A COST-EFFECTIVE ANALYSIS OF SELECTED READING PROGRAMS IN THE GRAND RAPIDS PUBLIC SCHOOLS

Thesis for the Degree of Ph. D.

MICHIGAN STATE UNIVERSITY

JOAN MARIE WEBSTER

1972

This is to certify that the

thesis entitled

Cost Effective Analysis of Selected Reading in the Grand Rapids Public Schools

presented by

Joan M. Webster

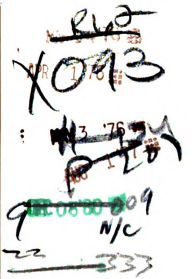
has been accepted towards fulfillment
of the requirements for

Ph. D. degree in Education

Wm. C. Hicks

Major professor

Date May 4, 1972



0917 03
MAR 0 8 2003

ABSTRACT

A COST-EFFECTIVE ANALYSIS OF SELECTED READING PROGRAMS IN THE GRAND RAPIDS PUBLIC SCHOOLS

By

Joan Marie Webster

The Problem

The current challenge of accountability from the taxpaying public requires proof of results. The results might best be based upon a per-pupil cost of a learning unit or grade gain skills acquired rather than solely on the cost of maintaining children in school.

Purpose of the Study

The major purpose of the study was to determine a cost-effectiveness relationship between inputs (instructional costs) and outputs (student achievement gains) in six reading programs in the Grand Rapids Public Schools. Subsequently, the design shown could establish a model upon which school officials can make future decisions regarding the use of resources available.

Student Population Sample

The studied programs operate within the Title I area (inner city) identified as being eligible for compensatory funds. A population sample was drawn from each of the programs. The students have been identified as the lowest performing students in reading in that grade level in selected schools as verified by the school system's previous spring testing scores. All students in the sample are enrolled in grade levels 2, 3, 7, 8, and 9.

Procedure and Design

Due to the variety of programs, the different time allotments for the reading activities and unequal class sizes; the inputs (instructional costs) were reduced to a common denominator of student minutes of exposure (SME) in six cost categories that were defined as the most appropriate definable variables that constitute the differences in the programs studied. The six cost categories were identified as staff salaries, both professional and paraprofessional; start-up costs; added facility costs; staff training costs; student and teacher incentive costs; and costs for materials and supplies. A per-student annual cost for the programs studied included three performance contracting programs: Alpha II, Westinghouse Learning Corporation (WLC),* Combined Motivation and Educational

*Now called Learning Unlimited.

Systems (CMES); Project Read--a publishing company's "canned" program; Traditional Remedial Reading (TRR) and a regular (control) school program. All other costs were considered to be prorated equally across all programs.

A pre/post testing program using the Metropolitan 70's standardized achievement test measured the student gains in the reading programs studied.

The statistical design deemed most appropriate for examining the reading achievement gains was the analysis of variance. Because of the unequal cell size, the Scheffé post hoc procedure was applied.

To compute the cost of one-tenth (.1) student achievement gain in reading and thereby establishing a relationship between costs and gains (inputs to outputs), the annual cost for reading was divided by the average one-tenth grade gain.

Achievement Gains and Cost-Effectiveness Results

The unequal assignment of program treatments prohibited any over-all analysis covering all of the data at one time. Thus, three separate analyses were performed.

The elementary grades 2 and 3 were exposed to Alpha II, WLC, Project Read, TRR, and a control program. The middle grade 7 was exposed to Alpha II, CMES, TRR, and a control group program. The middle grades 8 and 9 were exposed to Alpha II, CMES, and the control program.

Reading Treatment Program and Mean Achievement Gain	Grades 2	3	7	8	9
Alpha II	.4	.5	.5	1.0	.8
Westinghouse	.6	.7			
Project Read	.7	.7			
Traditional Remedial Reading	.8	.8	.2		
Combined Motivation and Education			.7	1.1	.6
Control (Regular School)	.7	.4	.4	.3	.4

The relationship of costs to gains (cost-effectiveness) is summarized below for one-tenth (.1) student grade gain:

Elementary Grades 2 and 3

Alpha II	$ 22.51
Westinghouse Learning	11.82
Project Read	16.34
Traditional Remedial Reading	49.60
Control (Regular Program)	14.28

Middle School Grade 7

Alpha II	$ 19.89
Combined Motivation and Education	16.23
Traditional Remedial Reading	274.75
Control	23.82

Middle School Grades 8 and 9

Alpha II	$ 10.47
Combined Motivation and Education	13.18
Control	25.24

Cost per one-tenth (.1) student achievement gain in reading.

