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AUTHOR Wright, Calvin E.
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ABSTRACT

An adequate evaluation of the Program for Learning in Accordance with Needs (PLAN) necessitates consideration of all the PLAN goals and the extent to which they have been attained. Two sets of goals are identified. Eleven specific goals for each student, which involve the acquisition of a wide range of information, skills, and abilities in addition to personal development are listed and techniques for measuring success in attaining them are suggested. Five general PLAN goals are presented in the appendix. In this report, evaluation of the attainment of goals in grades 1, 2, 5, and 6 is achieved by comparing scores on standardized tests administered at different times for PLAN students and for groups of students from traditional classrooms, designated as controls. The data used for 1967-68 was obtained from the test files of the cooperating schools, while data for 1968-69 was supplemented by test scores from a PLAN supported testing program. Comparisons were made by PLAN teachers for all students to whom the tests were administered and for those students who had scores on both a given pretest and a given posttest. Problems in the interpretation of the data are discussed. As a result of the comparison, it is generally concluded that when grade placement and growth are considered, the PLAN students perform as well as or better than the controls, despite the initial problems of a new program. It is also noted that there is a tendency for a student to do better the longer he is in the program. (PR)

EVALUATION DATA AND THEIR USES IN AN INDIVIDUALIZED EDUCATION PROGRAM

Calvin E. Wright

American Institutes for Research

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EVALUATION DATA AND THEIR USES IN AN INDIVIDUALIZED EDUCATION PROGRAM

Since its inception, PLAN has been a data oriented program of individualized education. As might be expected, initial evaluations were formative in nature, supplying information needed for the improvement and refinement of the system. An adequate evaluation of PLAN can be made only if all of the various PLAN goals are considered. The major uses of evaluation data are, therefore, oriented towards determining the extent to which the goals have been attained. To date, there has not been an opportunity to evaluate the program's success in attaining all of the goals that have been identified, nor have all of the required measurement devices been developed.

The Goals of PLAN

Two sets of goals for PLAN have been identified. The general goals are shown in the Appendix. PLAN goals for each student, with some indication as to how success in attaining them may be measured, are as follows:

1. To assist each student to acquire information about available choices regarding occupational roles, leisure time activities, and citizenship responsibilities.
   a. Included is: knowledge about the required education and abilities needed for various occupations; learning about educational and occupational opportunities and citizenship roles; and the nature of other activities involving self-expression, appreciation, and personal realization and satisfactions.
   b. How well this goal is attained can be evaluated in part by use of appropriate PLAN guidance module tests. In addition, three information tests are needed covering: careers and occupations; leisure, avocational, cultural activities; and citizenship roles.
2. To assist each student to acquire information about individual differences, the nature of the learning and change process, and the development of abilities, interests, and values.
   a. Appropriate module and guidance tests can be used to evaluate student attainment of this goal.
3. To assist each student to acquire information about his own abilities, interests, values, and other characteristics.
   a. The student should understand his potentials in light of item 2 above.
   b. Scores on the PLAN constructed Developed Abilities Performance Test, General Information Test, and other scales can be determined. In addition, self-appraisal procedures and tests should be developed.

4. To assist each student to formulate goals based on his interests and values.
   a. Satisfactions should also be considered.
   b. Evaluations should include finding out what the student likes to do, and how he spends his time.
5. To assist each student to develop skills in planning and personal decision-making related to the formulation and attainment of his goals.
   a. The student should be able to plan wisely and make good decisions using all available facts and probabilities.
   b. To test decision-making, a closed situation can be used where all the necessary facts are given and the student's ability to plan is evaluated. Profiles from Project TALENT can be evaluated by the student. Career games should also be developed.
6. To assist each student to manage his own personal development.
   a. A criterion for this goal is needed. Self-management skills should be considered.
7. To assist each student to take responsibility for carrying out his individual development, and to develop favorable attitudes towards learning.
   a. The major concern is with how well the student can carry out his program as planned. Self-responsibility, self-reliance, and self-motivation are component parts.
   b. Typical behavior should be measured whereby the student demonstrates his ability to carry out his program independent of his teachers and parents. A standardized assignment could also be used. The information that the student asks people for could be determined. Carrying through on assigned and agreed upon tasks with responsibility and effort is one of the areas covered in the Performance Record for Personal and Social Development (Flanagan, 1956a).
8. To assist each student in his personal development and adjustment.
   a. Self-concept, initiative, and integrity are included.
   b. Related areas in the Performance Record (Flanagan, 1956a) are: showing independence, initiative, and originality; and showing honesty and integrity. The High School Social Situations Test (Flanagan, 1956b) can be used to record behavior in the area of showing strength of character and integrity. Information could also be collected on absentee rates, referrals for counseling assistance, and the number of legal troubles that a student has.
9. To assist each student to develop good patterns of social behavior.

