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AUTHOR Fredericks, H. D. Bud; Moore, William G.
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ABSTRACT

The Teaching Research Infant and Child Center classrooms service moderately to profoundly handicapped preschool children by providing comprehensive individualized curriculums emphasizing self help, motor development, language, and cognitive skills. Each model classroom contains 12 children with a teacher and an aide, and utilizes volunteers and parents to assist in instruction. Individualized instruction, one to one teaching relationships, is used. Evaluation data demonstrates that the educational procedures employed within the Teaching Research model produce an accelerated effect on learning rates that cannot be attributed to change or maturation. Data also demonstrates that the Teaching Research procedures and methodologies are sufficiently defined to be transmitted to another professional who can in turn produce similar effects in a different educational site. A chart presents random samples of individual programs. (SBH)

DATA BASED CLASSROOM FOR PRESCHOOL HANDICAPPED CHILDREN,

TEACHING RESEARCH INFANT AND CHILD CENTER

Project Directors
H.D. Bud Fredericks
William G. Moore

Program Area: Education for the Moderate to Profoundly Handicapped

I. Project Title: Data Based Classroom for Preschool Handicapped Children, Teaching Research Infant and Child Center

II. Project Directors: H.D. Bud Fredericks and William G. Moore

III. Source and Level of Funding:

	Federal	Local
	HCEEP, BEH	Mental Health Division, Oregon
1975-76	$135,644	$ 30,253

IV. Program Start Date: July 1972 - 5 years in operation

V. Brief Description of Project:

The Teaching Research Infant and Child Center classrooms serve moderately to profoundly handicapped preschool children of mixed diagnoses, ages 1 to 8 years. The classrooms are formulated on the principles of individualization of programs within the context of a comprehensive curriculum emphasizing self-help, motor development, language, and cognitive skills. Two model preschool classrooms are located in the Teaching Research Infant and Child Center, one for children ages 1 year to 3 years, and the other for children ages 3 to 8 years. The classrooms are certified by the Oregon Department of Education and are in part funded by local school districts. Each model classroom is designed to serve 12 children with a teacher and an aide. Each classroom utilizes volunteers and parents to assist in the instruction of the children.

Handicapped children ranging in severity from moderate to profound are served in these classrooms. Included are profoundly mentally retarded, cerebral palsied, autistic, emotionally disturbed and deaf/blind children. One of the purposes of the classrooms is to demonstrate the feasibility of non-categorical education of handicapped children.

Curriculum Overview: Sequenced & Programmed. The model, replicated in more than 300 classrooms throughout the United States, has been described in A Data Based Classroom for Moderately and Severely Handicapped Children (Fredericks, et al., 1975). The curriculum utilized in the model is the Teaching Research Curriculum for the Moderately and Severely Handicapped (Fredericks, et al., 1976). It is based upon the principles of developmentally sequenced materials and a task analysis of the skills to be learned.

Priorities for determining which skills will be taught to children are derived from pretest results of skills selected from the curriculum. The deficit skills are prioritized by the parent and educational staff. Priorities are based on the assumption that schooling for the handicapped must assist the child to function more effectively in society. Inadequate language and motor skills are the two most visible indicators of a handicapping condition. Therefore, to assist the child toward more normal functioning, concentration is focused on these indicators with the goal being to help the handicapped child use language and movement as much like normal children as possible. After the priorities are established, the child may be placed in one or more of the four curricular areas -- self-help, motor, language and cognitive.

Self-help skills include dressing, eating, toileting, and personal hygiene plus more advanced stages of self care. The motor curriculum includes the entire range of basic motor movements, from tone normalization and trunk

righting, to walking, running, and jumping. Fine motor skills as well as recreational skills (e.g., swimming, throwing a ball and catching a ball) are also included. In addition, some standard physical education activities designed to improve strength and stamina comprise part of the program.

The language curriculum includes both expressive and receptive oral language. For some children, signing, fingerspelling and speech reading are substituted for oral language instruction. The receptive oral language curriculum starts with the child attending to sounds and vocalizations. It progresses through sequences where the child responds to simple, then multiple commands, culminating in appropriate responses to abstract concepts.