Major Conclusions

Elementary Grades 2 and 3

1. All reading programs studied resulted in less than one (1) year reading achievement gain.
2. There were no significant differences in grade gain achievement among the programs within the two studied grade levels.
3. Cost-effective analysis leads one to conclude that TRR programs are the most costly.
4. The Westinghouse program is indicated to be the least expensive per one-tenth (.1) grade gain.
5. Westinghouse, Project Read, and the control program are the most cost-effective, producing the greatest gains for less cost. All three are within a $4.00 cost per one-tenth (.1) grade gain. However, the control group was over 20 per cent more expensive than WLC, Project Read was over 38 per cent more expensive.
6. The overall mean gain for TRR was the highest but the cost was considerably higher than the other four programs, almost five times as much as the lowest cost program.

Middle School--Grade 7

1. The TRR program had the highest cost per one-tenth (.1) achievement gain (almost twelve times the control group cost).
2. The CMES and Alpha II programs were the most cost-effective, i.e., they provided the most learning for the dollar.
3. The control group performed half as well as the performance contracting programs.

Middle Schools--Grades 8 and 9

1. There was a significant difference between the control group and both performance contracting programs; Alpha II and CMES.
2. The control group was the most expensive group per one-tenth (.1) grade gain with the Alpha II program being only slightly over 41 per cent the cost of the control group and the CMES program cost being 68 per cent of the control group.
3. Student achievement gains in Alpha II and CMES were slightly above one (1) grade level, whereas the control group only gained approximately one-third as much.

Implications

The findings of this study seem to indicate that certain implications for the reviewer's consideration must be mentioned.

Herewith are presented several of these implications which should be given further deliberation:

1. The apparent implications created by the intergrouping of students in learning situations may have some sociological impact. In the performance contracting programs, there appeared to be an effective social relationship established among students for self-help and a help-one-another attitude, i.e., one student tutoring another which could have a further positive effect on better achievement.

2. Students who could evaluate their progress in the more structured and individualized programs appeared to have an improved attitude towards themselves, their peers and the school.

3. Student attendance in school did improve in the performance contract and programmed instruction programs which may have been a result of (a) better student self-image, due to the student's perception of his success, (b) the contract use obligation of the contractor and staff which required a minimum

number of days attendance, and (c) or a greater sensitivity of the school system for keeping more accurate records.

4. Very serious consideration must be given the feasibility of continuing the traditional remedial reading programs as they are being carried on today. There are implications in this study for a more structured program. There are also implications for improving the methods of selecting students and the sociological impact upon the student who is chosen and identified with the remedial program. The isolation factor of a remedial reading setting may prove a hinderance to the student's ability to learn.

5. The role of the building principal may need to be redefined. The principal, in order to fulfill the requirement of a two-way street of accountability must have the autonomy to make decisions in implementing learning programs which should include day-to-day changes in program design as well as adequate local latitude in financial decisions affecting the immediate implementation of program changes.

6. This study would indicate that schools have just begun to develop criteria for performance objectives of the education function. Schools will need to more clearly define these objectives as well as develop methods of evaluating the success or failure in achieving these objectives.

A COST-EFFECTIVE ANALYSIS OF SELECTED READING PROGRAMS IN THE GRAND RAPIDS PUBLIC SCHOOLS

By

Joan Marie Webster

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Elementary and Special Education

1972

ACKNOWLEDGMENTS

If I were to acknowledge all those who contributed directly and indirectly to this effort this would be the longest section of all. I have chosen to be selective, therefore, and give a special vote of appreciation to the following:

The Administrative Staff of the Grand Rapids Public Schools, namely, Mr. Phillip E. Runkel, Superintendent; Dr. C. Robert Muth, Deputy Superintendent; Dr. Elmer H. Vruggink, Assistant Superintendent for Instruction; and Mr. Wallace Norgrove, Director of Special Programs. Without their continued support and cooperation, this study would not have been possible.

In addition to these staff members, I especially thank Mr. James Gallagher, Director of Budget and Finance, who worked endlessly to assist me with the development and computation of the cost data.

Dr. Stanley E. Hecker, School Finance Expert, for his valuable consultations and advice in designing the cost data model.

Dr. Leon Lessinger, Calloway Professor, for his "long distance" enthusiastic support of my endeavors.

Mr. Charles Stalford, Project Manager of the Office of Economic Opportunity; Remedial Performance Incentive Project, for providing the testing and data collection services.

Dr. Ruth Hill Useem, member of my doctoral committee, who not only provided me with sociological insights but with a feminine model of a professional educator.

Dr. Calhoun Collier, member of my doctoral committee, for his general support given to me throughout my academic and professional career.

Dr. William Durr, member of my doctoral committee, for sharing his valuable insights into the teaching of reading and for providing growth opportunities for me within the profession.

Dr. Vern Hicks, chairman of my doctoral committee, for his seemingly infinite patience and strong support throughout my program.

Dr. Norman P. Weinheimer, director of my doctoral dissertation, former Superintendent of the Grand Rapids Public Schools who had the courage to initiate most of the programs studied in this thesis and who, as Michigan's leading proponent of accountability in the public schools, provided the idea and much of the incentive for the study.

