing with concepts and need to see an actual center "in action." If this first-hand experience is necessary, it may be accomplished in two ways. You might make arrangements with the director for a "tour." Or, you might take a portable TV camera or still camera and a cassette recorder and bring back an audio (interview) visual report to show to staff members and parent groups. We used this latter approach and found it to be most effective in building staff understanding. Be sure to let the director of the center you are to visit know what you are planning. If the director and his or her staff are expecting you, you will probably find that they are more than anxious to "show and tell." Remember to go with a list of carefully prepared questions for your interview.



Cost

How much does an I.L.C. cost? Obviously, there is no simple answer to this. There are some estimates which can be used for planning, however.

For an I.L.C. of from 20 to 25 student stations, a figure of $400 per station will work pretty well. This figure will include costs of furniture, machines, software, and office equipment. This does not include costs of remodeling existing space or building a new facility. Remodeling an existing classroom might be done for $2500 and would include carpeting, adding electrical outlets, and partitioning for office and work space.

We based our estimates on the following costs:

3 tables, 3'x6' (12 stations) @$150	450
13 carrels, "wet" @$125	1600
25 chairs @$12	300
8 deck-mounted cassette players @$120	960
4 machines @$200	800
1 video tape player	1200

1 TV monitor	150
Office furniture and equipment	1500
Shelving (purchased or built in)	400
Software (learning packages)	1500
	$8860

See appendix for drawings of learning centers.

The two figures which would vary the most are software and machines. What you spend in this area depends, of course, on how many skill areas you plan for, the range of materials (grade levels), and the hardware involved.

These various elements will be discussed in more detail later.

How much planning time?

An I.L.C. may be as simple or as comprehensive as your need and resources dictate. It may be set up to deal only with improving reading skills, or it may be designed to improve skills in many subject areas.

If a number of decisions have already been made (number and kind of students and learning objectives identified), one semester should be enough for planning. The physical space for the center can be readied while the staff planner selects and orders the necessary instructional materials and equipment.

If, however, you are starting with only the idea that some kind of I.L.C. might meet some of your needs, you have much to do. In this case, we would recommend a full time staff member for the full school year. This person would gather data about I.L.C.'s and meet periodically with other staff to follow through the steps outlined in this manual.

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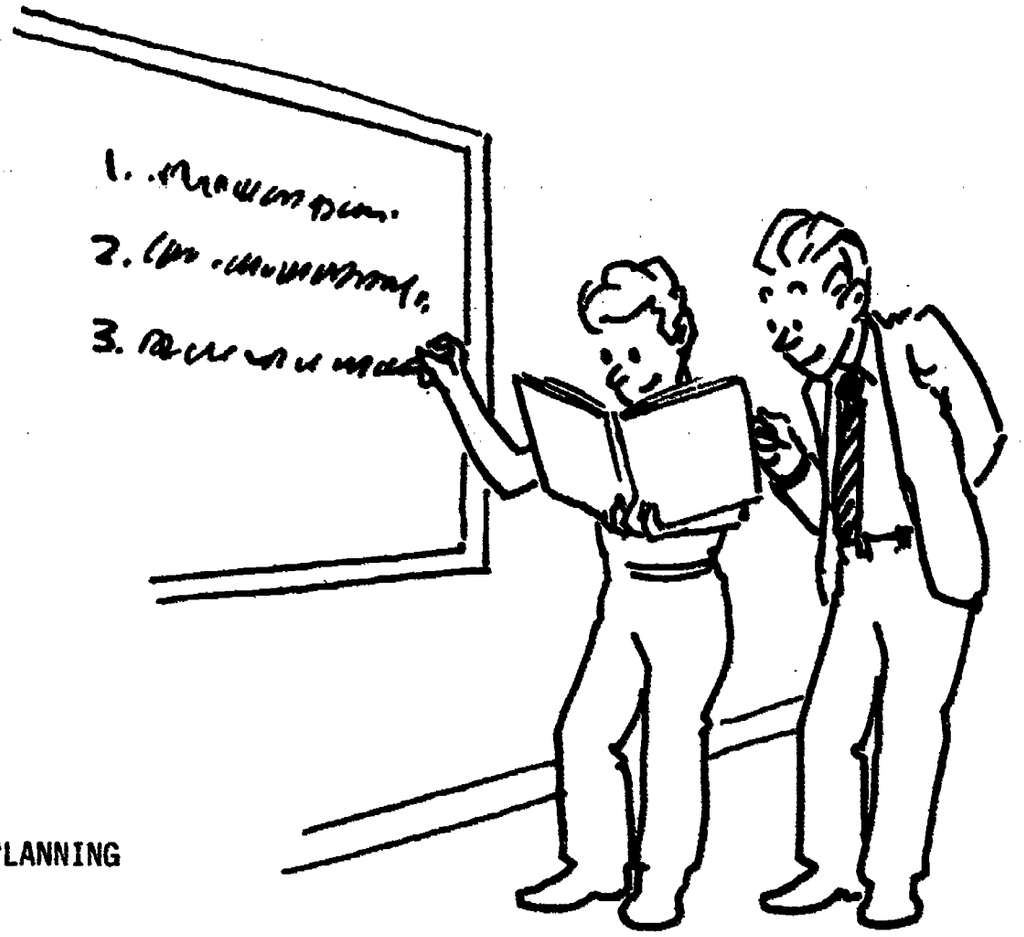

PLANNING

Planning Tools

Planning calendar (see Appendix G)

Using a planning calendar can be very helpful in keeping you on the track and meeting deadlines.

A planning calendar, and the charts used to display a planning calendar, spell out -

what tasks are to be accomplished

the order in which they occur

what persons are to perform these tasks

when each task is to start

when each task is to be completed

Putting this down on paper and making copies available to all who are involved in the planning has many advantages which should be obvious.

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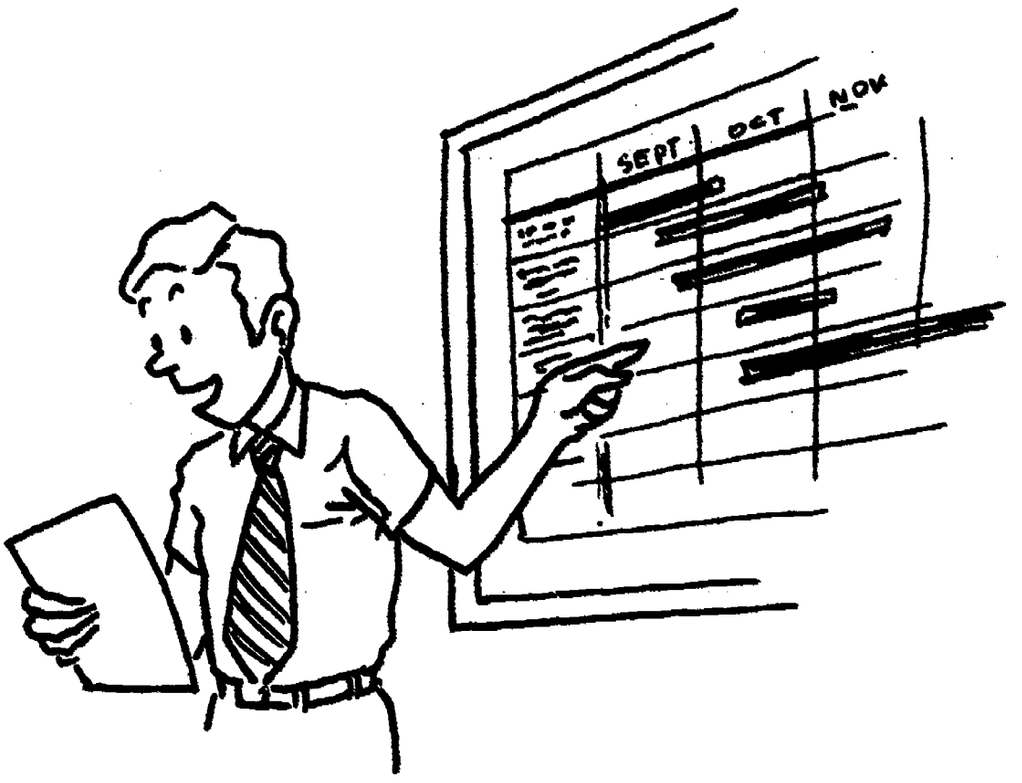


We have included a sample planning calendar and chart used to display the various tasks. You will note that some activities must follow others but many can overlap or be occurring at the same time.

Flow Chart (See appendix H)

The flow chart which we used in planning our I.L.C. is included to give you another example of a planning tool which might be useful.

The one element which makes a flow chart different from a calendar is the "decision block." These are a series of critical conditions which must be met before other activities can proceed. These conditions are in the form of questions which can be answered "yes" or "no." If "yes," you proceed to the next activity; if "no," what then? The flow chart should show what happens then.

Anticipating possible problems and planning alternatives will reduce the number of "surprises." Surprises are fun on your birthday but not while you are thrashing your way toward a deadline.

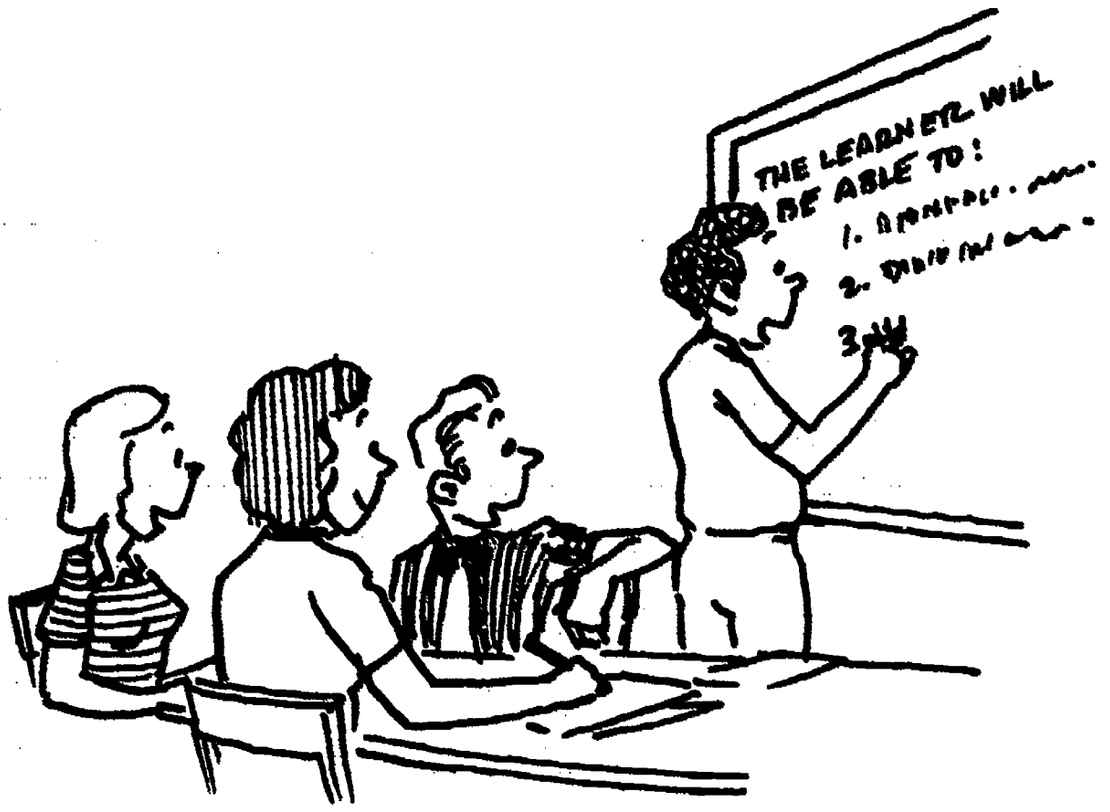
Instructional objectives

This discussion will reflect our peculiar bias about instruction. We assume that our obligation as educators is causing and evaluating learning, not merely providing instruction; there is a difference.

If you accept this discipline, you accept the obvious implication that you cannot make intelligent decisions about kinds of instruction and materials until you have determined what specific skills are to be learned by what kinds of students.

We do not see an I.L.C. as a study hall, as "supplemental" or for "enrichment" or as a novelty to demonstrate that we are into the latest educational fad. We do see the I.L.C. as a very effective vehicle for causing certain kinds of learning.

What has all this to do with planning? Simply this: you cannot design a facility to accomplish "X" until you have defined "X."



Learner performance objectives

Let's start by identifying the kinds of learners who will be using the center. Identify how? By age? By grade level? By demonstrated needs in particular skill areas? The last would seem to make sense.

Next, determine those particular skills to be learned or improved which your I.L.C. will deal with and the range of abilities to be accommodated by the instructional materials.

"Range" refers to entry and exit levels in any kind of instruction which is sequenced, such as instruction in reading. For example, will your self-instructional materials in reading range from 4th through 8th grade, from 7th through 12th, college level?

By now, most of us are familiar with the form of "behavioral" or "learner" objectives. These "performance" objectives described what the learner is able

to do as a consequence of instruction. In order to define entry and exit levels for the various areas of instruction, it is necessary to write instructional objectives in this form.

For example, "The student will demonstrate a reading level of grade ____ or better as measured by ____(test)____."

This criterion measure may be used as a prerequisite behavior for entering or exiting an instructional unit or program.

One of the most commonly used methods for describing levels of academic achievement is "grade level." Although not precise, using grade level has some practical advantages. Many publishers of self-instructional materials describe the range of their products this way. Many standardized achievement tests yield scores which translate into "grade level." This is also a term which seems to be generally understood by the layperson.

What constitutes "Mastery?"

For most cognitive learning, a quantitative definition of mastery is the performance level (score) on some kind of test. Whether "mastery" performance shall be 100%, 95%, 90%, or something less is an arbitrary decision based on the particular importance attached to the learning involved. When a particular skill is an essential prerequisite for subsequent learning, complete mastery is required. Stated another way, everyone must get an "A" in the unit or program before he or she proceeds to subsequent units.

Remember, we are not interested in developing bell-shaped curves; we are interested in causing learning. There is no need to continue to demonstrate that there are individual differences in aptitude for learning; this has been pretty well established.

We are aware of the many criticisms of standardized achievement tests (norm-referenced tests). However, until such time as there is a consensus about what, precisely, constitute the essential academic skills, how they are best taught/learned, and how they are measured, we will suggest that these tests provide a useful estimate of student learning.

An alternative, of course, is to develop your own specific criterion measures and try to match instruction to these. This is a formidable task. For example, the Instructional Objectives Exchange book lists 313 objectives in the area of reading for kindergarten through third grade.

Matching specific instruction to each of these would require a great deal of time. We doubt that the typical school system is prepared to commit resources to this kind of effort. Therefore, our model for a learning center is more modest. It does not answer all of the criticisms of our traditional approach to schooling, but it does satisfy some of the more obvious ones.

SELECTING INSTRUCTIONAL MATERIALS

The materials used in an I.L.C. are self-instructional (auto-tutorial). Any book we might read and learn from could be considered "self-instructional" in that sense. However, we are talking about something more than this.

Criteria

To meet our definition of "self-instruction," a learning package or system must meet a number of criteria:

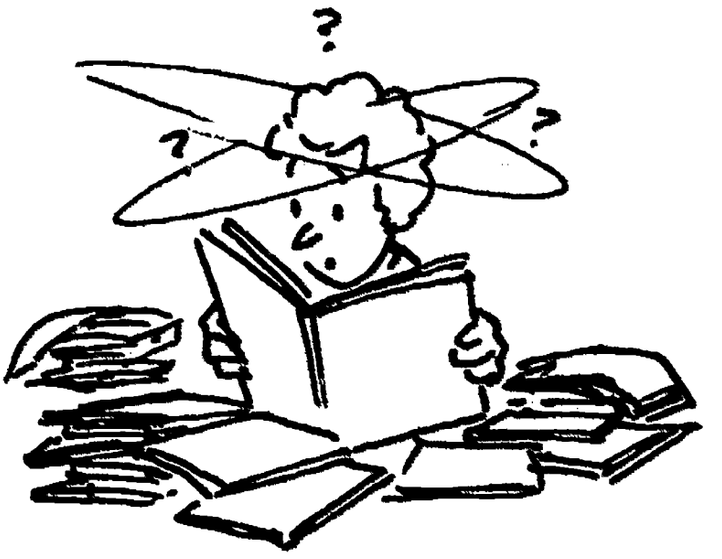
- it should have pre- and post-tests to monitor and measure student gain
- it should have diagnostic or prescriptive tests to determine student's present status and entry level into the material
- it should have learning objectives stated in performance terms

- it should have criterion tests to measure the achievement of these objectives.

Most commercial materials which are offered fail to meet these criteria.

After you have made some decisions about skills to be learned and have set some limits as to range, you come to the fun part. "Which one shall we buy?"

Selecting particular kinds of self-instructional materials from the myriad of stuff offered for sale was the most challenging and time-consuming part of putting together a learning center. Apparently most manufacturers are able to sell their wares with a glib sales pitch and attractive packaging. It is a rare company and/or salesperson who can (or will) furnish validation information containing hard data on the effectiveness of their materials. Happily, the pressure is on the producers of instructional materials to become more accountable. (Note the new California and Florida laws requiring publishers to show some evidence that their educational materials will do what they claim.)



See appendix O for a list of some materials we have used and would recommend.

Individualized vs personalized

The materials we use are individualized only to the extent that a student works through them at his or her own level and at his or her own rate. Because of his or her performance on a diagnostic pre-test, the student may be working

in only certain parts of the material. In the more precise sense, the materials are not really individualized; that is, they are not personalized or designed for that student alone. See instructional model next page.

What instructional mode is most effective?

This is like asking which holds more, a bag or a box? So far as we have been able to determine, there is no one "best way" to present instruction. A well-written programmed book in math can be more effective than a poorly-designed program using sound/filmstrips, color slides, or films; and it is a lot less expensive.

Our learning center, which emphasizes training in basic academic skills, uses the following modes:

printed programmed materials

sound/filmstrips

audio cassette tapes

video tapes

sound/slide

Most of our materials are in a printed, programmed format.

Many of our learning packages use more than one mode. For example, in our study skills course (six units), we use programmed text, video tape (a tour of the library), and audio cassettes (for listening-notetaking). Some particular skills obviously dictate the mode to be used. Improving skills in listening and notetaking require that the student listen to lectures or discussions while he or she practices organizing and writing down in appropriate form what he or she is hearing. You don't develop this skill by reading about it; you learn to listen and take notes by listening and taking notes.

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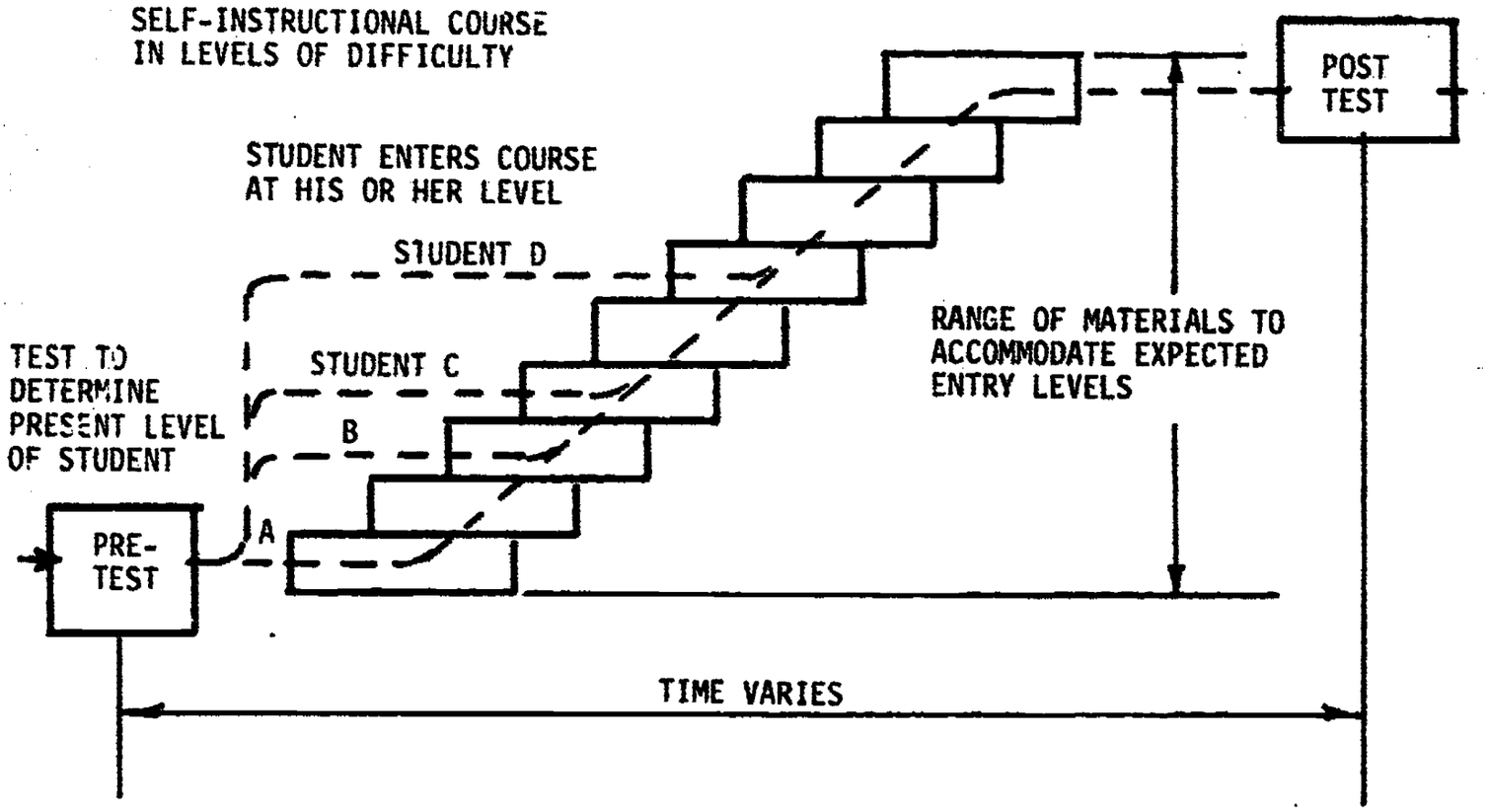
BASIC INSTRUCTIONAL MODEL IN AN

INDIVIDUALIZED LEARNING CENTER



Time to reach mastery level will vary depending on:

1. where student enters the learning unit
2. how many hours per week the student spends working in the unit
3. student's aptitude for learning
4. student's motivation

Range and levels of materials

You may be planning your I.L.C. for elementary, high school, or college level students or for adults. Reading materials designed for elementary students in the fifth grade will probably not be appropriate for use by adults reading at the fifth grade level. There are self-instructional reading materials made for both groups.

