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IDENTIFIERS INDIVIDUALLY PRESCRIBED INSTRUCTION, IPI

ABSTRACT

AN ANNOTATED BIBLIOGRAPHY IS THE THIRD CONCLUDING PORTION OF THIS THREE-PART PROGRESS REPORT ON IPI. PART I DOCUMENTS PROGRESS AND FINDINGS UP TO SEPTEMBER 1969 WITH THE AID OF A FLOW CHART OF THE SYSTEM, A TABLE OF BEHAVIORAL OBJECTIVES FOR THE MATHEMATICS CONTINUUM 1969-70, A BRIEF HISTORICAL TABLE (1954-66) OF PROGRESS FROM RESEARCH TO IPI THROUGH FEDERAL SUPPORT, MODELS FOR EVALUATION OF IPI AND FOR ITS WIDE-SCALE ADOPTION; A MAP SHOWING THE NUMBER OF IPI SCHOOLS BY STATE (1960-70), TABLES SHOWING MATH FIELD PARTICIPATING SCHOOLS BY YEAR AND ELEMENTARY SCHOOL DEVELOPMENTAL EFFORTS. IPI RESULTS OF WORK TO DATE ARE RECORDED ACCORDING TO HOW IPI AFFECTS PUPIL ACHIEVEMENT AND ATTITUDES, TEACHER ATTITUDES AND CHANGES, AND ADMINISTRATORS. A DESCRIPTION OF IPI AS A DEVELOPMENTAL INSTRUCTIONAL SYSTEM CONCLUDES THIS PART OF THE REPORT. THE SECOND PART IS CONCERNED WITH FORMATIVE AND INTERIM SUMMATIVE EVALUATIONS. IN THE FORMATIVE EVALUATION ACTIVITIES ARE CLASSIFIED AS PUPIL-ORIENTED, PERSONNEL-ORIENTED, OR SYSTEM-ORIENTED, AND UNDER EACH CLASSIFICATION ARE DETAILS CONCERNING AUTHORS, TITLES AND DATES OF PUBLISHED INVESTIGATIONS, THE POPULATIONS AND INSTRUMENTS THAT CONTRIBUTED TO THE RESEARCHES, AND THEIR DESCRIPTIONS AND RESULTS. THE INTERIM SUMMATIVE EVALUATION PROCEEDS IN LIKE MANNER. (GO)

A PROGRESS REPORT: *Individually Prescribed Instruction*

September, 1969

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ACKNOWLEDGEMENTS

The Board of Research for Better Schools, Inc.

For having enough wisdom to select IPI and protect the staff for development time.

The Staff of Research for Better Schools, Inc.

Without which program and evaluation would be impossible.

Learning Research & Development Center — University of Pittsburgh

For researching, inventing, and having infinite patience with mavericks.

The Participating Schools and Teachers

Who are willing to be pioneers in searching for new frontiers for children and also demonstrate a willingness to change if somebody will help.

The Participating Pupils

Who are our richest investment.

The Cooperating Regional Laboratories

Who proved that professionals can work in the best interest of children in a national network.

The U. S. Office of Education — Division of Educational Laboratories' Staff

For understanding, encouraging, funding and believing.

FOREWORD

The work of Research for Better Schools, Inc. has been supported by many individuals and organizations. It is recognized that not every person has been in accord with the approaches taken by RBS in moving toward the wide-scale adoption of Individually Prescribed Instruction. Battles of cost reduction, improvements to the system, resolutions of problems, and the maintenance of a critical mass of resources in personnel and money have not been easy. At RBS the prevailing attitude is that 'our work is fraught with opportunity.'

No final answers are available on the total worth of Individually Prescribed Instruction, as one means of providing individual learning for children. The tone of this report of progress, hopefully, reflects some major promise, but this should not be construed to mean that RBS has suddenly found some magical formula for solving the educational problems of learners.

Also, it should be clearly understood that our work to date is far from complete. The corporate goal of designing an entirely new elementary school program with relevancy for all learners by 1975 is uppermost in our thinking. To reach this broad goal will demand new insights, more research, major dollars, and the necessary managements skills that make it possible to bring together the consortium of critical masses of highly competent personnel.

Since nobody can prescribe the best method of reporting progress for a variety of audiences which includes superintendents, school boards, teachers, parents, researchers, and many others — RBS has taken the liberty of describing progress in a new format.

The progress report is divided into three major parts. Part I deals with the chief progress and findings of IPI to date, Part II reviews in abstract format some fifty studies, and Part III presents a comprehensive annotated bibliography — carefully indexed — of the studies which have been completed at the time of this writing.

Each reader is urged not to use any one datum as a means for acclaiming or disclaiming the total instructional system of IPI. If the RBS method of constant revision for the improvement of education is successful, no results will ever be final. After all, the purpose of data feedback is to provide useful information for the continuing improvement of education in a systematic way.

We, at RBS, would appreciate any comments you may have concerning the progress report, both in terms of format and content.

James W. Becker
Executive Director

August 1969

CONTENTS

PART I.

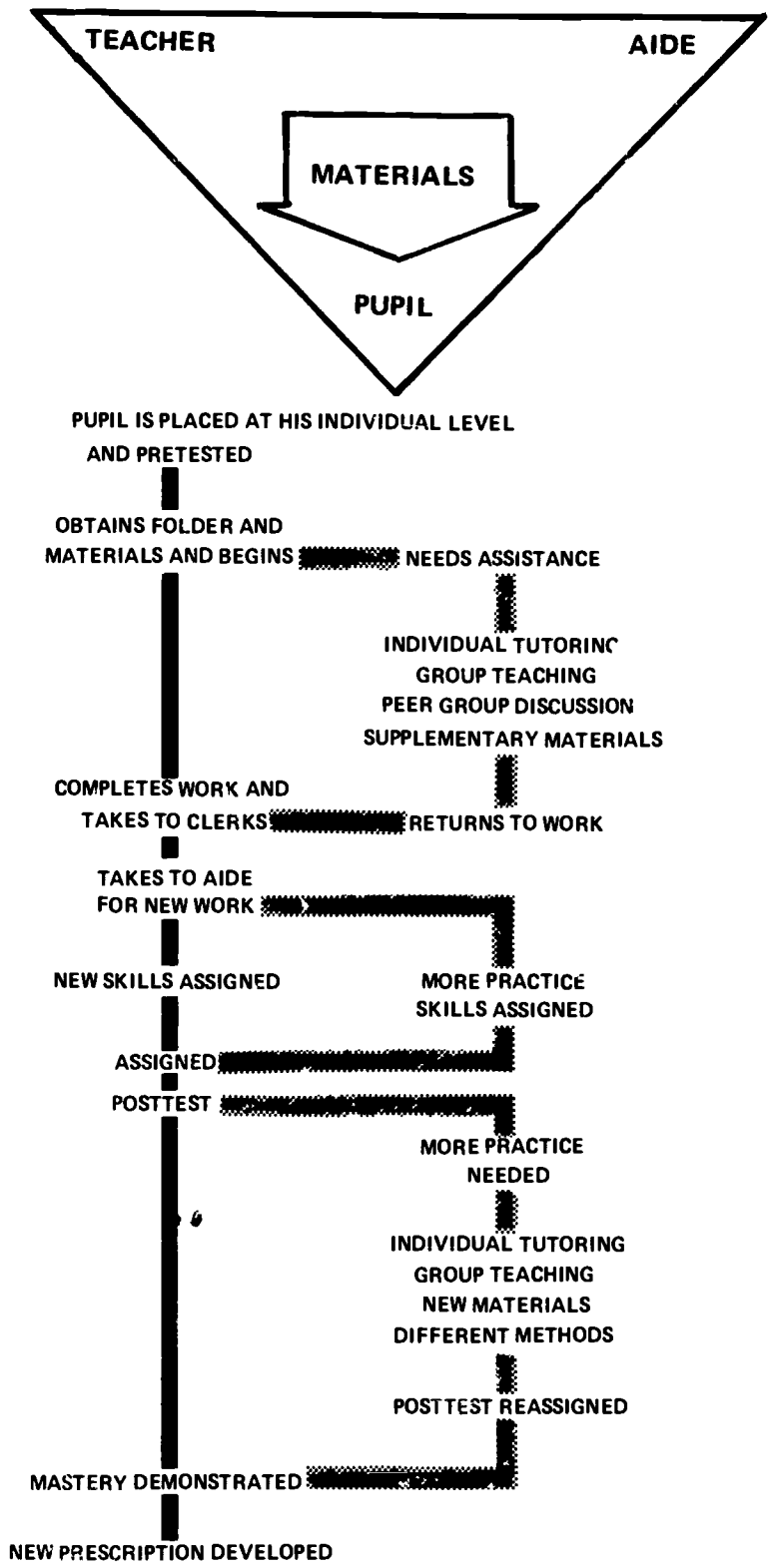
PROGRESS AND FINDINGS TO DATE

INDIVIDUALLY PRESCRIBED INSTRUCTION (IPI) IS ONE METHOD OF PROVIDING FOR INDIVIDUALIZED INSTRUCTION

IPI IS AN INSTRUCTIONAL SYSTEM THAT INCLUDES:

- Placement tests and a prescription technology designed to place learners into their own properly tailored instructional content.
- Pretests to determine what the learner already knows about the content being taught.
- Instructional materials built around specified objectives for the content being taught.
- Checkpoints in the curriculum to guide the learner in measuring his individual progress.
- Posttests to measure the overall mastery of a unit of instruction.
- A management system for teachers.
- Training programs in the use of the instructional and management system for administrators, teachers, and teacher aides.
- A monitoring and data feedback network designed to improve the instructional and management system.

A FLOW OF THE IPI SYSTEM



NUMBERS OF BEHAVIORAL OBJECTIVES FOR THE MATHEMATICS CONTINUUM 1969-70

	A	B	C	D	E	F	G	TOTALS
Numeration	12	10	8	5	8	3	8	54
Place Value		3	5	9	7	5	2	31
Addition	3	10	5	8	6	2	3	37
Subtraction			4	5	3	1	3	16
Multiplication				8	11	10	6	35
Division				7	7	8	5	27
Comb. of Processes			6	5	7	4	5	27
Fractions	3	2	4	5	6	14	5	39
Money		4	4	6	3	2		19
Time		3	2	10	9	5	3	32
System of Meas.		4	3	5	7	3	2	24
Geometry		2	2	3	9	10	7	33
Special Topics			1	3	3	5	4	16
TOTALS	18	38	44	79	86	72	53	390

FROM RESEARCH TO IPI THROUGH FEDERAL SUPPORT

1954 →	1963 →	1966 →	1966 →
EXPERIMENTAL RESEARCH	**RESEARCH & DEVELOPMENT**	**DEVELOPMENT & DISTRIBUTION**	**APPLICATION**
Individual Researchers	**Learning Research & Development Center Funded by U.S.O.E.**	**Research for Better Schools, Inc. Funded by U.S.O.E.**	**Learners and Target Populations**
Typical Efforts: • Programmed Instruction • Rate of Learning • Pacing • Individual Differences	Typical Efforts: • Synthesize Knowledge • Develop Model for Individualization • Create Experimental School • Oakleaf (IPI) Started	Typical Efforts: • Select IPI as Major Program • Develop Training Systems • Develop Feedback Loop • Develop Wide-Scale Adoption System	Typical Efforts: Instructional Systems — • Mathematics • Reading • Spelling • Handwriting • Science

A MODEL FOR EVALUATION OF IPI

Evaluation of Objectives

- Adequacy of form of statements.
- Relationship to a philosophy, basic purpose.

Study of Relationship of Objectives and Plan

- Does plan show promise achieving objectives?
- Does planning suggest modification of objectives?

Study of Relationship of Operation and Plan

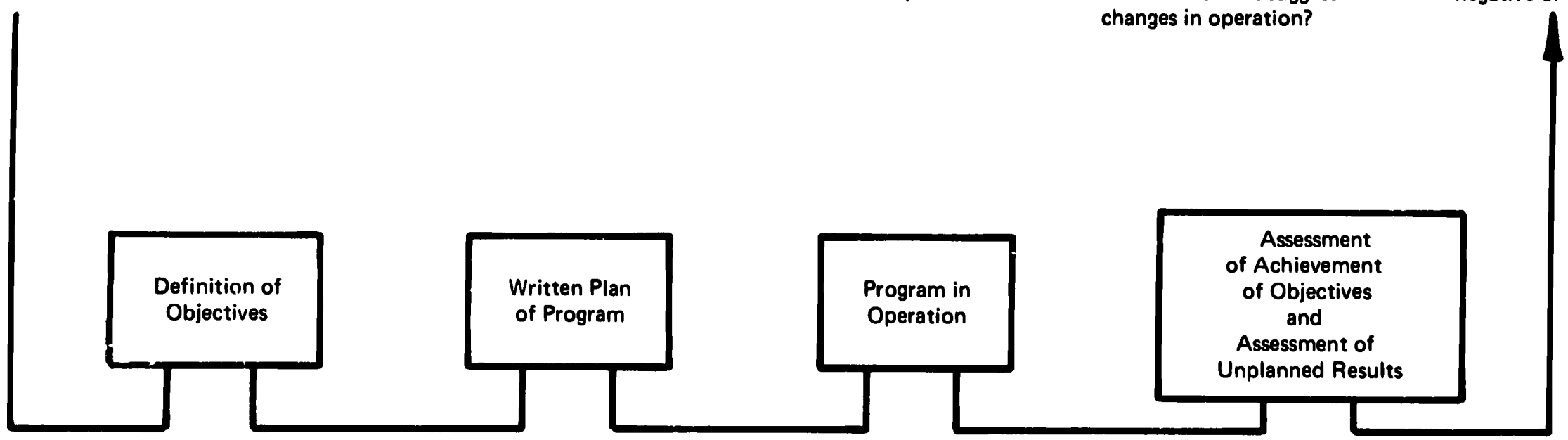
- Is plan specific and complete?
- Is operation as per plan?
- Does operation suggest modification in plan?

