

DEVELOPMENT OF AN ARENA FOR TESTING THE APPLICABILITY
OF LABORATORY STRATEGIES AND TACTICS

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Early in our work we realized that the relevance of laboratory research for program development and evaluation would be enhanced by direct involvement with the practical problems of ongoing habilitative and educational endeavors. Furthermore, our laboratory data have shown that the majority of our severely and profoundly retarded participants are quite capable of acquiring behavioral skills under suitable contingencies of reinforcement. However, most of our laboratory participants are not eligible for classes in the institution schoolhouse. They are considered custodial cases and are even housed in buildings geographically separated from the residents who are thought to be good training risks. Mainly because of the custodial orientation of the personnel most directly responsible for the residents, the development of instructional programs for them has turned out to be a far more difficult undertaking than establishing a daily operating laboratory for long-term behavioral study. After two years of trial and error, however, we now have a workable system for classroom management and supervision.

FACILITIES

Our program development and evaluation facilities are adjacent to the laboratory. The main area (Figure 1), renovated and furnished with Title I funds, includes a classroom where pupils may work on their own or in small groups with materials such as paint, clay, and building blocks. We can observe the classroom through one-way windows.

During daily sessions pupils are given the opportunity to practice the skills they are learning in individual tutorials. They practice counting aloud with a class member as leader, they learn to recognize words and relate them to pictures, and they practice together saying what day it is and what time it is and responding when called by name. The pupils seem to enjoy this period and we believe the group sessions are helping them to overcome their reluctance to play or work together.

Four cubicles are used for more intensive individual tutoring. Most lessons in specific skills are given in these cubicles, which provide freedom from distractions. One-way windows allow observations of tutorial sessions.

The program development area, originally intended as a work area for the staff, is now doubling as a teaching area. Pupils also come here twice a day to trade their tokens for goodies and privileges at the "store".

A room across the hall functions as our data analysis area. Sometimes, when large stimulus materials are being used or when several pupils are involved in the same lesson at the same time, this room is used as a teaching area. Also, lectures to visiting groups are usually given in this room.

PUPILS

Our pupils range from pre-adolescent to middle aged. According to conventional classifications, most of them are "severely" or "profoundly" retarded; a few are "mildly" or "moderately" retarded and, in some cases, are considered "outward bound." They represent several of Fernald's dormitories, but the majority are from Wheatley Hall -- severely retarded boys and girls averaging 16 years of age. Most of our pupils are being studied concurrently in our laboratory.

RESIDENT AIDES

We currently have four "outward bound" residents working in the classroom. One helps supervise the pupils, another is responsible for constructing teaching materials, the third sorts and files our numerous data sheets, and the fourth performs janitorial tasks and takes pupils to the residents' store.

These residents are also being taught specific skills they wish to acquire. One is learning to type, another to read words that will assist him in traveling outside the Fernald grounds, and a third is learning to read the days of the week. Some of our former resident aides have left the institution altogether, some work in the community but still live at Fernald, and some are employed in a Fernald workshop.

The majority of our resident aides have asked to participate in our program either directly or through their social workers. Most of them have had difficulties in their past jobs because of what was considered unacceptable social behavior. We found that once they were given specific responsibilities and adequate training and were treated as adults, their unacceptable social behaviors began to disappear.