a. This involves social adjustment, leadership, helping others, sharing, sensitivity, group orientation, and adaptation to rules and conventions.
b. Teacher or student observations of behavior in standardized situations can be used to record appropriate and inappropriate behaviors in the areas of: dealing effectively with difficult situations; showing consideration for the feelings of others; contributing to group interests and goals; and dealing effectively with rules, conventions, and teacher suggestions. All but the latter are also included in the High School Social Situations Test (Flanagan, 1956b), which also covers leadership.

10. To assist each student to develop his basic skills and abilities.
    a. This goal pertains to long-range abilities and skills, rather than short range achievement objectives. Ingenuity is related.
    b. Scores on the Developed Abilities Performance Test and on standardized tests can be used to evaluate student attainment of this objective. Procedures should also be developed so that test results can be reported in terms of situations meaningful to the student.
11. To assist each student to acquire and retain knowledge, concepts, principles, and skills, and to acquire the techniques needed in applying them to new problems.
    a. This goal covers the content of traditional instruction, plus learning how to learn and applying what is learned.
    b. The attainment of this goal can be evaluated by use of the module tests, PLAN prepared achievement tests, and standardized tests. Measures of retention should be developed. An evaluation using academic grades might also be useful.
    c. Whether or not the student learns new skills and knowledge at the best difficulty level and rate for him can be evaluated by determining the number of new educational objectives that he masters in a given period of time.
    d. The amount of time required to achieve specific educational objectives can be used as an index of whether or not the methods and materials used by a student are the most efficient for him.

Comparisons of PLAN and Control Students

Success in attaining two of the goals of PLAN can be evaluated by comparing scores on standardized achievement tests for PLAN students and for groups of

students in traditional classrooms that have been designated as Controls. Such comparisons have recently been completed for both the 1967-8 and 1968-9 school years. Data used for 1967-8 were obtained from the test files of the cooperating schools, while data for 1968-9 were supplemented by test scores from a PLAN supported testing program. Comparisons were made by PLAN teacher for all students to whom the tests were administered. Comparisons were also made by PLAN teacher using those students who had scores on both a given pretest and a given posttest, using various pre- and posttests as the data were available.

The data presented in Tables 1 through 4 were obtained by summarizing the results by grade level for those pairs of pretests and posttests with the largest number of students. As necessary, adjustments were made for slight variations in testing dates. For grades 1 and 2, data were used only for those schools that reported scores on all of the subtests for both the selected pretests and the selected posttests. For grades 5 and 6, to the extent appropriate data were used only for those schools that reported scores on subtests in common between the selected pre- and posttests. As a result the same students are included in both the pre- and posttests for any given year and grade level.

In interpreting the data the following items should be noted.