Study of Relationship of Operation and Assessed Results

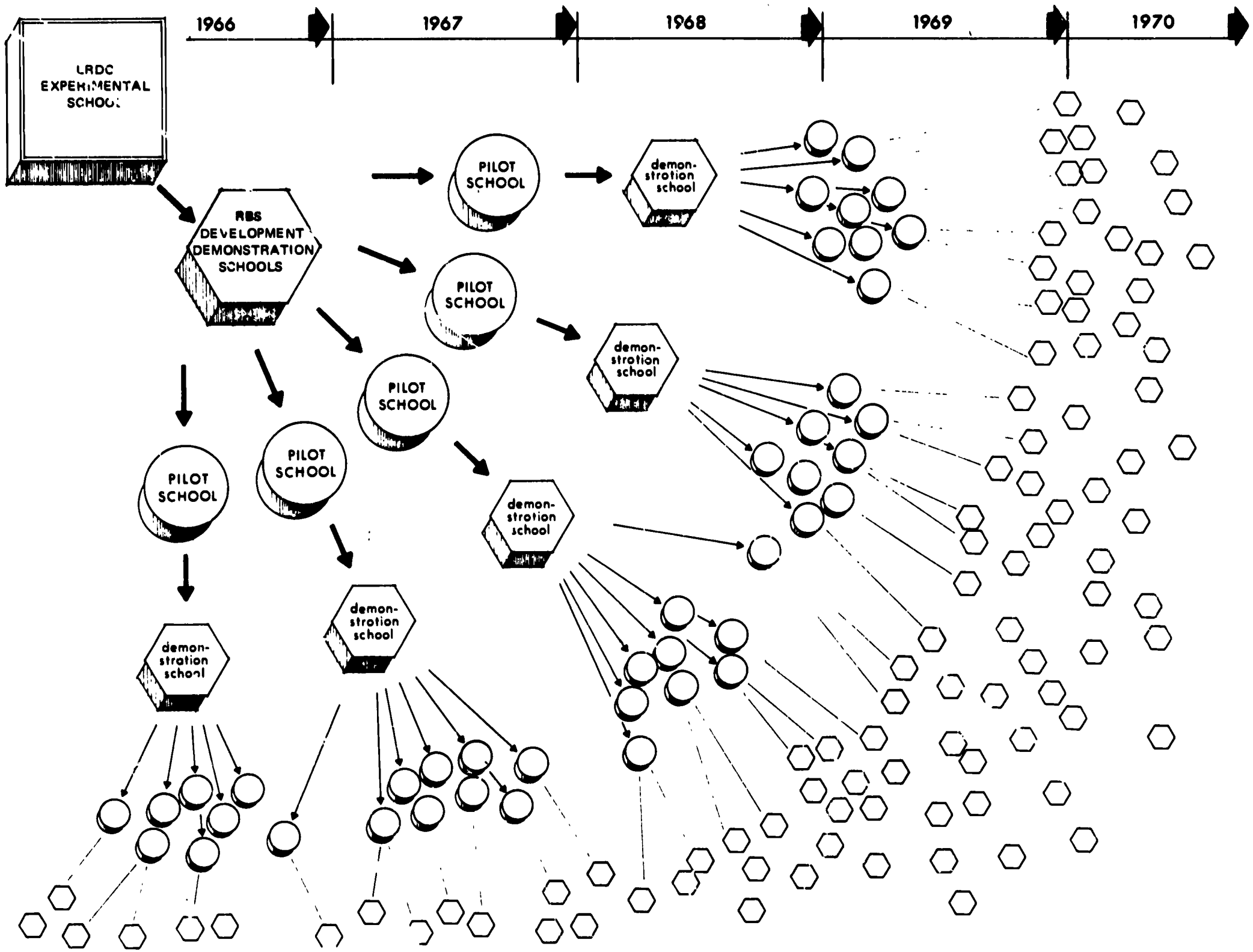
- Does operation produce desired results?
- Does operation produce unplanned results?
- Does assessment suggest changes in operation?

Study of Relationship of Immediate Results to More Ultimate Goals

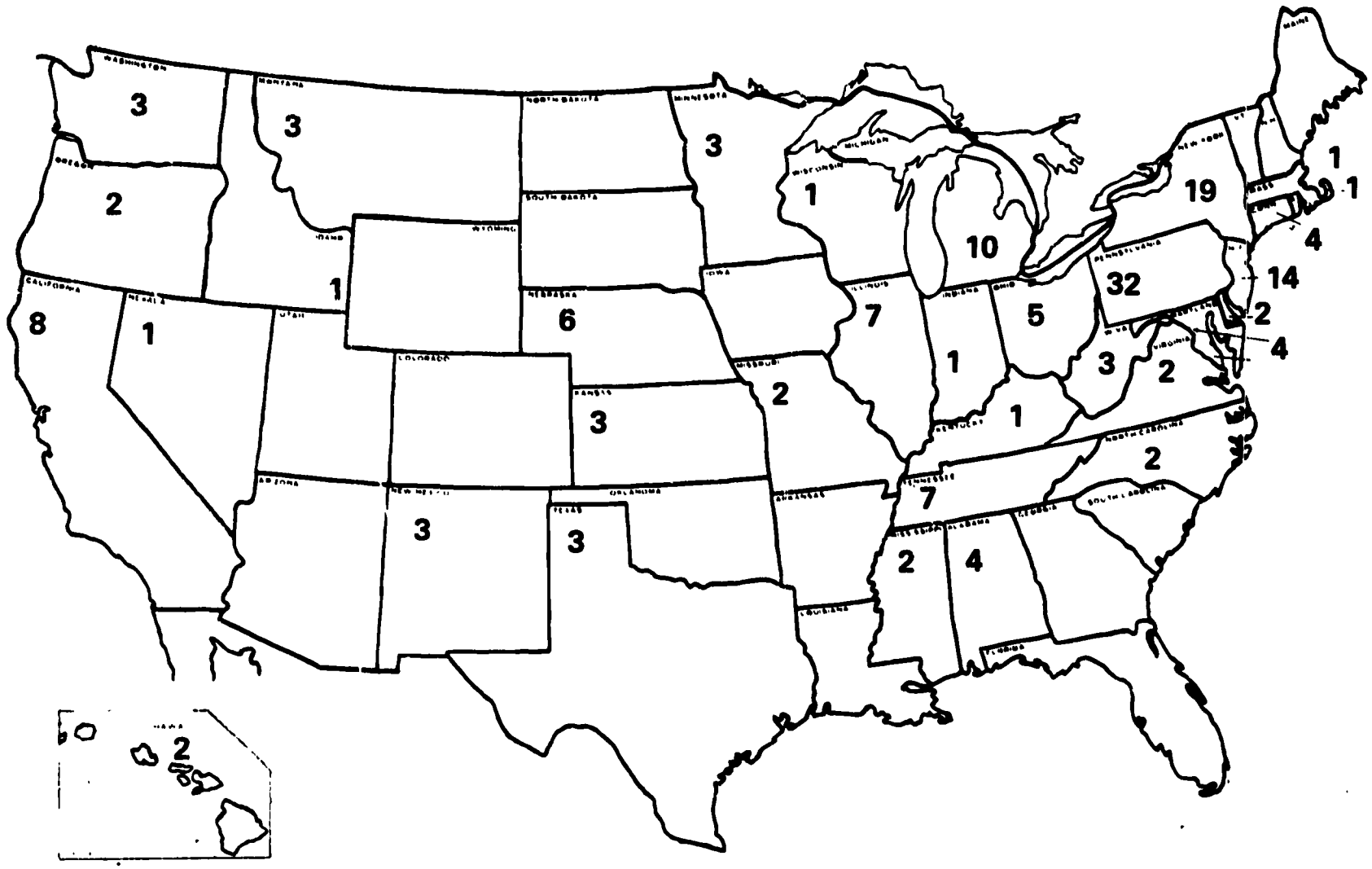
- Does achievement in program correlate with later achievement?
- Are unplanned results negative or positive?



A MODEL FOR WIDE SCALE ADOPTION



NUMBER OF IPI SCHOOLS BY STATE — 1969 — 1970



MATH FIELD PARTICIPATING SCHOOLS BY YEAR

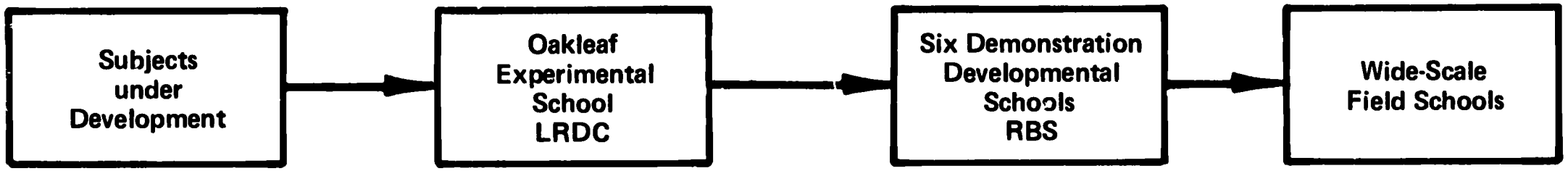
YEAR	STATES	SCHOOLS	TEACHERS	PUPILS
1966 – 1967	6	13	150	4,250
1967 – 1968	6	26	226	5,817
1968 – 1969	27	97	880	23,000
1969 – 1970 (Approximate)	32	175	1,600	50,000

\+ CANADA

GREECE

TAIWAN

ELEMENTARY SCHOOL DEVELOPMENTAL EFFORTS



• Mathematics	1965	1966	1967
• Reading	1965	1967	1970
• Spelling	1968	1969	1970
• Handwriting	1968	1969	1970
• Science	1968	1969	1971
• Social Studies	1970	1970	1971

IPI RESULTS OF WORK TO DATE

The following highlights, general in nature, present some of the changes and results of our work to date. Such a summary affords the reader a thumb-nail sketch but not a detailed accounting. Most of the results and changes deal with the IPI mathematics instructional system.

▲ **Pupil Achievement**

- On standard achievement tests IPI pupils do as well as non-IPI pupils.
- Some statistical differences on standard achievement tests are occurring in favor of IPI pupils in special education and reform schools.
- Standard achievement tests do not adequately measure the IPI program since many of the IPI skills are not tested by standard normative referenced achievement tests (less than 30%).
- There is need for new test construction designed as criterion referenced tests as opposed to normative referenced tests.
- On IPI placement tests the IPI pupils score significantly higher statistically than do the non-IPI pupils.
- IPI does indeed provide for individualization for the learner by removing the ceiling for the learner. Scores and rate of progress for IPI pupils are statistically greater than those for the non-IPI pupils.
- Girls achieve at a higher rate than do boys in the IPI schools.

▲ **Pupil Attitudes**

- Based on interview data, IPI pupils like school better than non-IPI pupils.
- IPI pupils like math better than non-IPI pupils.
- One school, ghetto in nature, has reduced police contacts from an average of 137 per year to an average of one per year. Broken windows, once a serious problem, have all but disappeared as a source of concern.

- **Teacher Attitudes and Changes**
  - Surveys conducted over the past three years indicate that teachers are highly positive about the IPI program.
  - Teachers are working harder in IPI than they would in other programs but obtain greater satisfaction since they can meet the challenge of individual differences for each pupil.
  - Teachers, in spite of all their critics, are willing to make significant changes in teaching for children if somebody is prepared to offer a program with specific direction and help.
  - Teachers become diagnosers of learning instead of dispensers of information.
  - Teachers provide valuable feedback information for program changes.
  - Teachers are taught to use the instructional system in a short period of time.
  - Teachers use data to correct their writing of prescriptions.
  - Substitute teachers can, with little training, manage the system of IPI, thus providing for a continuity.
- **Administrators**
  - The principal can be taught to use the system and in turn become the teacher and instructional leader for his own staff of teachers.
  - New roles are created for the principal as an instructional leader.
  - The principal uses data to manage the instructional system.

▲ **IPI as a Developmental Instructional System**

- Participating schools can be selected on the basis of specified criteria including administrative commitment, teacher commitment, retraining, and research participation.

- The RBS developmental model of moving from an experimental school to demonstration-developmental schools to wide-scale field testing schools can be managed with a data feedback system designed to measure the extent of implementation and pupil progress.

- It is possible to implement IPI on a national scale by collecting data to measure implementation which in turn can be used to monitor and correct mistakes.

- Feedback information can be used from field data to improve classroom management and the instructional system.

- As a result of developmental data the instructional system has had three major revisions. For example:

1966 – 1967	Single sheet approach
1967 – 1968	50% change and booklets adopted
1968 – 1969	Training and management system changes
1969 – 1970	Testing revised system

- Objectives, as a result of feedback data, have been reduced from over 540 in 1966 to 390 for 1969.

- Costs for instructional materials have followed a decreasing pattern from:

1966 – 1967	$42
1967 – 1968	$18
1968 – 1969	$16
1969 – 1970	$12

Further reductions making the system cost feasible for schools is fast approaching reality.

- The technology developed from IPI has broad applications for the development of individualized instructional systems.
- It is possible to go from research to practice if you have a sufficiently broad base. The individual research through the 1950's made IPI possible.
- The computer is becoming a more critical tool in individualizing learning. Primitive though the methods may be, the computer as a tool for both teacher and pupil is essential.
- The results of the assessment of the degree of implementation of IPI in participating schools show that the instructional system can be successfully implemented.
- Students in IPI do not always work in isolation. There is a 28% variation in the use of instructional settings.

PART II.

FORMATIVE AND INTERIM SUMMATIVE EVALUATIONS

FORMATIVE & INTERIM SUMMATIVE EVALUATIONS

The evaluation of any new program is extremely difficult. At times the instruments necessary for evaluation are non-existent and have to be invented; also, the evaluation of any new program cannot be treated in the same manner as experimental research in that changes, many times dependent upon observations and value judgments, have to be made to correct identified weaknesses of the new program being evaluated.

IPI, as an instructional system, does not escape any of the above problems. To date over 110 studies have been generated. Approximately fifty of these studies have been selected and presented in Part II in summary form. Descriptive studies about the instructional system have not been included in this section but can be found in Part III — **An Annotated Bibliography**..

It should be further noted that the data do not always agree. Such phenomena are not rare in educational research and evaluation. Evaluators, like all other humans, tend to agree to disagree. When value judgments have to be made disagreements are bound to arise.

Part II presents formative and interim summative evaluations which have been highlighted from on-going and completed studies — all of which are listed in Part III.

No attempt has been made to deal with the composite results of Part II. In a sense this is an experiment on the part of RBS in presenting what are believed to be the relevant facts concerning author, title, date, population, instruments, description, and results. The truth is that nobody knows exactly what the best form is in presenting such findings. It is hoped that this approach provides reader ease, as well as direct communication in a concise, meaningful manner.

A brief description of formative and summative evaluations is presented, followed by the data to date.

FORMATIVE EVALUATION

Formative evaluation refers to studies that are used to improve or help in the formation of a program. Often formative studies are internal studies concerned with variables within the program itself. Comparisons with other instructional systems need not necessarily be conducted; although such comparisons can be used to help in the development of a program. The way in which the results are used, rather than the content of the study, determines whether it is formative or not.

The formative studies presented in this section of the report have been sub-divided into categories of pupil-oriented, personnel-oriented, and system-oriented activities. In addition several studies being completed during 1969 are included.

INTERIM SUMMATIVE EVALUATION

Following the formative evaluations are procedures designed to make interim summary assessments of the overall value of an educational program. These procedures include collecting data on planned and unplanned effects as well as the need for value judgments concerning the worth of the results achieved. Eventually summative evaluation should be able to lead to statements such as, 'If this instructional system is implemented in this way, within this setting, following these conditions, the following results should occur.' The interim summative studies presented in this section of the report deal with achievement, side effects on pupils, and classroom observations.