PHYSICAL FACILITIES

Just as there is no one best instructional mode, there is no "best way" to layout a learning center. We can discuss some options and make some suggestions, however.

A typical learning center will require these elements:

1. Student stations
   a. tables (which seat four)
   b. carrels purchased or built in (some with cassette players)
2. Open shelving, adjustable, for instructional materials
3. File cabinets (2-drawer)
   a. one for student folders
   b. one for instructors (tests, answer keys, manuals, forms, etc.)
4. Instructors' station (desk, storage)
5. Private area (office), sound proof (counseling, visitors, phone calls, etc.)
6. General storage, supplies
7. Work area (optional) for instructional product development.

In planning space requirements, the ideal situation is to start with instructional objectives. These determine the kinds of learning programs, packages, and systems to be purchased. These, in turn, dictate the kinds of

space needed to accommodate them. See appendix for suggested layouts for remodeling a typical classroom.

General considerations

If there is good general lighting throughout the room(s), it is not necessary to have lighting in individual carrels. Carpeting is a must for reducing noise level, for maintenance, and to make the center more attractive.

How many student stations?

We would suggest 25 as maximum for any one area or room. This is perhaps as many as an instructor or tutor can keep up with. Keep in mind that in an I.L.C., at any one time students will be working at different levels in many different programs. There is no way to predict who will need what kind of help or when.

Carrels or tables?

We use both. After observing our students for a year, we discovered that they are equally divided as to their preference for a place to work. If the learning package requires the use of special equipment, the student will go to the machine. If a programmed text is being used, the student may elect to work in a study carrel or sit with others at a table. Carrels provide more privacy, which is important to some students.

Audio cassette players

We recommend that such units be playback-only and that they be built into a carrel if possible. Playback-only eliminates the possibility of tapes being erased. Having units built in ("deck mounted") eliminates the problems of storing, checking in and out, damage from handling, and having them "walk off."

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Deck-mounted units are available from Avid Corp. (model 505 LC) and from Wollensak (model 2505 AV).

How many?

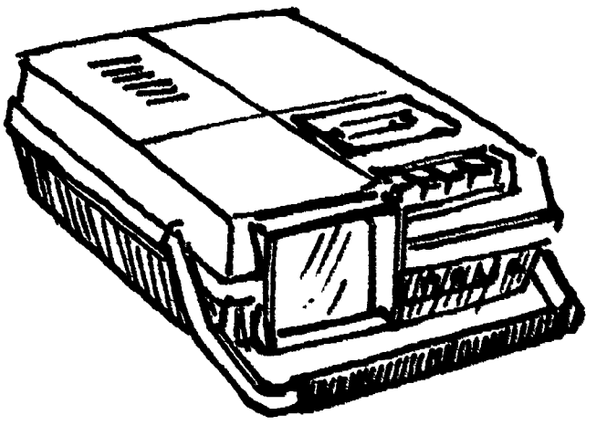
This, of course, depends on how many student stations you plan for your I.L.C. and how many of your programs will use audio tapes. As a rule of thumb, we would recommend that up to one third of the stations be "listening stations." Since the students will be using headsets, you will not need speakers with the cassette players. See sketches for layout suggestions.

"Viewing stations"

We use a sound filmstrip projector, a sound/slide projector, and a video tape player and monitor. We felt that the problems involved in trying to operate a 16mm projector in our I.L.C. ruled out any benefits. If we need a film, we put it on video tape and use it with our video tape player.

What kinds of machines?

Because of our limited experience in using projectors, we are really not qualified to recommend specific models. There is an organization which does this, however. "E.P.I.E.," Educational Products Information Exchange, (see appendix) is a sort of Consumers' Union of the education business. In a special E.P.I.E. report (No. 60, March 1974), the cassette sound filmstrip viewers are evaluated. The standard LP 10-2 is recommended. Prices of the machines evaluated ranged from $129.50 (Singer) to $295.00 (Dukane). (See appendix J)



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We are involved in developing some of our own instructional products so we purchased a sound/slide projector (3M model 625 Sound on slide projector recorder). This machine will allow you to put together a learning package with color slides and accompanying narration which can be updated or modified easily. This is an expensive machine, but could be justified if you have time to develop materials for it.

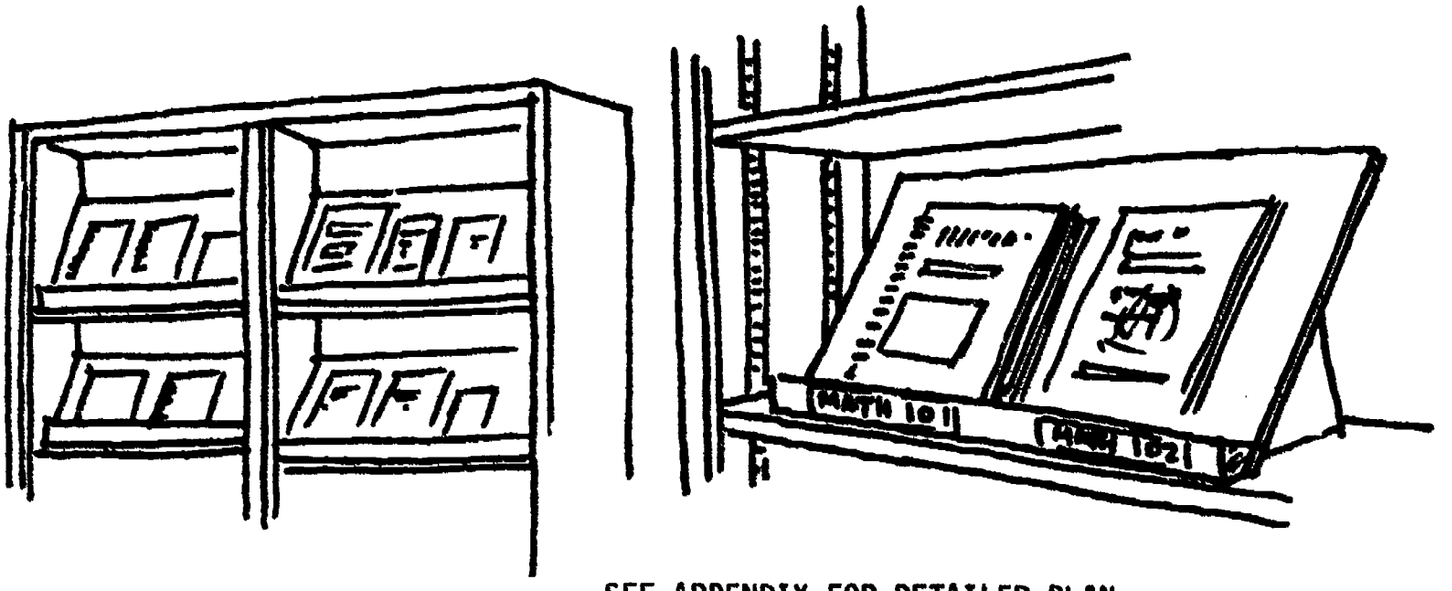
Most of these machines can be used in a carrel set up for that purpose. It is easier to have the student go to the machine than to be lugging the machines around.

See the accompanying sketches for layout suggestions. (See appendix N)

Storage of instructional materials.

The first consideration is to make the materials accessible to students. To allow for growth of your I.L.C., it is best to make provisions for lots of adjustable shelving.

At this point, a picture is probably worth many words so we have made sketches of some ways to display materials that have worked well for us.



SEE APPENDIX FOR DETAILED PLAN

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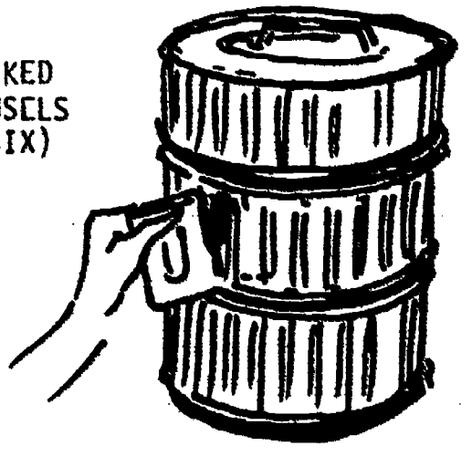
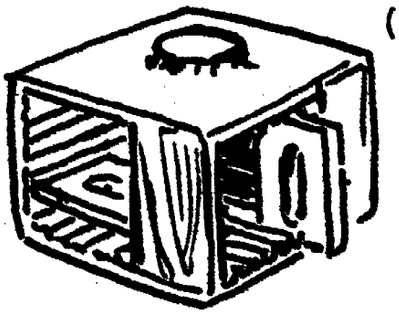
CASSETTE STORAGE

STACKED CAROUSELS (DOSIX)





(DYNASOUND)

Need for separate room

There are many times during the day when the director and/or instructor(s) of the I.L.C. are involved in conversations other than tutoring. The phone rings, another staff member comes by, a private conference with a student is needed, a salesperson drops in to show you that new unit in math, "visiting firemen" want to see and talk to you about your I.L.C., etc. It has been our experience that students resent these interruptions, particularly if they take place in the study area. It is important, therefore, to provide a private area where these activities can take place. It is also important that the space be close by and somewhat sound proof but not isolated visually. A glass panel in a separating door will take care of this.

Staff work area

Whether this is necessary depends on the extent to which staff members (I.L.C. staff and others) will be developing their own self-instructional materials for use in the I.L.C.

If the bug gets you, it can be fascinating work. It takes a lot of time to do properly, however, The discipline involved in developing self-instructional materials which include specific performance objectives and

pre- and post-tests which measure the achievement of these objectives may be foreign to many teachers.

Equipment for instructional product development

Again, the need here will be determined by staff interests and talents, budget, student learning needs, and time (the most precious resource of all). We have experienced the frustration of having a list of learning packages to do and the space and equipment needed but not the time to work on them.

Assuming that you have the time and plan to get into this, you will find these items helpful:

chalk board	planning board
drawing board	desk, table, or counter
cassette recorder	typewriter(s)
machine for copying	machine for binding

ADMINISTRATION OF THE I.L.C.

Up to now we have not defined the kinds of students the I.L.C. might be serving.

If your I.L.C. is for adults, certain procedures will be different than if you are part of an elementary or high school. Elementary or high school students may be assigned to work in the I.L.C. and may have very little choice as to subject areas and the hours they will be in attendance. For adults, the I.L.C. will almost certainly have to be open several evenings a week, and the scheduling will be more flexible.

Scheduling

Because of the limited number of stations, students will need to be scheduled in the I.L.C.

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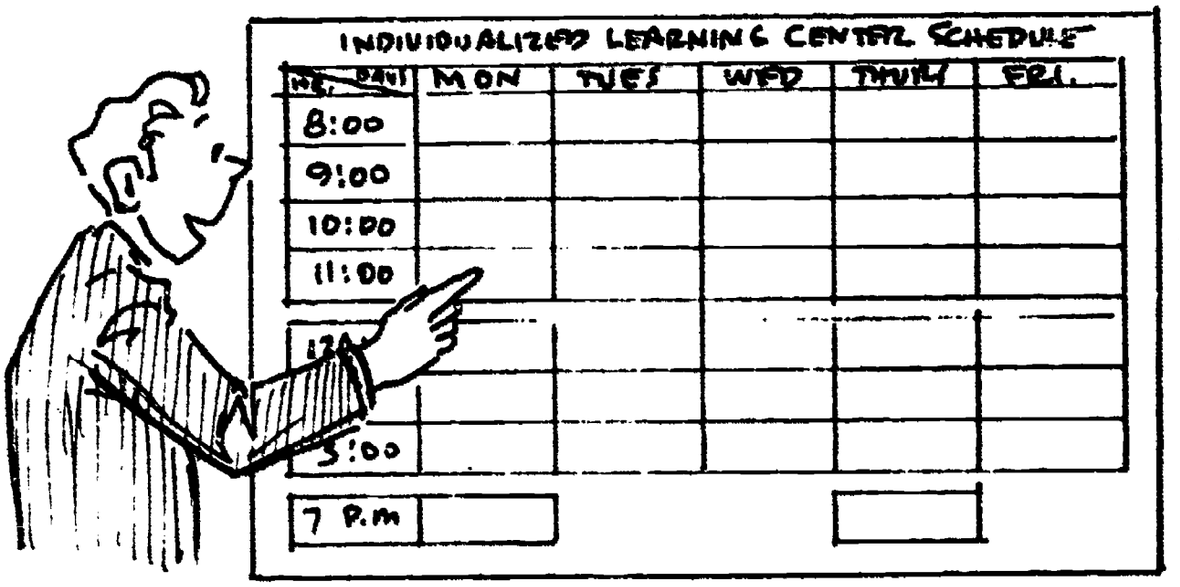
One of the great advantages of an I.L.C. is the flexibility it offers in scheduling students. For any particular course, you can schedule a student for from one to ten hours per week (or more if really necessary). Three to four hours a day in an I.L.C., however, should be maximum for a student. The number of hours scheduled per week may be dictated by the amount of material to be covered in a six-week or semester period or by the number of other courses the student is taking.

Although this approach does not require that all students be at a certain level or place at a certain date, there should be some minimum acceptable rates for moving along through a program. Not all students will move at the same rate, but all should be making some progress.

We use a large sheet (30"x40") made out as a calendar week with a block for each period. The names of students are written into each block of the period for which they are scheduled. See sketch.



Another advantage to an I.L.C. is the ease with which students can make up or put in extra time. Unless every station is filled every period, a

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student should be able to come into the I.L.C. at his convenience to do extra work.

Combined I.L.C. and group classes

We have some courses which involve both study in the I.L.C. and group or seminar classes. For example, a student in an English composition class might meet with a group two hours per week and be scheduled in the I.L.C. for three hours per week. This assumes, of course, that the two activities would be planned and correlated.

MONITORING STUDENT PROGRESS

We have two ways of monitoring a student's progress. Each student has a file folder for each course or study unit which he or she is working in. Attached to each folder is a form which notes the days and hours the student is assigned to work in that unit. There is also a place for an entry to be made by the student after each study session in that unit, noting time in, time out, and what work was done. See a typical entry on the sample below.

SCHEDULE CONTRACT — INDIVIDUALIZED LEARNING CENTER

ROBERT WILSON (Student's Name) | 55 100 (Course #) | STUDY SKILLS (Course Title) | 3 (Credit Hours)

Days (Circle) (Monday) Tuesday (Wednesday) Thursday (Friday)

Hours (Fill in) 9:00 to 10:00 to 9:00 to 10:00 to 9:00 to 10:00

Robert Wilson (Student's Signature) — SEPT 10, 1974 (Date)

Date	Time In	Work Done	Time Out	Sovr's Initials	Comments
9/16	9:00	lesson 1, took tests exer. 1 and 2	10:00	JDb.	SCORES ON TESTS LOOK GOOD!
9/18	9:00	lesson 2, did exer 3a	10:00	JDb	I'LL CHECK WHEN YOU FINISH 3b.
9/20	9:00	did exer 3b	10:00	JDb	WHAT HAPPENED

STUDENT'S FOLDERS ARE FILED IN I.L.C.

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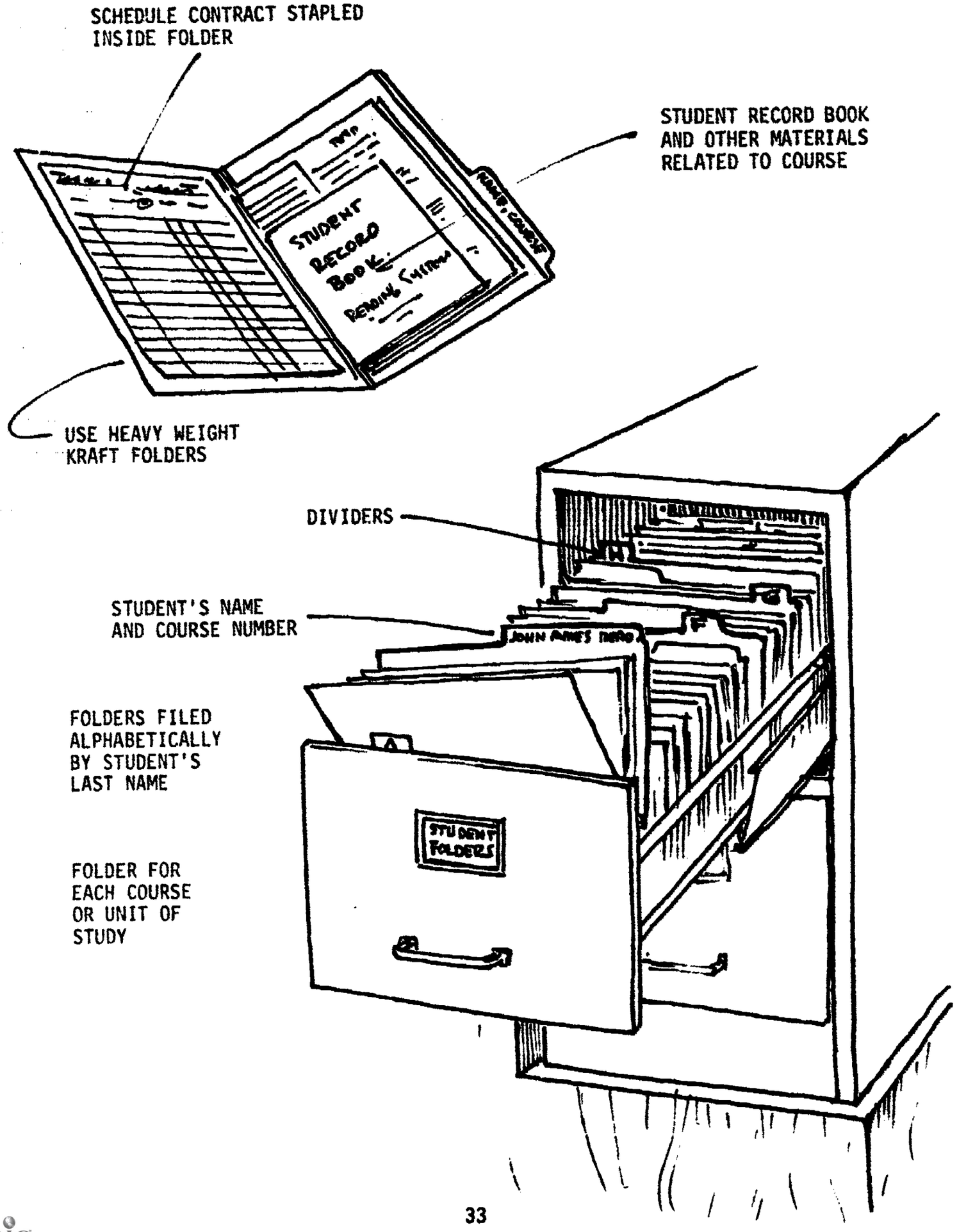

Ater making an entry on the schedule contract form, the student leaves the folder in an "in basket" on the instructor's deck. During or at the end of the day, the instructor checks through the folders and notes where the student is in the unit and how much is being covered during a period in the I.L.C. If the unit includes a booklet in which the student records answers to questions and problems and scores of en-route tests, this booklet is also kept in the folder. This provides a second record of progress. In most self-instructional learning packages, the student scores his or her own en-route tests over the sections in a unit. The instructor will administer and grade a pre- or post-test over the unit. The score on the unit post-test will determine whether the student goes on to the next unit or must review and retake the test.

Why pre-tests?

The answer to this should be obvious. If a student can demonstrate on a pre-test that he or she already knows the data, principles, concepts, operations, or whatever to be covered in a unit, what purpose is to be served by making him or her go through the unit? Unlike the mountain climber, we don't require the student to do the unit "because it's there."

A student works in a learning package or unit because his or her performance on a pre-test indicates that he or she lacks a particular skill that the unit is designed to help him or her acquire and one which we have previously determined is important. It may be important in and of itself or as a prerequisite for subsequent learning.

Being able to skip over units also has certain motivational value to students. This is one example of what is meant by the phrase "...moving through the materials at their own rate."

Some pre-tests are designed (or can be modified) to be diagnostic and are used to prescribe which sections a student is to study in a unit and which can be omitted. See the explanation of the Heywood math program as an example of this. (See appendix Q)

Consumable materials

Many of the commercial programmed texts are designed for the student to write in and would therefore be consumable. Buying 20 or 30 new copies of these every year or semester can be expensive. A student can just as easily mark his or her responses on a cut, lined, yellow pad or on a printed response sheet which can be run off on a copying machine. Some materials, such as S.R.A.'s kits, use "Student Record Books." These provide places to mark answers to each lesson and to record scores of the tests taken. These are not expensive and are therefore not worth trying to replace with some substitute of your own.

GRADING

Administratively, we have found this to be biggest headache. If your I.L.C. has to follow certain traditional procedures, such as grade reports every few weeks or at semesters, this can present problems.

If we sort students on the basis of the amount of work covered during a certain time interval, we are back in the same old bag of comparing students, which contradicts what we are trying to do. On the other hand, if we "grade" only the quality of work and not the quantity, we could say that everyone gets an "A." There is nothing wrong with this except that it doesn't seem quite fair to record as an "A" a student who got through only two units during the time that another student successfully completed eight units.