An expressive oral language curriculum was developed in the Center: Teaching Research Initial Expressive Language Program (McDonnell, et al., 1975). The curriculum has eight sub-programs, the most advanced of which teaches a child to chain four word phrases. Since many of the children do not initially exhibit expressive language capabilities, this curriculum starts at the basic fundamentals of the child imitating gross motor movements and then pairing sounds with these movements. If the child demonstrates some initial expressive language capability, deficits in that ability are determined and sub-programs prescribed. During the course of a child's education, he might be working on two or more of these sub-programs at one time. For instance, he might be building vocabulary, chaining words together and improving articulation. Higher level language curricula are available for children with more advanced skills. The cognitive area includes pre-reading, reading, writing, basic number concepts and arithmetic skills all of which have been task analyzed and developmentally sequenced.

The cognitive curriculum includes those preschool activities associated with pre-academic or academic instruction. Pre-reading skills, writing and coloring, color recognition and beginning math are included.

Techniques. The teaching of children must include the management of their social behavior. Inappropriate behavior which interferes with the learning process must be eliminated before effective teaching can occur. Thus, if inappropriate behaviors are exhibited by a child, the initial teaching efforts must remediate these behaviors.

Because of the moderate to profound handicapping conditions of many of these children, individualized instruction is necessary. The model makes a distinction between individualized programming and individualized instruction. Individualized programming refers to placing the child in a curriculum based on his functional ability. Individualized instruction implies a one-to-one teaching relationship.

When group instruction occurs, the interactions are designed for each child's individual instructional program. In this model, group instruction is provided only by the teacher or aide.

Trained volunteers play an important instructional role in this model. They are taught the proper way to deliver cues and feedback and to record the child's appropriate and inappropriate responses to instruction. The maintenance of volunteers' instructional skills are objectively monitored by the teachers. A volunteer is either rotated among the children to teach a specific subject area or is assigned to one or two children and conducts programs across a variety of curricular areas for those children during the day.

Individual instructional programs are prepared for each child. A program prescribes the skill to be taught, the way in which the materials are to be presented and the feedback to be given to the child. Volunteers employ the instructional programs with each child and record child performance data in a specified manner. If the volunteer indicates, either through recorded data or verbally during classroom instruction, that the child is having difficulty learning a particular program, the teacher provides the instruction for the child. The teacher uses the daily data to determine the appropriate individual programs for the following day and to determine if alterations are needed in sequencing, cue presentation, or feedback.

One of the assumptions of the program is that handicapped children learn in much the same way as normal children, only more slowly. Therefore, these children require more rather than less schooling than normal children. Since it is difficult to extend the classroom day, it is extended into the home by teaching parents to be teachers. Utilizing the same training methods used to train volunteers, the teachers teach the parents to teach their children. Individual instructional programs, chosen by the parent and teacher to be taught in the home, are coordinated with programs in the school. Teaching periods in the home vary from 10 to 30 minutes. Approximately 85 percent of the parents participated in home instruction. All parents participated in their child's programming planning conferences.

The physical facilities for each classroom include a large work area where children can play or where the teacher or aide can conduct group instruction. In addition to the large area, five individual instruction areas are provided.

The average costs per pupil, including administrative and overhead costs, range from $2,365 in the Teaching Research site to $3,100 in some of the replication sites. Cost figures appearing in the heading of this report reflect the costs for operation of the Teaching Research center, which includes not only the classroom components but also group homes for children, a parent training clinic, and an extensive in-service training program.

VI. Evidence of Effectiveness:

Historically, guidelines for the determination of the effectiveness of an educational program have centered around statistical differences between treatment and non-treatment comparison groups. However, considering severely and profoundly handicapped children, a number of factors challenge the appropriateness of these procedures. The most prominent challenges stem from the low density and the heterogeneous nature of this population making the identification of comparable groups difficult if not impossible.

An alternative is single subject design procedures (Sidman, 1960). One such procedure is referred to as the "multiple baseline" technique (Baer, Wolf, & Risley, 1968). In the multiple baseline technique, a number of skills[1] are identified and measured over time to provide baselines against which subsequent changes can be evaluated. With these baselines established, the teacher then applies an educational program to one of the skills, produces a change in it, and simultaneously may record little or no change in the other skills. The teacher then applies the educational program to one of the other, as yet unchanged, skills. If performance changes at that point, evidence is accruing

[1] These skills or behaviors may be within the same child, similar child skills or behaviors across different children or the same skill or behavior observed in different settings.

that the educational program is indeed effective, and that the prior changes were not simply a matter of coincidence. The educational program may be subsequently applied to succeeding skills.