And most of all, my husband, Dick, who somehow managed to keep his composure during this period of uncertainty. Without his love and encouragement, I would not have completed this dissertation.

TABLE OF CONTENTS

Page

APPENDICES

Appendix

LIST OF TABLES

LIST OF CHARTS

CHAPTER I

INTRODUCTION

Man, being a social creature, has devised the "community" as a social locality or environment in which to live. Communities depend upon "public institutions" for adhesiveness. Broadly defined, a public institution is an established organization dedicated to a public service. A public institution can be thought of as a servant administering unto its master--the community. The viability of the institution rests largely upon the fiscal support of the community and this is significantly catalyzed by the community's confidence caused by the institution, indeed, realistically rendering a measureably satisfactory service. If this confidence waivers, assuredly one can expect fiscal deterioration of the institution. Because the community and the institution are so interdependent, the health of one is rather contingent on the health of the other.

Public institutions have a fundamental and legal obligation to be "accountable" to society. Formidable pressures brought forth by the sixth and seventh decades

of the twentieth century vests "accountability" with added meaning not only in the jargon of institutional vocabulary, but is increasingly stressed within corporate philosophies throughout the entire expanse of free enterprise. Perhaps the emphasis on "accountability" is precipitated by the economic effects of higher tax burdens, rampant inflation and, now, a rather adamant demand by the public that they "want their money's worth."

This cry for "our money's worth" is evidenced by a lack of local support and understanding of education in many Michigan communities as evidenced in a May 5, 1968, The Grand Rapids Press story which reported a Michigan Educational Association observation. Of 120 school-operating millages voted thus far in Michigan in 1968, only 61 passed. George Taylor, Associated Press Business writer, in a national survey, reported in The Grand Rapids Press on April 23, 1968, that there are signs all across the land that the American taxpayer is becoming increasingly unwilling to vote "yes" on bond issues and school budgets which could result in higher taxes for him. He used as example the states of New York, Oregon, Florida, California, and Kansas where "voter resistance certainly is hardening in terms of increasing number of rejections on bond and millage issues." And even more recently John P. Corr, education writer for The Philadelphia Inquirer, wrote in a

December 3, 1970, story that the Pennsylvania State Board of Education must find a way to make educators accountable for the progress of their students and that a drastic overhaul of the school financing system should be based on a formula using definite educational goals and programs as a grant basis.

Mr. Raymond L. Godmer, School Management Services Consultant, Michigan Department of Education, cites the following statistics on voter reaction to recent operational millage and bond issues in the state of Michigan in a letter to this writer dated March 12, 1971:

Operational Issues

1968-69	598 total	366 passed	232 defeated
1969-70	656 total	458 passed	198 defeated
1970-71 (through Jan.)	73 total	44 passed	29 defeated

Bond Issues

1968-69	122 total	41 passed	81 defeated
1969-70	112 total	42 passed	70 defeated
1970-71 (through Jan.)	48 total	19 passed	29 defeated

Even more recently, Dr. Norman P. Weinheimer, Executive Director of the Michigan School Board Association, issued a prepared statement of voting statistics for that organization's monthly publication which tabulated the June 14, 1971, Michigan millage election results. Dr. Weinheimer's tabulations read as follows:

Operating Millages		Additional Millages	
Passed	82 districts	Passed	43 districts
Defeated	19 districts	Defeated	7 districts

Bond and "Building and Site"

Passed	4 districts
Defeated	7 districts

In analyzing these statistics, Dr. Weinheimer concluded that one child out of four in Michigan faces educational programs varying from no educational program at all to seriously curtailed programs in the coming school year.[1]

Most educators and responsible citizens are hopeful that many of the crucial social issues can be resolved through quality education. Accountability is becoming a useful concept to revitalize the public's faith in public school education. Dr. Leon Lessinger, former commissioner for elementary and secondary education in the United States Office of Education, now Professor of Urban Education at Georgia State University, defines the concept in this manner:

> Accountability is the product of a process. At its most basic level, it means that an agent, public or private, entering into a contractural agreement to perform a service will be answerable for performing according to agreed-upon terms, within an established time period, and with a stipulated use of resources and performance standards. This definition of accountability requires that the parties to the

---

[1]Norman P. Weinheimer, "From the Desk of the Executive Director," Michigan School Board Journal (July, 1971), 10.