FORMATIVE EVALUATION

PUPIL-ORIENTED ACTIVITIES

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Bolvin - Variability of Pupil Achievement in Mathematics Feb. 1966	Oakleaf, before and after the introduction of IPI	– IPI tests – Metropolitan Achievement Test	IPI tests are given at the beginning and end of the first year of IPI and the results in units mastered are compared by grade. Variability data is also obtained on the Metropolitan at the beginning of the year.	In grades 1, 4, 5 and 6, variability in achievement after a year of IPI was no greater than in standard graded instruction. Variability on the Metropolitan showed a general increase with number of years in school.
Boozer - Evaluation of Variability Among Students in Total Number of Units Mastered per Year. Summer 1968	Oakleaf pupils 1967-68	IPI tests for units in which work was done.	1967-68 variability data for each grade at Oakleaf is compiled utilizing the Pitt time-sharing computer terminal system.	Variability in pupil achievement occurs in both math and reading. Variability is greater at the higher grade levels. The time-sharing system can be utilized to conduct small data analyses such as these quickly.
Cox, et. al. - Description and Evaluation of the First Two Years of IPI Ch. V: Pupil Achievement Dec. 1966	Oakleaf School pupils 1964-66	IPI tests Prescription data	Variability and rate of achievement (ratio of pages to days up to the first posttest) in Math, Reading and Science units.	Great variability between units and large individual differences within units. Middle math levels (C-E) take the most pages and days to mastery; higher reading levels take the most pages and days to mastery.
		IPI tests Prescription data California test of Mental Maturity Metropolitan Achievement Test	Correlation of math and reading rates with selected variables.	Significant correlations (positive and negative) were found between: – math and reading rates – math/reading rates and IQ – math rate and Metropolitan math achievement score – first math posttest and days in math pages in math IQ post and present Metropolitan Reading and Math test scores.

PUPIL-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Lipson - Transfer and Generalization in IPI Feb. 1966	Oakleaf students 1964-66	IPI continuum	Use of transfer instances (those cases in which the student has received instruction in prerequisite skills, and then shows mastery on advanced dependent skills) as a comparative measure of transfer.	Probability of transfer increases as the student's background in arithmetic increases. Addition and Subtraction show greater probability of transfer than do Multiplication and Division. The percentage of students in a class showing transfer behavior increases linearly by grade.
Scanlon - Self-Initiated Activities in an Individualized Program - 1966	Oakleaf 5th and 6th grade students and teachers	– Measure of self-initiated behavior – Measure of student interest – Measure of peer-group evaluation of initiation – Student interviews – California Test of Mental Maturity – Metropolitan Achievement Test	Three treatments, introduced one per month, were used over a four-month period. Treatment #1 was designed to create awareness and use of supplementary materials. Treatment #2 provided opportunities to explore special interest areas. Treatment #3 was designed to capitalize on special interests and to structure opportunities for teachers and peers to praise exceptional work.	Self-initiation can be improved by providing special techniques during class periods. There is little relation between self-initiation and IQ achievement or sex of student. Student interest in math did not increase after self-initiation treatments, nor was there any significant change in peer evaluation of self-initiation. Interviews showed that pupils wanted to continue the treatments, and believed these provided them the chance to work on their own, teach themselves and go at their own speed.

PUPIL-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Yeager, Lindvall - An Exploratory Investigation of Selected Measures of Rate of Learning Winter 1967	Oakleaf pupils 1967-68	California Test of Mental Maturity (1st and 2nd grades) Otis Quick Scoring Test of Mental Ability (Grades 3-6)	Exploration of three possible measures of rate of learning that could be employed in individualized learning programs using IQ as a predictor of: 1) number of units completed per year; 2) time to complete given units; and 3) amount of content mastered per day.	There is no correlation between IQ and actual rate of progress in IPI, although there is a significant correlation for all grades between IQ and level of attainment prior to beginning IPI (as measured by Placement Testing). Correlation on the other two measures of rates of learning are generally non-significant, leading to the conclusion that rate of learning is not a general characteristic of the learner but rather is specific to the particular learning task.
Yeager, Lindvall - Evaluation an Instructional Innovation through the Observation of Pupil Activities - 1968	Oakleaf, one other IPI school	Structured Observation Guide	Observers observed, at two-minute intervals over entire class period, and made a tally for each student, showing the specific activities in which he was engaged.	

Major Category of Activity	Mean % of Students Engaged in Activity	
	Oakleaf	Other
Independent	61%	42%
Teacher-pupil	8%	12%
Non-instructional	29%	42%
Pupil-pupil	2%	.2%
Group	.0%	.0%

PERSONNEL-ORIENTED ACTIVITIES

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Bolvin - Evaluating Teacher Functions - Feb. 1967	Oakleaf teachers in the first two years of IPI.	Prescription sheets	Teachers' prescriptions were reviewed and length and types of prescriptions tabulated. The analysis of type seems to be largely subjective.	Two patterns of prescribing were identified. Prescription practices seem to be limited by the curriculum materials and student information readily available to the teacher. Some changes in practices were observed over the two years.
Cox, et. al. - Description and Evaluation of the First Two Years of IPI Ch. VIII: Prescription Writing	Oakleaf teachers 1964-66	Prescription sheets	Study of prescription writing practices.	Certain teachers tend to develop a few set patterns of prescription writing which fail to take actual pupil performance into account.
Ch. IX: Non-Cognitive Variables - Dec. 1966		Interviews	Teacher attitudes and recommendations.	All teachers were in favor of individualization of instruction, and felt that it fostered pupil interest, self-motivation and independence. Major problem is the handling of the slow child. They found the initial adjustment to teaching IPI difficult, but felt it made for more efficient utilization of their time.
Dudley, et. al. CASEA - The Decision-Making Structure of Schools Feb. 1969	3 IPI schools 3 Control schools 3 Multi-unit for Project Models (Wisc.) 3 Multi-unit Control Schools for Project Models (Wisc.) 6 Wash. (state) Schools	Questionnaire	To determine the decision-making process of schools and the teacher perceptions of the authority structures, the following questions were asked: – What positions had primary responsibility for making decisions? – What is the nature of the relationship of people involved in each decision?	Variability within types of schools (control, multi-unit and IPI): – Control: teachers see themselves as decision makers with the principal as a consultant. – Multi-unit: decisions are made in committees, not by individual teachers but each school had different authority structure. – IPI: no clear, consistent pattern with a trend toward a prescription type of authority relationship.

PERSONNEL-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Eidell, et. al. CASEA - Uniformity and Variability in the Organizational Char acteristics of Elementary Schools - Feb. 1969	3 IPI schools 3 Control schools 3 Multi-unit schools for Project Models (Wisc.) 3 Multi-unit control schools for Project Models (Wisc.)	Four instruments measuring: — Job satisfaction — Pupil control orientation — Reference group orientation — Leadership of school principals (Items adapted from Halpern & Croft OCDQ)	The four instruments were administered in a two-hour session after school.	**JOB SATISFACTION** Instrumental (work) ranking of highest to lowest Multi-unit experimental Multi-unit control IPI control IPI experimental Multi-unit consistently higher than IPI. Expressive (interpersonal) — same as above in ranking, but no significant differences in magnitude. (NOTE — Tries to attribute differences to regional variations.) **PUPIL CONTROL IDEOLOGY** (Humanist to custodial) — Rank order from most humanistic: Multi-unit experimental Multi-unit control IPI experimental IPI control **REFERENCE GROUP ORIENTATION** (Cosmopolitan to local) — Rank order from most cosmopolitan: IPI experimental Multi-unit experimental Multi-unit control IPI control

PERSONNEL-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Eidell (Continued)				**LEADERSHIP** Aloofness – Rank order from most aloof: Multi-unit control IPI experimental Multi-unit experimental IPI control Consideration – Rank order from most 'human': Multi-unit experimental Multi-unit control IPI control IPI experimental Production Emphasis (Degree of Close supervision) – Rank order from most directive: Multi-unit control IPI control IPI experimental Multi-unit experimental Thrust (Attempt to motivate via example) – Rank order from highest to lowest: Multi-unit control Multi-unit experimental IPI control IPI experimental **SUMMARY** – Variation according to geographic location – Greatest differences are found between IPI experimental and multi-unit experimental – Few interpretations offered.

PERSONNEL-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Stehr, et. al. CASEA - Task Differentiation in Elementary Schools: An Exploratory Analysis Feb. 1969	3 IPI schools 3 Control schools 3 Multi-unit schools for Project Models (Wisc.) 3 Multi-unit control schools for Project Models (Wisc.) 6 Washington (state) schools	Organization task instrument	The instrument was designed to elicit an extensive job description from each teacher and the ranking of the tasks listed according to their importance and the time it takes to carry them out.	Task area with greatest number of responses: — IPI 'management' with 18.4% — IPI control: 'management' with 20.8% — Multi-unit: 'planning' with 22.5% All schools are almost equal on the frequency of 'evaluation'. Organization of the school does not affect the frequency of: guidance, professional advancement, growth, and teacher content areas, meetings, planning, PR, stimulation-motivation, and teacher-instructional activities. Most important tasks were for: — IPI management — Multi-unit: evaluation When time is the factor, the following is important for: — IPI: evaluation, stimulation-motivation — Multi-unit: guidance **TENTATIVE CONCLUSION** — IPI schools seem to have a far greater impact on the task structure of teachers than multi-unit schools.
Deno, Jenkins — Evaluating Pre-planned Curriculum Objectives 1967 (University of Delaware)	13 in-service teachers and one principal	IPI Continuum Classification check-list	Purpose of study was to determine whether a technique for analyzing behavioral objectives in terms of critical components (such as specificity of behavior; context and determined criterion of the objective) could be developed and reliably used by a typical group of in-service teachers.	Concluded that nearly every objective sampled from the IPI math continuum may be described as 'a general behavioral objective with neither a signal nor a criterion explicitly stated.'

PERSONNEL-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Scanlon - The Use of Data in School Selection and Training of Administrators Feb. 1969	Teachers in two new IPI schools	Two school case studies Pre- and posttests in training materials	Field testing and refinements of individualized teacher training materials.	An application for new schools with specified criteria for their selection.
	IPI administrators (60)	Questionnaire I: (ATP)	Administrative training program was held in the spring of 1968 and attended by 60 principals.	Development of an administrative training program to enable principals to train their staffs. Response to the training program was quite positive. Administrators ready to train their staffs.
	Teachers in 70 IPI schools	Teachers' evaluation of training program and materials. Trainer's report of procedures used in training session. Trainer's summary and evaluation report.	Teacher training program held during the summer of 1968.	Teacher and trainer evaluation of the individualized training program and materials was quite positive. Marked cost reduction realized by this new approach to staff training.
RBS - Summary of IPI Teachers' and Administrators' Conference March 1968	147 IPI teachers from 25 IPI schools	Workshop reports	19 workshops were held in which teacher recommendations were made in topic areas.	Most teachers believed workshops were helpful. Specific recommendations were made for: – seminar topics for math and reading – time and structure of planning sessions – classroom management – math and reading readiness activities – teacher evaluation by principals and self-evaluation

PERSONNEL-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
RBS (Continued)				— prescription writing — reporting progress to parents — techniques used to take into account learning characteristics — public relations.
		Questionnaire	Administration of opinionnaire in which teachers rated certain aspects of IPI on a scale from 'excellent' to 'poor' and made specific comments.	Results from the questionnaire can be summarized as follows: — Teachers felt IPI math best for average or above average pupils, and that classroom atmosphere, motivation and discipline were good. — Teachers generally liked their own role in IPI but were critical of their training. — About half of the teachers felt the instructional materials were good; others felt them adequate or needed improvement. — Only one-third of the teachers felt planning sessions were good or excellent. — Most were in favor of seminars. — Most felt IPI made more demands on the teacher than previous systems. — Most felt aides were effective. — Many seemed to have changed their opinion of IPI from negative to positive since its introduction into their school. — Comments during conference sessions showed teachers felt program also benefits below average pupils because it helps to maintain their interest.

PERSONNEL-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
RBS - Summary of IPI Teachers' and Administrators' Conference Feb. 1967	79 teachers and 18 administrators from 12 IPI schools	Reports on workshops	Discussion of administrative and teacher training used in IPI and recommendations for the future. Discussion of problems of interaction between student-teacher, teacher-teacher, teacher-administrator, and teacher system.	Suggestions were made for individualized teacher training procedures and more practice in using IPI procedures as a part of the training. Changing roles included: – A shift of responsibility from teacher to the student with the teacher being more responsive to student needs. – More communication and cooperation among teachers. – More communication with the administration. – Teachers must be able to teach and know varied content simultaneously.
		Teacher questionnaire	Short teacher questionnaire included two multiple-choice questions about attitude toward IPI, several evaluating and conference sessions, and two open-ended questions asking for opinions of the strengths and weaknesses of IPI.	– Importance of the teacher increases in IPI. – IPI is a step toward superior classroom with specific strengths including materials, motivation of pupils, and role of teacher. – The need for refining the skill sheets was selected as the major weakness.
		Administrative questionnaire	Short administrator questionnaire included two multiple-choice questions about attitude toward IPI, several evaluating the conference sessions, and two open-ended questions asking for opinions of the strengths and weaknesses of IPI.	– Importance of the administrator increases in IPI. – IPI accomplishes the goal of individualizing instruction, increases teacher and student motivation, and provides more time for the teacher to teach. – The two major weaknesses pointed out included teacher and administrative training, and the need for refining the materials.

SYSTEM-ORIENTED ACTIVITIES

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Bolvin - The Use of Field Data for Improving IPI Materials and Procedures Feb. 1969	IPI pupils in 25 schools	Prescription forms (math)	Analysis of prescription variability. To determine if all 390 objectives in the math program are necessary. Analysis of diagnostic instruments to determine learning problem areas.	Number of pages prescribed vary among pupils; instructional techniques prescribed did not. Particular skills in which large numbers of students had a pretest mastery indicated a need for eliminating some objectives. An analysis of CETs and posttests required for mastery identified some units in which materials were inadequate, objectives were missing, and posttests provided inadequate sampling of outcomes.
Cox, et. al. - Description and Evaluation of the First Two Years of IPI Ch. VII: Retention of Learned Material Dec. 1966	Oakleaf School pupils 1964-66	IPI posttests	Study of retention of mastered units during the school year and over the summer.	Most units are retained, with great gains in some units over the summer.
Glaser - Adapting the Elementary School Curriculum to Individual Performance Oct. 1967	Oakleaf School	Prescription data	Effort was made to use the computer to keep track of pupil progress and to generate reports on achievement.	Report format developed was a computer output of a line graph for the individual pupil showing his accumulated progress in terms of units mastered over time. The slope of the graph is a measure of his rate of achievement. This type of output might be used as a 'report card.'