The approach used in this project is a multiple baseline approach. Although continuous daily data are available for formative evaluation purposes, i.e., altering instructional programs, it is not presented because of limited space. Consequently, summative evaluation in the form of multiple baseline data on student performance are presented to document the effectiveness across program areas (a) before instruction; (b) at the beginning of instruction; (c) at the time of mastery, and (d) at the period following mastery to determine maintenance. Three individual programs for each of 20 children from Teaching Research and 10 children from replication sites, are presented as a sample to demonstrate the acquisition of skills under the conditions of no instruction vs. instruction. Data, reported on repeated samples of student performance, show that minimal progress occurs in skills not being taught while dramatic changes in skill acquisition systematically occur under instructional conditions.

The data presented and discussed in this section are organized around two major foci:

1. Data are presented to document that the instructional strategies employed in the Teaching Research model have a significant impact on the learning rate of moderately to severely handicapped children that cannot be attributed to natural growth or maturation.
2. Data are presented to demonstrate that the Teaching Research model is sufficiently well defined that it can be replicated by others, resulting in similar educational effects.

A. Impact of the Instructional Model

In order to determine the impact of the instructional model on the children served, it was necessary to compute the number of skills acquired with and without instruction. Once this was done, a comparison could be accomplished.

Figure 1 displays a sample of individual programs conducted with a sample of students from both Teaching Research and replication sites. Twenty students were selected from two Teaching Research preschool classrooms and 10 were selected from replication sites. The students and programs were selected on a random sampling basis. Three programs for each student were sampled to demonstrate the variety of programs and the fluctuations in time that occur between initial assessment, the beginning of the program, and program completion.

The data further demonstrate that the passing of time without the inclusion of direct individual instruction produces little change in students diagnosed as moderately to profoundly handicapped. It can be observed through the repeated measures on individual students that once instruction is initiated the number of new skills acquired increases considerably. Since instructional programs were initiated at different time intervals for the same child and the same measures were taken at placement and before instruction was initiated, these data represent a multiple baseline effect.

To compute gains without instruction, the total number of months that elapsed between the placement test and the initiation of instruction was divided into the number of new skills acquired during that time period. Results of this computation indicate that a mean of .91 skills per month were acquired by the children at Teaching Research and a mean of .79 skills per month were acquired by the children in the replication sites.

The number of new skills acquired while instruction was conducted was determined by subtracting the total number of skills present at baseline from the total number of skills present at program termination. By totaling the number of new skills gained under instructional conditions and dividing them by the number of months in which instruction occurred, a mean number of skills acquired per month can be reported. This computation was done for the 20 children in the Teaching Research Center and for the 10 children in replication sites. Results of the computation indicate that in the programs sampled, a mean of 6.44 skills per month were acquired by the children at Teaching Research and a mean of 9.01 skills per month were acquired by the children in the replication sites.

These computations represent progress in a single instructional program. In most cases, both at the replication sites and at Teaching Research, each student received instruction in approximately 10 programs per month. Theoretically then, the mean gains computed for the single instructional program could be multiplied by a factor equal to the total number of programs conducted for that month. This computation provides an even further dramatic description of the increase in new skills when viewed across the student's total daily programs, i.e., 6.44 to 9.01 skills per month times 10 programs equals 64.4 mean skills per month acquired at the Teaching Research site to over 90 new skills per month at the replication sites.

The data used to compile the computations discussed in the previous section were taken from the information in Figure 1. A key has been presented to assist the reader in understanding the various categories of information available in Figure 1.

In those cases where replication site data on student performance surpassed the acquisition rate of Teaching Research students, it would appear to be related to the severity of the handicap. In the Teaching Research sample, (N=20) 8 students were classified as moderately handicapped, 10 severely handicapped, and 2 profoundly handicapped. The sample from the replication sites contain 6 students who were labeled as moderately handicapped and 4 severely handicapped. These classifications have been made according to the State of Oregon classification and definition of handicapping conditions. In both samples the number of new skills acquired without the assistance of instruction is less than one new skill per month.

B. Impact of the Training Model

Between January 1975 and December 1976, 301 professionals were trained in the implementation of the Teaching Research Infant and Child Center model at Teaching Research. After the one week training, each trainee returned to his own educational site where he replicated the procedures he learned. All trainees were provided with on-site follow-up by the training staff.