The belief that a "report card" with A's, B's, C's, D's, and F's on it really tells us something about what a student has learned is a belief that is largely a matter of habit and tradition. A report card which notes a "B" in math really tells us nothing about which math skills a student has mastered, if any. Most attempts to change this, however, are stubbornly resisted.

The best answer is simply a progress report describing where the student is. If comparisons must be made, the student's present status could be contrasted with the desired or expected levels to be reached. That is, his or her performance is compared to a criterion performance level, not to the performance of other students.

TESTING AND EVALUATION

The Achievement Battery

We use the results of these tests in two ways. First, they serve to determine the present status of the student. Deficiencies, if any, are noted and work in the I.L.C. is prescribed. We use a test which yields grade equivalent scores which makes placement in the materials easier. Secondly, giving the alternate form of these tests at the end of the year serves as one measure of the effectiveness of the learning center.

Most achievement batteries test in a number of sub-skill areas. This allows us to be more precise in scheduling. For example, a student is not enrolled in "math," he or she is assigned a particular kind of math at a particular level for a specified number of hours per week. Or, for language arts, the student is not enrolled in "English" but is scheduled a certain number of hours in punctuation or grammar or vocabulary or composition or whatever the test indicates his or her need to be.

This matching of instruction to student needs assumes, of course, that self-instructional materials at the needed level are on hand.

If your I.L.C. is part of a school system, giving these achievement tests to I.L.C. and non-I.L.C. students might provide data for comparing the effectiveness of what you are doing. Don't be afraid of these comparisons. You will probably come out looking good; if you don't, you should be the first to know and the first to want to do something about it.

We have noted gains of several grade levels in some skill areas after a student has spent only one semester in the I.L.C.

Other tests

Most of our self-instructional materials have their own tests. Many have small en-route tests which the student takes and grades himself or herself. Almost all have tests over major units which are administered and scored by an instructor.

ATTITUDE SURVEYS

Do your students like this approach to learning? Why not ask them? We have included a copy of a survey questionnnaire we have used for the past couple of years. The reason for such data gathering is to improve what you are doing. Keep the questionnaires anonymous; hopefully, the students will let you know what they really think. (See appendix E)

EVALUATION BY STUDENTS

The real test of the usefulness and effectiveness of any instructional material or procedure is whether students can and will use it and learn what it was designed to teach.

For those materials we have developed, we continually solicit student

feedback. Our first usable draft of a learning package we call a "prototype." It is offered with the expectation that it can and will be revised and improved. We encourage students to give us their comments about the material on forms designed for that purpose. See appendix F.

APPENDICES

SECTION I

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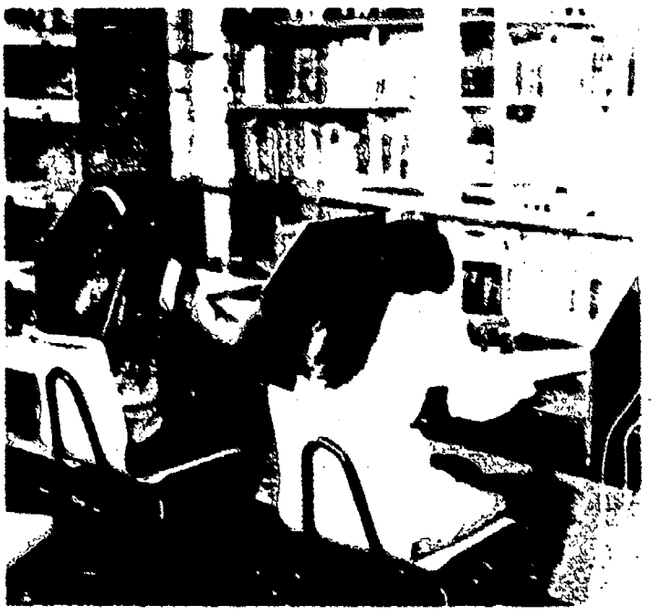

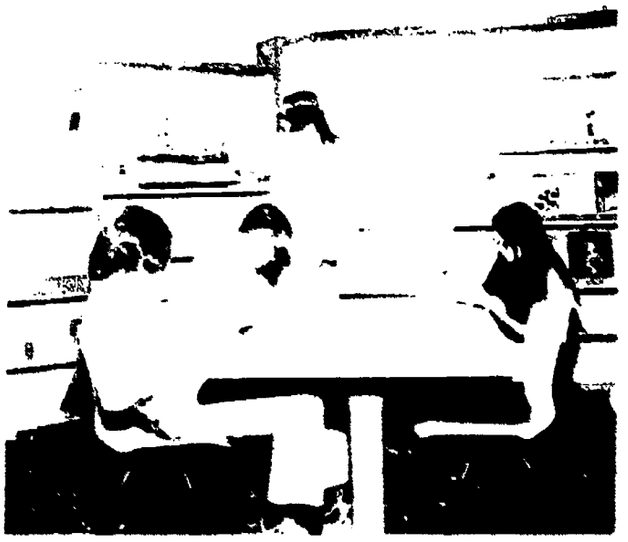

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SCHEDULE CONTRACT

INDIVIDUALIZED LEARNING CENTER

Student's Name _____ Course # _____ Course Title _____ Credit Hours _____

Days (Circle)	Monday	Tuesday	Wednesday	Thursday	Friday
Hours (Fill in)	___to___	___to___	___to___	___to___	___to___

Student's Signature _____ Date _____

Date	Time In	Work Done	Time Out	Spvr's Initials	Comments

SCHEDULE CONTRACT CONTINUED

STUDENT _____ | _____ | _____

course | title | credit hours

ATE	ARRIV TIME	WORK DONE	DEPART TIME	SUPERVISOR INITIAL AND COMMENTS

INDIVIDUALIZED LEARNING CENTER

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_____ WEEK _____ SEM. 197____

STUDENT_ _____

REPORT FOR 4 WEEKS ENDING_____

COURSE	GRADES		SCHEDULED ATTEND. HRS		ACTUAL ATTEND. HRS *50 min. "HRS"		PERCENT ATTEND.	
	Average for 4 wks	Overall average to date	For past 4 weeks	Total to date	For 4 weeks	To date	For 4 weeks	To date

Grades are shown as per cent (%), for letter grade. (see scale below)

Scheduled attend. are the number of 50 min. periods you were scheduled to be in the I.L.C. during the reporting period (and total time to date).

90 to 100% = A
80 to 89% = B
70 to 79% = C
60 to 69% = D
0 to 59% = F

COMMENT_____

APPEND. B

INDIVIDUALIZED LEARNING CENTER Evaluation 1973 - 74

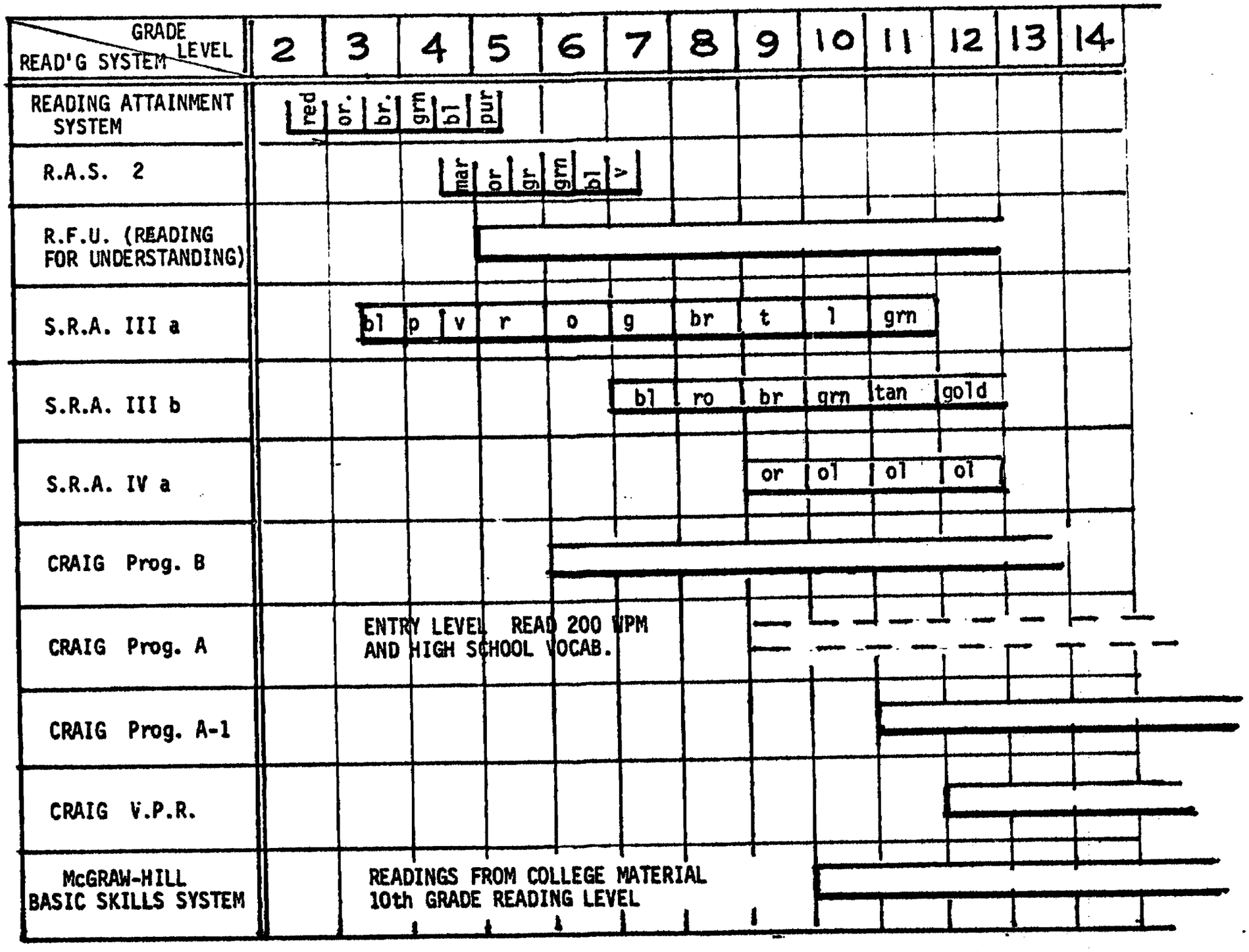
COURSE_____ INSTRUCTOR_____

Hrs. per wk. in I.L.C._____ Instructional materials used: in I.L.C._____

Hrs. per wk. in group _____ in group class_____

Calif. Achievement Tests	READING								LANGUAGE ARTS								COURSE GRADE	ATTEND
	PRE-TEST			POST-TEST			GAIN		PRE-TEST				POST-TEST				GAIN			
STUDENT	Vocab	Comp	Total	Vocab	Comp	Total	1 sem	2 sem	Mech.	Usage	Total	Spell.	Mech.	Usage	Total	Spell.	1 sem	2 sem	(Aver. 2 sem.)	
Mean																				

SOME SELF-INSTRUCTIONAL READING SYSTEMS



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HOW I FEEL ABOUT THE INDIVIDUALIZED LEARNING CENTER 1973-74

Date _____1974

I am taking ☐ only one course ☐ 2 or more courses in the I.L.C.

☐ Male ☐ Female

☐ Non - College ☐ In College

Now that you have had the experience of working in the I.L.C., we would like to know what you think about the I.L.C. as a place for learning.

After reading each statement, decide whether or not you "Strongly Disagree," "Disagree," "Don't Know," "Agree," or "Strongly Agree," then check the box in the appropriate column.

	Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree
1. I feel that I learn more about a subject in a regular classroom than I do in the Individualized Learning Center.	☐ SA	☐ A	☐ DK	☐ D	☐ SD
2. Becoming responsible for my own learning is as important as getting to know a particular subject.	☐ SA	☐ A	☐ DK	☐ D	☐ SD
3. Most students work harder and get more done in an individualized learning center than in a regular classroom.	☐ SA	☐ A	☐ DK	☐ D	☐ SD
4. The objectives of instruction (What I am supposed to be able to do) are more clearly stated in the courses in the I.L.C. than in most of my other classes.	☐ SA	☐ A	☐ DK	☐ D	☐ SD
5. The immediate feedback (knowledge of results) provided by the materials in the I.L.C. makes learning easier.	☐ SA	☐ A	☐ DK	☐ D	☐ SD
6. It is important to me to know how well I am doing in the courses I take in the I.L.C.	☐ SA	☐ A	☐ DK	☐ D	☐ SD
7. I think I learn more from a tape than from a lecture in a classroom.	☐ SA	☐ A	☐ DK	☐ D	☐ SD
8. It is easier to learn from programmed books than from a regular textbook.	☐ SA	☐ A	☐ DK	☐ D	☐ SD

	SA	A	DK	D	SD
9. Programmed materials are confusing to use.	☐	☐	☐	☐	☐
10. I work harder when I am competing with other students than when I am working on my own.	☐	☐	☐	☐	☐
11. The teachers in the I.L.C. are usually able to give me the help I need.	☐	☐	☐	☐	☐
12. The teachers in the I.L.C. do not seem to be interested in how well I am doing.	☐	☐	☐	☐	☐
13. I have a more positive attutide toward learning since I have been in the I.L.C.	☐	☐	☐	☐	☐
14. The materials in the I.L.C. are interesting.	☐	☐	☐	☐	☐
15. Working in the I.L.C. at my own rate is important to me.	☐	☐	☐	☐	☐
16. It is important to me to work privately so that others don't know when I make mistakes.	☐	☐	☐	☐	☐
17. The I.L.C. has made me more responsible for my own learning.	☐	☐	☐	☐	☐
18. It is important that my grades for courses in the I.L.C. do not depend on what other students do.	☐	☐	☐	☐	☐

19. What course is in the I.L.C. that should be taught as a group class, if any? _____

_____

20. A. What I <u>dislike</u> most about working in the Learning Center is _____

_____

_____

B. What I <u>like</u> most about working in the Learning Center is _____

_____

_____

C. To make the I.L.C. a better place to learn, I would suggest _____

_____

_____

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WE WOULD LIKE YOUR HELP

We think we have selected the best instructional materials available to help you learn. We have also developed some instructional materials of our own that we think are pretty good. BUT - YOU are the best judge of that.

Some kinds of learning require hard work - even drudgery. Not all learning is "fun" - but most can and should be understandable and interesting.

We would like to have your comments and suggestions about a course or unit that you have just completed. We have provided a check list to make this easier. You need not sign your name.

Thank you!

Jeanne, John, Bill, and Dave
I.L.C. Staff

INSTRUCTIONAL PRODUCT DEVELOPMENT

I have just finished _____ No. _____ of _____
(Lesson, Unit, Section) (Name of Course)

It took me about _____ Mins. / Hours to complete.

The DIRECTIONS were: ☐ Easy to Understand WHY? _____
☐ Hard to Understand _____
☐ Confusing _____

The LEARNING OBJECTIVES were: ☐ Easy to Understand COMMENTS _____
☐ Confusing _____

The MATERIAL to study was: (Check one in each column)

☐ Too Easy
☐ Too Difficult
☐ About Right
☐ Dull, Uninteresting
☐ Somewhat Interesting
☐ Very Interesting

I feel that I ☐ Did / ☐ Did not achieve the learning objectives.

To make the instruction more ☐ useful / ☐ understandable / ☐ interesting, I would suggest:

_____

_____

_____

DATE _____, 197___ SIGNED (If you care to) _____

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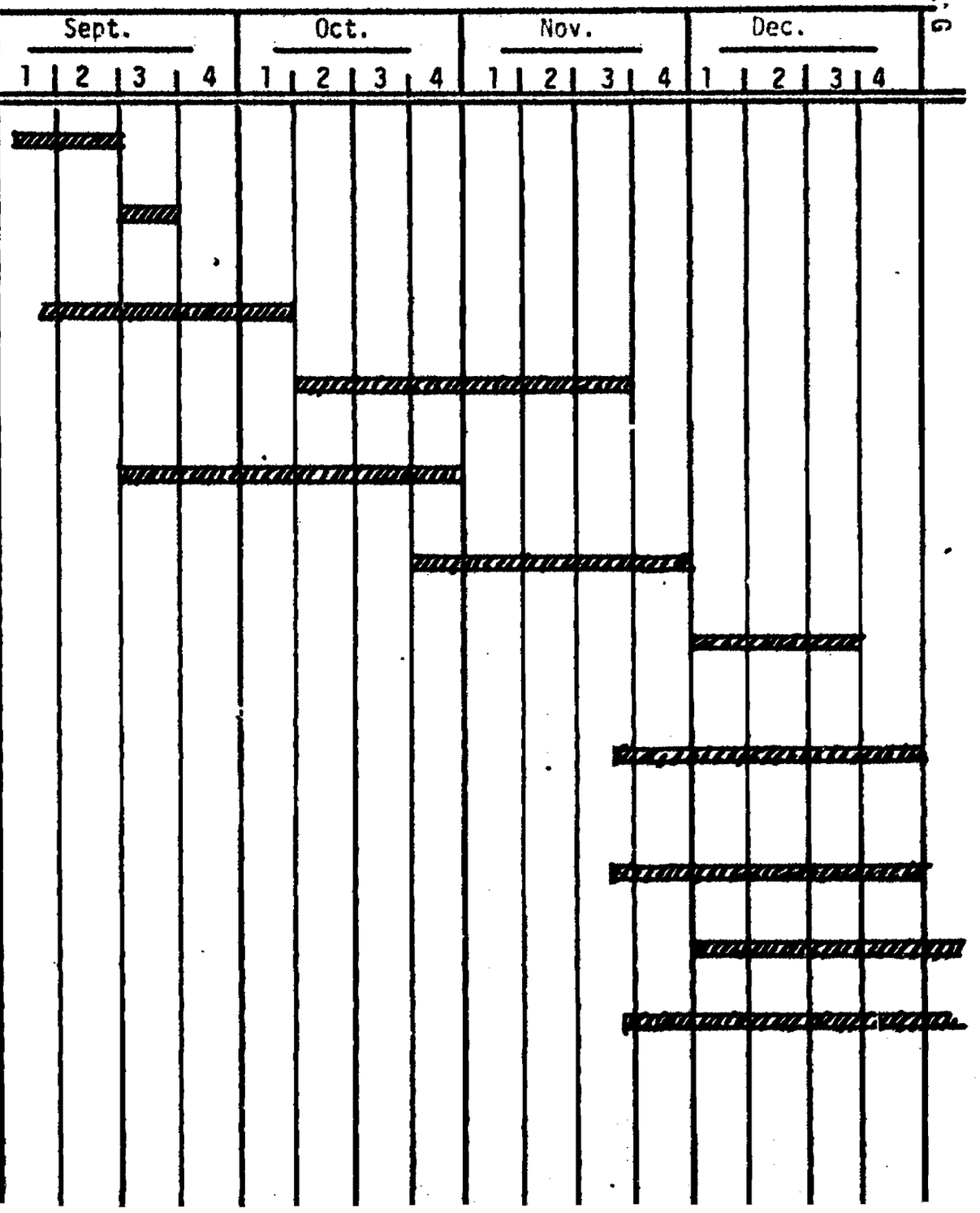
PLANNING CALENDAR

PROJECT PLANNING FOR I.L.C.