1. Due to the relatively large sample sizes, most PLAN-Control differences are statistically significant (including some grade equivalency score differences of .1 or one month). Such differences are not assumed to be of practical significance so t test results are not shown on the tables.
2. One problem in interpreting the relative performance of the PLAN and Control students is readily apparent: in most cases the two groups were not comparable on the pretests administered when the students entered PLAN. An attempt had been made to select PLAN students randomly from among all students at a given grade level at each school. Either the rest of the class, or a random sample thereof, was to serve as Controls. However, where random selections were made, final choices regarding participation in PLAN were made by the schools from among the students selected after consultation with the parents involved. Where Control schools were designated rather than Control students at the same school, there was no way in which the comparability of the two groups could be assured. Part of the problem of the evaluation of the progress of PLAN students under these circumstances is that it is not known whether the tendency is greater for students with higher achievement to stay ahead, or those behind to catch up more, assuming equal initial abilities. Statis-

tical or other procedures to attempt to adjust for pretests differences between PLAN and Control should be tried.

3. The pros and cons of using standardized test data to evaluate a program of individualized education have been discussed elsewhere (e.g., Wright, 1969; I.P.I., 1968). Interestingly, Research for Better Schools has summarized a number of studies (A Progress Report, 1969) that compared the mathematics achievement of Individually Prescribed Instruction and Control Students using standardized tests such as the Iowa Test of Basic Skills, Metropolitan Achievement Test, and Stanford Achievement Test. No statistically significant differences were found between the two groups of students. In both PLAN and I.P.I., students do not proceed to new skills until they have achieved mastery of the units on which they are working. They may not, therefore, compare favorably on standardized tests with students in traditional classrooms that have been exposed to (but not necessarily mastered) a greater number of skills.
4. Growth scores should be interpreted cautiously. Some statisticians have recommended that such difference scores not be used (e.g., Cronbach & Furby, 1970), while others (e.g., Carver, 1970) have taken a more liberal view.

As seen in Table 1, the pretest for 1968-9 grade 1 students was the Metropolitan Readiness Test. PLAN students had larger mean scores on all subtests. The Spring posttest was the Stanford Achievement Test Primary I battery. PLAN means were about equal or greater than those for the Controls except on Spelling, where the difference was about one month. All means for both groups were above grade placement at time of testing.

Data for 1968-9 grade 2 students are shown in Table 2. The 1967-8 pretest, administered while the children were in Kindergarten, was a PLAN developed Kindergarten Rating Form. The children selected for PLAN had higher readiness scores than the Controls, especially for Reading. On the S.A.T. Primary I battery used at the end of grade 1, PLAN means were somewhat larger than those for the Controls except on Spelling, where the two groups were about equal. Both groups were above grade placement on all subtests.

PLAN and Control were generally comparable on the 1968-9 pretest for those students with scores on the grade 2 pre- and posttests. Posttest scores favored the Controls on some subtests, especially Word Study Skills and Science and Social Studies. On Arithmetic Computation the PLAN students were about one month below grade placement, while the Controls were at grade placement. All other means were

above grade placement. For the subtests in common between the pre- and posttests, PLAN showed greater growth than the Controls except on Word Study Skills, where neither group had the expected 6 months increase. The greatest growth was 8 months by the PLAN group on Paragraph Meaning.

The results for grade 5 are shown in Table 3. PLAN means were greater than those for the Controls on the 1968-9 pretest, the S.A.T. Intermediate I battery, except for Arithmetic Computation. Differences as large as 6 months were found between the two groups. On the posttest, the S.A.T. Intermediate II battery, the PLAN-Control differences are about equal to or greater than those found on the pretest. PLAN students generally showed somewhat greater growth during the year than the Controls. For some subtests, especially Word Meaning and Social Studies, neither group had the expected 6 months growth. This may be a function of differences in the norming of the two batteries. PLAN students grew 9 months in Language and 7 months in Arithmetic Application. The Controls were below grade placement on five subtests, while PLAN students were below on one.

Table 4 shows the data for 1968-9 grade 6 students. The 1967-8 pretest, administered at the end of grade 4, was the Iowa Test of Basic Skills. The PLAN students were 5 months to one year ahead of the Controls on all subtests. The I.T.B.S. was also used as the 1967-8 posttest at the end of grade 5. PLAN students were again ahead of the Controls, but the differences were generally less than on the pretest. Growth for the PLAN students was somewhat less than that for the Controls, although the PLAN students were above expected grade placement on all subtests.