SYSTEM-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
O'Keefe - Use of Placement Tests in IPI Math July 1968	Oakleaf pupils Grades 5 and 6	IPI materials	The control group began work on unit indicated by placement test results; the experimental group began work at the level on which they were working the previous spring, regardless of placement test score.	Pupils in the experimental group spent considerably less time in working on previously mastered units. There was no correlation between score on the placement test and time taken to complete a unit.
Unks - IPI Mathematics: A Report on the Results of 1967-68 Prescription Data Analysis May 1969	4,685 pupils in 19 IPI schools	IPI mathematics prescription sheets	Prescription data for each skill including such items as pages used, test scores, days spent in skill was summarized. Printouts of the summaries yield information relating to fine aspects of IPI. – initial pupil placement – gross pupil progress – sequencing and difficulty of instructional units – sequencing and difficulty of skills – test unreliability and non-validity	Model placement levels for each grade were determined as follows: grade 1 — level B grade 2 — level C grade 3 — levels C and D grade 4 — level D grade 5 — levels D and E grade 6 — level E Percentages of pupils who could not be placed at any level decreased from grade 1 to 6. Over all grades the average number of units completed in one year was 12.5 (about one level). Average units completed in a year increased from grade 1 to 6. In all grades the level at which most work is done at the end of the year is one higher than at the beginning. Eighteen out of 70 units are identified as easy by pretest data; 26 are difficult. Most difficult skills are identified within the problem units by average test scores. Twenty-five units are identified as difficult by posttest data. Altogether 56 units are difficult by pretest and/or posttest data or need skills resequenced.

SYSTEM-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Unks (Continued)				Forty-eight out of 372 skills are identified as easy by pretest data; 57 by CET data. Fourteen are difficult according to pretest data; 68 according to CET data; 32 by use of instructional techniques. For 55 units the orders of skills from easy to difficult according to pretest data are listed. Difficult units and skills are indicators of possible test non-validity or unreliability. Thirty-three units found easy by pretest data at the beginning of the year (as opposed to only 18 later in the year) may indicate misplacement of pupils and non-validity of placement tests.
Weinberger - Temporal Retention - April 1969	4 IPI schools Grades 1-5 1,230 pupils	Placement tests	Analysis of units retained, gained, or lost during summer recess.	Mean units across levels and areas gained or lost was 0. Particular units by grade where mean loss or gain was greater than one level are noted. The recommendation is made that it is unnecessary to Placement Test pupils each fall.
Weinberger - Use of Data in Monitoring School School Implementation of IPI — Feb. 1969	79 IPI schools 650 teachers	Placement profiles Prescription sheets	Use of diagnostic instruments and mastery criterion. Use of instructional materials and settings.	Placement Tests 88% correct usage Pre-, Post- and CETs 72% to 96% correct usage More variability is needed in the use of the techniques. There is variability in length of the first prescription for a skill.
		Planning session report forms	Use of planning sessions.	Analyses include the nature and frequency of meetings with emphasis on the topics discussed and continuous training used.

SYSTEM-ORIENTED ACTIVITIES (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Weinberger (Continued)		Report of student progress	Compiled from a data bank file of IPI placement and progress information on 15,000 students.	Used to determine the rate, amount and dispersion of academic progress made by individual (and groups of) students. There is wide dispersion within all IPI classes.
		Report of student visitation monitors	Results of periodic visits to the schools by trained observers.	Produces data on the elements involved in implementing IPI in various types of schools.
Weinberger - Degree of Implementation of IPI: Spring Results April 1969	79 IPI schools 650 teachers	Prescription sheets	Use of diagnostic instruments and mastery criterion.	Pre-, Post- and CETs 85% to 96% correct usage More variability is needed in the use of the techniques. There is variability in length of the first prescription for a skill.
Weinberger - Degree of Implementation of IPI: Fall-Spring Comparison April 1969	79 IPI schools 650 teachers	Prescription sheets	Use of diagnostic instruments and mastery criterion.	Correct usage of mastery criterion on CETs and posttests increased.

INTERIM SUMMATIVE EVALUATION

PUPIL ACHIEVEMENT

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Bialeck and Castro - A Second Year Evaluation of Individually Prescribed Instruction (IPI). Monterey, California, Nov. 1968.	Grades 4-6 in four IPI and four control schools in Monterey area — three IPI schools had math and one had reading.	Iowa Test of Basic Skills	Test was administered in September and May and a 'total arithmetic score' consisting of a combination of the concepts and problem solving was computed.	There is no significant difference between IPI and control; all differences are insignificant or favor the non-IPI groups.
		Placement tests	Tests were administered in September incorrectly and in May. The Lorge-Thorndike Intelligence Scale was used to divide the pupils into three ability groupings.	General superiority of non-IPI. All differences are insignificant or favor the non-IPI groups.
Fisher - An Investigation of Three Approaches to the Teaching of Mathematics in the Elementary School, Unpublished doctoral dissertation, University of Pittsburgh, 1967.	420 pupils in five schools with three types of curriculum treatment: — IPI — programmed learning instruction — standard classroom instruction	— Metropolitan Achievement Test: arithmetic computation and arithmetic problem-solving and concepts. — Iowa Test of Basic Skills (ITBS): arithmetic concepts and arithmetic problem solving.	Instruments: — The Metropolitan was used as pretest and posttest of student's arithmetic ability with pre-administration the preceding spring. — The ITBS was administered on an untimed-ungraded basis as a posttest. — The Otis Quick Scoring Mental Ability Test was used as a control variable.	No significant differences between IPI, programmed learning instruction, and standard classroom instruction.

PUPIL ACHIEVEMENT (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Gallagher - The Evaluation of Student Achievement in the Individually Prescribed Program in Mathematics at the Frank A. Berry School, Bethel, Conn. Graduate School of Education, Fairfield University, May 1968.	Grades 3-6 in school in Conn. – half in IPI and half not.	Stanford Achievement Test	The test was administered in October 1967 and April 1968 to both groups in computation, concepts and applications. Analysis of variance procedures were applied to median scores (grade equivalents).	No significant difference.
RBS - IPI Evaluation Summary 1967-68: Status Report Nov. 1968.	Grades 3-6 in five paired IPI and control schools - 1,700 students	Iowa Test of Basic Skills	This instrument was administered in the fall of 1967 and spring of 1968 in arithmetic concepts, problem solving, on an ungraded-untimed basis. The sections on reading comprehension and vocabulary were also given. The total raw score from 'test grades' 3, 5, and 7 were analyzed using MANOVA.	– No statistically significant difference between IPI and control schools in math achievement. – Girls did better than boys. – No statistically significant difference between IPI and control schools in the dispersion of math achievement scores.
		IPI Placement tests	The IPI placement tests were administered in the fall of 1967 and the spring of 1968. MANOVA processing was used.	– IPI schools started lower in three of four grades, gained more, and ended higher than control schools for all four grades. – A significant difference in the dispersion of placement scores, greater than .01, occurred in the IPI schools both pre- and post-.
		An arithmetic reasoning test which is part of the National Longitudinal Study of Mathematics Abilities.	A fifteen-item multiple-choice test consisting of math problems for which student responded with process to be used.	Extreme non-normality (skewed to the high end – upper limit too low) of the untimed scores led to no processing.

PUPIL SIDE EFFECTS

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Bialeck and Castro - A Second Year Evaluation of Individually Prescribed Instruction (IPI). Monterey, California, Nov. 1968.	Grades 4-6 in four IPI and four control schools in Monterey area — three IPI schools had math and one had reading.	Bialeck-made paper and pencil questionnaire.	The percentage of responses by item is reported by school.	**MATH:** — IPI pupils choose arithmetic as one of their two favorite subjects more than control pupils. — Low ability students find IPI most attractive. — More IPI pupils believe they are 'learning about as much as I can right now' than control pupils. In other words, pupils do recognize this feature in IPI. — IPI pupils prefer working by themselves more than control pupils. **READING:** — Control pupils choose reading as one of their two favorite subjects more than IPI pupils.
	Five 4th grade students.	Interviews with five IPI students.	Three interviews were held with each student at intervals of six weeks starting in January.	— To the pupils, IPI made math more enjoyable. — Pupils do feel competitive. — Tests elicit ambivalence: an enjoyment over the end of work or beginning of new material coupled with anxiety over finding out possible failure.
Elk Grove Illinois School District with the cooperation of Dr. Robert Stake, Univ. of Illinois. - Individually Prescribed Instruction: A Study of Independent Behavior. Unpublished report, Feb. 1968.	— Gifted pupils (+120 IQ) in two schools in Elk Grove, Illinois school district and two control schools. — All pupils in two IPI and two control schools — Parents of pupils	— An independence scale was developed from the results of a teachers' survey. — An attitude questionnaire was developed regarding math and reading in general and IPI math and reading. — Questionnaire for parents regarding the IPI program.	Instruments were administered during the fall of 1967.	— Gifted IPI students demonstrate more independent positive actions than gifted non-IPI students. — IPI students indicate slightly more positive attitudes toward reading and math than do non-IPI children. — IPI students showed more favorable attitudes toward IPI reading and IPI math than general reading and math. — Parents of children in IPI generally have positive attitudes toward the program.

PUPIL SIDE EFFECTS (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Gallagher - The Evaluation of Student Achievement in the Individually Prescribed Program in Mathematics at the Frank A. Berry School, Bethel, Conn. - Graduate School of Education, Fairfield University, May 1968.	Grades 3-6 in school in Conn. — half of the pupils in IPI and half not.	California Test of Personality: sections on self-reliance, personal worth and school relationships.	Mean difference between IPI and control were computed.	Slightly higher scores for control over IPI.
		Gallagher-made attitude toward arithmetic instrument.	Mean difference between IPI and control were computed.	Significant difference in favor of IPI pupils.
RBS - IPI Evaluation Summary 1967-68: Status Report Nov. 1968	Grades 3-6 in five paired IPI and control schools — a total of 1,700 students.	The Ideas and Preferences Inventory and Arithmetic Reasoning sections of the attitude measures used by the National Longitudinal Study of Mathematics Abilities.	The following scales were submitted for MANOVA processing: — arithmetic vs. non-arithmetic — pro-arithmetic composite — arithmetic — easy vs. hard — actual arithmetic self-concept — ideal arithmetic self-concept	— No statistically significant differences between the IPI schools and the control schools were found. — There was considerable interaction between school and treatment.

CLASSROOM OBSERVATION

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Bialeck and Castro - A Second Year Evaluation of Individually Prescribed Instruction (IPI). Monterey, California. Nov. 1968.	Four IPI and four control schools in Monterey area - three IPI schools had math and one had reading.	Bialeck-made observation schedule of pupil activities.	A random selection of 10 pupils per class were observed three or four times a period for one minute of observation for five days. On this basis, a description of the activities was made.	Given that the IPI program was not strictly implemented in these schools, the results were: – There is as much variability within the IPI and control school groups as there is between them. – A 'typical' child spends his time: IPI / Control independent work 42% / 36% teacher-pupil work 6% / 8% non-instructional use of time 47% / 25% pupil-pupil activity 4% / 9% large group activity 1% / 22%
		Bialeck-made observation of teacher-student interaction.	A two-week observation of IPI and control classes for a total of five hours.	student-oriented communication 63% / 34% non-instructional interaction 70% / 43%
RBS - IPI Evaluation Summary 1967-68: Status Report Nov. 1968	107 teachers in five paired IPI and control schools	Flanders-Interaction Analysis	The Mann-Whitney U-Test was used to perform the statistical analysis in which the data were compared, variable by variable. The analysis was made combining grades 1-3, 4-6 and 1-6.	– **Questioning** – Control school teachers asked more questions than IPI teachers – significant difference. – **Criticism** – IPI teachers were more critical of students in grades 1-3 than control teachers – significant difference. – **Silence** – The amount of 'silence' was statistically significant in grades 1-3, with the IPI schools being more 'silent.' – **Student Talk** – There were slight, but statistically significant differences in both categories of student talk (narrow and broad). Students used more broad and less student talk in the IPI classrooms than students in control classes. – No significant differences between IPI and control in socio-emotional climate, evaluative behaviors, and lecturing and directions.

RBS STUDIES IN PROGRESS

RBS STUDIES IN PROGRESS

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
DeRenzis - An Investigation into the Relationship Between the Attitude Patterns and Prescription Writing Patterns of Teachers Using the IPI Mathematics System	215 teachers in about 25 schools	Runner Studies of Attitude Patterns IPI math prescription sheets.	Teachers consenting to participate in the study completed the Runner questionnaire. Their prescriptions were analyzed for patterns of variability. Prescription patterns and attitude responses were compared.	In progress.
Schmidt - A Pilot Study of Selected Variables and Their Relation to Spelling Achievement	4th, 5th and 6th grade pupils in one IPI demonstration school	IPI spelling tests Seashore Rhythm Test Lorge Thorndike Test 'What Do You Think'	Differences between 'high' and 'low' spelling groups on rhythm, IQ, and types of spelling areas were studied.	In progress.
Unks - Individually Prescribed Instruction: A Pilot Study of Productive Thinking Abilities	1,325 pupils in grades 3-6 in three IPI demonstration schools and three control schools	'Measure of Children's Abilities: Productive Thinking - Series M' P. R. Merrifield	Five abilities relating to divergent productive thinking with semantic content were measured. The abilities and the instrument are based on theory derived from the structure of intellect model.	In progress.
Weinberger - Individually Prescribed Instruction: Results of 1968-69 Mathematics Prescription Analysis	Grades 1-6 in seven demonstration schools	Mathematics prescription sheet	Data taken from prescription deals with scores, use of materials and techniques, time utilized, sequence of prescription.	In progress.

R&S STUDIES IN PROGRESS (Continued)

AUTHOR, TITLE & DATE	POPULATION	INSTRUMENTS	DESCRIPTION	RESULTS
Weinberger - Individually Prescribed Instruction: Results of 1968-69 Reading Prescription Analysis	Grades 1-6 in seven demonstration schools	Reading prescription sheet	Data taken from prescription deals with scores, use of materials and techniques, time utilized, sequence of prescription.	In progress.
Weinberger - Individually Prescribed Instruction: Results of 1969 Teacher Opinionnaire	72 teachers in seven demonstration schools	Teacher opinionnaire concerning Individually Prescribed Instruction	Questions pertain to advantages, disadvantages, and problems with IPI, opinions about procedures and organization.	In progress
	71 teachers in seven demonstration schools	Teacher information concerning future development in Individually Prescribed Instruction	Questions deal with continuous training, teacher participation in curriculum development, likes and dislikes in reading, science, and spelling.	In progress.
Weinberger and Scharf - Individually Prescribed Instruction: Results of 1969 Pupil Questionnaire, 'What Do You Think'	Pupils in grades 4, 5, 6 in five demonstration schools Pupils in grades 4, 5, 6 in five control schools	'What Do You Think'	Instrument in three parts asked questions about attitudes toward school and specific subjects. IPI pupils were given five extra questions specific to IPI. The three parts of the instrument consisted of: 1) open-ended questions, 2) a semantic differential, and 3) multiple-choice questions.	In progress.

PART III.

ANNOTATED BIBLIOGRAPHY

ANNOTATED BIBLIOGRAPHY

A constant problem at RBS has been one of developing the most effective lines of communication in order to share our work to date with the variety of audiences and requests received. Some people want to know all we know both verbally and in print; others are satisfied with brief generalizations.

The volume of mail for requests either in response to letters, or by furnishing written reports has reached a proportion of major concern to RBS. Both the time and cost have caused RBS to attempt a new mode of sharing.