VOLUNTEERS

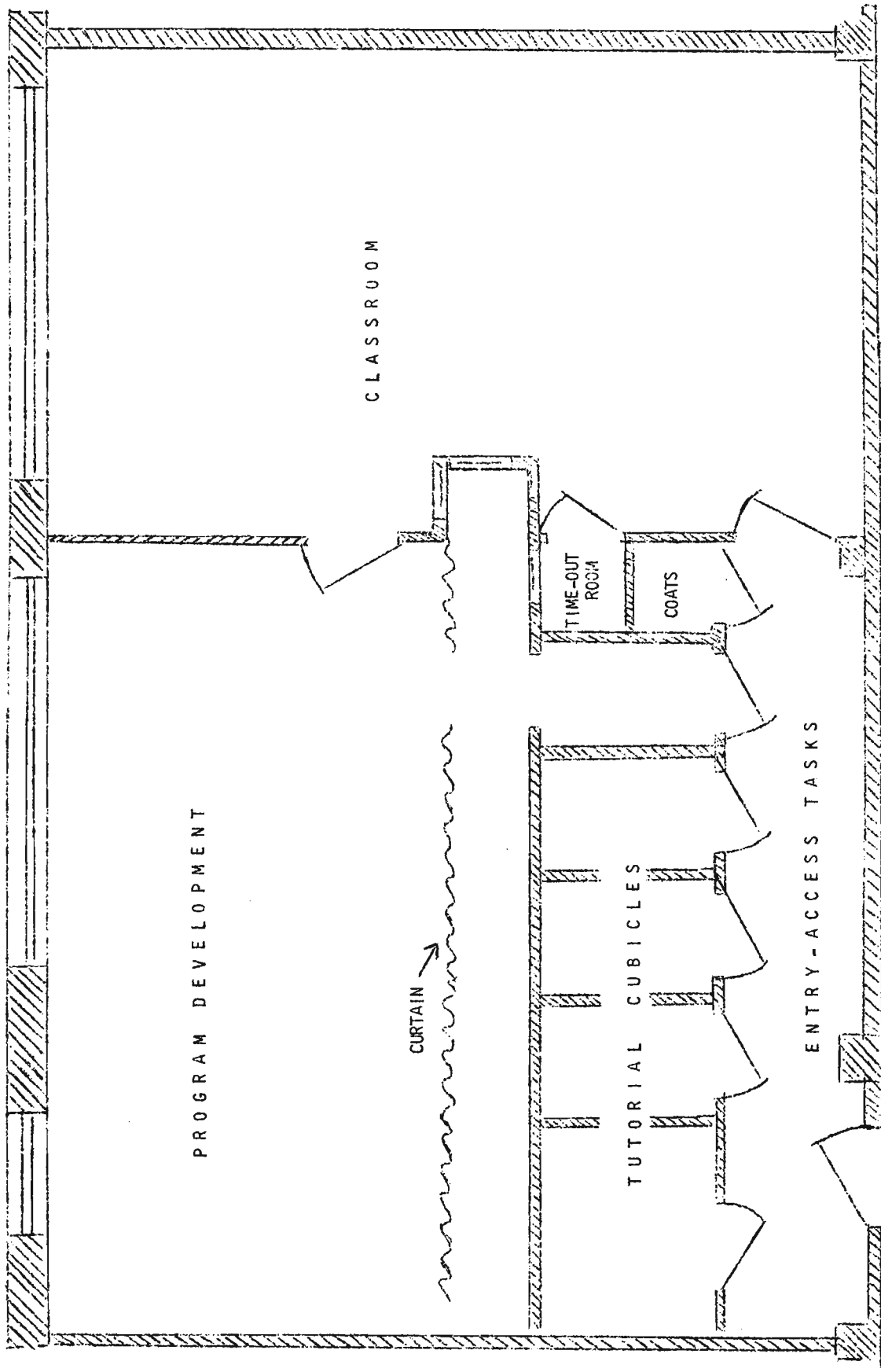
Our classroom welcomes volunteers. College students from Boston University, Boston College, Harvard, Radcliffe, Brandeis, Middlesex Community College, and Tufts work in the classroom for one or two sessions each week. On Wednesdays we are joined by 20 students from Lincoln-Sudbury Regional High School. Fifteen of the Lincoln-Sudbury volunteers, under the direction of a staff member, work in the basement of Wheatley Hall with the residents whom we hope to prepare for our regular classroom.

All volunteers receive an introduction to the classroom — its history, purpose, and details of operation. They are then observed as they conduct a few tutorials so that the staff can discover if they are having any problems. After one or two sessions a volunteer is usually ready to conduct tutorials independently, with staff consultation available whenever it may be needed. Their work is observed periodically to ensure that no difficulties go unremedied.