APPENDIX G

PERSONNEL	TASK
Dave C. Garn K.	Visit I.L.C., make video tape of tour with interview
Dave C. Gary K.	Make presentation to staff
Curriculum Committee	Define target population and skill areas to be handled in I.L.C.
Curriculum Committee	Develop instructional objectives
John J. Bill D.	Locate physical space for I.L.C.
Dave C.	Do working drawings for remodeling and get cost estimates
John H. Bill D. Gary K.	Order furniture and select carpeting
John H. Gary K. Jeanne S.	Select and order instructional materials for preview
John H. Jeanne S.	Select and order equipment and machines
Maintenance Dept.	Remodeling work done
Jeanne K. John H.	Plan and produce necessary administrative forms



MAKING D.L.L. OPERATIONAL

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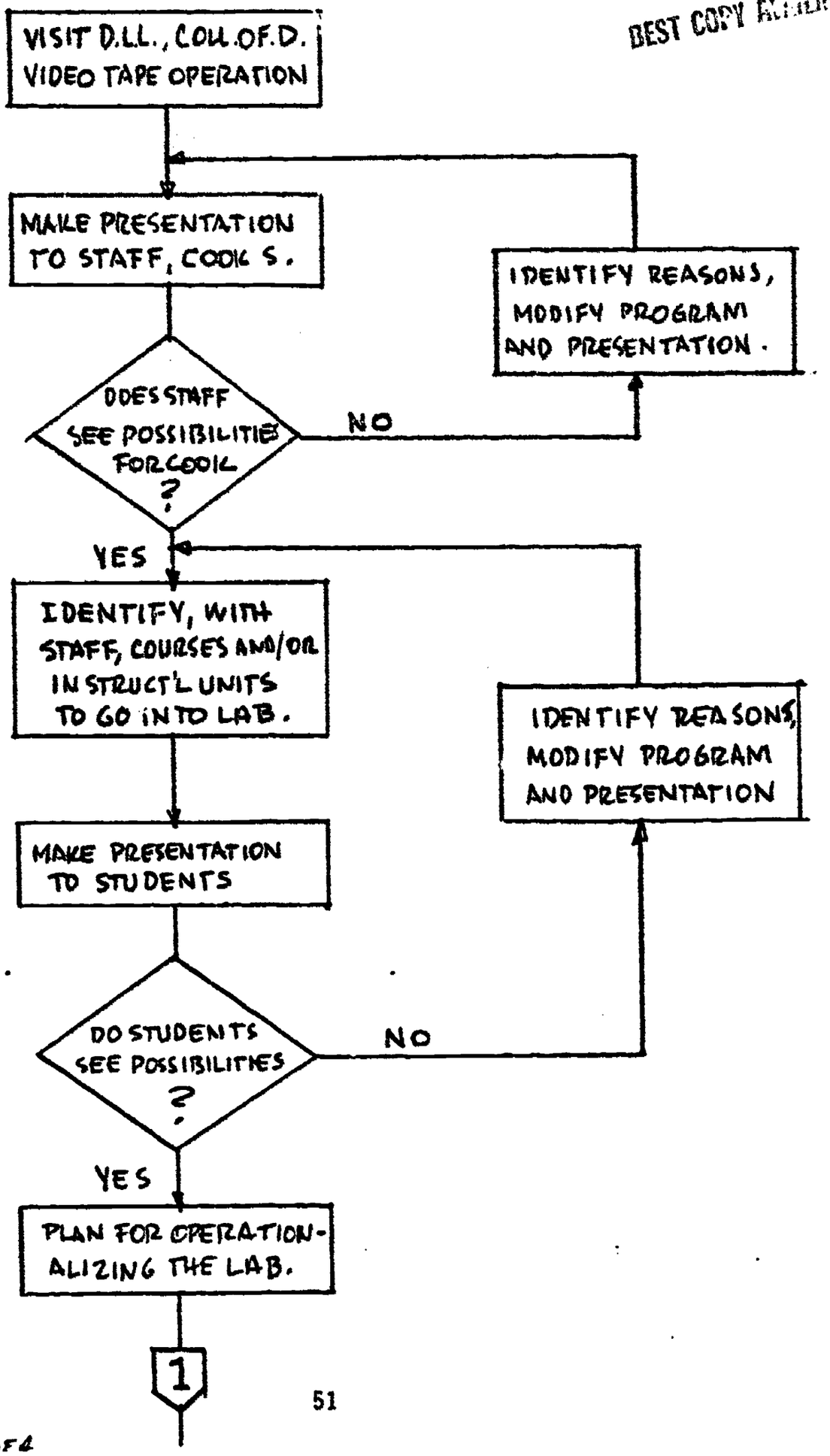
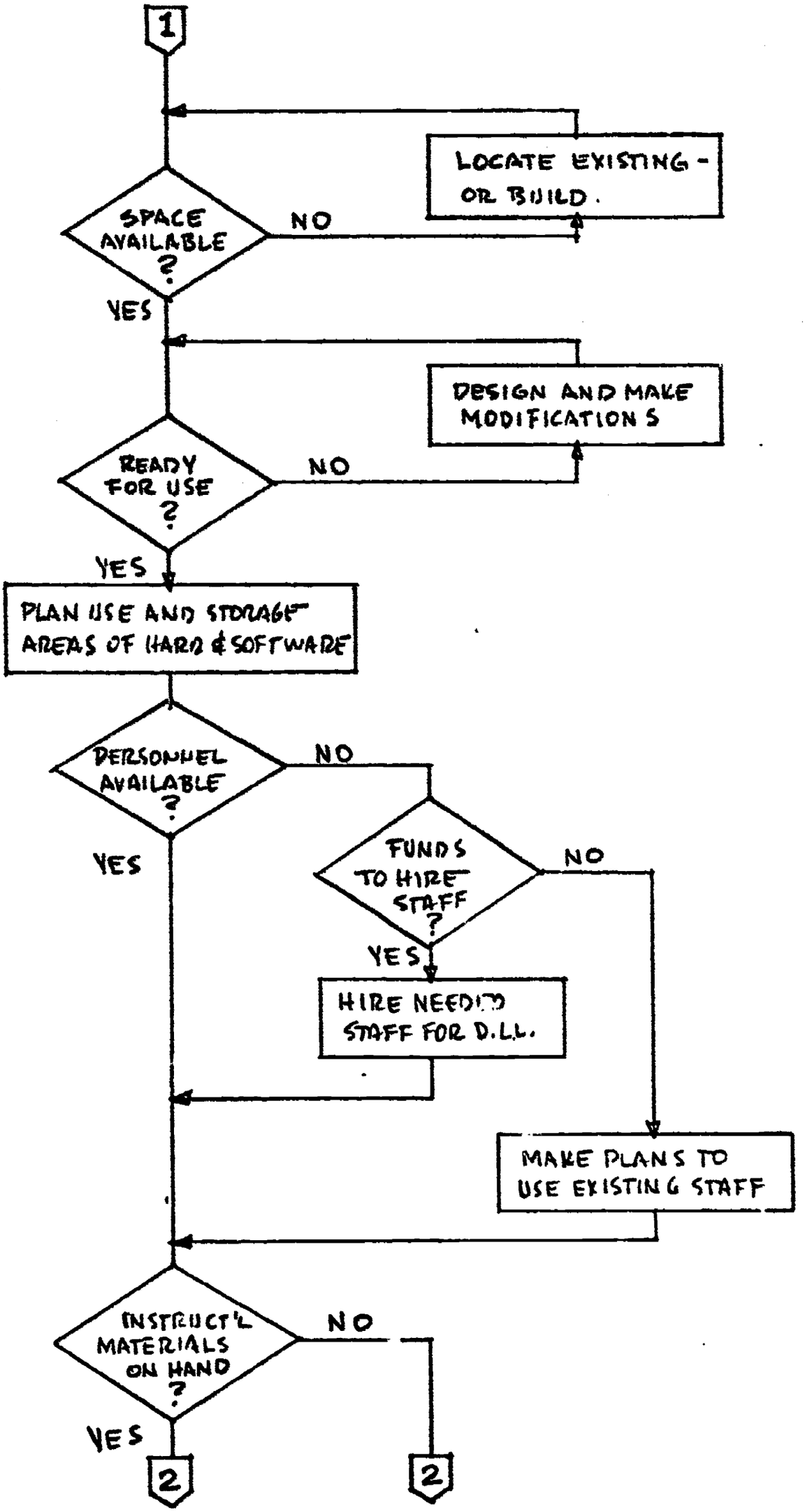


DAVE CAMPBELL
D.L.L. COOK SCHOOL
1972 26 OF 4


1
LOCATE EXISTING - OR BUILD.
SPACE AVAILABLE ?
NO
YES
DESIGN AND MAKE MODIFICATIONS
READY FOR USE ?
NO
YES
PLAN USE AND STORAGE AREAS OF HARD & SOFTWARE
PERSONNEL AVAILABLE ?
NO
YES
FUNDS TO HIRE STAFF ?
NO
YES
HIRE NEEDED STAFF FOR D.L.L.
MAKE PLANS TO USE EXISTING STAFF
INSTRUCT'L MATERIALS ON HAND ?
NO
YES
2
2

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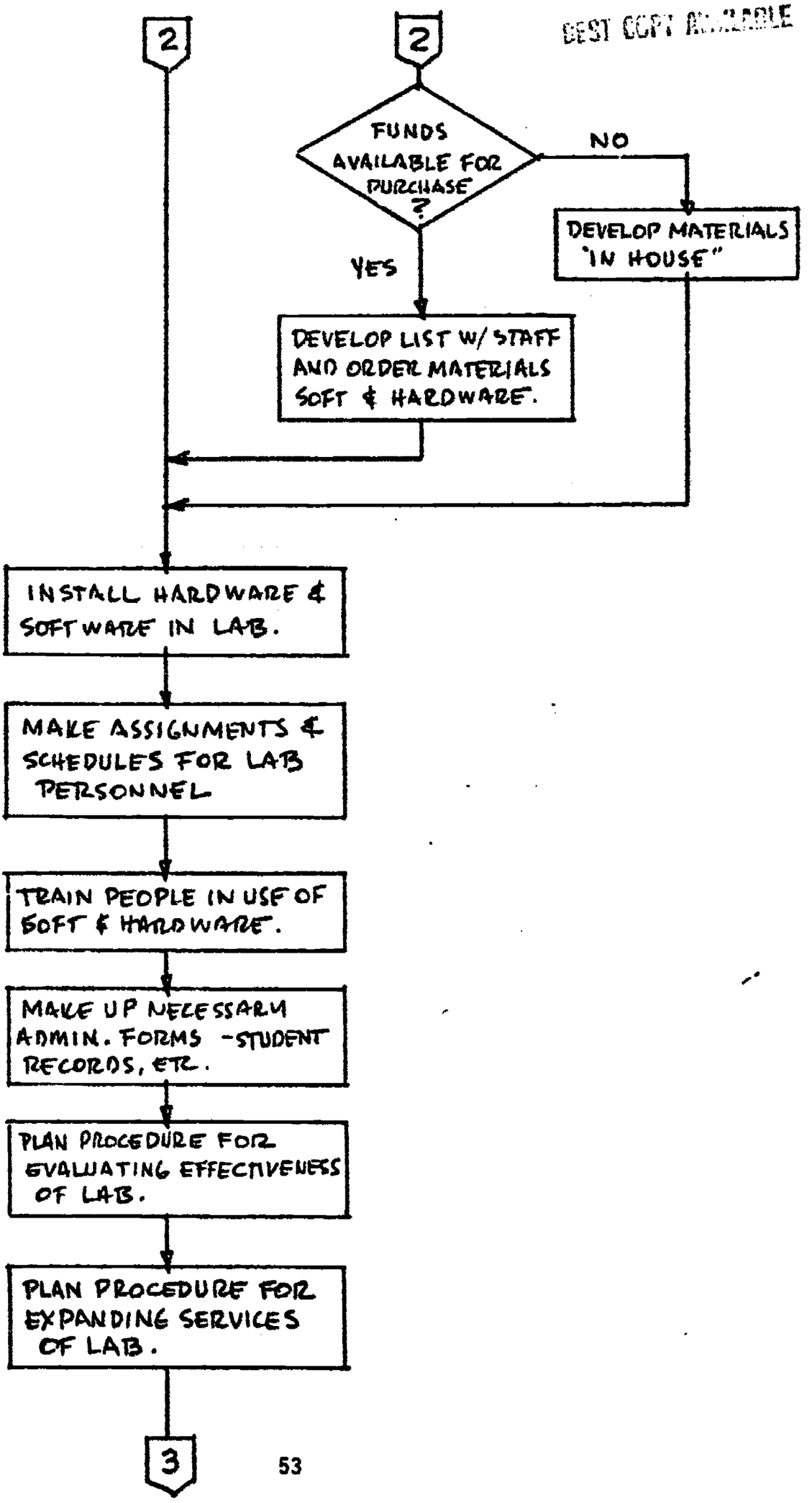

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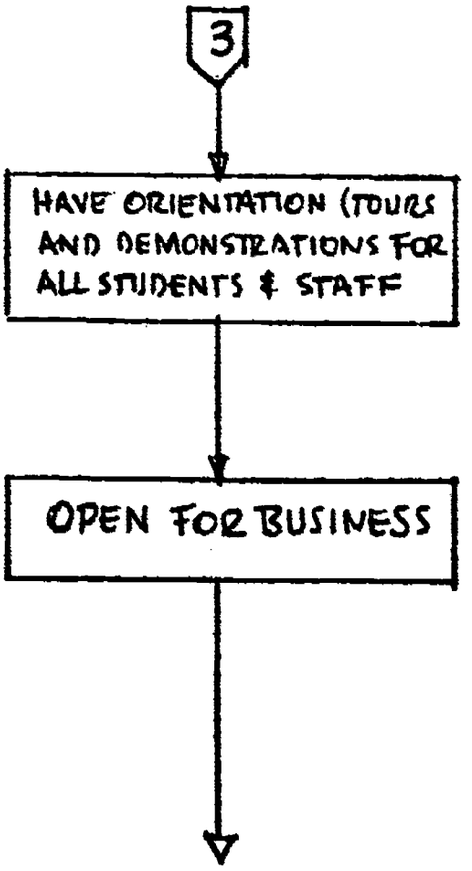
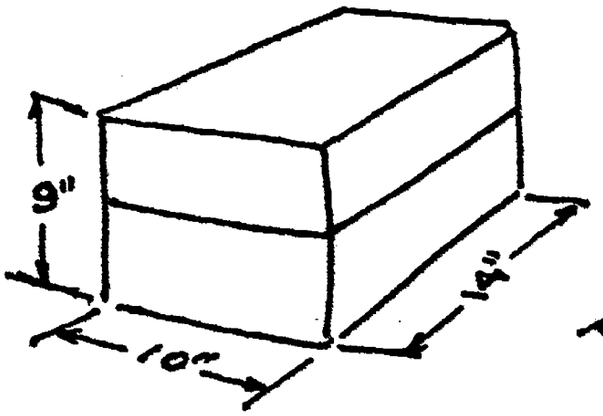


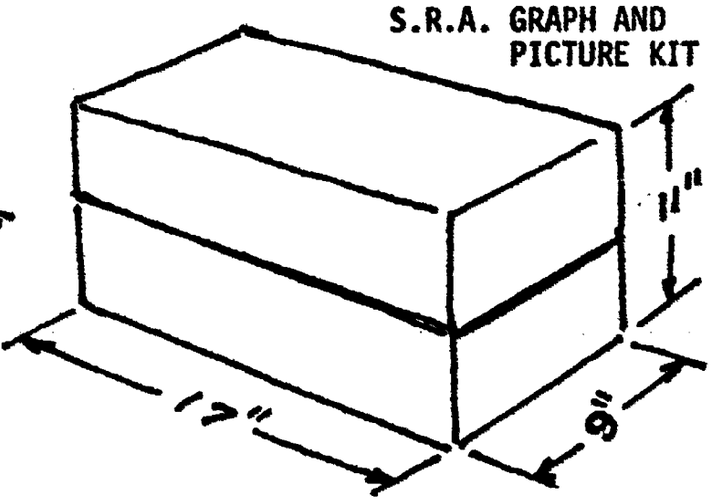
pg. 4 of 4

SOME INSTRUCTIONAL "STUFF"

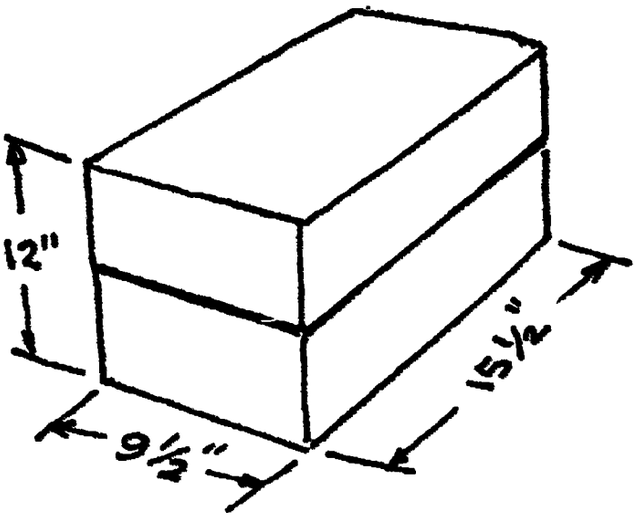
10" SHELVING WILL HANDLE MOST PACKAGED MATERIALS



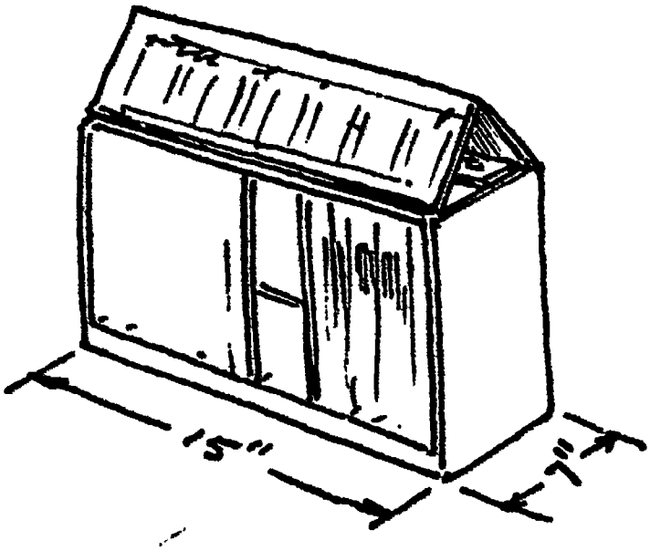
S.R.A. GRAPH AND PICTURE KIT



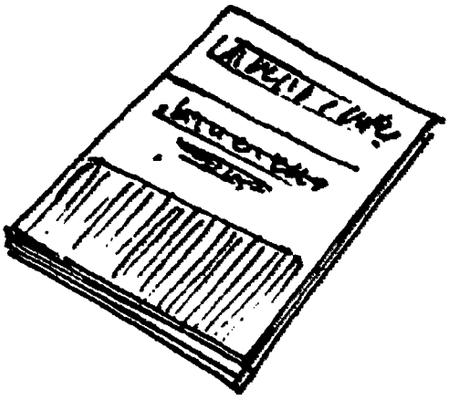
S.R.A. READING LABS
3a, IIIb, IVa



S.R.A. MAP AND GLOBE STUDY SKILLS



READING ATTAINMENT SYSTEM

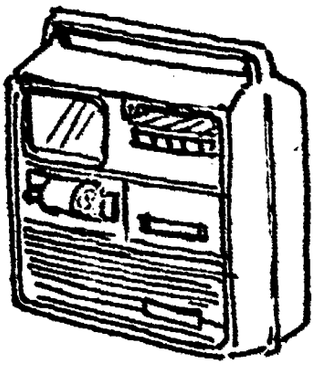


MOST PROGRAMMED TEXTS AND WORKBOOKS ARE 8½"x11".

APPEND. J

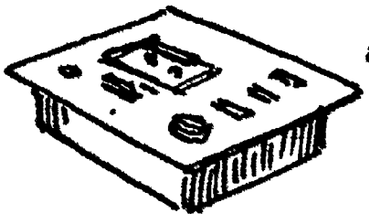
SOME MACHINES

BEST COPY AVAILABLE

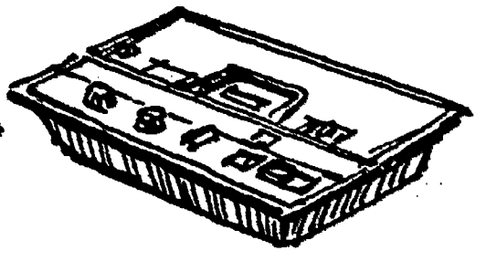


SINGER GRAFLEX SOUND FILMSTRIP PROJECTOR 8" X 11½" X 12½" HIGH

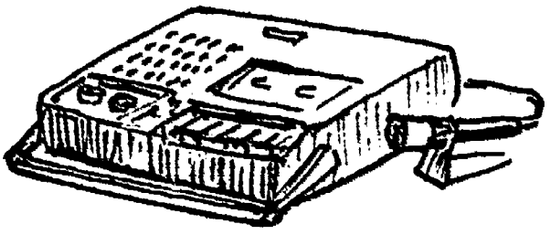
PLAYBACK ONLY CASSETTE DECKS



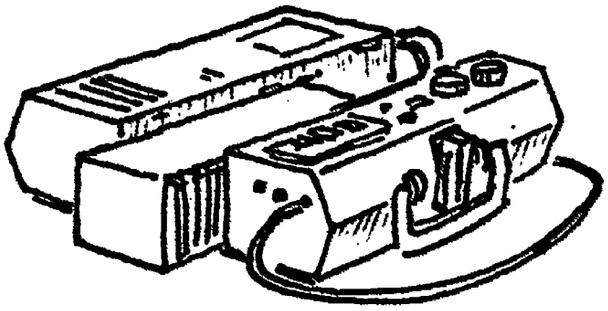
AVID 505 LC. 8"x9"x4"



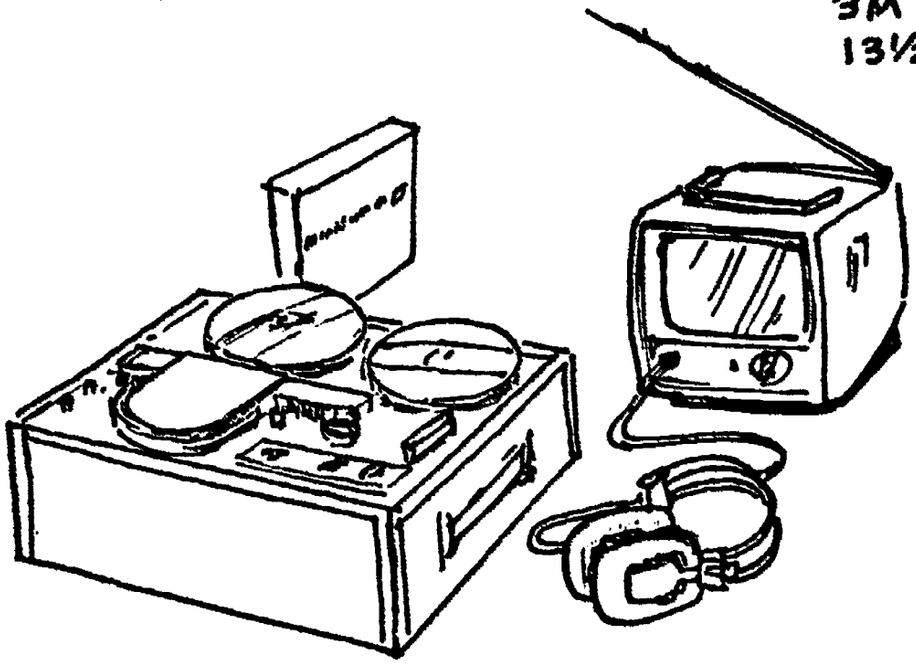
WOLLENSAK 2505 AV 13½x9⅛x4 7/8



SONY CASSETTE RECORDER 10½x11½x3"

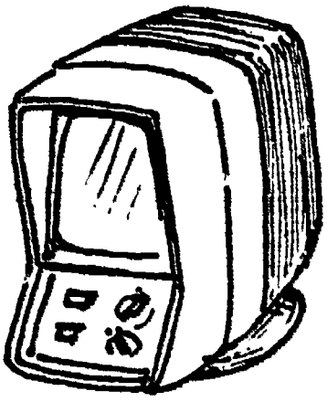


3M SOUND ON SLIDE PROJECTOR 13½"x12½"x6"