Three skills considered important in the training model were sampled. These three skills are presenting instructions or cues to a child, consequating the responses and recording data to indicate progress. In these three categories Teaching Research requires 90% proficiency in each area before a trainee is considered to possess these skills. To assess proficiency in these skills, observations are conducted while the trainee is teaching. During the training week, four 10 minute observations are conducted daily. Interrater reliability across the training staff is 85% in the use of the observation instrument.

For the purposes of this report, a random sample of 31 trainees were selected and their skill level at the beginning of the training is recorded and compared with their skill level when they completed training. The observations on the 31 trainees in the sample indicated that when they began training, 22 of them (71%) met criteria on delivery of cues, 13 (42%) met criterion on consequating and 26 (84%) met criteria on recording data. Skill level on the final observation indicated that 28 trainees (90%) met criteria on delivery of cues, 26 (84%) met criteria on consequating and 29 (94%) met criteria on recording data. The number of trainees successfully meeting criterion increased as a result of the training provided.

Six months after these trainees were trained, members of the training staff visited them at their site to assess the degree to which they were maintaining their skills. At that time it was found that 29 (94%) met criteria on presentation of cues, 26 (84%) met criteria on consequating and 31 (100%) met criteria on recording data. These data indicate that the trainees, as a group, either maintained or increased their skills.

At the time of the six month follow-up, in addition to assessing the three skill areas mentioned, six other factors are observed that are considered mandatory for successful implementation of the model. These factors are presented during the training week and are: (1) utilizing scope and sequence in curriculum; (2) task analyzing programs; (3) maintaining continuous data; (4) updating programs daily; (5) using volunteers in instruction, and (6) using aides in instruction. At the time of follow-up all trainees were successfully implementing factors 1, 2, 3, and 6 and 97% of them were successfully implementing factors 4 and 5. These data again indicate the high degree to which the trainees have acquired the skills in the model and implemented them in their site.

Making changes in and maintaining teacher's behavior is only relevant if those changes can be shown to be related to improved student performance. The data which appear in Figure 1 indicate that the trainees were able to produce a similar increase in student performance to that which was demonstrated in the Teaching Research Center. In all cases of analyzing individualized student performance, the replication sites were able to equal or surpass the data represented by Teaching Research's students on similar programs. The repeated measures, a systematic implementation of programs, and the continuous documentation that new skill acquisition increases dramatically when instruction is implemented, indicates that the Teaching Research procedures have been successfully adopted by the trainees.

C. Summary

The data demonstrate that the educational procedures employed within the Teaching Research model produce an accelerated effect on learning rates that cannot be attributed to chance or maturation. Evidence has been presented that new skills will be acquired without instruction at a mean of .79 to .91 per month. When instruction is introduced an immediate impact on the mean number of new skills acquired occurs (6.44 to 9.01 per month).

By allowing time to elapse between the original assessment and the application of an individual program and in some cases by starting other programs immediately following initial assessment, it is possible to show that skill acquisition increases dramatically under instruction. Even though minimal skill acquisition will occur without instruction, not a single case could be found where an increase in skills, not under instructional conditions, approximated the acquisition that was observed during instruction.

It has also been demonstrated that the Teaching Research procedures and methodologies are sufficiently defined that they can be transmitted to another professional who can in turn produce similar effects in a different educational site. The data show that teacher behavior can be changed during the training period to successfully meet the performance criteria required to operate the Teaching Research model and that subsequently these behaviors are maintained resulting in a similar impact on pupil performance.

VII. Cost Information:

The following costs are computed for one Preschool for Handicapped Classroom. This classroom serves 12 moderately to profoundly handicapped children ages 3 to 8 years.

Object of Expenditure	Operational Expense	Installation Expense
Administration & Supervision	$ 2,000	$ 2,000
Teacher	13,386	1,115 (Training
Aide	7,245	603 Time)
Supplies	500	2,500
Transportation	3,420	---
Work Study	1,840	---
TOTAL	$28,391	6,218
Average Cost Per Child	2,365.92	
Pupil/Teacher Ratio = 12:1		