> contract keep clear and complete records and that this information be available for outside review. It also suggests penalties and rewards, accountability without redress or incentive is mere rhetoric![2]

Mr. Robert J. Gravue enlarges upon this statement when he says:

> The concept of educational accountability is concerned basically with techniques to guarantee a certain level of student performance relative to stated objectives and goals with an accompanying efficient use of resources. The educational enterprise will face growing competition for resources, with ecological, health and continuing national defense demands among others being highlighted. A criterion of effective fiscal support for public education will be the degree of faith that the citizenry has in the ability of school systems to "give the people their money's worth."[3]

Lessinger, in a presentation at the Institute on Independent Educational Accomplishment Auditing, November, 1969 stated:

> . . . widespread disillusionment with the results of American Education has generated intense and even desperate efforts at school reform. . . .
>
> Our schools must assume a revised commitment--that every child shall learn. Such a commitment includes the willingness to change a system which does not work, and find one which does; to seek causes of failure in the system and its personnel

---

[2]Leon Lessinger, "Engineering Accountability for Results in Public Education," Phi Delta Kappan, LII, No. 4 (December, 1970), 127.

[3]Robert J. Gravue, "Accountability: Comments and Questions," Educational Technology, XI, No. 1 (January, 1971), 34.

> instead of focusing solely on students; in short, to hold the school accountable for results in terms of student learning rather than solely in the use of resources.[4]

Exactly two months later, the same idea was reframed more specifically by Daniel P. Moynihan, Counselor to the President:

> For generations Americans were taught that the best measures of how a school would perform were inputs such as teachers' salaries or class size. It is now definitely established that this is not so. The relationship between such inputs and educational achievement is weak and uncertain, even erratic.
>
> Therefore, do what Coleman did: measure inputs. If educational achievement, defined as reading scores or whatever, is the desired output, measure that. Moreover, measure it in such a way that the public can have some idea of what it is getting for its money, how its children are doing compared to other children, and so forth.[5]

Although the concept of accountability in education is not new, these statements and the call for accountability from parents and legislators have resulted in a new push in education; as Don Davies predicted in December, 1969, "Accountability will soon replace relevance as in the 'in' word among educators."[6]

---

[4]Leon M. Lessinger, "The General Concept of Independent Accomplishment Auditing" (presented at the Institute on Independent Education Accomplishment Auditing, Hotel Newporter, Newport Beach, California, November 10-12, 17-19, 1969), pp. 3-4.

[5]Daniel P. Moynihan, "To Solve a Problem, First Define It," New York Times, January 12, 1970, p. 62.

[6]Don Davies, "The 'Relevance' of Accountability," The Journal of Teacher Education, XXI (Spring, 1970), 127.

President Nixon proposed in his January, 1970, nationally televised veto of the $19.7 billion education and labor appropriation bill, that he would propose "a new and searching look at our American school system" because, in terms of the money and efforts being put into education in the United States, "we're entitled to get more out in terms of better quality education."[7]

The President said in his Special Message to Congress on Educational Reform, "We must stop congratulating ourselves for spending nearly as much money on education as does the entire rest of the world--$65 billion a year on all levels--when we are not getting as much as we should out of the dollars we spend."[8] In this March 3, 1970, message to Congress, the President said:

> . . . we derive another new concept: accountability. School administrators and school teachers alike are responsible for their performance, and it is in their interest as well as in the interests of their pupils that they be held accountable. Success should be measured . . . by the results achieved in relationship to the actual situation of the particular school and the particular set of pupils.[9]

---

[7]"Transcript of the Nixon Speech," New York Times, January 27, 1970, p. 24.

[8]"Excerpts from the President's Special Message to Congress on Educational Reform," New York Times, March 4, 1970, p. 28.

[9]Ibid.

Mr. Nixon reiterated the central thesis of the "Coleman Report," The Equal Educational Opportunity Survey of 1966, published by James Coleman of John Hopkins University when he said that the input-side of education--more money for better pupil-teacher ratios, better buildings, better equipment--may not make any substantial difference."[10] Accordingly, as with Dr. Coleman, accountability in terms of performance has come to the fore: has Don Davies' prediction been realized?

Donald Rumsfeld, former director of the Office of Economic Opportunity, in a speech titled "Experiments in Education" and delivered in San Francisco on September 23, 1970, illustrates the public's concern for accountability in education when he read an open letter from Washington, D.C. parents to the teachers' union which was blocking implementation of the Clark Plan in the District of Columbia's schools. The Clark Plan would have provided a concentrated effort to improve reading and math levels of students. It read:

> AN OPEN LETTER TO THE TEACHERS' UNION FROM ANGRY CITIZENS . . . We've supported you for pay raises. We've supported you for better teaching conditions. We've gone to bat for you before the School Board. We've listened to both sides. We've been patient. We've been understanding of your problems. We've gone along with you. . . . Now it's time for you to listen to US. And you better believe it.

---

[10]Robert B. Semple, Jr., "Nixon Proposes Reexamination of Aid to Schools," New York Times, March 4, 1970, p. 1.