VIDEO TAPE PLAYER/ RECORDER 15¾"(W)x9½x13½(D)

9" MONITOR



CRAIG READER 10" WIDE x 14"x15" HIGH

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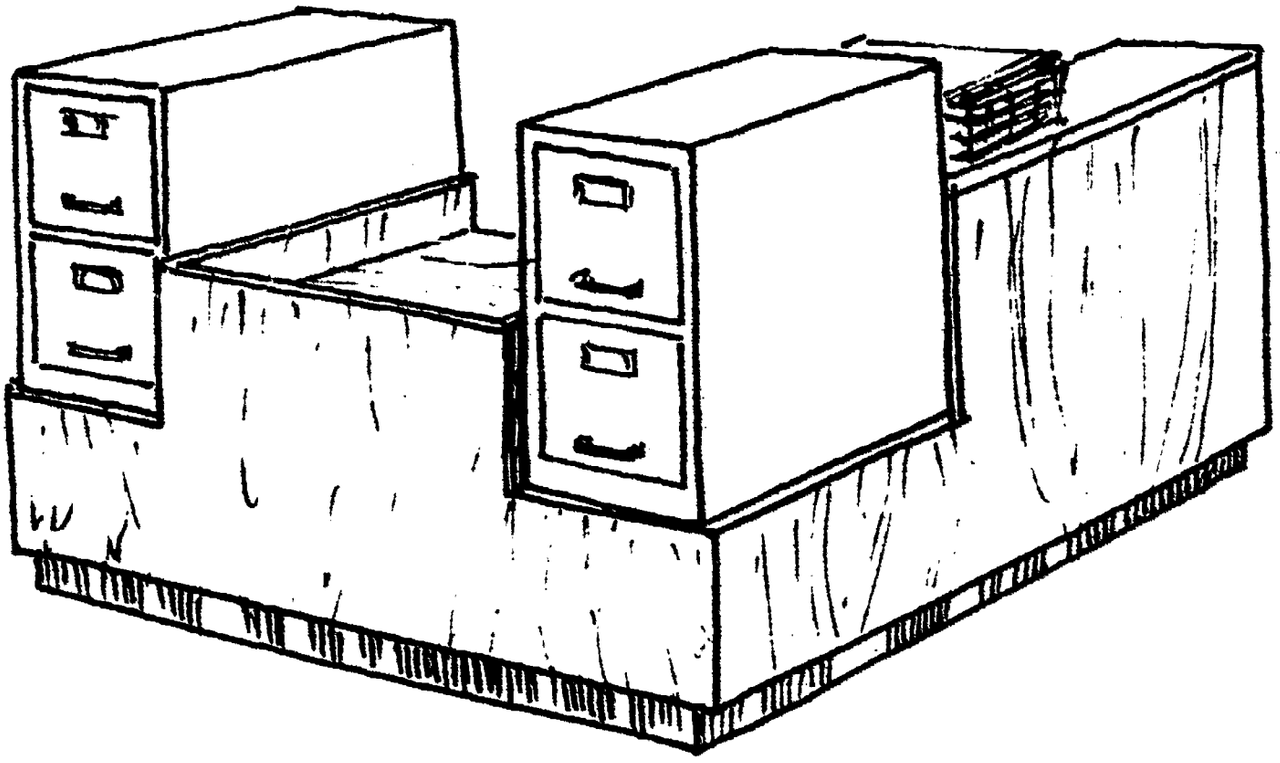
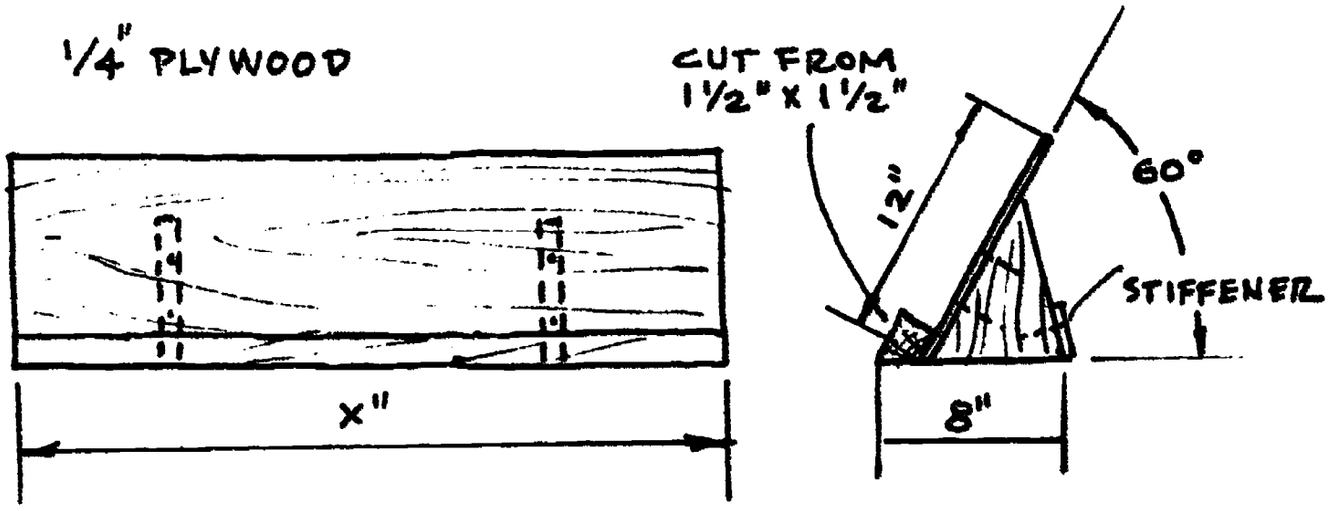


INSTRUCTORS' DESK, COUNTER AND FILE CABINETS. THIS UNIT CAN BE MADE FROM 3/4" VENEER PLYWOOD.

BE SURE TO ANCHOR FILES AT BACK!

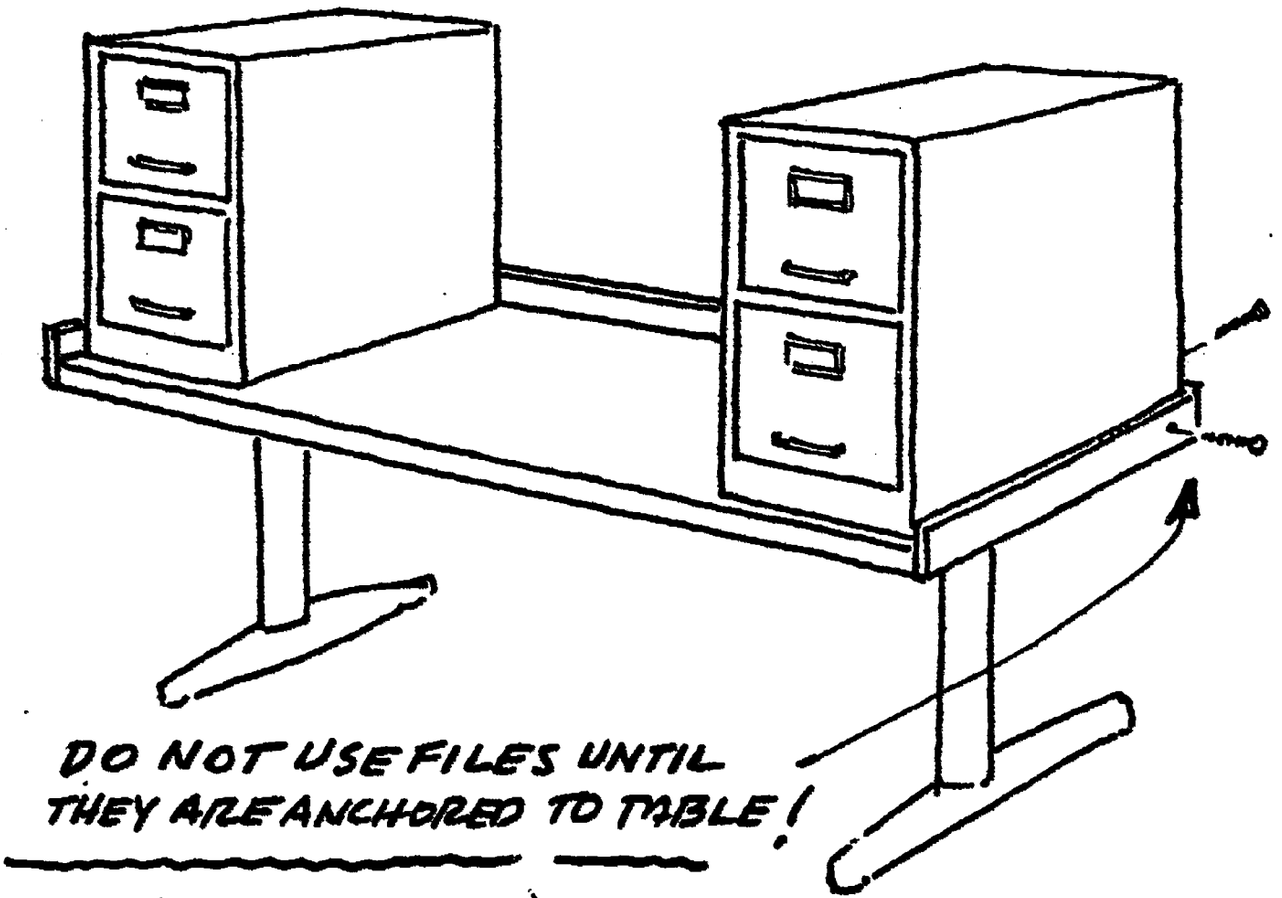
DISPLAY RACK



VARY LENGTH TO FIT SHELVING

FILES CAN BE USED ON TOP OF LOW TABLES.

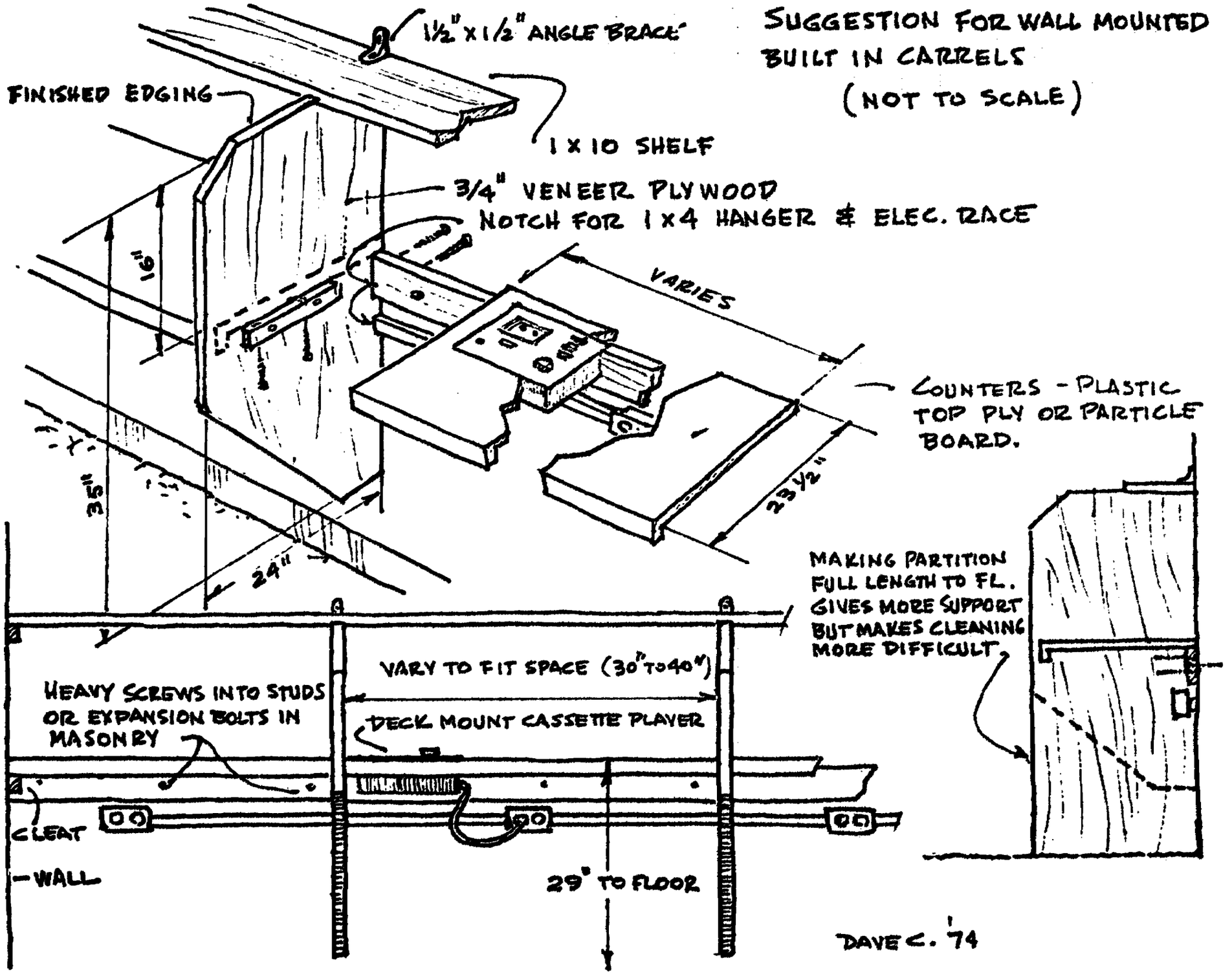
BEST COPY AVAILABLE



DO NOT USE FILES UNTIL THEY ARE ANCHORED TO TABLE!

SUGGESTION FOR WALL MOUNTED BUILT IN CARRELS

(NOT TO SCALE)



DAVE C. 1/74

APPEND. N

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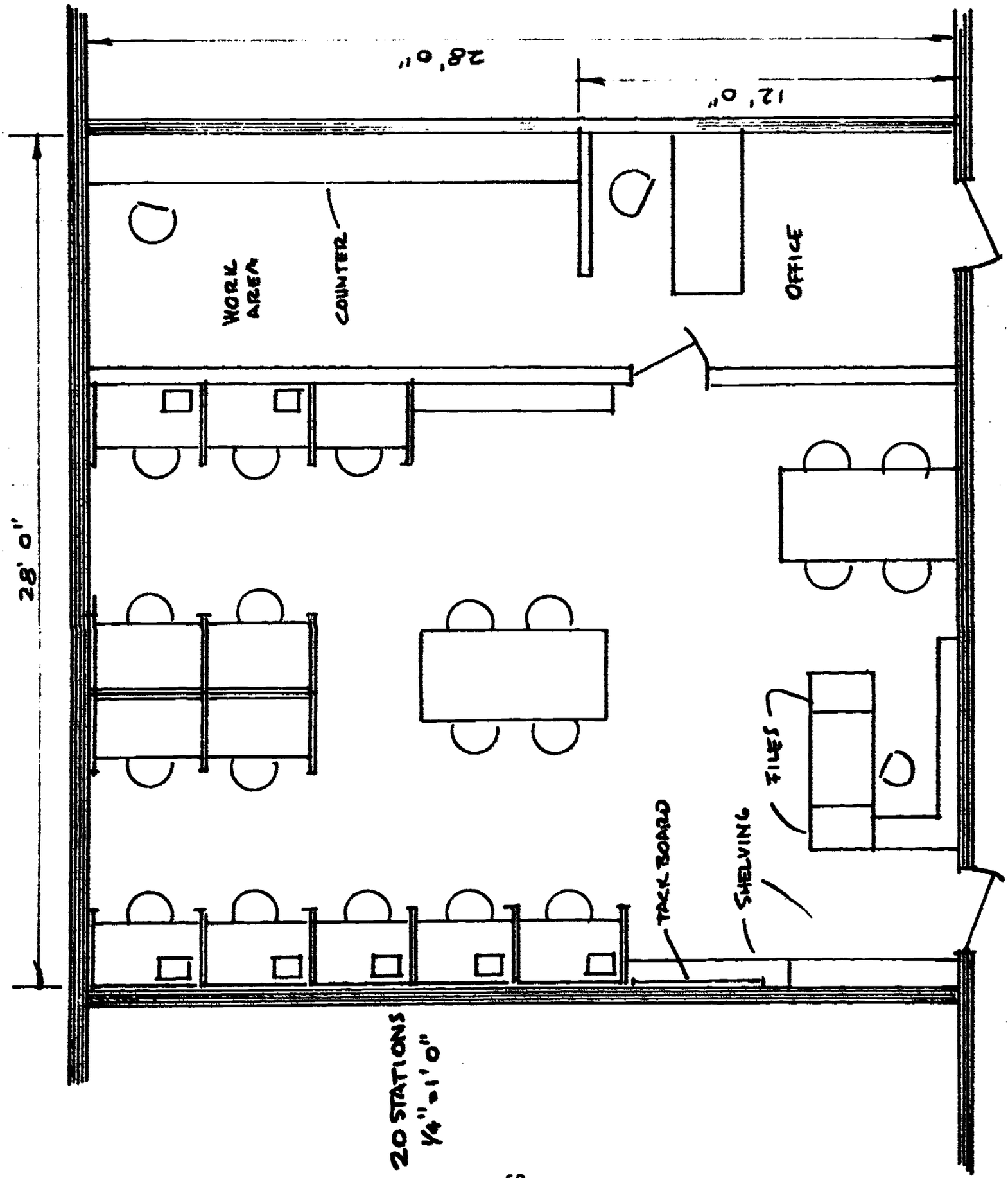
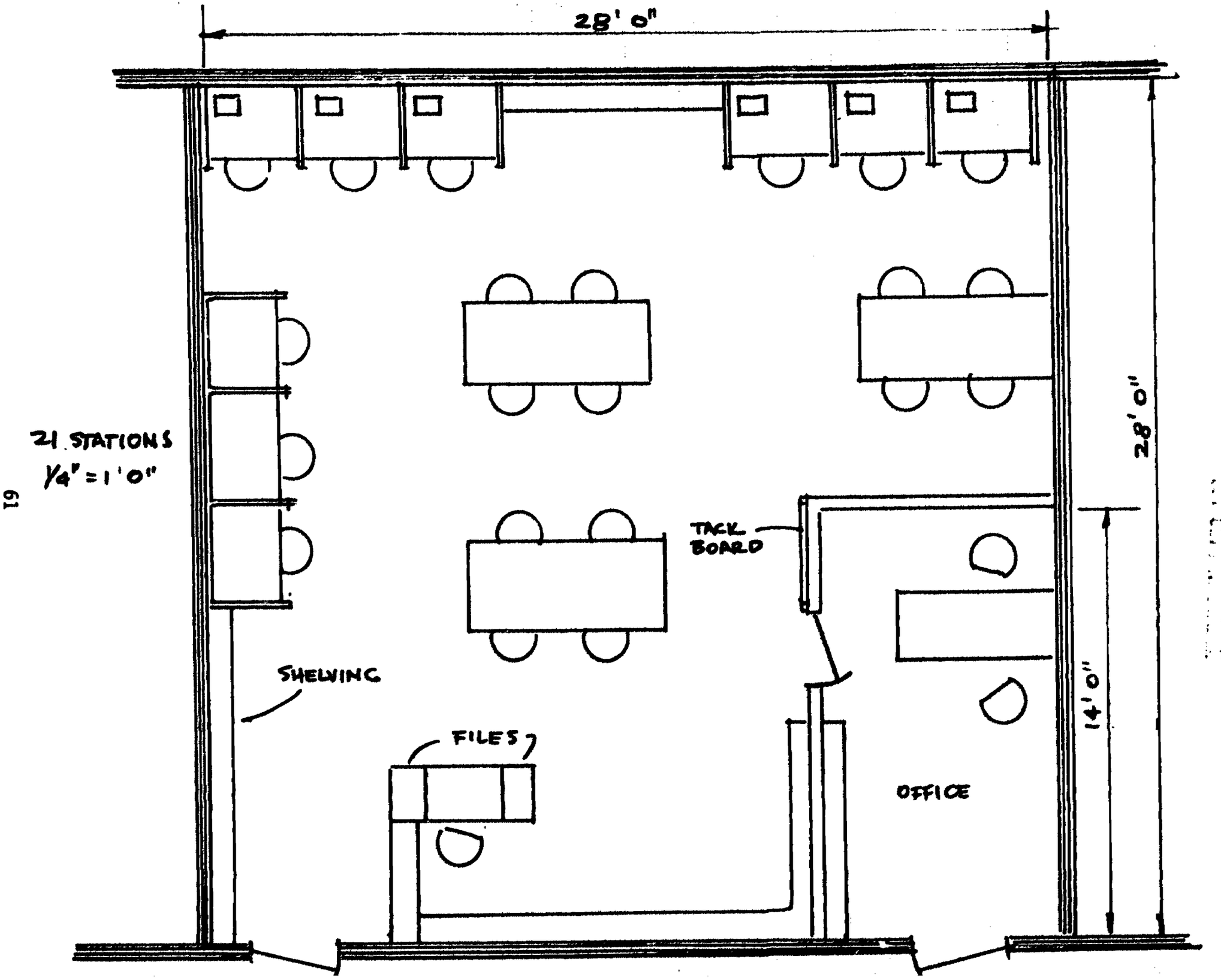
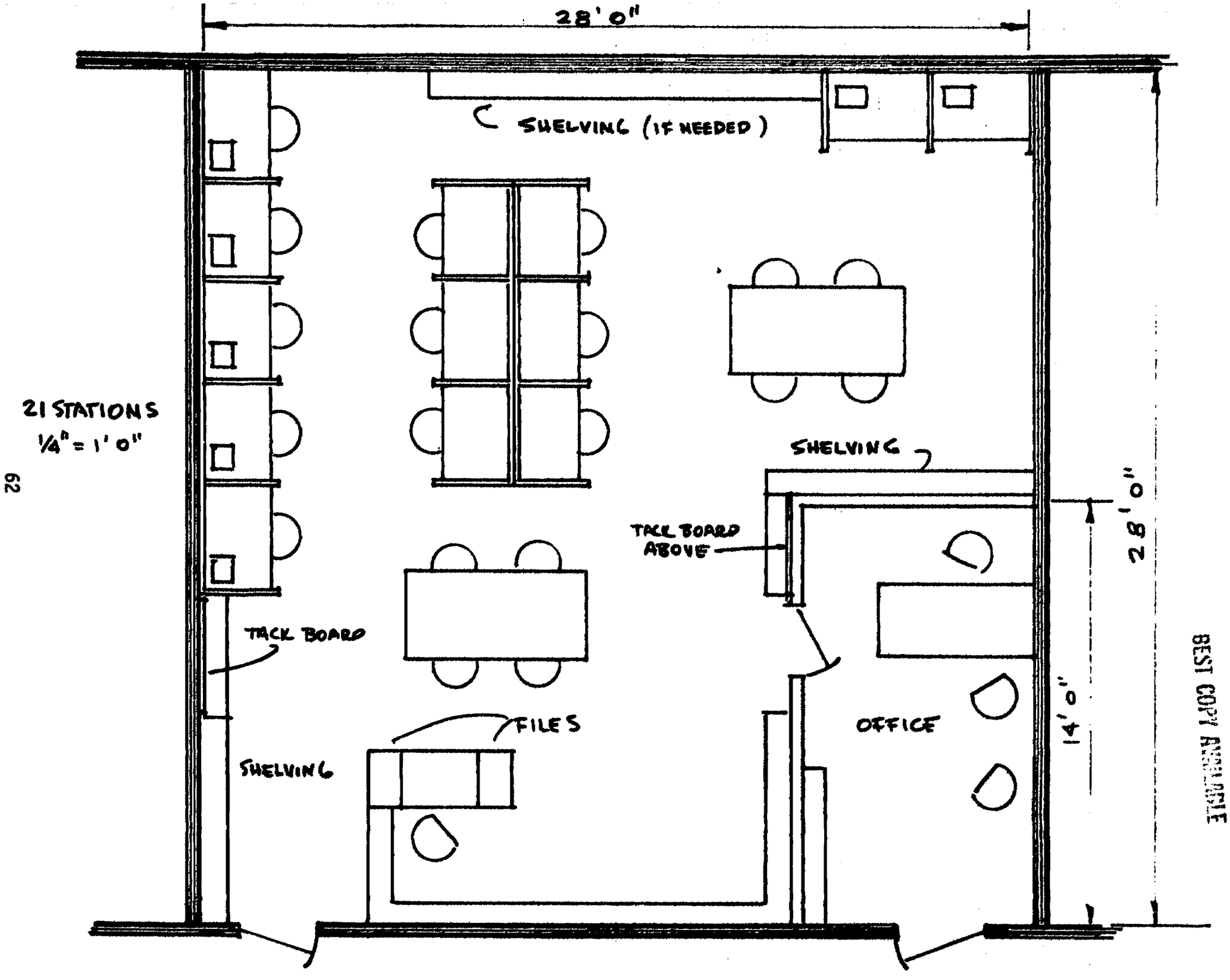