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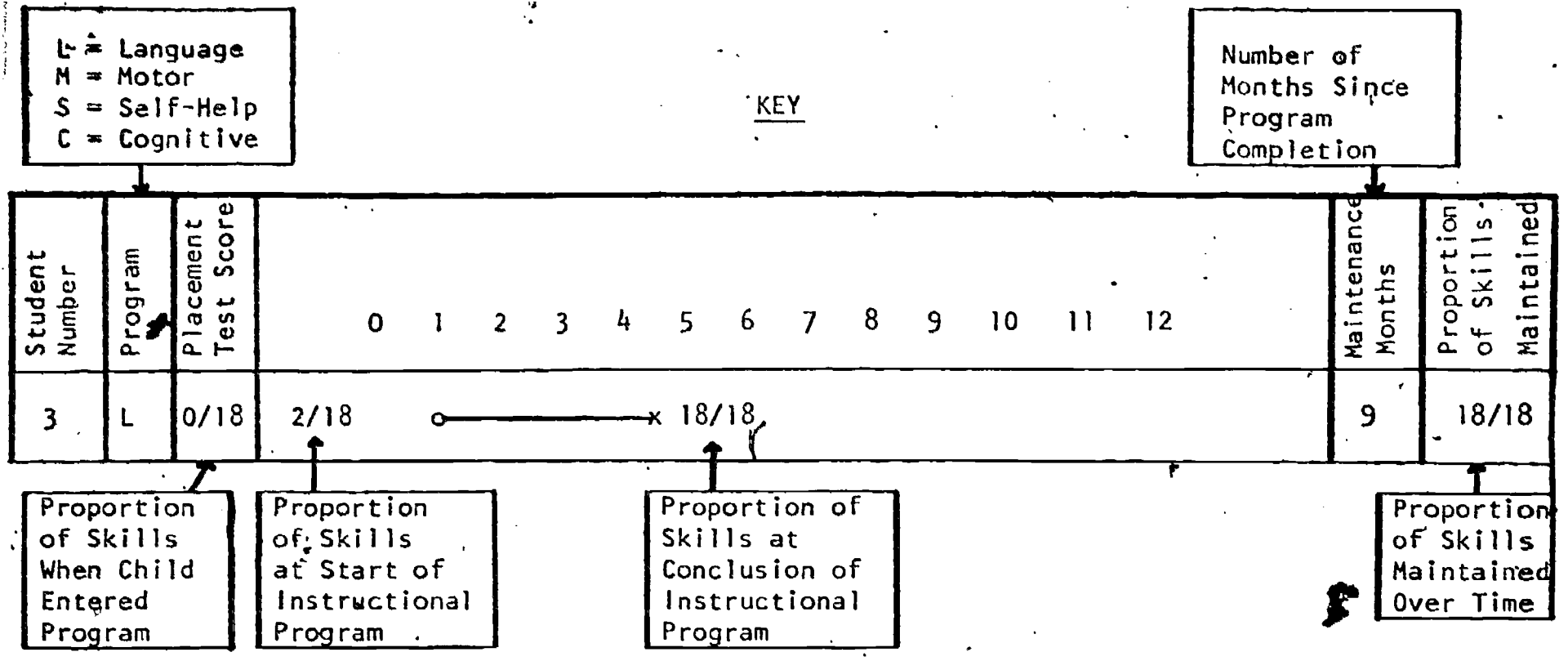

o = Program Start
x = Program End

2 Top Number is Number of Skills Present at Observation Time

18 Bottom Number is Number of Skills Required for Successful Completion or Mastery.

Figure 1
RANDOM SAMPLES OF INDIVIDUAL PROGRAMS

N = 20

Elapsed Time in Months

Student Number	Program	Placement Test Score	Maintenance Months	Proportion of Skills Maintained
1	L	12/36	9	36/36
	L	13/30	14	30/30
	S	0/12	9	12/12
2	M	0/40	14	40/40
	S	0/7	13	7/7
	M	0/5	11	5/5
3	L	0/18	9	10/18
	L	15/48	15	48/48
	M	74/107	50	107/107
4	L	17/36	8	36/36
	S	0/5	27	5/5
	M	0/80	26	80/80
5	M	0/33	11	33/33
	S	0/10	12	10/10
	L	9/16	13	16/16
6	L	0/160	13	160/160
	M	0/9	44	9/9
	S	0/8	26	8/8

Figure 1, con't.