> We've had it up to here with your bickering and squabbling with our School Board. We've had it up to here with threats to torpedo a plan that has such high promise of giving our kids the kind of education they need--and haven't been getting--that the School Board voted for nine to one. We've had it with a headline--grabbing union leader trying to usurp the policy-making functions of our School Board--a Board WE elected, by the way. We've had it with being told that 250 odd members of your union represent ALL of you, or even a majority. We've had it with defiance by a few as an excuse for damaging and maybe destroying our children's chance for decent education and meaningful lives. . . .
>
> About the Clark Plan. We elected a School Board to make the decisions and set the policies. . . . Along came the recommendation to implement the Clark Plan and the Board voted for it. That's good enough for us . . . isn't it good enough for YOU?
>
> Let's get it straight. We've had it with seeing our children's education washed down the drain in a torrent of words. They're OUR children and we KNOW what the school system has done for them so far. And it's not enough. As far as we're concerned, the Clark Plan is the best answer today, here and now, for giving our children the education they need. As far as we're concerned, the Clark Plan is IT. And we expect you to get with it.[11]

Rumsfeld further states that the Office of Economic Opportunity is in business to do something about poverty. There can be no question about the link between poverty and education. Nor can there be any question about the inadequacy of existing efforts from the standpoint of the poor.[12]

Rumsfeld also said that if the O.E.O. has to step on some toes of the educational institutions to get it

---

[11]Donald Rumsfeld, "Experiments in Education" (speech delivered in San Francisco, California, September 23, 1970), p. 14.

[12]Ibid.

solved, then so be it. If these educational institutions have a knee jerk reaction and are too rigid to accept criticism or change, then something has to be done to help bring about the change. The school people's opposition makes them very much like most protectors of any special interest. Teachers have a vested interest that they are protecting rather than acting as an ethical influence for the people that they theoretically are to serve. They may view their job as to preserve the status quo, but it is my job to help poor children.[13]

Mr. Rumsfeld continued his discourse on the present failures of public school education and the taxpayers' reluctance to continue supporting non-performance producing educational programs when he said:

> We have been told repeatedly by some that the secret to a productive educational system lies in the number of dollars we expend.
>
> We have been told that shortcomings can be corrected merely through the expenditure of additional funds. Such contentions have to be based on assumptions:
>
> --That reading levels are directly related to teacher-pupil ratios.
>
> --That increased per pupil expenditures affect math achievement.
>
> --That the quality of education is somehow related to the attractiveness of the physical plant.
>
> --That what counts is the "quality of the school," not the quality of educational experience of the individual child.

---

[13] Ibid., p. 15.

It is painfully clear that the massive influx of more dollars, more classrooms, more teachers, and more compensatory programs has fallen short of the desired impact.

The poor have grown cynical--they are fed up with promises that are not kept, results which have not materialized.

The non-poor--the taxpayers--have grown tired of being told that every problem can be resolved if we only spend more money--they are tired of paying for programs which fail to produce the promised results.

The Office of Economic Opportunity is concerned with the problems of the educational system serving the poor. It has launched an experiment which will show potential for improving educational opportunities. It will test the concept of performance contracting.

Under performance contracting, a school district contracts with a specific group--a private firm or its teachers' association, for example--to provide instruction to children in the school district who are not achieving at grade level norms. Contractors are paid only to the extent that they are successful in improving the educational skills of the children they instruct. In the experiment, the contractors will be paid only if they increase skills by more than one grade level. They will make a profit only if skills increase by 1.6 grade levels, nearly four times the average now attained in schools serving poor neighborhoods.

Within broad policy guidelines established by the school board, the contractors are free to use a variety of approaches to achieve their results. Some are using computers and teaching machines. Others are offering incentives to teachers and even to the students themselves. But from the standpoint of potential educational reform, the most significant feature of this concept is accountability: no success, no pay.

The experiment is under way in twenty-one school districts. In each of the 18 districts one of six firms is under a performance based contract to teach math and reading to a sample of youngsters in grades 1, 2, and 3 and 7, 8, and 9. In the additional three districts, the teacher's organization or the school district itself will be the contractor. Nearly 30,000 students will be a part of this experiment with approximately 12,000 receiving the experimental services. An independent, third-party organization is carrying out the evaluation of the performance of the private

> firms and a follow-up study of the students will enable us to determine the impact of improvements of basic skills on subsequent school performance.[14]

Performance contracting then, is one process for which accountability may be an end product. This concept is not new to public education. School managers (superintendents and business managers) have operated school feeding, transportation, and maintenance programs on performance contracts for years. It is the extension of this idea into the realm of learning through a particular process that Lessinger identifies as performance contracting.

As defined by Lessinger, performance contracting is an "educational engineering" process

> . . . whereby a school contracts with private firms, chosen competitively, to remove educational deficiencies on a guaranteed performance basis or suffer penalties. Without being told what program is to be used, the contractor is encouraged to innovate in a responsible manner. Upon successful demonstration, the contractor's program is adapted by the school on a turnkey basis.[15]

One of the benefits of a performance contract to a Local Education Authority is relating learning to cost. Lessinger calls performance contracting the legal device

---

[14] Ibid., pp. 4-6.