The S.A.T. Intermediate II battery was used at the beginning of grade 6 in 1968-9. Although the means for the PLAN students are larger than those for the Controls, most of the differences are relatively small and non-significant. On the posttest, an alternate form of the S.A.T. Intermediate II battery, PLAN had higher means on all subtests except Arithmetic Computation and Arithmetic Concepts, where the latter difference was about 2 months. Growth for PLAN students was greater than that for Controls on six of the nine subtests. Neither group showed expected growth on some subtests. The Control students were below grade placement on five subtests, while the PLAN students were only below on three of the nine.

The data presented for the four grade levels is obviously difficult to interpret since the PLAN and Control groups were not comparable on the pretests. Generally, however, it appears that the PLAN students at least held their own when grade placement and growth are considered. This finding is encouraging since there were the usual start-up problems expected of a new program, and materials were

often not available for the brighter students to progress to the curriculum of the next higher grade level. There is also some tendency for students to do better the longer that they are in PLAN. This finding will bear looking into in the future.

Table 1

Means and Standard Deviations for 1968-9 Grade 1 Students

1968-9 Pretest Metropolitan Readiness Test November, 1968 (Raw Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Word Meaning	294	10.49	2.46	291	10.96	2.32	.47
Listening	295	11.42	2.10	291	12.17	2.21	.75
Matching	294	10.33	2.82	291	11.43	2.17	1.10
Alphabet	296	13.67	3.33	291	14.45	3.01	.78
Numbers	296	16.22	4.02	291	17.87	3.69	1.65
Copying	293	8.75	3.70	291	8.96	4.68	.21

1968-9 Posttest Stanford Achievement Test Primary I, Form W May, 1969 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Word Reading	294	1.93	.56	290	2.03	.65	.10
Paragraph Meaning	293	1.88	.53	290	1.96	.65	.08
Vocabulary	291	2.24	.86	288	2.61	.97	.37
Spelling	282	2.16	.61	272	2.04	.50	-.12
Word Study Skills	288	2.54	1.21	288	2.57	1.13	.03
Arithmetic	291	2.11	.54	289	2.24	.66	.13

Grade placement at time of testing: 1.8.

Table 2

Means and Standard Deviations for 1968-9 Grade 2 Students

1967-8 Pretest PLAN Kindergarten Rating Form June, 1967 (Raw Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
General Readiness	229	11.69	2.46	247	12.17	2.16	.48
Reading Readiness	231	10.97	2.96	247	13.00	2.52	2.03
Social Readiness	225	14.43	2.74	247	15.02	2.16	.59

1967-8 Posttest Stanford Achievement Test Primary 1, Form W November, 1968 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Word Reading	232	2.27	.64	248	2.51	.72	.24
Paragraph Meaning	234	2.32	.73	248	2.45	.82	.13
Vocabulary	228	2.90	1.09	246	3.07	.94	.17
Spelling	226	2.34	.63	241	2.30	.67	-.04
Word Study Skills	226	2.96	1.31	242	3.10	1.32	.14
Arithmetic	228	2.36	.53	242	2.51	.59	.15

Grade placement at time of testing: 2.2.

(Table continued on next page.)

Table 2 (Continued)

Means and Standard Deviations for 1968-9 Grade 2 Students

1968-9 Pretest Stanford Achievement Test Primary I, Form W November, 1968 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Word Reading	262	2.39	.64	372	2.41	.73	.02
Paragraph Meaning	264	2.40	.76	372	2.41	.85	.01
Vocabulary	263	2.93	1.05	372	3.09	1.04	.16
Spelling	260	2.44	.64	367	2.30	.68	-.14
Word Study Skills	261	3.09	1.28	370	3.10	1.38	.01
Arithmetic	261	2.44	.50	370	2.54	.60	.10

Grade placement at time of testing: 2.2.