CURRICULA

Specific programs in basic skills are teaching the pupils to carry out simple requests that could and should be an integral part of their daily activities in their dormitories. They are learning to recognize written letters and words, to identify objects in their immediate environment, to discriminate colors and shapes, to identify the days of the week, to count, to set the table, to locate parts of the body. Some are learning to read aloud, to respond appropriately to short written requests, and to recognize currency. Relational prepositions such as inside-outside are being taught to them, and they are learning to match numerals with quantities. All of these programs are initially conducted in the cubicles on an individual basis.

Most of the pupils have learned to work for tokens in the laboratory. They now also work for tokens in the classroom, and are learning how to use tokens to obtain privileges and goodies. In the laboratory, we have found that many of



PROGRAM DEVELOPMENT AND EVALUATION FACILITIES - - - BEHAVIOR DEPARTMENT

FIGURE 1

them are quite selective in what they will work for. By offering television, music, and visual materials, in addition to candy, we can reach many more residents. Therefore, classroom pupils may earn the privilege of watching Sesame Street, listening to records, or looking at pictures and books. Some choose to "rent" flash cards and other instructional materials.

To maximize opportunities for the pupils to generalize their skills, we have made available a variety of group activities. Some of the activities are considered privileges which must be earned -- for example, going to the gym or joining the group on a field trip. Throughout the day, teachers structure tasks which test the pupils' ability to use their new behaviors. Pupils who purchase a session of Sesame Street are encouraged to participate in parts of the program by singing, counting, and making size and shape discriminations. In the gym, pupils are rewarded for joining in as many activities as possible.

The pupils are encouraged to use their skills in a variety of other ways. For example, each day before entering the classroom, pupils engage in a series of "entry access tasks" (see Figure 1). They must "sign in" by finding their name on the attendance board and move it from the "out" to the "in" position. Then they must identify the day of the week, which is printed on a large card near the attendance board. There is a large clock which the pupils must identify as a clock. If they have learned to read a clock, they are asked to read the time that is on the clock. They then go to the closet, remove their coats and hang them up. Until recently, before the pupils reached the closet they were required to cross a 5-foot long, 4-inch wide balance board which they made and painted themselves. Falls off the board were recorded on a large "Fall-Off" scale on the wall next to the balance board. When the pupils were coordinated enough to balance without falling off, we deleted this requirement for entrance to the classroom.

While awaiting instructional sessions, pupils are usually free to do as they wish. Books, musical instruments, crayons, pegboards, puzzles, and other educational toys are available. When the classroom first opened, most of the pupils simply sat doing nothing. Few of them explored the classroom. Although they had been used to operating laboratory devices by themselves, their ward environment had never encouraged exploratory behavior in a group situation. If necessary, we rewarded the pupils for examining or even just touching the materials around them. Eventually the materials and activities themselves acquired reinforcing properties, and the pupils began exercising their own preferences. Now the pupils use their tokens to "rent" the very materials they previously ignored.

OUR STRATEGIES FOR CLASSROOM DEVELOPMENT

On the basis of incoming data and past experience, we are evolving a series of strategies which serve as tactical guides for what has become a multifaceted operation with developmental potential beyond our early expectation. These strategies have been empirically derived from strategies developed in our laboratory work and from daily observation of the participants. A more detailed description of their derivation and the manner in which they have become operationalized in the classroom was presented last year at the annual meeting of the American Association on Mental Deficiency (Barrett, 1970). The empirical justification of these strategies will rest largely on our future work.

The pupils know best

Our classroom program is being functionally calibrated for the pupils it serves. The real founders of the classroom were, after all, the severely and profoundly retarded residents who, by their behavior, kept telling us not only that they could learn but that they would seek to learn. At the almost indis-criminable lower point of the Gaussian curve, there is, at present, no educational "model," because education, as well as society at large, has traditionally re-jected the severely and profoundly retarded. They are our model; we must learn from them as they learn from us.

The teacher is the expert on teaching

Our classroom is being empirically developed by a teacher who has had ample experience with and heavy commitment to the very people who are being taught. Past experience made it clear that administratively conceived models were most often armchair-derived notions of what should be taught -- with little awareness of either the pupils' existing behavior repertoires or the need for teachers with technological skills and creative ability. Although the classroom was set up as both a testing ground for application and as an experiment in its own right, freely emitted behavior of both pupils and teachers is allowing a natural evo-lution rather than a laboratory-formulated development of our classroom organi-zation and procedures.