[15] Leon Lessinger, "White House Memo Defining Performance Contracting," December, 1969.

upon which educational engineering or public accountability depends.[16]

Dr. Raymond L. Boozer in his recent study concluded that citizens are most likely to vote favorably in future millage elections if the money appropriated is used for special education programs, adult remedial and trade programs, more individual instruction, smaller classes for children, an extended use of school facilities for all citizens, and for the construction of new building facilities.[17]

Therefore, the individual performance contracting programs may be a device to render the accountability upon which the voting public judges the effectiveness of a school program.

Michigan's Governor William Milliken in his State of the State message as reported in The Detroit Free Press, January 15, 1971, urged state support for performance contracting in the schools when he said performance contracting experimentally under way in the state introduces business management methods and profit

---

[16]Leon Lessinger, Every Kid a Winner, Accountability in Education (New York: Simon and Schuster, 1970), p. 35.

[17]Raymond L. Boozer, "A Study of the Voting Publics in Grand Rapids, Michigan, to Provide the Basis for Planning and Conducting Future Public School Operating Millage Elections in the District" (unpublished Ph.D. thesis, Michigan State University, 1969), p. 162.

motive into the schools with the private contractor guaranteeing pupil progress as a condition of receiving payment.

Dr. John W. Porter, Michigan State School Chief, cited twenty-five major state education issues to be resolved in the coming year. Among these was "Accountability and independent educational audits." Dr. Porter and the Michigan State Board of Education also identified and supported "performance contracting as a promising educational practice."

Nature of the Problem

The challenge of public accountability through performance contracting demands proof of results. The results must be based upon a per-pupil cost of a learning unit or grade gain skills acquired rather than solely on the cost of maintaining children in school.

This is the nature of the problem. School systems identify school cost on the basis of how much they spend for instruction; administration, attendance and health; transportation; operation and maintenance; capital outlay; fixed charges; service, transfers, and contingency.[18]

Lessinger states that:

---

[18]"The Board of Education of the City of Grand Rapids, Michigan; Final Budget, 1970-71."

> Our public elementary and secondary schools enroll 44 million students, employ 1.9 million teachers, and spend over $30 billion in tax funds annually. We have all kinds of measurements of where that money goes: we can pin down per-capita expenditures in any school district in the country, state how much any of them spend for construction and interest payments on borrowed money, and enumerate pupil-teacher ratios until the sun goes down. But all of these figures, useful as they are for some purposes, refer exclusively to financial inputs rather than educational outputs. We have virtually no measurement of the results that our vast enterprise yields. For example, we do not know what the average cost of increasing a youngster's reading ability by one year is: all we know is what it costs to keep him seated for one year with a textbook and a teacher. Many of the available indexes measure our competence as financial managers; but how many of them evaluate our effectiveness as educational managers? It would make much more sense if we moved from the concept of per-pupil cost to the concept of learning-unit cost, and focused on the cost of skill acquisition rather than on the cost of maintaining children in schools.[19]

Byron K. Love in his suggested Cost of Education Model for K-12 Michigan districts, concludes that those responsible for the educational program should be able to set objectives, plan to fulfill those objectives by means of a curriculum and instruction based upon it, budget for what is planned and account for what happens. There should be a complete set of information for each program. This information should include the objectives of the course, who taught it, who attended the class, the nature of the instruction, materials used, location, time scheduled, amount of money budgeted for it, and the cost. With this set of information the program can

---

[19]Lessinger, op. cit., p. 11.

be meaningfully evaluated both educationally--in terms of how well it met the objectives (outputs)--and in terms of resources (inputs) needed to implement.[20] Love's final conclusion, then, is that better decisions regarding program selection and operation result when production (output) is methodically related to objectives.

According to newly developed criteria, when resources are limited, the setting of priorities is essential. To provide a sound basis for establishing such priorities, sets of information relating to the programs are essential. This information is necessary to calculate the required cost of performing instruction with specified designs. A program could be educationally effective but its high cost may render it indefensible. However, with appropriate sets of information available, a school board or school administrator can weigh the evidence for continuing, modifying, or discontinuing a program.

> One of the most difficult, and often the most neglected processes in school system management, is communication upward, downward, and laterally in the organization with the central purpose of improving quality. With "programs" identified, planned through staff involvement, budgeted for with an understanding of what is economically

---

[20]Byron K. Love, "The Development of a Suggested Instructional Programs, Cost Model for K-12 Districts of the State of Michigan" (unpublished Ph.D. thesis, Michigan State University, 1968).

> feasible, and accounted for in terms of all resources committed to the objectives, there is something to communicate about.[21]

To date, public information is exceedingly limited on actual costs for performance contracts which have been awarded recently or are pending. From current literature, however, it appears that most of the districts which have implemented or are planning to implement performance contracting have utilized ESEA Title VIII (Elementary-Secondary Educational Act--Dropout Prevention) funds. Because no additional monies are available under Title VIII, many school districts have turned to Title I (Compensatory Education) with the exception of the OEO Remedial Performance Incentive Project.