28' 0"
21 STATIONS
1/4" = 1'0"
TACK BOARD
SHELVING
FILES
OFFICE
14' 0"
28' 0"

ERIC



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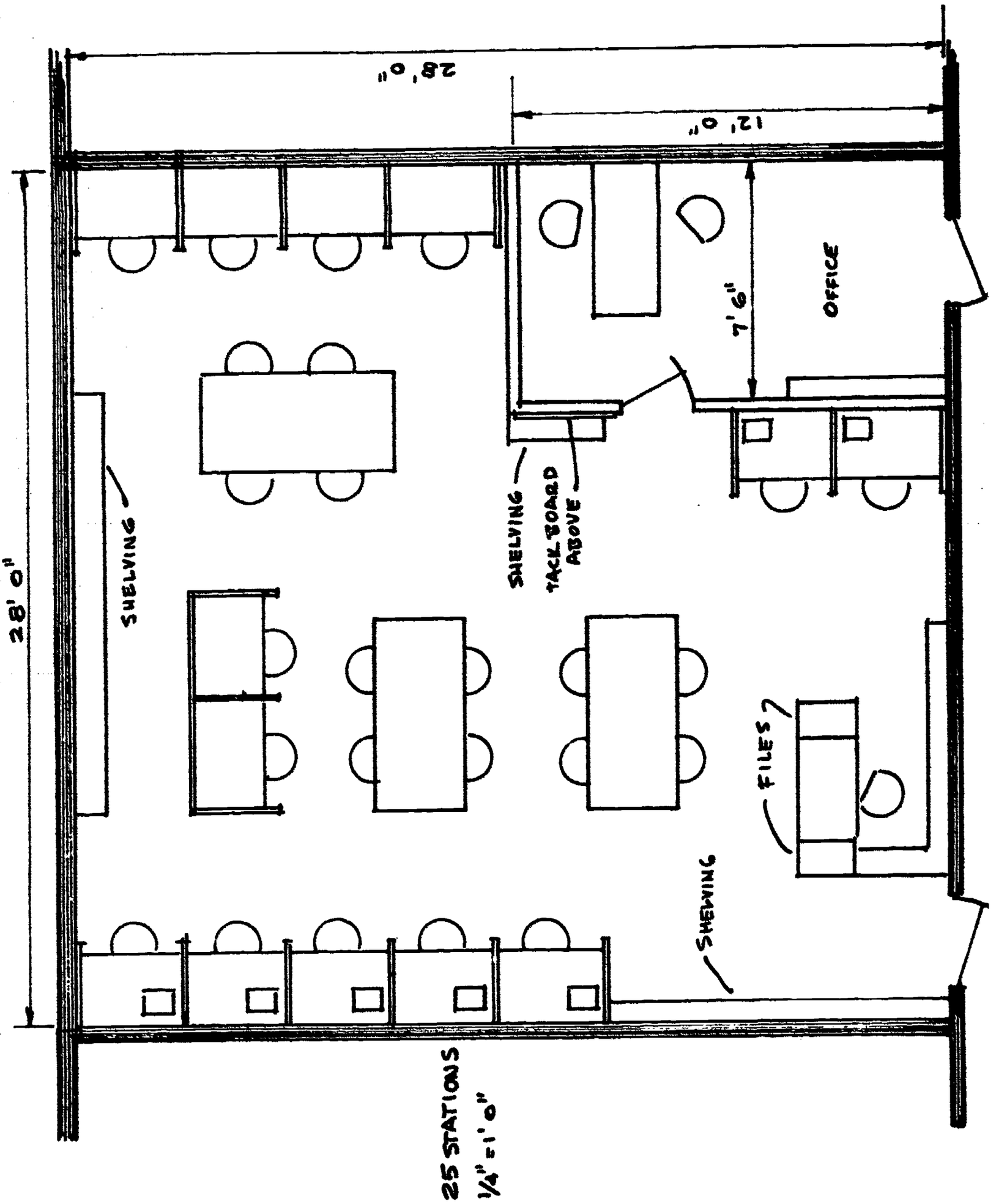


SELF-INSTRUCTIONAL MATERIALS

This listing is in no way comprehensive. It includes only those products we have used and recommend. There are many others available in these and other areas.

1. READING

S.R.A. (Science Research Assoc.) makes "reading labs" whose levels range from elementary through high school. We have used these "labs:" 3a, IIIb, IVa, and R.F.U. (Reading For Understanding). These are printed, programmed materials designed to improve reading rate and comprehension.

Craig reading programs require the use of reading pacers. These machines run more than $250 each. We have used reading programs "A," "B," and "V.P.R. (Vocabulary, Preview, Read)."

R.A.S. (Reading Attainment Systems--1 and 2) are similar to the S.R.A. kits in format and use. The essential difference is that the content of the reading materials is at an adult interest level.

Basic Skills System (McGraw-Hill) consists of "study-type reading kits" in natural and social sciences. These are on the tenth grade reading level and are designed for college or college-bound students. The content and questions require reading for information and special facts. The Basic Skills System also includes a unit on listening and note-taking, which uses audio tapes and response books. We have included this as one unit of our study skills course.

2. LANGUAGE ARTS

"Word Clues" by E.D.L. (McGraw-Hill) is a vocabulary building program. The series consists of seven books for reading levels seven through thirteen. Placement tests are available. Hand-held mechanical tachistoscopes for rapid word recognition and spelling are used with programmed work books.

GRAMMAR AND USAGE

English 2200, 2600, and 3200 are produced by Harcourt Brace and Jovanovich. These are three programmed books on grammar and usage, capitalization, punctuation, and ways of improving writing style for junior and senior high school levels.

Basic Skills in English by Individual Learning Systems is senior high or junior college level. The I.L.S. materials are a series of printed, programmed texts which can be used several ways. Because of diagnostic tests, each student may take an individual path through the

materials. The course is designed to teach students to write a composition which is well-organized and correct in grammar, punctuation, and spelling. The course includes a supplementary unit on listening and note-taking.

PUNCTUATION

We have used Punctuation: A Programmed Approach by Southwestern Publishing Co. This covers 27 basic rules of punctuation, using a printed, programmed text.

3. MATH

A First Program in Mathematics by Arthur H. Heywood (Wadsworth Publishing Co.) is a programmed approach dealing with math skills in five areas: whole numbers, common fractions, decimal fractions, percent, and practical algebra. It is difficult to attach grade levels to these skills. Perhaps it would be safe to say that these materials are appropriate for middle elementary students, starting with Unit 1, Whole Numbers.

Each unit has a diagnostic pre-test which permits a student to plan an individual path through the unit, studying only those elements he or she needs. This flexibility in prescribing instruction adds to the bookkeeping but does individualize a student's course of study. [See Appendix Q for the forms we have developed to allow for prescribing (programming) and monitoring a student's progress through the units.]

There are other programmed approaches such as those published by Grolier and by Sullivan. These are perhaps simpler to use but are not diagnostic and prescriptive.

Basic Mathematics books I, II, and III, published by Westinghouse Learning Corp. are designed to teach addition, subtraction, multiplication, and division of fractions; the basic operations with decimals; and basic principles of geometry. This program would seem to be useful as review or remedial for high school age or adult students. Tests for each section are diagnostic and prescriptive.

4. STUDY SKILLS

As yet, we have found no commercial package which satisfies our needs. We developed our own six-unit course which includes two units which are commercially produced. These units are the S.R.A. kits on graph and picture study skills and map and globe skills. Also, we have used a college-level program, How to Survive in College, by Education Marketing Corp. The course is on eight cassette tapes, together with a work book.

5. CONSUMER EDUCATION

We have used Modern Consumer Education, produced by Grolier. The material includes cassette tapes, film strips, booklets, and student response books. Units include ways to shop and handle money; getting

a lawyer; you and your landlord; and buying furniture, appliances, a car, drugs, medicines, health insurance, etc. A new supplement adds five areas. A filmstrip projector which advances the film on an inaudible cue is recommended.

In this area, a new booklet, Forms in Your Future, gives the student practice in seeing and completing samples of most of the forms encountered as an adult. Twenty-four forms from driver license to income tax are explained. This and the consumer education unit would be a useful supplement for any adult basic education program.

Here are some organizations to which you might write for information about self-instructional materials. These are companies whose products we have used and would recommend.

Behavioral Research Laboratories
Box 577
Palo Alto, California
(programmed materials)

Craig Educational Products
921 West Artesia Boulevard
Compton, California 90220
213/537-1233
(reading programs)

CTB/McGraw Hill
Order Service Center
Del Monte Research Park
Monterey, California 93940

Educational Developmental Laboratories, Inc.
284 East Pulaski Road
Huntington, New York 11743
("word clues" vocabulary)

Educational Marketing Corporation
5001 West 78th Street, Suite 800
Minneapolis, Minnesota
("How to Survive in College," college level study skills)

Educational Systems Development
Box 457
Royal Oak, Michigan 48068

E.M.C. Corporation
180 East Sixth Street
St. Paul, Minnesota 55101
612/227-7366
(spelling improvement series)

Entelek, Inc.
42 Pleasant Street
Newburyport, Massachusetts 01950
(Vol. I, Elementary-High School Programmed Instruction Guide, $9.50)

Globe Book Company
175 Fifth Avenue
New York, New York 10010
("Forms in Your Future")

Grolier Educational Corporation
845 Third Avenue
New York, New York 10022
(consumer education, reading attainment system)

Harcourt Brace Jovanovich
Polk and Geary Streets
San Francisco, California 94109
(programmed English series)

Houghton Mifflin Company
777 California Avenue
Palo Alto, California 94304
("Practical Math for Business")

Individual Learning Systems
Post Office Box 3388
San Rafael, California 94902
415/479-0177
(basic skills in English)

Instructional Objectives Exchange
Post Office Box 24095, Department A
Los Angeles, California 90024

Science Research Associates, Inc.
259 East Erie Street
Chicago, Illinois 60611

Southwestern Publishing Company
11 Guittard Road
Burlingame, California 94010
415/697-7050
(punctuation, programming approach)

Teaching Resources, Inc.
Station Plaza, Bedford Hills
New York, New York 10507

Wadsworth Publishing Company, Inc.
Belmont, California 94002
(a first program in mathematics, Heywood)

Westinghouse Learning Corporation
100 Park Avenue
New York, New York 10017

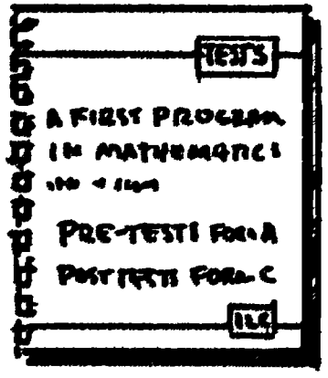
Educational Products Information Exchange Institute
463 West Street
New York, New York 11014
(bulletin and publications about educational products - the "Consumers Union" of education)

INSTRUCTIONAL SYSTEM FOR MATH

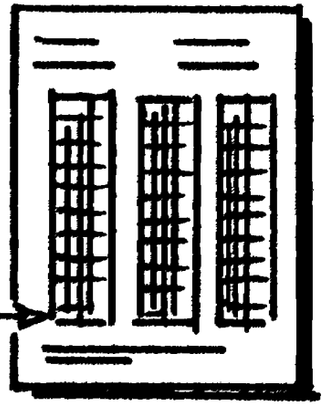
HEYWOOD PROGRAMMED TEXT

5 UNITS, WHOLE NUMBERS · COMMON FRACTIONS · DECIMAL FRACTIONS · PER CENT · PRACTICAL ALGEBRA

(1) STUDENT TAKES PRE-TEST FOR PRESCRIPTION (PROGRAMMING)
TEST BOOKLET CONTAINS FORM A (PRE-) AND FORM C (POST) TESTS.

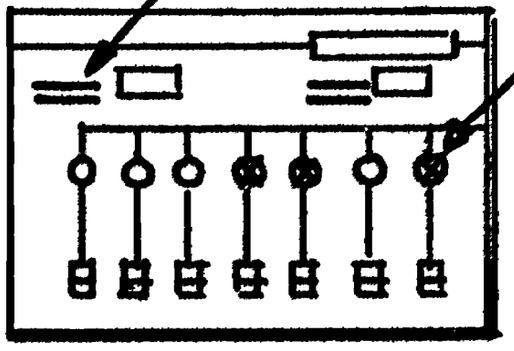


STUDENT TAKES TEST FOR ONE UNIT AT A TIME USING THE ANSWER SHEET PROVIDED

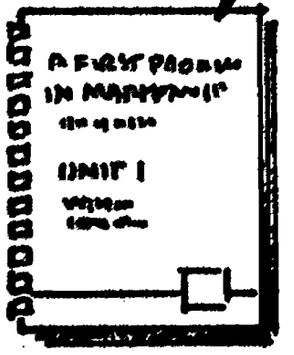


(FIRST TEST WOULD BE TEST 1, FORM A)

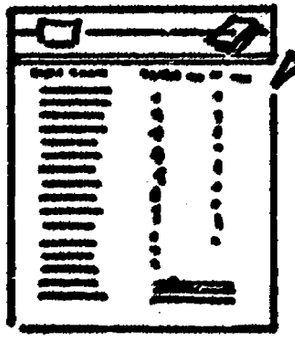
(2.) TEACHER GRADES TEST AND PRESCRIBES INSTRUCTION - (MARKS PROGRAMMING SHEET)
RECORD PRE-TEST SCORE



(3) STUDENT WORKS THROUGH THE SECTIONS MARKED - USING THE PROGRAMMED TEXT FOR THAT UNIT



FORM AVAILABLE FOR MARKING FRAME ANSWERS AND EXERCISE ANSWERS.



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ILC

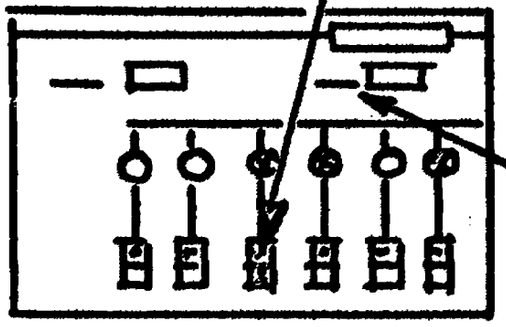
INSTRUCTIONAL SYSTEM FOR MATH

(4) AT THE END OF EACH SECTION, STUDENT WILL DO EXERCISE FOR THAT UNIT

EXERCISES ARE IN BACK OF TEXT.

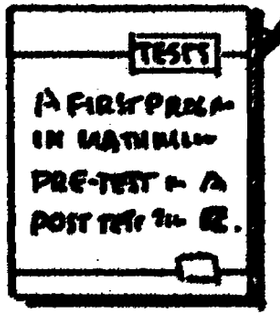
STUDENT WILL CHECK ANSWERS USING EXERCISE ANSWER KEYS.

(5) STUDENT MARKS SCORE OF EXERCISE IN BOX ON PROGRAMMING SHEET



- THEN WORKS THROUGH NEXT SECTION MARKED ON PROGRAMMING SHEET

(6) WHEN ALL SECTIONS AND EXERCISES ARE COMPLETE, STUDENT TAKES A POST-TEST OVER THE UNIT



RECORD SCORE OF POST TEST ON PROGRAMMING SHEET

(7) STUDENT NOW READY FOR PRE-TEST (FORM A) FOR NEXT UNIT

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SECTION II

EVALUATION PROCEDURES AND RESULTS

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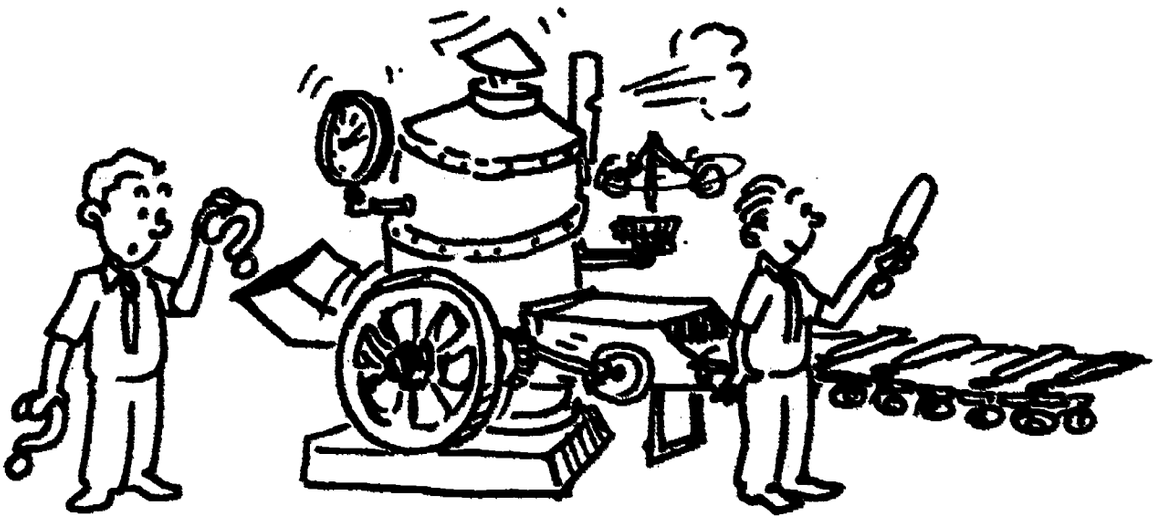
EVALUATION PROCEDURES AND RESULTS



TYPES AND PURPOSES OF EVALUATION

Evaluation has been stereotyped as an activity conducted by a person with a Ph.D. in education, who, for a large consultant fee, is invited to visit a project, interview staff, and write an erudite tome about the successes and failures of the program. Different concepts were used in the evaluation of the Individualized Learning Center at Cook School.

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W. James Popham (1972: 1), a renowned authority about evaluation has said,

> Although there have been minor differences of opinion through the years, most educators have conceived of educational evaluation as an operation in which the quality of educational enterprise is judged. In other words, for most educators, the term 'evaluation' means appraising the worth of an educational undertaking such as a curriculum, a course of study, or a particular instructional procedure. Generally, such evaluations are undertaken with a view to making decisions; for example, should a course of study be organized in one way or another, should a new instruction scheme be adopted, etc.

As Popham (1972: 3), mentioned and as is shown in the display below, there are two basic roles for evaluation.

Role	Name	Purpose
Role 1	Needs Assessment	To determine the desired ends
Role 2	Treatment Adequacy Assessment	To judge the worth of the educational means

Judging the worth of an educational means, according to Popham, can occur at different times for different purposes in the project as displayed below.