1968-9 Posttest Stanford Achievement Test Primary II, Form W May, 1969 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Word Meaning	263	3.01	.84	373	3.19	.99	.18
Paragraph Meaning	263	3.15	.84	373	3.25	1.04	.10
Spelling	263	3.19	.96	360	3.08	1.07	-.11
Word Study Skills	263	3.63	1.53	372	3.31	1.49	-.32
Language	264	3.40	.88	372	3.50	1.15	.10
Arithmetic Computation	262	2.78	.52	370	2.72	.54	-.06
Arithmetic Concepts	264	3.36	1.03	370	3.35	1.03	-.01
Science and Social Studies	264	3.50	.98	372	3.13	1.03	-.37

Grade placement at time of testing: 2.8.

Table 3

Means and Standard Deviations for 1968-9 Grade 5 Students

1968-9 Pretest Stanford Achievement Test Intermediate I, Form W November, 1968 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Word Meaning	319	5.69	1.60	235	6.03	1.09	.34
Paragraph Meaning	319	5.30	1.82	235	5.86	1.91	.56
Spelling	319	5.21	1.69	235	5.29	1.61	.08
Word Study Skills	368	5.22	1.70	299	5.51	1.72	.29
Language	370	4.79	1.65	297	5.32	1.80	.53
Arithmetic Computation	369	4.69	1.07	298	4.43	.76	-.26
Arithmetic Concepts	369	5.40	1.45	300	5.91	1.57	.51
Arithmetic Application	369	5.07	1.44	300	5.48	1.43	.41
Social Studies	290	5.40	1.44	248	5.79	1.43	.39
Science	290	5.40	1.81	249	5.63	1.79	.23

Grade placement at time of testing: 5.2.

1968-9 Posttest Stanford Achievement Test Intermediate II, Form W May, 1969 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Word Meaning	316	5.80	1.43	236	6.16	1.43	.36
Paragraph Meaning	315	5.78	1.74	236	6.36	1.70	.58
Spelling	314	5.87	1.84	235	5.98	1.74	.11
Language	369	5.57	1.92	298	6.22	1.80	.65
Arithmetic Computation	363	5.16	1.14	296	5.00	.93	-.16
Arithmetic Concepts	367	5.96	1.41	297	6.46	1.27	.50
Arithmetic Application	368	5.64	1.83	297	6.21	1.76	.57
Social Studies	293	5.40	1.49	248	5.89	1.48	.49
Science	289	5.59	1.91	246	6.26	2.01	.67

Grade placement at time of testing: 5.8.

Table 4

Means and Standard Deviations for 1968-9 Grade 6 Students

1967-8 Pretest Iowa Test of Basic Skills Grade 4 May, 1967 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Vocabulary	191	4.73	1.05	154	5.25	.78	.52
Reading Comprehension	191	4.78	1.28	154	5.35	1.09	.57
Language Skills	100	4.37	1.01	51	5.34	.98	.97
Work Study Skills	100	4.34	.94	51	5.32	.99	.98
Arithmetic Skills	100	4.31	.88	51	5.24	.84	.93
Arithmetic Concepts	143	4.84	1.04	101	5.47	.79	.63
Arithmetic Problem Solving	143	4.55	1.08	101	5.30	.97	.75

Grade placement at time of testing: 4.8.

1967-8 Posttest Iowa Test of Basic Skills Grade 6, Form 1 May, 1968 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Vocabulary	191	6.16	1.35	155	6.42	1.29	.26
Reading Comprehension	190	6.15	1.46	155	6.44	1.30	.29
Language Skills	100	5.50	1.26	51	6.50	1.30	1.00
Work Study Skills	100	5.82	1.17	51	6.42	1.51	.60
Arithmetic Skills	100	5.30	1.05	51	6.11	1.06	.81
Arithmetic Concepts	140	5.88	1.30	101	6.30	1.33	.42
Arithmetic Problem Solving	140	5.33	1.37	101	5.97	1.29	.64

Grade placement at time of testing: 5.8.

(Table continued on next page.)