Part III presents the major writings conducted about IPI since 1966. Several earlier references are included since the descriptions provide a valid link to the work of RBS-LRDC to date.

In addition to the annotation and index RBS is making provisions to handle all prior studies on a microfilming basis, at cost, thus eliminating tons of paper associated with studies to date. Arrangements are also being conducted to make all studies and data available through the ERIC (Educational Resources Information Center) System in the Office of Education, thus affording greater sharing and use. Meanwhile, serious researchers are invited to visit the RBS headquarters and use the studies in our library.

Future studies will be issued as technical papers in limited quantity and then placed on the microfilming system. Hopefully, the above method will provide faster access in reporting and also reduce the time and cost factor for RBS.

INDEX CATEGORIES

1. Author
2. Title
3. Year
4. LRDC
5. RBS
6. Rationale and Descriptive Papers
   a) IPI specific
   b) general, related programs, etc.
7. Testing
   a) general related theory
   b) IPI tests and testing program
8. Psychological Learning Modes and Learning Theory
9. Evaluation Questions and Design
10. Mathematics
11. Reading
12. Science
13. Oakleaf School
14. Other IPI Schools
15. Achievement
    a) measures of rate
    b) measured by IPI tests
    c) measured by standardized tests
    d) related factors
16. Attitude
    a) pupil
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17. Pupil Activities
18. Teacher Activities
    a) prescription practices
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19. Other Personnel Functions
    a) aides
    b) administrators
    c) LRDC
    d) RBS
20. Comparative Studies (IPI vs. non-IPI)
21. Objectives
22. Policy
    a) RBS Board
    b) Office of Education
23. News Media Releases

BIBLIOGRAPHY

Beck, Isabel L. and Bolvin, John O. *A Model for Non-Gradedness: The Reading Program for Individually Prescribed Instruction, Part III of a Symposium: Language Arts in the Non-Graded Schools.* Elementary English, XLVI:2, February 1969.

Succinct description of the IPI model for individualization. The article includes a selected linguistic approach to reading and its four stages: 1) pre-reading; 2) decoding; 3) comprehension and skills development; and 4) independent reading. There is a brief discussion of: objectives, diagnostic instruments, materials, individual prescriptions, classroom management, and data collection.

Indexed under 4, 6a, 7b, 11, 17, 18a, 21.

Becker, James. *Discussion, Educational Technology: New Myths and Old Realities.* Harvard Educational Review, Vol. 38, No. 4, pp. 747-751, Fall 1968.

Response to an article in same issue by A. Oettinger. Discusses need for change in education by citing Newark, N.J. system as an example. Places blame for the present mess on "establishment" rather than on school administrators. States that educators are not the ones who make basic educational policy. Describes IPI as a strategy — a different view of the way teaching should be done. Rejects the idea that individualization of instruction must be synonymous with maximum freedom of activity for the pupil. States that IPI has never been billed as a panacea by LRDC or RBS.

Indexed under 5, 6a, 21

Becker, James W. *Incorporating the Products of Educational Development Into Practice.* Research for Better Schools, Inc. July 1969.

Traces the development of IPI from program selection to actual practice. Provides criteria, a description of the model, the allocation of resources for educational development, and problems confronting the developer prior to institutional adoption.

Indexed under 5, 6, 10, 14, 19, 21, 22a, 22b.

Becker, James W. *Run Computer Run: A Critique.* Research for Better Schools, Inc., May 1968.

A paper prepared for the Conference on Information Technology and Secondary Education, Harvard University. The paper discusses social problems confronting innovations, a description of IPI as contrasted with individualization, and some premises for future consideration.

Indexed under 5 6a, 6b, 21, and 22a.

Becker, James W. *Toward Automated Learning.* Research for Better Schools, Inc., February 1968.

A professional paper delivered at the American Educational Research Association in February, 1968. The paper traces the essential elements of IPI from the paper-pencil mode into expanding uses with the computer including instructional management and computer-assisted instruction.

Indexed under 6a, 6b, 7, 8, 21.

Bialek, Hilton M. and Perkins, Kristen. *A First Year Evaluation of Individually Prescribed Instruction (IPI) Programs in Four Schools in the Three-County Area.* Unpublished report, Project EDINN, George Washington University, Office of Sponsored Research, Monterey, California, August 1967.

One interesting finding is that IPI is easier to administer in some type of large group or multi-room complex rather than the self-contained classroom. It also seems that IPI effectiveness is highly dependent upon the availability and judicious assignment of adequate para-professional assistance. The report presents the results of a series of interviews with IPI teachers; an analysis of a questionnaire periodically administered to IPI and control students; an analysis of the effects of classroom communication patterns; a discussion of individualization based on IPI and conventional classroom assignments; and an analysis of progress based on both IPI and standardized test instruments.

Indexed under 9, 10, 11, 14, 15a, 15b, 15c, 16a, 16b, 17, 18a, 18b, 18c, 19a.

Bialek, Hilton M. and Castro, Barbara. *A Second Year Evaluation of Individually Prescribed Instruction (IPI).* Monterey, California, November 1968.

Four IPI and four control schools were compared in three main areas: 1) student attitude toward school and school subjects; 2) teacher and classroom activity and interaction; 3) student achievement over the school year.

Results show: 1) that students clearly like IPI, and that the structure of the program is attractive to pupils at all ability levels, especially those of low ability; 2) 63% of all communication in IPI classes are initiated by the students (vs. 34% in non-IPI classes); and that 70% of all interactions in IPI classes are non-instructional in content (vs. 43% in non-IPI classes); the latter finding is in contradiction to the first year's observations; 3) achievement test results for math and reading are presented.

Indexed under 9, 10, 11, 14, 15b, 15c, 16a, 20.

Bolvin, John O. *Evaluating Teacher Functions.* Paper presented at the annual meeting of the American Educational Research Association, New York, February 1967. Reprinted as Working Paper 17, Learning Research and Development Center, University of Pittsburgh, February 1967.

Teacher prescription practices are described in this report and two patterns of prescribing which teachers exhibit are identified. Some data in tabular form is presented to show length and types of prescriptions written by individual Oakleaf teachers for selected mathematics units. Though a few summary statistics are indicated, the analysis seems to be largely subjective. One conclusion noted was that prescription practices seem to be limited by the curriculum materials and student information readily available to the teacher. Some changes in prescription practices are shown over a two-year period, 1965-66 to 1966-67.

Indexed under 4, 10, 13, 15b, 15d, 18a.

Bolvin, John O. *The Use of Field Data for Improving IPI Materials and Procedures.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, December 1968. (Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, February 1969.)

The paper lists the sub-elements of the five major elements of the IPI plan: 1) a testing program; 2) prescription writing practices; 3) instructional materials and devices; 4) teacher classroom activities; 5) classroom management problems. It discusses the results of prescription data analysis, such as variability of prescriptions; the need for all present objectives in the math continuum; and problem areas in terms of lesson materials.

Indexed under 4, 7b, 9, 17, 18a, 18b, 19, 21.

Bolvin, John O. *Variability of Pupil Achievement in Mathematics.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, February 1966. Reprinted as Working Paper 1, Learning Research and Development Center, University of Pittsburgh, February 1966.

This study compares variability in achievement of Oakleaf pupils before and after the introduction of IPI. The results of pre- and post-testing with IPI Placement Tests are used, and the mean and standard deviation of units mastered is calculated for each grade. Variability for each grade with and without IPI is compared by matching grade one at the end of the school year with the grade two from the beginning of the year. All grades are equated on I.Q. In grades 1, 4, 5, and 6, the results of this comparison do not support the hypothesis that variability of achievement in individualized instruction is greater than in standard graded instruction. This may be due to lack of a good measure of rate of achievement in IPI. Variability before is also measured by the Metropolitan Achievement Test and shows a general increase with number of years in school.

Indexed under 4, 10, 13, 15a, 15b, 15c, 18a.

Bolvin, J. O. and Glaser, R. *Developmental Aspects of Individually Prescribed Instruction.* Audiovisual Instruction, October 1968.

This paper describes how the philosophy of IPI fits into the current trend in education and gives a brief discussion of the ways IPI attempts to individualize instruction through four general goals. A brief forecast for the future look of IPI is also made.

Indexed under 6a, 6b.

Bolvin, J. O., Lindvall, C. M. and Scanlon, Robert G. *A Manual for the IPI Institute.* Learning Research and Development Center, University of Pittsburgh and Research for Better Schools, Inc., June 1967.

A manual used in the training of teachers and administrators at the 1967 IPI Summer Training Institute in Pittsburgh. It includes a rationale of a system of individually prescribed instruction, as well as detailed explanations of the procedures and practices involved in the program. It is a slightly revised edition of the *1966 Manual for the IPI Institute.*

Indexed under 4, 5, 18c.

Boozer, Robert F. *A Study of the Relationship Between IQ and Units Mastered Per Year, Mathematics 1967-68.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, July 1968.

Data is presented which indicates a slight relationship between IQ and one measure of rate at Oakleaf for 1967-68.

Indexed under 4, 10, 13, 15a, 15d.

Boozer, Robert F. *An Overview of a Validation Study of the Sequencing Nature of Instructional Objectives.* Unpublished paper, University of Pittsburgh, June 1968.

This is a proposal for a study of whether the objectives in each IPI unit are scaled in the Guttman sense. The proposed application to IPI pretests of Lingoes' program for multiple scalogram analysis is outlined. Hypotheses concerning the curriculum to be tested by the study are stated.

Indexed under 4, 7a, 9, 10, 13, 15b.

Boozer, Robert F. *Evaluation of the Variability Among Students in Total Number of Units Mastered Per Year.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, Summer 1968.

This paper provides variability data for each grade at Oakleaf for 1967-68 in both math and reading.

Indexed under 4, 10, 11, 13, 15a.

Coleman, William A. *As Fast as Your Brain Knows How.* Parade Magazine, September 1968.

Article discusses the enthusiasm with which children, teachers, parents, and the Office of Education view IPI. Two case studies of fifth grade transfers to Oakleaf are used as illustration.

Indexed under 6a, 13, 17.

Cox, Richard C. *Item Selection Techniques and Evaluation of Instructional Objectives.* Journal of Education Measurement 2:181–185, 1965. Reprint 4, Learning Research and Development Center, University of Pittsburgh, 1965.

The use of statistical item difficulty and discrimination indices as criteria for selecting test items is shown to alter the content of the test according to Bloom's *Taxonomy of Educational Objectives.* This implies that the test may not be a valid measure of intended objectives after statistical item selection techniques are applied.

Indexed under 4, 7a.

Cox, R. C. and Boston, M. Elizabeth. *Diagnosis of Pupil Achievement in the Individually Prescribed Instruction Project.* Working Paper 15, Learning Research and Development Center, University of Pittsburgh, November 1967.

This is a description of the criterion-referenced diagnostic instruments designed for IPI, their purposes, and how they are used in the instructional process. Sample tests are included.

Indexed under 4, 6a, 7b, 10, 11, 12.

Cox, R. C., et al. *A Description and Interim Evaluation Report Concerning the First Two Years of the Individually Prescribed Instruction Project.* Learning Research and Development Center, University of Pittsburgh, December 1966.

This is the first comprehensive unpublished evaluation report on IPI containing a description of school variables, IPI in the Oakleaf School, pupil placement, pupil advancement, retention of learned materials, comparison studies, prescription writing, non-cognitive variables, and an extensive bibliography.

Indexed under 4, 6a, 7b, 9, 10, 11, 12, 13, 15a, 15b, 15c, 15d, 16a, 16b, 17, 18a, 18b, 18c, 19c, 20.

Cox, R. C. and Graham, G. T. *The Development of a Sequentially Scaled Achievement Test.* Journal of Educational Measurement, 3:2, Summer, 1966. Reprint 18, Learning Research and Development Center, University of Pittsburgh, 1966.

A preliminary study of the feasibility of applying Guttman scalogram analysis in achievement testing for individualized instruction is reported. The test developed is based on selected objectives from the IPI math curriculum.

Indexed under 4, 7a, 10.

Cox, R. C. and Sterrett, Barbara G. *The Application of a Model for Deriving More Meaning From Standardized Test Results.* Paper presented at the annual meeting of the National Council on Measurement in Education, Chicago, February 1968. Reprinted as Working Paper 42, Learning Research and Development Center, University of Pittsburgh, 1968.

The model provides a procedure for using a standardized achievement test as a criterion-referenced measure, essentially giving each pupil two scores—one on material he has studied and should be expected to know, and the other on material he is not expected to know. Data on IPI pupils is used to exemplify the model.

Indexed under 4, 7a, 10, 15b, 15c.

Deep, Donald. *Changing Role of Teachers.* Pennsylvania School Journal, 116:7, March 1968.

A description of Teacher functions and activities in IPI.

Indexed under 6a, 13, 18a, 18b.

Deno, Stanley R. and Jenkins, Joseph R. *Evaluating Preplanned Curriculum Objectives.* Research for Better Schools, Inc., 1967.

Thirteen elementary and secondary teachers analyzed a sampling of instructional objectives contained in the IPI Mathematics Continuum. Objectives were analyzed according to context, specificity and criterion as advocated by leading authorities on behavioral objectives. Findings indicated that IPI mathematics objectives are a more general statement of expected performance level than that specified by the often restrictive and ambiguous recommendations of adherents to the components of context, specificity and criterion.

Indexed under 5, 9, 10, 21.

DeRenzis, Joseph J. *A Summary List of Problems That Exist in the Standard Teaching Sequence Booklets Which Are Used in the IPI Mathematics Curriculum, Including Suggested Changes.* Research for Better Schools, Inc., 1969.

The listing includes typographical errors such as omissions, misprints, printing quality, computational errors, etc. In addition, some specific suggestions are made regarding sequencing, the writing of directions, and the use of illustrations.

Indexed under 5. 10.

Dougherty, John. *The IPI Mathematics Program, Implementation Report, Phase I. (September-December, 1968).* Research for Better Schools, Inc., 1969.

This is a collection of working papers relating to the nationwide diffusion of the IPI Mathematics program. Included are reports of visits by RBS personnel to IPI schools in twenty-six states, plus an introductory section presenting the rationale for the activity and some tentative conclusions.

Indexed under 5, 10, 14, 19d.

Dougherty, John. *The IPI Mathematics Program Implementation Report, Phase I, Vol. II, Cooperating Regional Educational Laboratory Documents.* Research for Better Schools, Inc., 1969.

This is a collection of working papers relating to the efforts by RBS to involve operational personnel in other regional labs in the diffusion of the innovation known as Individually Prescribed Instruction (IPI). Included are lab schedules for school visits, minutes of meetings, reports of school visits and other relevant materials.

Indexed under 5, 10, 14, 19d.

Dudley, Charles J., Smith, Keith F., and Pellegrin, Roland J. *The Decision-making Structure of Schools.* Unpublished paper, Center for the Advanced Study of Educational Administration, University of Oregon. (Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, February 1969.)

The study deals with perception of the authority structures held by teachers, principals, and other personnel. The types of schools in the study were: Multi-Unit Schools and their controls (Wisconsin); IPI Schools and their controls; and six schools in one State of Washington school district.