Good teaching is exploratory

The classroom is oriented toward exploring and developing methods that work best for each pupil. The behavioral potential of severely and profoundly re-tarded people is simply not known. Untested assumptions of behavioral limitation have been perpetuated by the traditional custodial orientation of large resi-dential institutions.

The self-fulfilling prophecy -- what Gunnar Dybwad has called the "liability of labeling" -- cannot be counteracted in a closed system or in an environment where tradition remains unchallenged. The most fruitful avenues for future growth and development should be empirically determined by demonstrated effec-tiveness of methods that generate and sustain each person's highest level of competence. The only way to discover new methods and new evidence of behavior potential is to provide a milieu in which teachers and pupils alike are encour-aged to experiment and to grow.

Everyone should learn and everyone should teach

The classroom programs are providing learning opportunities for the broadest possible range of people, from the most severely retarded residents to the most sophisticated training specialists -- an operational model of a maximally "in-tegrated" learning environment. Programs are appealing enough to attract the brightest college students, yet simple and specific enough to be taught by vol-unteer help.

In line with this strategy, participation in the classroom is always voluntary for both pupils and teachers. The door is open for pupils to come and go as they choose. The open-door policy has enabled many of the "outward bound" residents to observe and participate in classroom activities. We have no evidence of any-thing but beneficial effects resulting from this freedom of movement, which

allows in turn for freer interaction among the students.

The "specialty" of special education for retarded people -- and most especially for the "trainable" and "untrainable" -- should rest with those who are dedicated to experimentation and exploration. Not every teacher or school administrator should be expected to have these skills and interests. We truly believe that our most valuable resource for discovery is the behavior of the pupils themselves, and we are trying to make their behavior accessible to all who wish to teach them -- regardless of age or academic degree. After all, some of the best teachers are children's own parents (Barrett, 1969), yet even they are rarely encouraged to participate actively in the education of their children.

Pupils are individuals

The operating structure of the classroom is being evolved in ways that should maximize opportunities for pupils to show not only their individual abilities but also their individual preferences. Pupils' responses to specified instructional procedures are important functional descriptions of their behavior. To obtain maximum spread of behavioral differences and to permit individual behavior to reveal program adequacy or inadequacy, most procedures have to be tried initially with each pupil -- rather than with pupils selected on the basis of untested assumptions, hearsay, or apparent (undemonstrated) behavioral deficit or ability. For individuality to be revealed in transmittable terms, it is necessary to use a simple system for communication and evaluation -- one that goes beyond the unitless, dimensionless properties of our verbal descriptive system (Barrett, 1970). The methods adapted and developed to meet this requirement are described in a later section.

Teachers are individuals too

To expect all teachers to enjoy teaching the same content in the same way is just as unrealistic as to expect all pupils to learn equally well from the same program. In our classroom, each teacher is encouraged to try out whatever he or she thinks may work. If carefully described for replicability, and accompanied by pupils' behavioral charts that show new levels of progress, the teacher's procedures may become a formal modification or new phase of a developing special skill program. If a teacher wishes, he or she may start constructing a skill-training program which has not yet been incorporated into the curriculum or one in which very different procedures are used. Thus, teachers as well as pupils have every opportunity to find and pursue their behavioral specialty.

In our classroom curricula, we are attempting to incorporate methods that yield information for 1) curricular improvement, 2) improving the training of the pupils, 3) increasing the skills of the teachers who plan and/or execute it, and 4) adaptation by teachers of other classes for the severely retarded in both institutional and community settings. The self-corrective use of rapid behavioral feedback to teachers tells them how effective their methods are, with which children, for attainment of which criterion behaviors. Refinement and validation of methods that furnish prescriptive information not only for more effective instruction of individual pupils but also for more efficient development of instructional sequences should enable our classroom to become a methodologic resource for other special education programs.