Student Number	Program	Placement Test Score	Elapsed Time in Months (0 1 2 3 4 5 6 7 8 9 10 11 12)	Maintenance Months	Proportion of Skills Maintained
7	M	0/6	1/6 → 6/6	18	6/6
	L	0/9	5/9 → 9/9	9	9/9
	S	0/7	0/7 → 7/7	3	7/7
8	L	0/28	1/28 → 28/28	11	28/28
	M	0/45	2/45 → 45/45	14	45/45
	S	0/9	5/9 → 9/9	5	9/9
9	M	0/14	3/14 → 14/14	13	14/14
	L	0/9	3/9 → 9/9	7	9/9
	S	0/5	0/5 → 5/5	8	5/5
10	L	0/20	4/20 → 20/20	5	20/20
	L	12/16	12/16 → 16/16	5	16/16
	L	0/5	3/5 → 5/5	5	5/5
11	S	0/5	2/5 → 5/5	10	5/5
	L	0/12	6/12 → 12/12	10	12/12
	L	10/20	10/20 → 20/20	10	20/20
12	L	17/28	17/28 → 28/28	8	28/28
	M	0/24	0/24 → 24/24	8	24/24
	L	14/25	14/25 → 25/25	8	25/25
13	L	17/24	17/24 → 24/24	3	24/24
	L	0/15	0/15 → 15/15	4	15/15
	M	0/9	1/9 → 9/9	4	9/9
14	S	2/4	2/4 → 4/4	7	4/4
	M	0/25	1/25 → 25/25	9	25/25
	L	0/24	2/24 → 24/24	8	24/24
15	S	0/3	0/3 → 3/3	2	3/3
	C	0/25	0/25 → 25/25	2	25/25
	L	0/9	0/9 → 9/9	12	9/9
16	S	0/9	0/9 → 9/9	12	9/9
	S	0/5	2/5 → 5/5	12	5/5
	L	0/38	2/38 → 38/38	5	38/38
17	L	22/55	22/55 → 55/55	1	55/55
	M	0/20	11/20 → 20/20	12	20/20
	S	0/7	4/7 → 7/7	1	7/7
18	M	15/20	15/20 → 20/20	26	20/20
	S	0/5	2/5 → 5/5	27	5/5
	L	0/56	1/56 → 56/56	33	56/56
19	S	0/5	3/5 → 5/5	6	5/5
	S	0/10	2/10 → 10/10	12	10/10
	M	0/4	3/4 → 4/4	12	4/4
20	M	0/45	0/45 → 45/45	3	45/45
	S	0/5	0/5 → 5/5	3	5/5
	L	0/9	3/9 → 8/9	1	8/9

Figure 1, con't.

RANDOM SAMPLES OF INDIVIDUAL PROGRAMS
Replication Sites
N = 10

1	C	5/12	5/12 → 12/12	18	12/12
	L	3/5	3/5 → 5/5	5	5/5
	L	0/40	0/40 → 40/40	11	40/40
	L	0/6	0/6 → 6/6	11	6/6
	L	4/6	4/6 → 6/6	7	6/6
	L	0/40	0/40 → 40/40	11	40/40
2	S	4/7	4/7 → 7/7	14	7/7
	L	37/104	37/104 → 104/104	15	104/104
	C	10/12	10/12 → 12/12	17	12/12
3	C	3/15	3/15 → 15/15	11	15/15
	L	0/40	0/40 → 40/40	13	40/40
	L	0/40	0/40 → 40/40	12	40/40
4	M	20/30	20/30 → 30/30	11	30/30
	L	0/40	0/40 → 40/40	11	40/40
	L	0/40	0/40 → 40/40	11	40/40
5	L	22/104	22/104 → 104/104	7	104/104
	C	6/16	6/16 → 16/16	7	16/16
	M	24/45	24/45 → 38/45	3	45/45
6	L	1/6	1/6 → 6/6	3	6/6
	L	11/30	11/30 → 30/30	7	30/30
	M	33/40	33/40 → 40/40	7	40/40
7	L	5/16	5/16 → 16/16	3	16/16
	L	0/40	0/40 → 40/40	3	40/40
	L	0/40	0/40 → 40/40	3	40/40
8	C	0/16	0/16 → 16/16	12	16/16
	L	0/40	0/40 → 40/40	11	40/40
	L	0/40	0/40 → 40/40	5	40/40
9	L	13/36	13/36 → 36/36	1	36/36
	L	0/6	0/6 → 6/6	1	6/6
	L	0/16	0/16 → 16/16	3	16/16
10	L	21/36	21/36 → 36/36	4	36/36
	C	0/8	0/8 → 8/8	1	8/8
	L	24/32	24/32 → 32/32	6	32/32