The results showed little variability among the control schools where the principal plays a strong consultative role, and among IPI schools, where the IPI coordinator plays a prescriptive role. The Multi-Unit Schools showed much variability of authority structure, but all showed a strong trend toward group decision-making.

Indexed under 14, 18b, 19b.

Eidell, Terry L., Little, Ronald, and Thorlacius, Jon. *Uniformity and Variability in the Organizational Characteristics of Elementary Schools.* Unpublished paper, Center for the Advanced Study of Educational Administration, University of Oregon. (Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, February 1969.)

Four instruments measuring: 1) job satisfaction, 2) pupil control orientation; 3) reference group orientation, and 4) leadership of school principals were administered to a sample of teachers from four different types of schools — 3 IPI schools; 3 Control Schools; 3 Multi-unit Schools for Project Models: Wisconsin; and 3 Multi-unit Control Schools for Project Models. Results are not clear, and are explained in terms of regional differences.

Indexed under 14, 16b, 18b, 19b.

Elk Grove Illinois School District with the cooperation of Dr. Robert Stake, University of Illinois. *Individually Prescribed Instruction: A Study of Independent Behavior.* Unpublished report, February 1968.

The study was undertaken to evaluate the effect of IPI on the independent behavior of gifted (+120 I.Q.) children in two schools of the District. Two hypotheses also dealt with the utilization of time and positive attitudes toward school.

Indexed under 4, 5, 6a, 9, 10, 11, 14, 16a, 16b, 16c, 17, 18a, 18b.

Fawcett, Temple. *A Manual for Teacher Aides in IPI Mathematics.* Research for Better Schools, Inc. 1969.

The purpose of this comprehensive Aide's manual is to provide general information about individualized instruction and the IPI math program; to familiarize aides with the materials used in the program; give aides practice in the kinds of tasks they will be performing using IPI record sheets; and 4) to offer suggestions to facilitate the job.

A filmstrip and a record "Aiding IPI" is also included.

Indexed under 7b, 10, 18a, 19a.

Fisher, Jack R. *An Investigation of Three Appraoches to the Teaching of Mathematics in the Elementary School.* Unpublished doctoral dissertation, University of Pittsburgh, 1967.

Procedural differences between standard classroom instruction, programmed instruction, and IPI are described. Differences in student achievement in the three programs as measured by standardized tests are negligible.

Indexed under 6a, 6b, 10, 15c, 17, 18a, 18b, 19a.

Fisher, Jack R. *Audio-Visual Sources for IPI Mathematics.* Research for Better Schools, Inc., 1969.

A complete source on films, transparencies, filmstrips and film loops correlated to the IPI math objectives of 68-69. Contains titles, specific content, and the commercial source.

Indexed under 5, 10, 21.

Friends School, Wilmington, Delaware. *Individually Prescribed Instruction in the Friends School, 1967-68.*

A descriptive paper discussing the history and philosophy of individualization at Friends School, reasons for the selection of IPI, faculty preparation, and the essential elements of IPI.

Indexed under 6a, 14, 18c.

Gallagher, Peter K. *The Evaluation of Student Achievement in the Individually Prescribed Program in Mathematics at the Frank A. Berry School, Bethel, Conn.* Graduate School of Education, Fairfield University, May 1968.

The study tested the following hypotheses:

1. There will be significant differences in self-reliance, personal worth and school relations of the pupils engaged in IPI as compared to those in control classes. (Measure: California Test of Personality.) Results: not significant.
2. There will be significant differences in attitude towards Arithmetic of the IPI pupils as compared to the control classes. (Measure: Student Attitude Test toward Arithmetic.) Results: significant.
3. The arithmetic achievement will be higher in the IPI classes than in the non-IPI classes. (Measure: Stanford Achievement Test.) Results: not significant.
4. There will be some statistical difference in the learning progress of those children classified as culturally disadvantaged in the IPI classes. (Measure: Stanford Achievement Test.) Results: not significant.

Indexed under 9, 10, 14, 15c, 16a, 20.

Glaser, Robert. *Adapting the Elementary School Curriculum to Individual Performance.* Address delivered at the 1967 Invitational Conference on Testing Problems on 28 October, 1967, at the Hotel Roosevelt, New York City, under the auspices of the Educational Testing Service, Princeton, New Jersey. Reprint 26, Learning Research and Development Center, University of Pittsburgh, 1967.

This is a general report about the nature of IPI, including a description of the computer management system at Oakleaf and samples of James Weiler's graphic progress report outputs for individual pupils.

Indexed under 4, 6a, 7b, 8, 10, 13, 15a, 15b.

Glaser, Robert. *Discussion, Educational Technology: New Myths and Old Realities* in Harvard Educational Review, Vol. 38, No. 4, pp. 739-746, Fall 1968.

Response to an article in same issue by A. Oettinger. Defends the goal of individualizing of instruction as the most pressing need in education today and in the foreseeable future. Discusses IPI as one model of individualization. Discusses ways of effecting changes in schools despite their acknowledged resistance to same.

Indexed under 4, 6a, 6b, 8, 21.

Glaser, Robert. *Instructional Technology and the Measurement of Learning Outcomes: Some Questions.* American Psychologist, 18:8, 1963.

A distinction is made between norm-referenced and criterion-referenced tests, their characteristics and uses for evaluating achievement. Suggests differential procedures of item selection for the two different types of tests.

Indexed under 7a.

Glaser, Robert. *The Education of Individuals.* Working Paper 12, Learning Research and Development Center, University of Pittsburgh, September 1966.

This paper presents some of the background thinking and rationale for IPI though IPI is not mentioned explicitly. Chronbach's patterns for adapting education to individual differences are reviewed.

Indexed under 4, 6b.

Glaser, Robert. *The New Pedagogy.* Working Paper 1, Learning Research and Development Center, University of Pittsburgh, November 1965.

This paper sets an integrated conceptual framework for the R & D Center, giving rationale for the efforts in individualization of instruction, computer assisted instruction and psychologically based instructional design.

Indexed under 4, 6b.

Glaser, Robert. *The Program for Individually Prescribed Instruction.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, Illinois, February 1966. Reprinted as Working Paper 2, Learning Research and Development Center, University of Pittsburgh, February 1966.

This paper gives a description of Oakleaf IPI and how it fits into Chronbach's three patterns for adapting education to individual differences. Bar graphs are presented which show initial placement level and units mastered in one school year for each child at Oakleaf in the three areas of mathematics, reading, and science.

Indexed under 4, 6a, 10, 11, 12, 13, 15b.

Glaser, Robert. *Objectives and Evaluation: an Individualized System.* Science Education News, American

Association for the Advancement of Science, June 1967, pp. 1-3. Reprint 24, Learning Research and Development Center, University of Pittsburgh, 1967.

This article is a plea for operational specification of instructional objectives. It also mentions the need for criterion — referenced measures (as opposed to norm-referenced measures) in order to assess pupils' achievement of those objectives.

Indexed under 4, 6b, 7a.

Graham, Glenn T. *Sequentially Scaled Mathematics Achievement Tests: Construction Methodology and Procedures.* Unpublished doctoral dissertation, University of Pittsburgh, 1966.

The feasibility of developing sequentially scaled tests for criterion-referenced measurement of achievement was investigated. Guttman scalogram analysis and Menzel's scalability criterion were applied in order to construct scaled tests based on the IPI mathematics continuum. Reliability, validity, and item analysis techniques for resultant tests were examined.

Indexed under 7a, 7b, 10, 13, 20, 21.

Graham, Martha (ed.). *The IPI World: Individually Prescribed Instruction, News and Comments,* 1:2, Appleton-Century-Crofts, Educational Division, Meredith Corp., Washington, D. C., March 1969. (Newsletters)

Newsletter includes brief articles by Mary Ignatius (McAnnulty) on the beginning of IPI at Oakleaf, and Mabel S. Dillard (Bruns Ave., North Carolina) on IPI grouping for team teaching. There are brief statements on IPI-related activities at Hagerman (Idaho), Bruns Ave. and Clear Creek (North Carolina): Northfield (Md.); Waihee (Hawaii) and Boys Industrial (Pa.) schools.

Indexed under 13, 14, 17, 18b.

Heathers, Glen. *Learning, Mental Health, and Testing.* Speech presented at the annual convention of the National Education Association's Association for Supervision and Curriculum Development, San Francisco, March 15, 1966. Reprinted as Working Paper 18, Learning Research and Development Center, University of Pittsburgh, 1966.

A few recommendations are made in this report for testing procedures based on new curriculum developments. IPI is cited as an example.

Indexed under 4, 6b.

Heathers, Glen. *Self-directed Learning: the Master Key to Educational Reform.* Education in ferment: Presentation from the 1967 Fifteenth Annual Workshop, State Federation of the District Boards of Education of Atlantic City, New Jersey, October, 1967.

Self-directed learning is discussed as a necessary aspect of new educational programs. IPI is reported as an example of a program which allows for limited self-direction.

Indexed under 6b, 8.

Holzman, Seymour. *A One-to-One Ratio.* Scholastic Teacher, March 1969.

Gives a brief description of IPI as demonstrated in the Richland School, Quakertown, Pennsylvania. Article cites expressions of teacher opinions as to what type child IPI serves best.

Indexed under 6a, 14, 15d, 16d.

Hubrig, Billie and Stone, Ruth. *1967-1968. Reading Curriculum, Experimental Edition with Explanations.* Working Paper 28, Learning Research and Development Center, University of Pittsburgh. Printed by Research for Better Schools, Inc., September 1967.

Sequenced list of IPI reading objectives with sample test questions and indications of method of presentation to be used.

Indexed under 4, 11.

Humphrey, Jan. *Self-concept of Ability in IPI and Non-IPI Students.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, July 1968.

The purpose of this study was to test the hypothesis that students who had been in IPI should have stronger self-concepts of ability as learners than those in regular classes. A questionnaire was administered to 791 seventh grade students. The results did not support the hypothesis. IPI girls showed a decrease in self-concept of ability when they moved from IPI into a regular seventh grade program.

Indexed under 4, 13, 16a, 20.

Humphrey, Jan. *Specific Subject Self-concept in IPI and Non-IPI Student.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, July 1968.

Four hundred eighty-eight 7th grade students (including 21 who had had IPI in the 6th grade) responded to a questionnaire containing items on self-concept of abilities in Math, English, Social Studies and Science, and on their liking of these subjects. Results supported a previous finding that as one's self-concept of ability increases, there is a greater tendency for one to like the current course. The IPI subjects, however, departed from this tendency by preferring their 6th grade IPI math course (regardless of math self-concept). This did not happen with reading and science, however.

Indexed under 4, 16a, 20.

Individually Prescribed Instruction. Research for Better Schools, Inc., 1969.

Distributable-type brochure includes a brief history of individualization; the background of IPI — its distinguishing fundaments and diagnostic instruments; the role of RBS in disseminating, training and evaluating; discussion of the math and reading curricula; general-type questions and answers.

Indexed under 4, 5, 6a, 7b, 10, 11, 21.

Lindvall, C. M. *Criteria for Stating IPI Objectives.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, July 1968.

States requirements for developing sequences of objectives. Presents suggestions for defining the structure within units (applicable to different subject areas). Defines and illustrates IPI units (i.e. a limited number of "unified" objectives); discusses the need and form of an over-all goal for a unit in terms of evaluation and pupil performance.

Indexed under 4, 21.

Lindvall, C. M. *Instructional Design.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, 1968.

Discusses the need for development and refinement of IPI curricula, as suggested by Robert Glaser in the NSSE Yearbook, *The Changing American School,* 1966, pp. 215-42, also LRDC Reprint 5 "The Design of Instruction."

The basic steps involved in this effort include: 1) analyzing the characteristics of subject-matter competence; 2) diagnosis pre-instructional behavior; 3) carrying out the instructional process; and 4) measuring learning outcomes.

Indexed under 4, 21.

Lindvall, C. M. *Planning of Objectives, Learning Sequences and Units for IPI.* Learning Research and Development Center, University of Pittsburgh, 1968.

Develops criteria to be used in evaluating the quality of the form in which IPI objectives are stated. It is assumed that adherence to these will maximize the chance that any given objective will have the same exact meaning to all.

Indexed under 4, 21.

Lindvall, C. M. *The IPI Evaluation Program.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, December 1968. (Paper presented at the annual meeting of the American Association for the Advancement of Science, Dallas, December 1968.)

The paper discusses the formative evaluation of IPI as evaluation that provides feedback for indicating areas or operations in need of improvement. It includes examples of data collection, such as ACC reports of math dispersion; achievement by grade level on the ITBS; and dispersion of Oakleaf students in reading and math.

The paper also includes a chart listing the basic components of IPI and how these should be realized in both the plan and operation of the program, and to the basic goals of the project.

Indexed under 9, 10, 11, 13, 15a, 15c.

Lindvall, C. M. and Bolvin, J. O. *Individually Prescribed Instruction: the Oakleaf Project.* Working Paper 8, Learning Research and Development Center, University of Pittsburgh, February 1966.

This is a general descriptive report on Oakleaf IPI which includes assumptions underlying IPI, a brief description of instructional materials and procedures, purposes of the project, and some questions to guide the evaluation of the project.

Indexed under 4, 6a, 9, 10, 11, 12.

Lindvall, C. M. and Bolvin, J. O. *Programmed instruction in the Schools:* An Application of Programming Principles in Individually Prescribed Instruction. Programmed Instruction, Sixty-sixth Yearbook of the National Society for the Study of Education, Part II, University of Chicago Press, Chicago, 1967, pp. 217-254. Reprint 16, Learning Research and Development Center, University of Pittsburgh, 1967.

Principles for programming of instructional material are outlined and their use in the development of IPI described. Analogies between IPI and "programmed instruction" are drawn and IPI is presented as an example of how programming principles may be used in the schools without completely adopting programmed instruction.

Indexed under 6a, 6b.

Lindvall, C. M. and Bolvin, J. O. *The Preparation of Teachers for Individually Prescribed Instruction.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, February 1968. (Paper presented at the annual meeting of the American Educational Research Association, Chicago, February 1968.)

This paper represents a rationale of how teachers should be retrained for IPI. It relates some of the procedures used at an IPI summer workshop and procedures which might be used for in-service planning sessions.

Indexed under 4, 18c.

Lindvall, C. M. and Cox, R. C. *The Role of Evaluation in Programs for Individualized Instruction.* Educational Evaluation: New Roles, New Means, Sixty-eighth Yearbook of the National Society for the Study of Education. University of Chicago Press, Chicago, 1969.

Evaluation is defined as 1) a procedure for gathering pupil data to use in planning and monitoring individual programs; and 2) as a procedure for gathering and analyzing data in such a way that it leads to improvements in materials and in the instructional system.

IPI objectives and tests are discussed, along with other individualized learning programs, from Winnetka Plan (1925) to the Bucknell University Continuing Progress Plan, and AIR-Westinghouse Project Plan.

Indexed under 6a, 6b, 7b, 9, 15a, 15b.