DEVELOPING TACTICS FOR MANAGEMENT OF TRAINING OPERATIONS

One of the biggest obstacles to establishing a mutually enhancing feedback loop between classroom instruction and laboratory research is the disparity in the methods of describing and evaluating what they do. In the education and training of severely retarded people, the problem is compounded by the absence of instructional materials and procedures standardized on and for this segment of the retarded population. Teaching these people is a do-it-yourself business where anything goes -- even if it doesn't work. The most persistent problem is that few people know what does and does not work and with whom. Whatever evaluation occurs is usually reported in the form of vague statements. A teacher who succeeds in teaching certain tasks to certain pupils may be unable to communicate the methods to help other teachers and pupils because the teacher has never been trained to describe what he or she does in terms that anyone else can follow.

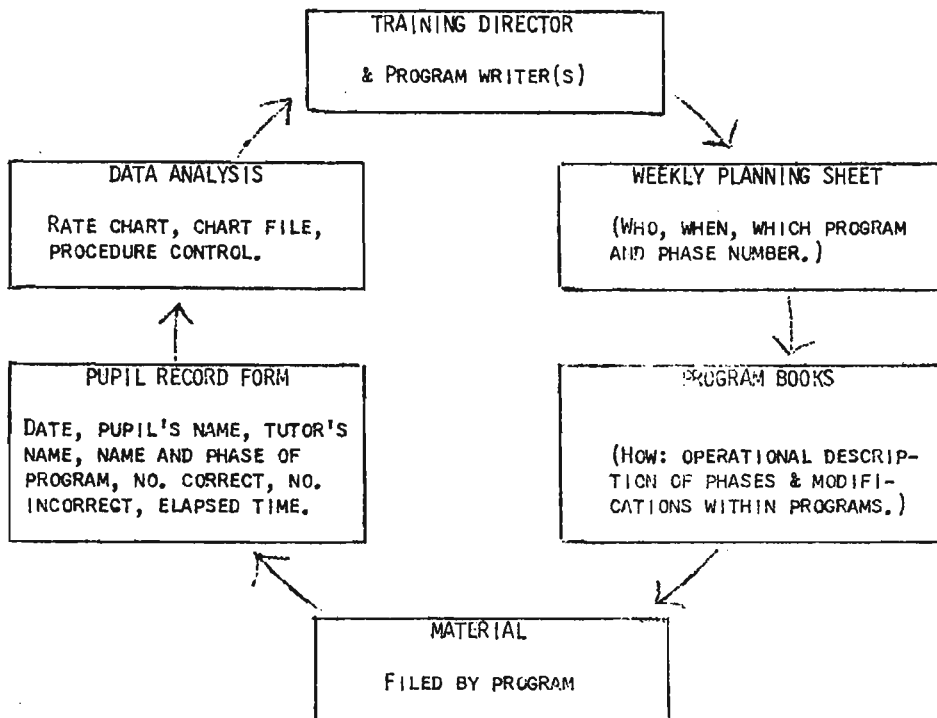
Good teaching is successful experimenting. It is the manipulation of the learning environment in ways that produce the desired changes in the pupils' behavior. And that is also what is done in the laboratory. But laboratory methods are precise; they are replicable because they are described in specific operational terms.

Before we could test the generality and usefulness of our findings, we had to find ways of facilitating communication and cross-comparison through the use of specifiable, reliably described recording and training procedures. Toward this end, we have established five methodological imperatives, most of which have recently been incorporated into daily classroom operations:

1. Focus on countable behaviors -- and count them.
2. Describe training procedures in clear, operational terms, and demonstrate the accuracy of your description by replication.
3. Record pupil behavior systematically on each task in terms of frequency over measured time units (i.e., rate).
4. Plot behavior on a common ordinate for all pupils on all tasks.
5. Keep a central file organized by procedure across pupils and by pupil (each pupil's training history).

These tactical requirements are simply potential ingredients of a rudimentary data production and retrieval system. Alone, they do not assure anything beyond filling files with behavior charts and procedural descriptions. To become functional they must be incorporated into an ongoing system for evaluation of instructional methods; that is, they must furnish rapid feedback for program modification to teachers, program writers, and training director. Furthermore, if they are to become universally useful tactics, they must be simplified into a series of step-by-step operations that will allow their use by people with varied degrees of training and competence.