At present, all performance contracting is done in addition to costs of the present educational program, and full state-aid expenditure per pupil is maintained throughout the project; whether there may be a saving in the future from changed staffing patterns is yet to be determined. The awarding of performance contracts on open bidding procedures may present the possibility of real savings to the taxpayer. It is suggested by many that performance contracting should not impose further financial burden on the local taxpayer, unless

---

[21]"Program Planning, Budgeting and Accounting in School System Operation" (a position paper by Allan R. Lichtenberger, Chief, Terminology Compatibility Branch, U.S. Office of Education, September 20, 1967), p. 4.

the private corporation can perform better than the public schools have in the past. The taxpayer should have the privilege of deciding whether the cost-benefits of performance contracting over other more traditional educational programs warrant such an arrangement.

The one basic problem of education today is that a complete set of factual information for each performance contracting program, a publisher's package program ("canned"), or traditional school programs defined in terms of grade gains or learning units and relative costs is not currently available in the public schools.

Purpose

The purpose of this study is to develop a cost-effectiveness model which may identify and isolate the most important factors contributing to the efficiency with which resources are expended for instructional activities in performance contracting programs, publisher's packaged programs, and traditional school programs. This model will be designed to determine the following information:

A. Program identification including the name of course, who attended it, course objectives, design (methods and materials) and content, length of time, type of school building and classroom, and costs.

B. Grade gains or learning unit gains of students enrolled in the courses.

C. Identification of costs per unit of student achievement.

Dr. Elmer H. Vruggink in his recent study recommends this type of study when he states that if an administrator is to make decisions on the future of programs in a local school system, he must have a variety of information in the following areas:

1. Cost
2. Achievement and/or IQ as measured by standard tests
3. Changing practices such as differentiated staffing
4. Transiency
5. Curriculum improvements or teaching techniques
6. Parent involvement
7. Staff involvement
8. Teacher characteristics
9. Adult-pupil ratio
10. Teacher and administrator turnover
11. Student racial characteristics
12. Decentralization[22]

This research does not purport to be an in-depth study of all these areas. Chapter III will review those areas which will be considered as one pattern for a possible cost factor definition.

---

[22]Elmer H. Vruggink, "A Study of the Contribution of Compensatory Programs in a Large Urban School System" (unpublished Ph.D. thesis, Michigan State University, 1970), p. 9.

Importance of the Study

The information in this study may provide the local board of education and school administrators with data to determine the degree of efficiency in which resources are expended for instruction, the relationship of factors contributing to the use of these resources, and a basis for decision making regarding the future of the programs studied.

The educational enterprise at present has two key problems: a lack of sufficient resources and pertinent information for making decisions. Those who control the resources, the taxpayers, show great reluctance to increase the level of support of school programs proportion to the rate of increasing costs and demands for service without positive assurance of educational productivity.

The taxpayer who is demanding accountability, perhaps has become knowledgeable not only in terms of fiscal spending but fiscal spending related to educational results.

According to Donald Rumsfeld, former director of the Office of Economic Opportunity and President Nixon's Cabinet member, the results of this information could revolutionize public school education. He said, "historically we have measured our concern by asking how many millions we spend, how many textbooks we buy, how

many schools we build. But these are all inputs. They don't tell us anything about the impact on human lives."[23]

If the present patterns of resources allocation can be changed to report a relationship between costs and benefits, and if school people allocate these resources based on facts, public confidence can be restored. The success of the student will tell the story.

Limitations and Assumptions

This study will be conducted within the school district of Grand Rapids, Michigan, although background will be drawn from other performance contracting projects that currently exist throughout the schools of the nation. Therefore, the applicability of the conclusions and recommendations of this study to other districts may be assessed in this light.

Secondly, although some reference will be made to mathematics programs, all conclusions will be drawn from the subject area of "reading."

Thirdly, the present practice of educational program accounting is very broad and inclusive. For purposes of this study, it will be broken down into five areas: (a) instructional program, (b) personnel, (c) pupils, (d) finances, and (e) facilities. The total information

---

[23]Jack Rosenthal, New York Times story, May 15, 1970.

system of each of these subsystems may provide a beginning basis for answering the following types of questions as recommended by Ronald Randall, Educational Turnkey Systems, Inc.

1. How sensitive are summary costs to changes in particular cost factors?
2. How sensitive are summary costs to changes in the costs of resources consumed?
3. What constitutes the minimal description of an educational medium or a method for conducting instructional activities needed for economic analysis?
4. What are economic trade-offs between constituent resources consumed in instruction, subject to overall budgetary limits?
5. What are the opportunity costs of certain alternative management actions not taken?[24]

Fourthly, although various aspects of the performance contracting concept will be analyzed in greater detail than the other more traditional programs studied because it is a rather new concept in education. The main emphasis of this study, however, will be in developing recommendations that will make available resources more effective in terms of student performance.