Lindvall, C. M. and Cox, Richard C. *Some Notes on the Rationale and Plan for the Evaluation of the Individually Prescribed Project in the Development and Replication of IPI.* (Address delivered at the annual meeting of the American Educational Research Association, 1967.)

Cites six elements considered in the IPI evaluation plans and examples of procedures used and documents produced about each. The six major elements are: 1) the program plan; 2) the operating program; 3) the school context; 4) pupil behavior, including achievement measures; 5) teacher behavior; and 6) unplanned influences.

Indexed under 4, 9, 15a, 15b, 15c, 16b, 17, 18a, 18b.

Lindvall, C. M. and Cox, R. C. (with the collaboration of Bolvin, J. O.). *Evaluation as a Tool in Curriculum Development:* the IPI Evaluation Program. Unpublished draft, Learning Research and Development Center, University of Pittsburgh, July 1968.

This paper provides rationale for and description of the testing and evaluation programs for IPI at the Learning Research and Development Center. It is a draft of a paper to be published in the American Educational Research Association Monograph Series on Curriculum Evaluation.

Indexed under 4, 6a, 7b, 9.

Lindvall, C. M. and Nitko, Anthony. *Criterion-Referenced Testing and the Individualization of Instruction.* Un-

published paper, Learning Research and Development Center, University of Pittsburgh, October 1968.

Discusses the need for criterion (or content) referenced tests as opposed to norm-referenced tests to determine what specific things a pupil does or does not know. The author provides a rationale for the derivation of criterion-referenced and norm-referenced tests scores. A distinction is made between criterion-referenced *tests,* criterion-referenced *information* and criterion-referenced *scores.* It is the criterion-referenced *information* that is essential for instructional planning. IPI math is cited as an example of the use of criterion-referenced testing.

Indexed under 4, 7a, 7b.

Lindvall, C. M. and Nitko, Anthony. *Criterion-Referenced Testing and the Individualization of Instruction.* University of Pittsburgh, 1969.

IPI pre-tests which are criterion-referenced tests and yield criterion-referenced information. This information tells the teacher what pupils can and cannot do in skills within the unit. It provides a general picture of how IPI has attempted to employ criterion-referenced testing to make individualized instruction possible.

Indexed under 4, 7a, 7b.

Lindvall, C. M. and Yeager, J. S. *An Exploratory Investigation of Selected Measures of Rate of Learning.* Paper presented at the annual meeting at the American Educational Research Association, Chicago, February 1966. Reprinted as Working Paper 3, Learning Research and Development Center, University of Pittsburgh, February 1966.

In this study, the usefulness of three different measures of rate of learning in IPI were investigated, and some hypothetical correlates of rate were tested. The three rate measures were 1) units per year; 2) days worked in specific units; and 3) content mastered per day in specific units. Correlations were made between mach rate and reading rate, between rate and IQ, and between rates in two different units.

Indexed under 4, 8, 10, 11, 13, 15a, 15b.

Lipson, Joseph I. *A Suggested Approach to the Elementary School Science Curriculum.* Working Paper 43, Learning Research and Development Center, University of Pittsburgh, May 1968.

Activities in the elementary school science should balance between relationships among verbal learning, laboratory experience, experiences in school, outside formal instruction, self-chosen activity and activity required by adult world. Stories of science, vocabulary of science and application of science should be included in content. A library-laboratory for investigations dictated by self-choosing is a must.

Indexed under 4, 6b, 12.

Lipson, Joseph I. *An Individualized Science Laboratory.* Science and Children, 4:4, December 1966. Reprint No. 17, Learning Research and Development Center, University of Pittsburgh, 1966.

This article is an illustrated description of the Oakleaf science program with some rationale throughout and a sample lesson script included.

Indexed under 4, 6a, 12, 13.

Lipson, Joseph I. *Individualized Instruction in Elementary Mathematics.* Research in Mathematics Education, National Council of Teachers of Mathematics, Washington, D. C., 1967. Reprint 22, Learning Research and Development Center, University of Pittsburgh, 1967.

A paper summarizing IPI objectives, materials, instructional procedures, achievement measures (standardized tests, number of units mastered, range of achievement, summer retention, rate and I.Q. correlation, and transfer), student motivation and implications.

Indexed under 4, 7b, 10, 13, 15a, 15b, 15c, 15d, 16a, 17, 19a.

Lipson, Joseph I. *Individualization of Science Instruction in the Elementary School Laboratory.* Draft of a speech delivered at the annual meeting of the National Science Teachers Association, Detroit, March 1967. Learning Research and Development Center, University of Pittsburgh, 1967.

A descriptive paper dealing with: a typical science class at Oakleaf, objectives of the program, a description of the aims of education, and the place of science in the curriculum, LRDC programs in individualization, and evaluative efforts.

Indexed under 4, 6a, 6b, 12, 13, 17, 18a, 18b.

Lipson, Joseph I. *Transfer and Generalization in Individually Prescribed Instruction.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, February 1966. Reprinted as Working Paper 5, Learning Research and Development Center, University of Pittsburgh, February 1966.

This paper defines the terms "generalization" and "transfer" and presents a model for identifying instances of transfer in IPI. Tables and graphs are presented showing the freouency of occurrence of transfer instances identified by the model in each grade and in each unit of the IPI curriculum. The data is suggested as an aid to help lesson writers revise the curriculum objectives and materials to promote transfer and generalization.

Indexed under 4, 8, 10, 13, 15b.

Lipson, J. I., Cohen, H. B. and Glaser, R. *The Development of an Elementary School Mathematics Curriculum for Individualized Instruction.* Working Paper 7, Learning Research and Development Center, University of Pittsburgh, 1966.

A description of the first IPI math curriculum and a discussion of the rationale for its development is presented and supported by related literature.

Indexed under 4, 6a, 10, 13.

Magoon, Jon and Cox, R. C. *The Principal Component Structure of Multiple Guttman Scales.* Paper delivered at a joint session of the National Council on Measurement in Education and the American Educational Research Association, Chicago, Illinois, February 1968. Reprinted as Working Paper 41, Learning Research and Development Center, University of Pittsburgh, 1968.

This study compares the results of applying two different analysis procedures to theoretical test data—one is the metric

technique of factor analysis, the other the nonmetric multiple scalogram analysis. It was found that under certain conditions of score distribution, reproducibility, and independence of scales, the Guttman scales could be represented by single principal components. Results may be significant for criterion-referenced testing.

Indexed under 4, 7a.

Moshy, Claire A. *Teaching in IPI* (a program of teacher preparation.) Research for Better Schools, Inc., 1968.

Training package was developed to enable administrators to train their own staffs. The materials are logically sequenced and auto-instructional. *Teaching in IPI* serves as an introductory program to IPI; it was designed to equip the teacher with the minimal skills needed to plan and conduct IPI in the classroom.

Volume I: an overview of individualized instruction and IPI; the behavioral objectives and IPI Math Continuum
Volume II: diagnosis of student achievement (the IPI tests).
Volume III: developing a prescription.
Volume IV: case studies
Volume V: case studies

Indexed under 5, 6a, 6b, 7b, 10, 18a, 18b, 18c, 21.

Nitko, Anthony J. *Measurement of Instructional Outcome vs. Measurement for Instruction: A View of IPI Testing Procedures.* Unpublished draft, Learning Research and Development Center, University of Pittsburgh, September 1968.

A review of IPI testing procedures in an effort to integrate these into a model of individualized instruction. An assumption is made that these measurements are a part of the instructional program itself; and as such have implications for immediate teaching and learning. Implications for changing the testing program of IPI are stated.

Indexed under 4, 7b.

O'Keefe, Kathleen. *Use of Placement Tests in IPI Math.* Unpublished paper, Learning Research and Development Center, University of Pittsburgh, July 1968.

An experiment using revised placement procedures (new policy for starting pupils on work using old placement tests and testing procedures) is described. The new policy seems to show promise for helping pupils proceed through the curriculum with less time spent studying units previously mastered.

Indexed under 4, 7b, 10, 13, 15b, 17.

Research for Better Schools, Inc. *Administrative Training Program for IPI Mathematics.* 1969.

The purpose of the Administrative Training Program (ATP) is to provide new IPI administrators with the necessary information and materials for the successful implementation of the IPI Math program in their schools. The materials described below are used in conjunction with on-site training at an existing IPI school. Emphasis centered on the role of the principal as the instructional leader of the IPI program in his school. The contents of the training package include:

1. Information about the ATP and evaluation forms
2. Discussion of *Teaching in IPI* (teacher training program)
3. Administering in IPI
4. Aiding IPI (including materials ordering procedures, training of professional and paraprofessional staff)
5. Evaluating IPI (appraisal activities for 1969-1970)
6. IPI reference bibliography

Indexed under 5, 10, 18a, 18c, 19a, 19b.

Research for Better Schools, Inc. *Annual Reports of the Corporation.* April 1966, September 1966, September 1967, September 1968.

Selected sections of these reports constitute basic policies adopted by the RBS Board as related to IPI. In addition, major IPI events and accomplishments are included as well as descriptions of the system over the past several years.

Indexed under 5, 6a, 6b, 9, 13, 14, 22a, 22b.

Research for Better Schools, Inc. *Basic Program Plans.* September 1968.

The plans describe the complete Individualizing Learning Program including an overview, program rationale, program description, expected outcomes, and projected work schedules. The plan is updated every year depending upon funding and previous year work experiences

Indexed under 5, 6a.

Research for Better Schools, Inc. *Degree of Implementation of Individually Prescribed Instruction, Guide for Interpretation of Results.* Fall 1968.

Paper discusses the specific criteria used in determining the degree of implementation for each teacher and school in the 100 school program.

Indexed under 5, 7b, 9, 10, 14, 17, 18a.

Research for Better Schools, Inc. *Individually Prescribed Instruction.* 1969.

A descriptive brochure which includes a brief history of individualization; the background of IPI, its distinguishing features and diagnostic instruments. The role of RBS in disseminating, training, and evaluating is discussed. The math and reading curricula are described. General questions visitors ask and answers for them are given.

Indexed under 4, 5, 6a, 7b, 10, 11, 21.

Research for Better Schools, Inc. *Individually Prescribed Instruction Application.* January 1968.

The application includes a cover letter citing the five specific criteria for the selection of new IPI schools.

Part I: basic information
Part II: knowledge of the IPI system (to be completed by the Superintendent of Schools)
Part III: knowledge of the IPI system (to be completed by the Principal)

Indexed under 5, 14, 19b.

Research for Better Schools, Inc. *Individually Prescribed Instruction Mathematics (IPI) Application for Individual School Participation.* 1969.

The revised application includes a cover letter citing the five specific criteria for the selection of new IPI schools and three separate parts covering different aspects:

Part I: (to be completed by the Superintendent of Schools): Basic System Data
Part II: (to be completed by the Superintendent of Schools): Administrative Committment

Part III: (to be completed by the Principal of the School): Administrative Commitment.

Indexed under 5, 14, 19b.

Research for Better Schools, Inc. *Degree of Implementation of Individually Prescribed Instruction, National Summary Reports: Fall 1968, Spring 1969, and Comparison 1968-69.*

Reports present results of analysis of prescriptions obtained from teachers in (80) IPI schools. The criteria for correct understanding of IPI procedures include the correct use of Placement Tests (Fall only), of pretests, posttests, CET scores, and variability of prescriptions.

Indexed under 5, 7b, 9, 10, 14, 17, 18a.

Research for Better Schools, Inc. *IPI Evaluation Summary 1967-68: Status Report.* November 1968.

A report is given on the results of a multiple analysis of variance involving data on IPI and control pupils on such variables as: IPI math pre and post placement scores; ITBS scores; non-verbal IQ; attitude information from the NLSMA Student Inventory and a "Five Faces" instrument; and teacher information from a classroom interaction analysis. Results are reported in the areas of pupil achievement, individualization, side effects, and teacher effects.

Indexed under 5, 9, 10, 13, 14, 15a, 15b, 15c, 15d, 16a, 17, 18b, 20.

Research for Better Schools, Inc. *IPI Evaluation Summary 1968-69. Status Report.* March 1969.

RBS data collection activities for 1968-69 are compiled and summarized in seven basic sections: achievement, formative math, formative reading, temporal retention, teacher attitudes, pupil attitudes, productive thinking. A description of instruments used, school involvement, and data processing are included.

Indexed under 5, 7b, 8, 9, 10, 11, 14, 15a, 15b, 15c, 15d, 16a, 16b, 20.

Research for Better Schools. *Preliminary Report, IPI Institute, Summer 1966.*

Plans for the 1966 IPI Summer Institute for training school personnel are presented in detail.

Indexed under 5, 6a, 18c.

Research for Better Schools, Inc. and Learning Research and Development Center, University of Pittsburgh. *Summary of a Conference of Teachers and Administrators Using the Instructional System, Individually Prescribed Instruction.* February 1967.

The objectives of the conference were: 1) to encourage teachers and administrators to define and list their functions in IPI; 2) to elicit what preparation they had to prepare them for these functions; 3) to determine what preparation is needed by teachers and administrators to be involved in IPI; and 4) to discuss problems of interaction between teacher-student, teacher-aide, and teacher-administrator. Teachers and administrators completed questionnaires covering the evaluation of various aspects of the IPI program and of the conference itself.

Indexed under 4, 5, 9, 13, 16b, 18a, 18b, 19a, 19b, 19c, 19d.

Research for Better Schools, Inc. and Learning Research and Development Center. *Summary of a Conference of Teachers and Administrators Using the Instructional System Individually Prescribed Instruction.* March 1968.

This report includes discussions on the problems in and recommendations for improving mathematics and reading seminars, planning sessions, prescription-writing, reading and mathematics programs, classroom activities, training. Other topics included teacher evaluation, reporting progress, special learning problems and characteristics, creative adaptations, public relations and evaluation of the workshop sessions.

Indexed under 4, 5, 10, 11, 17, 18b, 18c, 19a, 19b.

Resnick, Lauren B. *Design of an Early Learning Curriculum.* Working Paper 16, Learning Research and Development Center, University of Pittsburgh. December 1967.

This paper describes the rationale and procedure for designing a curriculum for children three to six years old in the Pittsburgh Primary Education Project (PEP). The curriculum is to develop "the skills and concepts that underlie intelligent [learning] behavior." Hierarchical sequences of behavioral objectives are derived by component analysis and may be used either in class-oriented or individualized programs. Currently, its use is being tested in an individualized setting.

Indexed under 4, 6b.

Scandura, Joseph M. and Satlow, Gerald. *An Analysis of Existing Curricular Materials in Mathematics Phase One (K-6).* Research for Better Schools, Inc., 1968.

An examination of ten widely used mathematics text series, including their objectives; the degree of correspondence between the objectives and the materials; evaluations of mathematics materials by publishers and authors; a summary of in-depth analysis of each series; conclusion and recommendations.

Indexed under 5, 10.

Scanlon, Robert G. *A Summary of Training Activities, IPI, June 1966-January 1968.* Research for Better Schools, Inc., 1969.