Time	Name	Purpose
During the Project	Formulative Evaluation	To make improvements in the educational means
At the Conclusion of the Project	Summative Evaluation	To compare the project with competitors

While the ILC project has come to the conclusion of its initial funding period, the instructional systems will be continued and revised. Therefore, this report is best understood as a formative evaluation. It is impossible and inappropriate to report, in any final sense, whether we succeeded or failed since the intent of this evaluation was to help us make improvements in the instructional systems of the ILC.

As mentioned previously in this manual, another dimension of the Developmental Learning Laboratory has been to create instructional products which could be used not only in the ILC by Indian and non-Indian educators but elsewhere as well. Approximately 1200 of these products have been distributed but an insufficient number of the evaluation forms have been returned to be included in this evaluation. Upon return, criterion referenced measures will be used to judge whether or not the instructional objectives in each product have been met based upon student performance. This evaluation, therefore, is limited to the instructional systems and products used in the Individualized Learning Center at Cook School.

PROCEDURES

The population for this evaluation included 24 Indian students 18 years of age or older who took courses in the ILC one or two semesters during the academic year 1973-74. Not included were eight students who took courses during the year but who failed for various reasons to take one or more of the ILC's operation because we discovered that the Iowa Test of Educational Development (12th grade version) was insensitive to student academic performance. Evaluations of the first operational year of the ILC are reported in Progress Reports one and two.

Population Characteristics

The ages of the 24 students range from 18 to 50. Seventy-five percent of the students were high school graduates before they began instruction. The median grade completed was 11th grade. In regard to marital status, 58% of the evaluation population were married. Some of the students were taking 6 or more hours of college while taking courses in the ILC. Twenty-eight of the students took 6 or more hours of college work at Mesa Community College or Arizona State University during the fall and/or spring semester of 1973-74. Seven tribes were represented in the population with the largest representations from the Episcopalian, Presbyterian, and Christian Reformed churches.

Program Characteristics

During the fall semester 1973, students in the ILC contracted for 350 hours of credit and completed 322 hours or 92% of their contracted credit hours. During the spring semester 1974, students contracted for 226 hours of credit and completed 187 hours or 83% of their contracted credit hours.

On the average during the fall semester, students took 14 hours of their study program in the ILC and during the spring semester, took 11 hours. During the fall semester 3,947 hours of instruction was scheduled and students completed 3,746 or 95%. During the spring semester 1974, students scheduled 2,428 hours of instruction and completed 2,380 or 98.1%. When attendance records were combined for the fall and spring semesters, the average student attended 99% of the hours that he scheduled. For more information about program characteristics, see Tables I and II in Appendix A.

Design

For administrative reasons it was necessary to use a quasi-experimental (one group only) design. We thought it unwise to use an experimental and control group in the evaluation because it would have meant withholding programs from students for at least a year's period of time. Using an experimental and control group also would have reduced the size of the evaluation populations.

Instruments

In this evaluation we sought to measure in the cognitive and affective domains. Three instruments were used.

1) The California Achievement Test to measure academic achievement in each of the basic study areas provided in the ILC, (Cognitive)

2) The Value Orientation Scale to measure changes in student cultural values, (Affective) and

3) a Student Attitude Inventory constructed by ILC staff to measure the attitudes of students toward various components of the ILC. (Affective)

The California Achievement Test, published by CTB/McGraw Hill, has three academic levels and two compatible versions which measure in the following areas: reading vocabulary, reading comprehension, mathematics computation, mathematics problem solving, language arts usage, language arts mechanics, and spelling. The California Achievement Test (referred henceforth as the CAT) yields scores in grade equivalency. In other words using the CAT it is possible to measure the year and the month before a student begins instruction and the year and month at the conclusion of his studies. One of the reasons that we selected the CAT was that it yielded a unit of measure (grade equivalency) which is readily understood by students

and others. During the first year of the ILC project, the Iowa Test of Educational Development (12th grade measure) was used, but other measures convinced us that many students were making academic gains but were not coming up to the beginning level of measurement of the ITED. For documentation about this point, see Progress Report No. 1.

To determine which level of the CAT to take, each student completed a short "locator test." The locator test is part of the Adult Basic Education program adapted from the CAT and published by CTB/McGraw Hill.

Each student taking courses in the ILC completed the CAT before they began instruction (pre-test) and after they completed one or two semesters (post-test). Because of the traditional problem of student negative attitudes at the end of the school year, the CAT post-test given in May 1974 was administered in an unusual way. Staff of the ILC requested that a "special day" be created for administering the post-test. Staff held a breakfast for all students to insure that they were awake, well fed, and relaxed before taking the test. Students were also rewarded by being allowed to skip the rest of their classes after the test. A casual survey of students completing the CAT post-test convinced us that students "did their best."

The Value Orientation Scale was also administered as a pre- and post-test. The Scale, developed by Fred L. Strodtbeck, is a measurement of acculturation to middle-class values. The VOS consists of eight true and false questions. A copy of this instrument appears in Appendix B. The first three questions in the VOS deal with time orientation and mastery over one's destiny. Questions four to six measure familism versus individualism and loyalty to extended family versus loyalty to nuclear family. Question seven tests for individual versus group orientation. Question eight deals with immediate versus postponed gratification. In a study conducted by the Southwest Cooperative Regiona

Laboratory entitled Analysis of Academic Achievement of Indian School Students in Federal and Public Schools, it is discovered that the relationship between student value orientation and academic achievment as measured by grade point average was statistically significant although the strength of the relationship was rather weak (correlation coefficient of .359.) In other words, the degree to which Indian students held middle-class values rather than traditional Indian values had something to do with their academic achievement.

A Student Attitude Inventory was developed by ILC staff at the end of the first year of operation. The Inventory included, initially, 26 items. Using a five point Likert-type Scale, students were asked the degree to which they agreed or disagreed with statements. A copy of this inventory can be found in Appendix B.

Reliability and validity coefficients of the California Achievement Test in this evaluation were those stated by the publisher. To the best of our knowledge no coefficients have been computed for the Value Orientation Scale nor did we compute them for the Student Attitude Inventory.

Evaluation Questions

Because this manual is being written for persons with limited or no background in statistics and research methods, we shall state the questions we considered rather than the usual hypotheses. Tables and other findings important to researchers have been placed in the appendices.

As we evaluated the ILC we sought answers to questions in order to make improvements in our learning systems.

1. *What can students now do as a result of studying in the ILC?* This question is another way of asking what criterion levels have students reached in what instructional packages. The answer to this question tells the specific skills which students gained as a result of their studies.

2. *Did students taking courses in the ILC either one or two semesters make statistically significant gains in the courses which they took as measured by the subscales of the California Achievement Test?* By knowing the answer to this question we felt that we could determine the effectiveness of the ILC's instructional program.

3. *Is it possible to predict what students can be expected to gain academically in each of their study areas as measured by the subscale of the California Achievement Test?* If this question could be answered, we would have helpful information for student guidance and for revising our instructional systems. For example, it would be unfair to compare one student who gains two years in reading with another who gains only one year if their academic backgrounds are different. Students want to know if they are gaining what they "should," but how does one determine how much a student can reasonably gain when his background and other factors are taken into consideration?

4. *Do students taking courses in the ILC one or two semesters make any statistically significant changes in their cultural value orientation as measured by the Value Orientation Scale?* By knowing the answer to this question we can determine the adequacy of a popular theory that Indian students must acquire non-Indian or middle-class values in order to succeed in school. Individualized instruction, with its accompanying technology, on the surface appears to be non-Indian. Would students have to change their values in order to succeed in the ILC? It was our hope when the ILC was started that students could maintain their cultural values and yet make academic gains.

5. *How do students taking courses in the ILC one or two semesters feel about the various aspects of the Learning Center as measured by a staff developed Student Attitude Inventory?* By knowing the answer to this question we will be able to make adjustments based upon the direct opinions of students as well as their performance measured by other instruments.

6. *How did the attitudes of students toward the ILC at the end of the second year compare with the attitudes at the end of the first year?* In other words, did the "newness" wear off and did students become less satisfied with the ILC?

7. *Is it possible to identify biographical and academic factors which contribute to student academic achievement?* By knowing the answer to this question we can identify which programs work for what types of students under what sort of programs. This information would be helpful in making revisions in instructional programs and also helpful in guidance counseling. If we discover, for example, that the age of the student when he begins work in the ILC makes a difference to his academic performance, then it becomes necessary to either screen out certain students on the basis of their age or make revisions in the instructional systems.

Results

The results of this evaluation will be reported in answer to each of the evaluation questions. To answer the first 6 questions, all statistical analyses were done using the ILC's Monroe Model 1766 Programmed Calculator and statistical packages furnished by the Monroe Company. To answer the 7th question, it was necessary to use the computer facilities of Arizona State University under a contractual arrangement.

1. What can students now do as a result of studying in the ILC?

In LANGUAGE ARTS, all of the students can now write a topic sentence, a paragraph, a thesis statement, and a composition. Nearly all of the students can identify the eight parts of speech, can capitalize correctly, and punctuate accurately. All of the students have learned the meaning of at least 150 new words and can spell these words correctly and half of the students have learned from between 200-300 words and can spell them correctly.

In SPEED READING all of the students are now reading at least 260 words per minute with 85% comprehension or better. Several of the students are reading above 450 words per minute with comprehension about 95%. One student is now reading 512 words per minute with 100% comprehension.

In MATHEMATICS all of the students can now add, subtract, multiply, and divide whole numbers. Most of the students can add, subtract, multiply, and divide fractions and several students are able to do algebraic formulas and can solve equations.

In STUDY SKILLS, nearly all of the students now know how to use the library card catalog, the Reader's Guide to Periodicals, an encyclopedia, the World Almanac, and a dictionary. All of the students now know how to use books including the ability to use the table of contents, the index, glossary, suggested readings, and illustrations. In regard to test taking, all students now can identify and name types of tests, can make the appropriate responses for different types of tests, can list four general rules in test taking, can name and identify types of grading systems, and can describe the meaning of "grade equivalent," "percentile rank" and "percentage of the total."

Other courses, in addition to basic studies, were offered in the ILC. These courses included Biblical, theological, and cultural studies. Similar statements to those made about abilities in basic studies can be furnished

about other courses upon request. These types of measures (statements) are called criterion-referenced measures which means that certain numbers of students met certain criteria or levels in the various instructional packages so that students now have skills which they did not have prior to their studies. To report more specifically in the use of criterion-referenced measures would require more space than is warranted in this manual. Such information, however, is available for those who are serious about establishing learning centers.

2. *Did students taking courses in the ILC either one or two semesters make statistically significant gains in the courses which they took as measured by the subscales of the California Achievement Test?*

The general answer to this question was yes; students did make statistically significant gains in reading vocabulary, reading comprehension, mathematics computation, mathematics problem solving, language arts usage, and language arts mechanics. Students did not make statistically significant gains in spelling although we expect this since no instruction was provided which was directly related to the task of learning spelling.

To arrive at these answers a t Test for Paired Observations was run. With 95% confidence we can say that the gains which students made were actual rather than a matter of chance. The following display shows where on the average students started before instruction, where they finished after participating in instruction, and the average amount of student academic achievement.

Academic Achievement Measured by California Achievement Test*

Academic Area	Average Academic Level Before Instruction	Average Academic Level After Instruction	Average Amount of Gain
Reading Vocabulary	7.2	8.4	+1.2
Reading Comprehension	7.7	8.7	+1.0
Reading Total	7.4	8.8	+1.0
Math. Computation	6.3	7.9	+1.7
Math. Problem Solving	5.7	6.6	.8
Math. Total	6.0	7.4	+1.4
Language Arts Mechanics	8.5	9.8	+1.3
Language Arts Usage	6.9	8.5	+1.6
Language Arts Total	8.0	9.3	+1.3
Spelling	10.2	10.9	.7

*Levels are stated in years and months. Example: 7.1 means 7th year, 1st month.

The range of student gains was very large. Some students gained as much as five years in two semesters and several others lost as much as two years. The following display shows the range of gain or loss for each of the subscale areas.

FOR STUDENTS TAKING COURSES ONLY ONE SEMESTER

	Lowest Gain Score	Highest Gain Score
Reading Vocabulary	-.4	+2.3
Reading Comprehension	+1.0	+2.7
Mathematics Problem Solving	-1.4	+3.2
Language Arts Mechanics	+ .1	+3.2
Language Arts Usage	-1.5	+2.4
Spelling	-1.9	+4.1

FOR STUDENTS TAKING COURSES TWO SEMESTERS

	Lowest Gain Score	Highest Gain Score
Reading Vocabulary	-1.1	+3.4
Reading Comprehension	-2.0	+3.3
Mathematics Computation	- .4	+5.1
Mathematics Problem Solving	- .9	+2.6
Language Arts Mechanics	-1.7	+5.2
Language Arts Usage	-1.0	+4.7
Spelling	-3.3	+4.4

For more statistical information about this analysis, see Table III in the Appendix.

3. Is it possible to predict what students can be expected to gain academically in each of their study areas as measured by the subscales of the California Achievement Test?

The general answer to this question was that we could predict in some subscales but not for others.

To find the answer to this question, we had to first calculate what students could be expected to gain using the following formula:

$$\frac{\text{C.A.T. Pre-test score}}{\text{Grade completed + 1}} = \text{Expected Gain}$$

The Bureau of Indian Affairs used this formula in their evaluation of Title I programs in the state of Arizona. In the formula an attempt is made to account for the educational backgrounds of students as measured by how many years they completed in school before beginning instruction and their educational entry level as measured by their pre-test score on the California Achievement Test. While there are more accurate ways of predicting student academic achievement,

we felt that this formula should be analyzed because of its simplicity. What we hoped to predict was the minimum that a student could be expected to gain in each subscale of the CAT rather than the maximum or actual amount of expected gain.

To answer this question, we used a t Test for Paired Observation utilizing the expected gains and actual gains in each subscale area of the CAT for students taking courses in the ILC one or two semesters. With 95% confidence we can state that there were statistically significant differences between expected and actual gains in the following areas:

Reading vocabulary

Mathematics computation

Language arts usage

There were <u>not</u> statistically significant differences in the following areas:

Reading comprehension

Mathematics problem solving

Language arts mechanics

Spelling

Another analysis was done to compute the percentage of students who met or exceeded their expected gains in each subscale area.

CAT Subscale Area	Percentage of students meeting or exceeding expected gain
Reading Vocabulary	76%
Reading Comprehension	78%
Mathematics Computation	88%
Mathematics Problem Solving	63%
Language Arts Mechanics	57%
Language Arts Usage	71%
Spelling	38%

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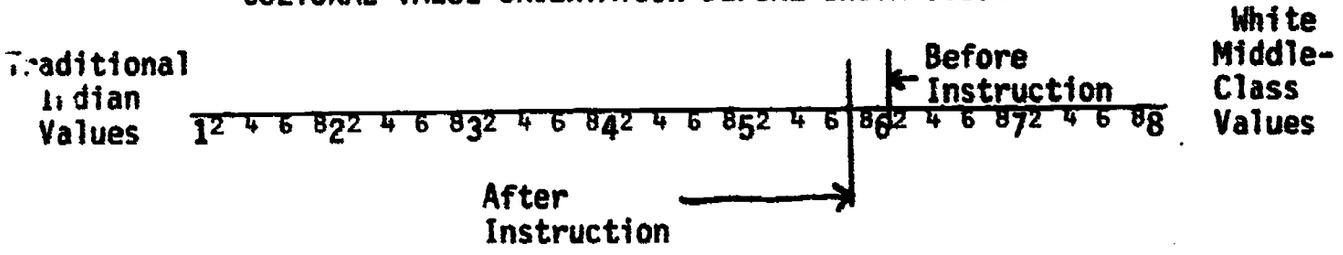
4. *Do students taking courses in the ILC one or two semesters make any statistically significant changes in their cultural values orientation as measured by the Value Orientation Scale?*

The general answer to this question was no. When a t Test for Paired Observation was run using the pre- and post-tests of the Value Orientation Scale, we found that while there was a numerical shift the difference was not statistically significant. We can state this with 95% confidence.

The displays below show where students on the average started and finished in their value orientation on a continuum from traditional Indian values to non-Indian or middle-class values as measured by the Value Orientation Scale. It should be remembered that while to the naked eye it appears as though there was a shift the difference could be due to chance in measurement.

CULTURAL VALUE ORIENTATION BEFORE INSTRUCTION



It is of interest that eight of the students moved from a preference for immediate gratification and toward a preference for delayed gratification. Eleven of the students, however, made no change along this continuum. The analysis showed that this change was not statistically significant. For more data about this analysis, see Table IV in the Appendix.

5. *How do students taking courses in the ILC one or two semesters <u>feel</u> about various aspects of the Learning Center as measured by a staff developed Student Attitude Inventory?*

1. When students were asked if they felt they learned more about a subject in a regular classroom than in the Individualized Learning Center, 53% agreed or strongly agreed while 41% disagreed.

2. Eighty-eight percent of the students agreed or strongly agreed that becoming responsible for their own learning is as important as getting to know a particular subject.

3. When given the statement "Most students work harder and get more done in an Individualized Learning Center than in a regular classroom," 59% of the students agreed or strongly agreed, 24% were unsure, and 17% disagreed.

4. Fifty-six percent of the students strongly agreed or agreed that the objectives of instruction are more clearly stated in the courses in the ILC than in most of their other classes, and 24% of the students disagreed.

5. When asked if the immediate feedback (knowledge of results) provided by the materials in the ILC made learning easier, 82% of the students strongly agreed or agreed. The remaining students were unsure.

6. Students were asked how they felt about knowing how well they were doing in their courses in the ILC. One hundred percent of the students agreed or strongly agreed that it is important for them to know.

7. Forty-seven percent of the students agreed or strongly agreed that they learned more from a cassette tape than from a lecture in a classroom and 35% of the students were unsure. Eighteen percent of the students apparently felt that they learned more from a lecture in a classroom.

8. When asked if they felt that it is easier to learn from programmed books than from a regular textbook, 57% of the students strongly agreed or agreed and 35% of the students were unsure.

9. Eighty-three percent of the students disagreed or strongly disagreed that programmed materials are confusing to them.

10. "I work harder when I am competing with other students than when I am working on my own." Reactions to this statement were mixed. Fifty-three percent of the students agreed or strongly agreed and 41% of the students disagreed or strongly disagreed. The remaining students were unsure.

11. When asked if the teachers in the ILC were usually able to give the help needed, 88% of the students agreed or strongly agreed and 12% disagreed or strongly disagreed.

12. Only 12% of the students agreed or strongly agreed with the statement that teachers in the ILC did not seem to be interested in how well they were doing.

13. When asked if students felt that they had a more positive attitude toward learning since they had been in the ILC, 70% of the students agreed or strongly agreed while 24% of the students were unsure, and 6% disagreed.

14. Ninety-five percent of the students strongly agreed or agreed that the materials in the ILC are interesting.

15. The students were asked if working in the ILC at their own rate is of importance to them. Eighty-eight percent agreed or strongly agreed.

16. Students were asked if they felt it important to work privately so that others don't know when they make mistakes. Surprisingly, only 35% of the students agreed or strongly agreed while 41% of the students disagreed or strongly disagreed. The remaining students were unsure.

17. Did the ILC make students more responsible for their own learning? When asked about this matter, 83% of the students agreed or strongly agreed that the ILC did help them become more responsible for their own learning while 12% disagreed.

18. Seventy-six percent of the students agreed or strongly agreed that it is important that grades for courses in the ILC not be dependent upon what other students do.

19. The Student Attitude Inventory included a request that students list their opinions about the courses that they felt should be taught as a group class instead of in the ILC. Two students mentioned English, three students mentioned Bible courses, 1 student mentioned study skills, 1 student mentioned mathematics, and the remaining students had no opinion.

20. The following items were listed by students as those factors which they disliked about working in the ILC: It is noisy (3 students), it is too quiet (1 student), it is too hot (1 student).

21. When asked what students felt they liked best about working in the Individualized Learning Center, the following matters were mentioned:

A. "Reading and basic English"

B. "You have your teacher, tapes, and materials."

C. "We are able to make up classes when we miss them."

D. "The individual work that we do"

E. "You can concentrate."

F. "Being alone and just sitting there and nobody knowing if you are working or not"

G. "Working at my own rate:"(mentioned by 6 students)

22. To make the Individualized Learning Center a better place to learn, the following suggestions were made by students:

A. "Do not permit visitors in the ILC."

B. "Bring in current learning devices to use and more of the latest materials on learning."

C. "Expository writing in college"

D. "Instructors to meet with students at times to discuss progress.

A majority of students did not have a response to this request for suggestions.

6. How did the attitudes of students toward the ILC at the end of the second year compare with the attitudes at the end of the first year?

When the responses to items for the second year were compared with the responses from the first year, it was found that no statistically significant differences existed for each item EXCEPT one. More students this year than last year felt that they could get more done in a regular classroom than in the ILC. To make these comparisons a Chi Square (2x3) Analysis was done. The five cells were collapsed into three. With 95% confidence we can say that the results are statistically significant rather than a matter of chance.

7. Is it possible to identify biographical and academic factors which contribute to student academic achievement?

This question actually contains two sub-questions; 1) How well can we predict student academic performance, and 2) What factors are contributing to academic performance in what amounts?

To answer this question Multiple Regression Analysis was done on a UNIVAC computer at Arizona State University. What was discovered from the analyses is that it is possible to predict student academic performance very well in six of the eight C.A.T. subscale areas (R^2 = above .84).

This type of knowledge of how students will do in the ILC before they begin instruction based upon information collected prior to academic work is important because it helps to determine what programs a student should use, under what conditions, and what reasonable results to expect. The ability to predict also helps to make modifications in the instructional program by knowing what worked for whom.

Where it was possible to predict student C.A.T. post-test scores, the following factors were identified as contributing significantly to student academic performance. These factors are listed in the order of how much they

contribute to student performance.