To accomplish these objectives, we gradually evolved a functional system for evaluating instructional methods. The communication circuit, diagrammed below, is our newest vehicle for supervision, coordination, and, most important, communication.



The communication circuit begins with the weekly planning sheet, which lists all our pupils and the program phases assigned for each. There is a blank for each day a program is to be run. Teachers may elect to concentrate on specific programs that they are developing, they may work with selected pupils on a variety of programs, or they may simply work with whichever pupils are available on the programs assigned for them. After the teacher has conducted a tutorial with a pupil, the teacher enters his or her name in the appropriate blank opposite the pupil's name so as to provide an up-to-the-minute record of which programs are still to be conducted on a given day and with which pupils.

The second component of the circuit are the program books, which describe the specific procedures of every program and each sequential phase within it. After finding out from the planning sheets what phases of which programs are scheduled, the teacher consults the appropriate program book for directions. For easy recognition, programs are color-coded according to level of difficulty.

RED: basic programs designed for new pupils and those with severe discrimination deficits or behavior problems. "Red" programs include those which require attention to visual stimuli, simple assembly tasks, coloring, and simple matching.

GREEN: intermediate programs requiring complex matching, cross-modal matching, and auditory comprehension.

BLUE: advanced programs involving verbal responses and the integration of skills into concepts.

The teacher's next step is to obtain the necessary materials from the color-coded materials file, the third component of the circuit. Programs and phases

of programs that can be conducted with each set of materials are listed on the outside of the envelope.

The teacher then gets a standard pupil record form, the fourth component of the communication circuit, fills in the appropriate identifying information, and takes the pupil to a tutorial cubicle to conduct the lesson. When the lesson is completed, the teacher fills out the remaining information on the data sheet, computes the rates of correct and incorrect responses, places the sheet in a data collection box, circles his or her name on the planning sheet (indicating that the session was completed), and notes the number of errors made by the pupil.

The fifth component of the circuit goes into operation when our data analyst collects the recording sheets. Each pupil's rates of correct and incorrect responses are plotted each day on standard six-cycle semi-log behavior charts, providing a graph of each pupil's progress on each program. The data analyst checks the graphs to see what changes are occurring in each pupil's behavior. He notes trends which suggest that a pupil is ready to move on to the next phase, that a program should be terminated, or that a pupil is making no progress and therefore needs a revised program.

The final -- and, in effect, also the first -- component involves the training director and program writers who decide what changes should be tried. To complete the communication circuit, the training director notes on the planning sheets the termination, the modification, or change of phase he considers most appropriate, and he posts descriptions of new procedures. In this way each pupil's curriculum is continually adapted to his or her recorded behavioral status.

The simplicity of the operations within the circuit has enabled us to offer immediate constructive classroom participation to anyone who is interested, including visitors, parents, volunteer workers, other Fernald staff members, and some of the more competent Fernald residents.

The circuit operations appear to have solved many problems that have heretofore impeded functional interaction between the laboratory and the classroom. The circuit has brought us to a common data base with sufficient flexibility to permit continuous evaluation of instructional sequences. Program development no longer suffers from staff turnover or idiosyncratic recording habits. Teachers no longer wonder whether their procedures are working.

In our early efforts, without the system, teachers often became discouraged and departed, reporting that their well-intentioned efforts with such severely retarded persons seemed to "get nowhere." Since inception of the system, staff turnover has dropped to zero. Teachers report enthusiastically that they feel freer to experiment because of the rapid feedback provided by the system.

There are a few points that should be emphasized.

-- The systems and operations described above are facilitating tools. They do not tell what to teach. They do not even tell how to teach. But they do provide a way of finding out.

-- The system was developed empirically in a classroom that operates each weekday with a minimum of fifteen severely and profoundly retarded institutional residents. In many respects the classroom system is a sophisticated analog of the system used by the laboratory for programming control and data flow.

-- The system and its components are in their infancy. As by-products of the proposed work, we hope to 1) further develop the system to analyze components of curricula, 2) incorporate laboratory findings as part of the assessment-training-evaluation communication cycle, 3) integrate as productive tutors not only college and high school students, but also retarded adult residents, and 4) prepare groundwork for testing the applicability of various components of the system in community special education facilities.

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