A description of teacher institutes, as well as the development of training materials and strategies used with IPI teachers and administrators.

Indexed under 4, 5, 18c.

Scanlon, Robert G. *Factors Associated With a Program for Encouraging Self-Initiated Activities by Fifth and Sixth Grade Students in a Selected Elementary School Emphasizing Individualized Instruction.* Unpublished doctoral dissertation, University of Pittsburgh, 1966.

The study included the use of three treatments in the math classes: 1) was designed to create awareness and use of a wide range of supplementary materials; 2) provided opportunities to explore special interest areas; and 3) was designed to capitalize on special interests and to structure opportunities for teachers and students to praise exceptional work. The treatments, introduced one per month, continued throughout the four-month research study. Three instruments were used to measure: 1) self-initiated behavior; 2) student interest; and 3) peer-group evaluation of initiation.

The major findings were that self-initiation can be improved by providing special techniques during class period; that there

is little relation between self-initiation and I.Q., achievement or sex of student.

Indexed under 13, 16a, 17, 18b.

Scanlon, Robert G. *History of Individualized Instruction.* Education in Ferment: Presentations from the 1967 Fifteenth Annual Workshop, State Federation of the District Boards of Education of New Jersey, Atlantic City, October 1967.

A general description of IPI as initiated by the Learning Research and Development Center and Research for Better Schools' dissemination and evaluation of IPI.

Indexed under 6a.

Scanlon, Robert G. *Innovation Dissemination.* Pennsylvania School Journal, 116:7, March 1968.

A description of how RBS is disseminating and testing IPI.

Indexed under 5, 6a, 14.

Scanlon, Robert G. *Oakleaf School: A Model for Individually Prescribed Instruction.* Paper presented at the Conference on Educational Innovations, Miami, June 1966.

The paper gives an overview of IPI at the Oakleaf School. The topics covered include: 1) background of the project; 2) development of behavioral objectives for the curriculum areas; 3) development of diagnostic instruments; 4) development of materials; 5) prescription writing; and 6) administering and scheduling of IPI. The final section, Conclusions, deals with research and evaluation questions.

Indexed under 4, 6a, 7b, 9, 13, 17, 18a, 18b, 18c, 19a, 19b, 21.

Scanlon, Robert G. *The Expansion of an Innovation.* Audiovisual Instruction, November 1968.

Article discusses the administrative implementation of IPI in terms of 1) selection of new schools, 2) retraining of administrators and teachers, and 3) systematic data collection to permit immediate improvements in the program.

Indexed under 5, 6a, 9, 14, 18a, 18c, 19b.

Scanlon, Robert G. *The Use of Data in School Selection and Training of Administrators and Teachers.* (Prepared for Meetings of the American Educational Research Association, Los Angeles, California, February 1969.)

Paper discusses two phases of the controlled expansion of IPI. Phase 1 includes the background for the development of the training materials and the instruments for their evaluation. Case studies of the two schools in which the materials were first field-tested are given. There is a discussion of the specific criteria for the selection of new IPI schools, as developed according to the results of the field-testing.

Phase 2 discusses the retraining of administrators to enable them to train their staffs, the development of specific administrator training programs, and copies of the instruments used to evaluate these.

Indexed under 5, 18c, 19b.

Scanlon, R. and Moshy, Claire. *Teacher Education for Individualized Instruction.* Research for Better Schools, Inc., 1968. (Paper presented at meeting of the Pennsylvania Education Research Association, University of Pittsburgh, November 1967.)

The evaluation if IPI teacher training or retraining from 1966 through 1967 is described. Cooperation between RBS and some selected colleges of teacher education are included.

Indexed under 5, 6a, 18c.

Scanlon, Robert G. et al. *A Manual for the IPI Institute.* Learning Research and Development Center, University of Pittsburgh and Research for Better Schools, Inc., June 1966.

A manual used in the training of teachers and administrators at the 1966 IPI Summer Institute in Pittsburgh. It includes a rationale of a system of individually prescribed instruction, as well as detailed explanations of the procedures and practices involved in the program.

Indexed under 4, 5, 18c.

Scharf, E. *Implementation of Individually Prescribed Instruction: Summary of Problem Areas Fall, 1966 – Spring, 1968 and Possible Solutions.* Research for Better Schools, Inc., 1968.

Summary of specific problem areas as derived from case histories of IPI in four demonstration schools (Downey, Richland, West, & Washington). Subjects covered include: materials (organization, shortage and inadequacy of); personnel (training and need for role definition); scheduling; prescription writing; planning sessions; seminars; classroom activities; visitors; and RBS – School relations.

Indexed under 5, 6a, 10, 14, 17, 18a, 19b, 18c, 19a, 19b, 19d.

Scharf, E. *Summary of Prescription Analysis Feedback, 1967-68.* Research for Better Schools, Inc., 1968.

The introduction cites the factors considered by RBS resource personnel in evaluating math prescriptions over a three month period for teachers at Richland, Washington, West, and Friends (Wilmington) Schools. Tables presenting the data are included, along with brief summary statements on teacher and school improvement in the various factors. The types of feedback forms used by the resource persons are also included in the report.

Indexed under 5, 10, 14, 18a.

Simon, Anita, Boyer, E. Gil and Buccino, Ernest. *A Comparison of Teacher-Pupil Verbal Interaction in IPI and Non-IPI Schools.* Research for Better Schools, November 1968.

The purposes of the study were to test the following hypotheses: 1) that IPI teachers do not differ significantly from non-IPI teachers in their verbal behavior on selected variables as measured by the Flanders 10 Category Interaction Analysis System; 2) that IPI pupils do not differ significantly from non-IPI pupils in their verbal behavior as measured by the Flanders System. Data for this study was collected from five IPI schools and their controls.

Results: In general, there were only small differences between IPI and non-IPI schools. The statistical differences that did show were few and in a direction opposite to what theory in this field suggests improves pupil outputs. Thus, it is reasonable to conclude that any improvements in IPI pupil outcomes over the control school pupil outcomes is not a function of the teacher verbal interaction measured by this study.

Indexed under 5, 17, 18b.

Temkin, Sanford. *Problems Associated with Relating Normative and Skill Tests.* Unpublished paper, Re-

search for Better Schools, Inc., 1967. (Paper presented at the meeting of the Pennsylvania Educational Research Association, University of Pittsburgh, November 1967.)

A description is given of a plan for relating IPI placement test and ITBS performance in a complex "micro-analysis" breaking scores and test groups down by school, grade, math area, level, and ITBS subtest, and utilizing analysis of variance and item correlations among other techniques to study relationships between placement test and ITBS scores.

Indexed under 5, 7b, 10, 11, 15b, 15c.

The Editors. *Individually Prescribed Instruction.* Education U.S.A. Special Report, 1968.

A comprehensive report covering many aspects of IPI from its origins to date. Of special interest are teacher suggestions on prescriptions to meet specific learning problems, and teacher and administrator view of IPI.

Indexed under 4, 5, 6a, 7b, 10, 11, 12, 13, 14, 15a, 15b, 15c, 16a, 16b, 16c, 17, 18a, 18b, 18c, 19a, 19b, 20, 21.

Unks, Nancy J. *A Plan for Evaluating the IPI Testing Program.* Unpublished paper, Research for Better Schools, Inc., 1967. (Paper presented at the meeting of the Pennsylvania Educational Research Association, University of Pittsburgh, November 1967.)

A rationale and overview of a plan for evaluating the IPI testing sub-program is presented with an outline of the plan based on Lindvall's evaluation paradigm.

Indexed under 4, 7b, 9, 19c.

Unks, Nancy J. *An Investigation of Validity of Reliability Concepts for Criterion-Referenced Measurement.* Unpublished Master's Thesis, University of Pittsburgh, 1969.

A logical investigation of the applicability of test evaluation procedures to criterion-referenced measurement was conducted. The appropriateness of traditional procedures developed on norm-referenced tests was found to be limited by the purposes of criterion-referenced measurement in individualized instructional settings. Selective applications of these methods are recommended. Some new procedures and concepts for item analysis, validity, and reliability are suggested to supplement the older techniques and to provide test evaluation procedures which are more congruous with the aims of measurement for individualized instruction.

Indexed under 7a.

Unks, Nancy J. *Basic System Data Reports, 1967-1968.* Research for Better Schools, Inc., April 1969.

A report is given on the contents of 10 types of printouts concerning the use of IPI math materials during the 1967-68 school year. For each type of printout, the data contained within is listed and the frequency of its issue is noted (by month, once yearly, etc.) A table at the end summarizes the printouts available and describes the raw data which is also available on magnetic tapes.

Indexed under 5, 9, 10, 15b.

Unks, Nancy J. *Individually Prescribed Instruction: A Proposed Pilot Study of Selected Intellectual Factors.* Research for Better Schools, Inc., December 1968.

Paper includes background discussion on the need for a study of creative problem solving in IPI to support or refute critical accusations; a rationale for the selection of feasible and operational measures of creativity; the experimental design for the IPI study; and a description of the six tests in the battery.

Indexed under 5, 8.

Unks, Nancy J. *I.P.I. Mathematics: A Report on the Results of 1967-68 Prescription Data Analysis.* Research for Better Schools, Inc., May 1969.

Prescription data based on 4,685 pupils in 19 I.P.I. schools was summarized, including such items as pages used, test scores, and days spent in each skill. Printouts of the summaries yield information relating to five aspects of I.P.I.:

1. initial pupil placement
2. gross pupil progress
3. sequencing and difficulty of instructional units
4. sequencing and difficulty of skills
5. test unreliability and non-validity

The results in each of these five areas were as follows:

1. Modal placement levels for each grade were determined as follows:

grade 1	level B
grade 2	level C
grade 3	level C and D
grade 4	level D
grade 5	level D and E
grade 6	level E

Percentages of pupils who could not be placed at any level decreased from grade 1 to 6.

2. Over all grades, the average number of units completed in one year was 12.5 (about one level).
Average units completed in a year increased from grade 1 to 6.
In all grades, the level at which most work is done at the end of the year is one higher than at the beginning.
3. Eighteen out of 70 units are identified as easy by pretest data; 26 are difficult. Most difficult skills are identified within the problem units by average pretest scores.
Twenty-five units are identified as difficult by posttest data.
Altogether 56 units are difficult by pre-test and/or posttest data or need skills resequenced.
4. Forty-eight out of 372 skills are identified as easy by pretest data; 57 by CET data.
Fourteen are difficult according to pretest data; 68 according to CET data; 32 by use of instructional techniques.
For 55 units the orders of skills from easy to difficult according to pretest data are listed.
5. Difficult units and skills are indicators of possible test non-validity or unreliability.
Thirty-three units found easy by pretest data at the beginning of the year (as opposed to only 18 later in the year) may indicate misplacement of pupils and non-validity of placement tests.

Indexed under 5, 7, 10, 14, 15a, 15b.

Unks, Nancy J. and Cox, R. C. *A Model for the Evaluation of a Testing Program.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, February 1968. Reprinted as Working Paper No. 4, Program of Studies in Educational Research, University of Pittsburgh, 1968.

A generalized, four-phase model is presented for evaluating the testing program of an educational innovation concurrent with the total project evaluation. The IPI testing program is used to exemplify the use of the model.

Indexed under 7b, 9.

Washington Conference on IPI. Unpublished tape-script, Research for Better Schools, Inc., July 1968.

Representatives from RBS, LRDC and USOE, and Panel members, participated in a symposium on the formative evaluation of IPI as an aspect of its continued development as an educational Program.

Robert Glaser:	general plan and rationale for IPI
John O. Bolvin:	present status of IPI
C. M. Lindvall:	IPI evaluation program: description and some results
James Becker:	role of RBS in the field development of IPI
Robert Scanlon:	specific RBS plans for further field development; administrator and teacher training
JoAnn Weinberger:	RBS program for monitoring of IPI; specific instruments and procedures
Benjamin Bloom: (U. of Chicago)	offered comments on general IPI evaluation and field testing; interested in study effects of IPI on different types of children
Nicholas Fattu: (U. of Indiana)	general problems of the management of instruction

Indexed under 4, 5, 6a, 8, 9, 17, 18c, 19c, 19d.

Weinberger, JoAnn. *Report of Comparison between Iowa Test of Basic Skills—Form 4 and IPI Continuum.* Research for Better Schools, Inc., November 1968.

Comparison of ITBS with the IPI continuum and placement tests by two independent raters (reconciled by a third when necessary). Results showed that very few ITBS items were in the IPI continuum. Of the 418 skills in the IPI math continuum, 26% were tested by the ITBS. Of the 147 skills on the IPI placement test, 27.9% were tested on the ITBS.

Indexed under 5, 9, 10, 15b, 15c, 20.

Weinberger, JoAnn. *Degree of Implementation of IPI 1967-68 Summary Report.* Research for Better Schools, 1968.

The degree of implementation of IPI was assessed for each teacher in the nineteen schools involved in IPI mathematics during 1967-68. The criterion questions on which the study was based were selected for their importance in the teacher's adherence to the mastery criterion, the correct administration of tests, and variations in prescription writing.

Indexed under 5, 9, 10, 14, 18a.

Weinberger, JoAnn. *Temporal Retention Study on IPI Mathematics.* Unpublished paper, Research for Better Schools, Inc., April 1969.

The purpose of this study was to determine the necessity of placement testing pupils at the beginning of each school year. Data were extracted from the Spring and Fall placement profiles of 1,231 pupils in four IPI schools; and the number of units gained or lost over the summer were calculated by grade level and area in the continuum. The results showed no overall difference, except that certain units were noted for their dominance of gains or losses in particular grades. It was concluded that it is not necessary to placement test pupils each September.

Indexed under 5, 7b, 10, 15b, 15d.

Weinberger, JoAnn. *The Use of Data in Monitoring School Implementation of Individually Prescribed Instruction.* Unpublished paper, Research for Better Schools, Inc. 1969. (Paper presented at the annual meeting of the American Educational Research Association, Los Angeles, 1969.)

The monitoring and evaluation system has been devised to meet the following purposes: 1) to assist school personnel by providing feedback on their use of the system, along with ways in which they can improve; 2) to appraise the training materials by determining if the goals and elements of IPI are upheld in actual field settings; 3) to provide the Learning Research and Development Center and Research for Better Schools with the developmental information needed for refining and improving the IPI system.

Three major instruments provide the source of information: 1) the Degree of Implementation Report (criteria for utilizing IPI procedures); 2) Report of Student Progress (placement and progress data); and 3) school visitation monitor reports.

Indexed under 5, 7b, 9, 10, 14, 15a, 18a, 19d.

Yeager, J. L. and Lindvall, C. M. *Evaluating an Instructional Innovation Through the Observation of Pupil Activities.* The High School Journal, 51:248-253, 1968. Reprint 34, Learning Research and Development Center, University of Pittsburgh, 1968.

Description of major categories used in an observation schedule for evaluating pupil classroom activities in IPI is presented. Sample data is given comparing Oakleaf with another school implementing IPI.

Indexed under 4, 6a, 9, 10, 13, 14, 17, 18b, 19a.

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