1.0 READING VOCABULARY (R^2 = .85)
- 1.1 C.A.T. pre-test
- 1.2 Age
- 1.3 Marital status

2.0 READING COMPREHENSION (R^2 = .94)
- 2.1 C.A.T. pre-test
- 2.2 Number of semesters in related courses

3.0 READING TOTAL (R^2 = .94)
- 3.1 C.A.T. pre-test
- 3.2 Number of semesters in related courses

4.0 MATHEMATICS COMPUTATION (R^2 = .87)
- 4.1 C.A.T. pre-test
- 4.2 Grade in school completed before starting instruction

5.0 MATHEMATICS PROBLEM SOLVING (R^2 = .85)
- 5.1 C.A.T. pre-test
- 5.2 Number of semesters in related courses

6.0 Mathematics Total (R^2 = .91)
- 6.1 C.A.T. pre-test
- 6.2 Grade in school before starting instruction

It was not possible to predict student academic performance as well in the areas of language arts. In language arts, however, the factors contributed to how students performed academically.

7.0 LANGUAGE ARTS MECHANICS (R^2 = .75)
- 7.1 C.A.T. pre-test
- 7.2 Number of semesters in related courses
- 7.3 Marital status

8.0 LANGUAGE ARTS USAGE (R^2 = .75)
- 8.1 C.A.T. pre-test
- 8.2 Value Orientation Scale score
- 8.3 Age at the time of beginning instruction

9.0 LANGUAGE ARTS TOTAL (R^2 = .77)
- 9.1 C.A.T. pre-test
- 9.2 Number of semesters in related courses

CONCLUSIONS AND RECOMMENDATIONS

1. STUDENTS TAKING COURSES IN THE ILC ONE OR TWO SEMESTERS DURING ACADEMIC YEAR 1973-74 MADE ACHIEVEMENT GAINS THAT WERE STATISTICALLY SIGNIFICANT IN THE BASIC STUDIES AREAS OF READING VOCABULARY, READING COMPREHENSION, MATHEMATICS COMPUTATION, MATHEMATICS PROBLEM SOLVING, LANGUAGE ARTS USAGE AND MECHANICS, BUT NOT IN SPELLING.

Because of this fact it is reasonable to infer that the instructional packages in the ILC and the educational systems are affecting student learning as measured by the CAT.

Students did not make gains in spelling that were statistically significant, but this was expected because no instructional programs in spelling were offered. Only four of the students were spelling below the eighth grade level in the fall, and only five students were spelling below the established program criteria level of eighth grade in the spring. The average level of spelling ability before instruction was 10 years and 2 months, and after instruction it was 10 years and 8 months; therefore, spelling was not a major problem area.

How students made gains is of equal important to what was gained. Prior to the establishment of the ILC, courses in basic studies were offered in the traditional manner. Group classes were held at set times with all students studying the same materials regardless of their educational entry level. When students missed class due to illness and when students had to return home because of family concerns, a "make up" situation was created which became difficult for student and teacher.

The ILC has, therefore, solved some administrative problems. It is now possible for students to study at their own pace, on their own level, and at a convenient time. The necessity of scheduling the right class for the right student at the right time has been eliminated.

While it is too early to know for sure, it appears that studies in the ILC reduce the amount of time required to prepare for the G.E.D. exam. In previous years it took students at least one year (2 semesters) to pass the G.E.D. test. In the ILC (with only one exception) the students completed the G.E.D. test in one semester or less.

Individualized instruction has also helped to solve a faculty-student ratio problem. In the traditional approach to education it is necessary to have fairly large classes to justify teaching staff. The ILC approach makes it possible and economically feasible to offer a number of courses where student-faculty ratios are as low as 2 to 1 because it is possible to add courses without adding staff.

Because of the ILC, student academic performance as measured by grade point average has also been improved. As reported earlier, the school's grade point average was raised one entire letter grade from a C average to a B average.

The so-called "attendance problem" has also been apparently solved in the ILC. Where prior to the ILC students on the average had as high as a 40% absence rate, the overall absence average in the ILC was less than 2%. The possibility of making up work that had been missed accounted for the improved rate of attendance.

In the typical approach to education it is difficult, if not impossible, for students to make up work. In the ILC when students must return home for funerals and other family concerns, it is possible to "freeze" or stop a student's program. In most classes if a student misses two or three weeks of work, it becomes necessary to drop the class. In the ILC students can pick up where they left off without being penalized for absence.

Students make statistically significant gains. That is true but it is also important that these gains were made in a way that (at least for us) makes the ILC an attractive alternative to the traditional approach to education.

2. STUDENTS ON THE AVERAGE DID BETTER IN SOME BASIC SKILLS AREAS THAN IN OTHERS.

Students made higher gains in the CAT subscale areas of reading vocabulary, mathematics computation and language arts mechanics than they did in reading comprehension, mathematics problem solving, and language arts usage. Why?

While this is only a hypothesis, it appears that students did better academically in areas requiring "lower order" mental activities. The term "lower order" refers to the beginning levels of a cognitive taxonomy. For example, in courses like reading comprehension where students need to synthesize and evaluate they did not do as well as in courses like reading vocabulary where memorization and recall are the primary skills required of students. In spelling where learning is primarily a matter of memorization, students did very well (an entry level of 10th grade or better for the average student).

If the hypothesis is true that students can function better at lower order cognitive levels, it could be due to poor educational backgrounds or to cultural factors. The answer to why students did better in some areas than in others can not be determined from the data. It is reasonable, however, to consider that a cultural dimension exists in relation to the use of various cognitive skills. For example, to be able to "evaluate" one must believe that it is legitimate to doubt and question. Students educated in a paternalistic educational system may have failed to develop the necessary attitudes prerequisite to the acquisition of certain higher order cognitive skills. Additional investigation is needed in this area.

3. WHEN THE FORMULA TO CALCULATE STUDENT EXPECTED ACADEMIC GAINS WAS USED, IT WAS POSSIBLE TO FAIRLY WELL PREDICT STUDENT PERFORMANCE IN THE AREAS OF READING VOCABULARY, MATHEMATICS COMPUTATION, AND LANGUAGE ARTS USAGE BUT NOT IN THE AREAS OF READING COMPREHENSION, MATHEMATICS PROBLEM SOLVING, LANGUAGE ARTS MECHANICS, AND SPELLING.

As mentioned earlier, the t Test for Paired Observations using actual and expected gains was more for the purpose of examining the formula than for considering student achievement.

When one considers that from 70 to 80% of the students exceeded their expected gains in the various subscale areas of the CAT, the formula looks "good," but is the formula accurate?

In "snooping the data," it was found that the formula consistently failed to estimate the minimal level of expected gains for students in the middle range of entry scores. In other words, the formula calculates expected gains better for students with poor or excellent educational backgrounds as measured by the CAT pre-test.

What is wrong with the formula? A partial answer is given to this question by the results of the Multiple Regression Analysis which show that other factors not considered in the formula account for student performance (at least at Cook School).

Another flaw can be seen in the formula itself. The CAT pre-test scores are calculated on a ten-month year, but in the formula a year is measured by a (1) for each year of schooling that the student has completed before starting instruction.

4. STUDENTS IN THE ILC DID NOT MAKE ANY CHANGES IN THEIR CULTURAL VALUES ORIENTATION WHICH WERE STATISTICALLY SIGNIFICANT.

If the Value Orientation Scale measures what it is intended to measure (the value orientation on a continuum from traditional Indian values to middle class values), we can conclude that studies in the ILC do not make students "white men." This conclusion is further supported by an analysis in which the relation between value orientation and academic performance was considered (correlation between V.O.S. pre- and post-tests with achievement gains). The

relation between value orientation and achievement gains was very, very weak. In other words, it DID NOT HOLD TRUE that the more middle class a student was, the better he or she did academically. The popular theory that an Indian student has to be WHITE TO BE RIGHT in school did not hold true in the ILC.

5. ON THE BASIS OF THE RESULTS FROM THE STUDENT ATTITUDE INVENTORY IT APPEARS THAT STUDENTS GENERALLY FEEL POSITIVE TOWARD THE ILC.

A large majority of the students felt positive toward the various components of the ILC system including the use of instructional objectives, frequent feedback of results, individualized help, programmed texts, and audio-visual materials.

From the results, however, it can be concluded that a few students would prefer to have a choice of either studying in the ILC or a traditional type of classroom. This conclusion is based upon the results of student responses to inventory items seven, eight, and ten in which a few students expressed an interest in hearing lectures rather than using tapes and in competing with other students.

It was puzzling to discover that a large percentage of students have less interest in "privacy" in learning than staff has assumed. The so-called "embarrassment factor" which was important for staff to prevent (embarassment about failing) was of less importance to students than teachers.

Of heartwarming significance to ILC staff was the fact that 70% of the students indicated that they now feel more positive about learning after having been in the ILC than they did before they started. If we have in fact "changed attitudes" about education, then we may have achieved something which cannot be measured for years to come.

The fact that the results of the Student Attitude Inventory at the end of the second year of the ILC were not significantly different from the results at the end of the first year indicates that student feelings about the ILC are not

affected by the length of time that they spent in their studies in the ILC. In other words, students have not (as yet) grown tired of the ILC.

6. WE CAN PREDICT STUDENT CAT POST-TEST SCORES VERY WELL IN THE AREAS OF READING VOCABULARY, COMPREHENSION, AND MATHEMATICS COMPUTATION AND PROBLEM SOLVING BUT NOT WELL ENOUGH TO MAKE MODIFICATIONS IN THE INSTRUCTIONAL SYSTEMS AS YET.

The purpose of "accurate prediction" of student academic peformance before instruction by knowing certain characteristics of students is to determine what programs will work for what students under what conditions with what expected results.

CAT pre-test scores and the number of semesters spent in related courses consistently had the strongest relation with student performance (CAT post-test scores) in most subscale areas.

Perhaps this conclusion is clearer by considering the negative side of the results. Our analyses show that more often than not the age of the student, the highest grade completed before starting in the ILC, marital status, and amount of time spent in study HAVE LITTLE IF ANYTHING TO DO WITH how well a student does academically. Does this mean that we have truly "individualized" or that other factors which we did not measure make the significant difference in how well students perform academically?

It should be noted, however, that in Reading Vocabulary AGE AND MARITAL STATUS DID MAKE A DIFFERENCE (contribute to the percentage of variance). In Reading Comprehension, Mathematics Computation and Problem Solving the number of semesters which students spent in related courses DID CONTRIBUTE to student performance.

Several recommendations should be considered based upon these results. First, the use of Multiple Regression Analysis should be continued since the results may be due to sample size as much as to actual effects. It is necessary

and important to know what factors are affecting student learning in order to control these factors in the students' interests.

Second, and this recommendation seems obvious, if a student can choose between studying for one or two semesters in a given area, he or she should study for two semesters because he or she likely will do better. This recommendation does NOT hold true, however, for Reading Vocabulary and Language Arts Usage where the number of semesters spent in study have little if anything to do with student performance.

Third, the continuation of some students studying for as much as 160 hours in some subject areas for a semester should be stopped because of the lack of justification for this effort. We have known for a long time that there is a point of "diminishing returns" in learning, and this holds true in the ILC. As yet we do not know what students under what conditions should study for what length of time. It is important to know this because each student's contracts for what will be studied and for how long. Unfortunately, guess work will have to be continued.

Concluding Remarks

The purpose of this evaluation was to identify areas for improvement in programs (formative evaluation). We have not proven in any definitive way whether the ILC is a success or failure. The analyses show that many of the procedures in the ILC should be continued because they are affecting learning and because student attitudes are positive about these methods. Considerable work lies ahead. It will be important to identify which specific instructional packages WITHIN academic areas work best for what types of students under what conditions. Since it is necessary to buy commercial packages without knowing how well the materials will work, careful evaluation is important to measure effectiveness and cost before additional funds are expended.

When Cook School submitted its proposal to Lilly Endowment, Inc., we asked for a chance to prove that the ILC approach would work. We provided reasonable assurance as the Pima Indians would say that "YH THAW EA JU" (it would happen). We feel that the ILC has!

APPENDICES

SECTION II

APPENDIX A

DEMOGRAPHIC FACTORS

TABLE I

RATE OF ATTENDANCE BY COURSE I.L.C. 1973 - 74

COURSE	FALL SEM 1973				SPRING SEM 1974				COMBINED			
	Number of students	Contract hours	Total hrs attended	% of attendance	Number of students	Contract hours	Total hrs attended	% of attendance	Combined total students	Combined contract hrs	Combined hrs completed	Combined % of attend.
Basic English EN 100	8	325	353.2	109	5	191	187.4	98	13	516	540.7	105
Eng. fundament. EN 121	6	248	268.1	108	7	229	230.9	101	13	477	499.0	105
English comp. EN 221	3	94	86.9	91	4	127	132.4	104	7	221	219.3	99
Basic math MA 100	15	540	501	93	12	709	697.4	99	27	1549	1498.5	97
Reading EN 110, 111	12	511	491.7	97	5	372	390.9	114	17	883	882.6	102
Speed reading EN 200	9	300.5	268.3	90	5	192	161.8	84	14	492.5	431	88

TABLE II

INDIVIDUALIZED LEARNING CENTER — COOK SCHOOL TEMPE, ARIZONA

Descriptive data	SPRING SEM. 73	FALL SEM. 73	SPRING SEM. 74
STUDENTS			
Non-college		19	15
College		8	8
Special (off campus)		2	1
Total credit hours contracted for		350	226
Total credit hours earned		322 (92%)	187 (83%)
Average no. hrs per week scheduled in I.L.C. (non-college students)		14.73	11.0
Overall average GPA		2.724	2.963
ATTENDANCE			
Total hrs scheduled		3847.5	2428
Total hrs attended		3746.64 (96%)	2330 (93.1%)

STUDENT HRS SCHEDULED PER WEEK BY SELECTED COURSES

Cr. hrs	Course	no. hrs	% of total	no. hrs	% of total	no. hrs	% of total
3 - 5	Reading			48	13	21	9
5	Math			93	27	54	24
Plus 2 hrs per wk outside I.L.C. 3	Basic Eng.			24	7	15	7
3	Eng Fund			18	5	21	9
3	Eng Comp			8	2	11	5
3	Study Skills			51	15	48	21
3	Speed Reading			23	7	15	7
	Totals			268	77%(of 350)	185	82% (of 226)
	Total hrs all subjects			350		226	

APPENDIX B

TREATMENT EFFECTS

TABLE III

Percentage of Students Exceeding Expected Gains

	Reading Vocabulary	Reading Comprehension	Math. Computation	Math. Problem Solving	L. A. Mechanics	L. A. Useage	Spelling
IN COURSE ONE SEMESTER							
Exceeded expected gain	4	5	1	2	5	6	3
Did not exceed expected gain	2	0	1	2	2	1	4
Total number of students	6	5	2	4	7	7	7
Lowest gain score	-.4	+1.0	-	-1.4	+.1	-1.5	-1.9
Highest gain score	+2.3	+2.7	-	+3.2	+3.2	+2.4	+4.1
IN COURSE TWO SEMESTER							
Exceeded expected gain	9	9	13	8	7	9	5
Did not exceed expected gain	2	3	1	4	7	5	9
Total number of students	11	12	14	12	14	14	14
Lowest gain score	-1.1	-2.0	-.4	-.9	-1.7	-1.0	-3.3
Highest gain score	+3.4	+3.3	+5.1	+2.6	+5.2	+4.7	+4.4
COMBINATION OF ONE AND TWO SEMESTERS							
Exceeded expected gain	13	14	14	10	12	15	8
Did not exceed expected gain	4	3	2	6	9	6	13
Total number of students	17	17	16	16	21	21	21
Percent exceeding expected gain	76%	78%	88%	63%	57%	71%	38%

TABLE IV

Changes in Value Orientations

	Pre-Test	Post Test
Number	20	20
Mean	6.10	5.65
Standard Deviation	1.25	1.35

Mean Difference	.45
t	+.169

Not significant at the .05 level.

TABLE V

MULTIPLE REGRESSION EQUATIONS TO PREDICT C.A.T. POST TEST SCORES

1. Reading vocabulary = .983 (C.A.T. pre-test score) + .147 (age) + -.841 (marital status) + -.183

2. Reading comprehension = .926 (C.A.T. pre-test score) + -3.163 (no. of semesters in related courses) + 6.038

3. Reading battery total = .745 (C.A.T. pre-test score) + -2.00 (no. of semesters in related courses) + 1.987 (expected gain score) + 4.718

4. Mathematics computation = 1.331 (C.A.T. pre-test score) + .294 (grade completed) + -3.345

5. Mathematics problem solving = 1.222 (C.A.T. pre-test score) + -1.056 (no. of semesters in related courses) + 1.177

6. Mathematics battery total = 1.324 (C.A.T. pre-test score) + .218 (grade completed) + -5.527 (no. of semesters in related courses) + -1.926

7. Language arts mechanics = .886 (C.A.T. pre-test score) + -.806 (no. of semesters in related courses) + .787 (marital status, married = 2, single = 1) + 2.208

8. Language arts usage = 1.172 = 1.172 (C.A.T. pre-test score) + .966 (V.O.S. pre-test score) + -.141 (present age) + -1.790

9. Language arts battery total = 1.014 (C.A.T. pre-test score) + .625 (no. of semesters in related courses) + 2.215

TABLE VI

Academic Achievement Measured by California Achievement Test

	Pre-Test			Post Test			Mean Diff.	t
	N	Mean	St. D.	N	Mean	St. D.		
Reading Vocabulary	16	7.21	2.21	16	8.36	2.66	+1.14	+3.73
Reading Comprehension	17	7.71	2.16	17	8.74	3.03	+.92	+2.37
Reading Total	17	7.74	2.37	17	8.75	2.83	+1.01	+3.82
Math. Computation	13	6.25	2.06	13	7.92	2.73	+1.67	+5.13
Math. Problem Solving	13	5.74	2.10	13	6.57	2.98	+1.03	+2.60
Math. Total	13	5.99	2.00	13	7.36	2.72	+1.37	+3.34
Language Arts Mechanics	21	8.48	3.04	21	9.76	3.20	+1.28	+3.38
Language Arts Usage	21	6.93	2.26	21	8.50	3.03	+1.57	+3.75
Language Arts Total	21	8.00	2.50	21	9.33	2.98	+1.33	+4.29
Spelling	21	10.21	2.75	21	10.86	2.53	+.09	+0.12

All areas significant at the .05 level or higher except Spelling.

TABLE VII

Comparison of California Achievement Test Actual and Expected Gains

	Expected Gains			Actual Gains			Mean Diff.	t Value
	N	Mean	St. D.	N	Mean	St. D.		
Reading Vocabulary	17	0.45	0.19	17	1.10	1.20	+.65	+2.25
Reading Comprehension	17	0.51	0.22	17	0.87	1.58	.36	+0.94
Math Computation	16	0.47	0.22	16	1.43	1.24	+.96	+4.01
Math Problem Solving	16	0.42	0.20	16	1.07	1.35	+.65	+2.07
Language Arts Mechanics	21	0.54	0.26	21	1.77	1.32	+1.23	+1.80
Language Arts Useage	21	0.48	0.22	21	1.56	1.91	1.08	+2.60
Spelling	21	0.65	0.29	21	0.64	2.04	-0.01	0.00

TABLE VIII

STUDENT ATTITUDE INVENTORY

BEST COPY AVAILABLE

Survey - Ga 1974

[illegible] students taking courses in [illegible]

Item No. on 1973 Survey	ITEM NO.	RESPONSES										MEAN
		1 SA		2 A		3 DK		4 D		5 SD		
		NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	
1	1	2	12	7	41%	1	6%	7	41%	-	0	2.76
2	2	5	29%	10	59%	2	12%	-	0	-	0	1.82
3	3	3	18%	7	41%	4	24%	3	18%	-	0	2.41
4	4	1	6%	8	47%	3	18%	4	24%	-	0	2.47
5	5	5	29%	9	53%	3	18%	-	0	-	9	1.88
6	6	8	47%	8	47%	-	9	-	0	-	0	1.50
7	7	3	18%	5	29%	6	35%	3	18%	-	0	2.50
8	8	3	18%	6	35%	6	35%	-	0	1	6%	2.40
9	9	-	0	1	6%	2	12%	12	71%	2	12%	3.88
10	10	2	12	7	41%	1	6%	5	29%	2	12%	2.88
12	11	5	29%	10	59%	-	0	1	6%	1	6%	2.00
13	12	-	0	2	12%	1	6%	7	41%	7	41%	4.10
14	13	5	29%	8	47%	4	24%	1	6%	-	0	2.17
17	14	4	24%	12	71%	-	0	1	6%	-	0	1.88
18	15	5	29	10	59%	1	6%	1	6%	-	0	1.88
19	16	1	6%	5	29%	4	24%	5	29%	2	12%	3.11
21	17	3	18%	11	65%	1	6%	2	12%	-	0	2.11
22	18	5	29%	8	47%	2	12%	2	12%	-	0	2.05

SA = Strongly agree
A = Agree
DK = Don't know
D = Disagree
SD = Strongly disagree

STUDENT QUESTIONNAIRE

NAME _____

DATE _____

DIRECTIONS:

The purpose of this questionnaire is to help the school evaluate the effects of the Individualized Learning Center upon some of your beliefs. There are no right or wrong answers to the questions. Please read each question carefully before either circling T (true) or F (false). Your answers will be kept private.

1. Planning only makes a person unhappy since plans hardly ever work out anyway. T F

2. When one is born, the success one is going to have is already in the cards, so one might as well accept it and not fight against it. T F

3. Nowadays, with world conditions the way they are, the wise person lives for today and lets tomorrow take care of itself. T F

4. Even when teenagers get married, their main layalty should still belong to their parents. T F

5. When the time comes for a young person to take a job, that person should stay near his or her parents, even if it means giving up a good job opportunity. T F

6. Nothing in life is worth the sacrifice of moving away from one's parents. T F

7. The best kind of job is where one is part of an organization, all working together, even if one doesn't get individual credit. T F

8. It is silly for a person to put money into a car when money could be used to get started in business or for an education. T F

Thank you for helping the school to help you by knowing some of your beliefs.