Table 4 (Continued)

Means and Standard Deviations for 1968-9 Grade 6 Students

1968-9 Pretest Stanford Achievement Test Intermediate II, Form W November, 1968 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Word Meaning	229	6.20	1.43	238	6.24	1.50	.04
Paragraph Meaning	229	6.58	1.92	238	6.59	1.87	.01
Spelling	305	6.16	1.76	231	5.25	2.04	.09
Language	308	6.09	1.87	234	6.23	1.90	.14
Arithmetic Computation	352	4.83	2.14	233	5.09	1.19	.26
Arithmetic Concepts	310	6.51	1.55	233	6.68	1.48	.17
Arithmetic Application	309	6.31	2.06	233	6.64	2.02	.33
Social Studies	258	6.02	1.72	178	6.29	1.53	.27
Science	257	6.20	2.05	178	6.63	1.98	.43

Grade placement at time of testing: 6.2.

1968-9 Posttest Stanford Achievement Test Intermediate II, Form X May, 1969 (G.E. Scores)	Control			PLAN			Difference
	N	Mean	S.D.	N	Mean	S.D.	PLAN - Control
Word Meaning	233	7.18	1.64	239	7.49	2.34	.31
Paragraph Meaning	234	6.71	2.08	240	7.28	2.10	.57
Spelling	306	6.94	2.10	232	7.05	2.30	.11
Language	310	6.33	2.09	232	6.75	2.02	.42
Arithmetic Computation	306	6.59	1.83	234	6.01	1.34	-.58
Arithmetic Concepts	303	7.08	1.90	228	6.92	1.70	-.16
Arithmetic Application	302	6.66	2.00	228	6.68	1.88	.02
Social Studies	262	6.40	1.97	175	6.75	1.93	.35
Science	259	6.75	2.24	179	7.26	2.11	.51

Grade placement at time of testing: 6.8.

Appendix

The General Goals of PLAN

1. To make available an individualized education program better adapted to the requirements of each student than existing programs.
   a. Specifically, PLAN proposes to broaden the focus of education to include: (1) preparation for an occupation or advanced education leading to an occupational role; (2) the development of cultural and personal interests, appreciations, insights, and skills as a basis for identifying and participating in activities which are deeply satisfying to the student in his leisure time; and (3) preparation for assuming his responsibilities as a citizen. It is the aim of PLAN that students in this educational program will make more progress with respect to these important long-range goals than do students in current conventional educational programs.
   b. Success in attaining this general goal will be evaluated in terms of success in attaining the more specific goals. Evaluation should be in terms of the degree to which PLAN enables each individual student to meet his needs.
2. To provide for the use of learning materials and instructional procedures that enable each student to acquire information, abilities, skills, and behaviors most efficiently.
   a. PLAN should avoid the waste of time, characteristic of many current educational programs, on materials already known to the student or on materials which are too difficult to enable him to learn.
   b. Through the empirical evaluation of TLU's and the monitoring of retention and the ability to generalize, the efforts devoted to review and new applications can be optimized for the student. This efficiency can be evaluated in terms of the increased achievement of the students in terms of their educational objectives through the use of the achievement tests and the Developed Abilities Performance Tests.
3. To provide a practical program which can be immediately implemented in nearly all school districts.
   a. This goal implies the achievement of a high degree of flexibility in the program with respect to community, administrative, teacher, and student requirements. It also implies a reasonable per pupil cost.
4. To conduct required formative evaluations that give indications as to the operation of the system, and to conduct research into aspects of human learning.
   a. The concern here includes, but is certainly not restricted to, the development and evaluation of testing instruments and procedures, the development

of norms and standards, and the evaluation of the rules and algorithms for program of studies determination, TLU matching, etc.

b. Among other instruments the Teacher Observation Scale and Student Observation Scale (Lipe & Steen, 1970) should be useful.

5. To have equipment and procedures which significantly contribute to students formulating appropriate goals and achieving them.

a. This goal relates to system and process procedures. Information about materials and students should be immediately available for whatever use to which it might be put.

b. Central to this goal is the evaluation of the adequacy of the computer system, and reports about the utilization of the system.

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