A final assumption that is made is that performance contracting may be a change strategy to foster greater accountability which may benefit the students through improved programs; benefit the teacher by providing a different role in education; benefit school administrators by providing solutions to financial and social crisis

---

[24]Ronald Randall, "The Cost-Ed Model," Educational Turnkey Systems, Inc., October, 1970.

within the system and benefit the community by providing sufficient data to assess the school program and further to renew its efforts to support such programs.

Definition of Terms

The following terms are used repeatedly in the study and have rather specific definitions as they relate to this study:

Behavior Modification.--The act of changing student behavior through the use of social and non-social reinforcers.

Comprehensive Evaluation.--The establishment of systems of performance control based on the continuous assessment of program operational and management process and resultant products.

Contract.--A legal document between the performance contractor and school system.

Contractor.--Educational technology firm selling an educational or instructional service.

Cost-Effectiveness.--An analysis of unit learning results obtained in relation to unit resources consumed under alternative approaches to program operation, as a determinant in continued program planning.

Hardware.--Machinery such as tape recorders and learning machines.

Learning Center.--A performance contracting project's student learning center room.

Line Item Budgeting.--Budgeting by specific account items, i.e., administrative salaries, transportation, etc.

Management Systems.--An adaption of systems approach through such techniques as (MBO) Management by Objectives or (PPBS) Program Planning and Budgeting Systems.

Performance Contract.--A procedure whereby private industry contracts with a school district to guarantee a certain amount of student achievement for a set amount of money.

Performance Objectives.--The specifications of program objectives in a comprehensive precise manner which indicates measures and means for assessing the degree of attainment of predetermined standards.

Reinforcing Events Area.--A classroom designed as a "free" room where students can indulge in non-academic events and fun such as pool playing, magazine reading, etc. as a part of the reward and incentive system.

Software.--Consumable materials such as programmed instruction workbooks.

Student Incentives.--Incentives given to students for appropriate behavior or for completion of work. In some programs the incentives are tied to achievement. Incentives are tokens, points, praise, teacher attention, stars, grades, etc. This can be exchanged for time in the "free" room or other tangible rewards such as a hamburger or taco.

Teacher Incentives.--Monetary incentives paid to staff members based on student performance.

Turnkey.--A process of turning a proven operation over to a local school system.

Summary

Preliminary examination would indicate that a need exists for more accountability by school system decision-makers as to what the cost-effectiveness of programs are. This study will attempt a design and analysis of general educational reading programs using a cost-effectiveness design.

CHAPTER II

SELECTED REVIEW OF LITERATURE

Review of Literature

School systems are being held more accountable by the electorate while this same electorate is reluctantly providing resources for the schools. Defeated local bond issues may be a prime indicator of general dissatisfaction with the schools. The taxpayer is asking "What am I getting for my money?" Traditionally, the schools have answered in terms of the kinds of facilities that exist, qualifications of the personnel that are employed, and the size of the expenditures. The public does not seem to accept this response in the 1970's. Today it appears that they want to know if the students can read and compute, secure and hold a job. This creates a new kind of accountability.

The direction of the accountability movement centers around the concern to find ways to relate dollars to outputs, i.e., the cost of a unit of education of known quality and quantity in terms of dollars expended. The traditional method of assessing

educational cost has been primarily based on the establishment of the relationship between dollars and educational input. These inputs have included such cost factors as the number of students served per dollar spent, the number of teachers and their dollar cost, the dollar cost of buildings, and number of courses provided and their dollar cost. Most school systems can provide this information easily with a little computation. But what about production? What are we producing with the measured inputs? Thus, the taxpayer is presenting a demand to measure the quality of educational output which he calls "accountability."

Accountability as defined by Lessinger is "doing what you said you would do" or "proof of results."[25] The basic idea of accountability in education is, according to Stephen M. Barro, Rand Corporation economist, "that school systems and schools, or more precisely, the professional educators who operate them, should be held responsible for educational outcomes for what children learn."[26]

---

[25]Leon Lessinger, "Robbing Dr. Peter to Pay Paul: Accounting for Our Stewardship of Public Education," Educational Technology, January, 1971, p. 13.

[26]Stephen M. Barro, "An Approach to Developing Accountability Measures for the Public Schools," Phi Delta Kappan, December, 1970, pp. 196-205.

This concept has been attacked by many educators, including Mrs. Helen Bain, president of the NEA, who has stated:

> It is pure myth that classroom teachers can ever be held accountable, with justice, under existing conditions. The classroom teacher has either too little control or no control over the factors which might render accountability either feasible or fair.[27]

Robert Kane, Evaluation Consultant for the California State Department of Education, disagrees with Mrs. Bain when he suggests that the question of "fairness" is academic; educators have always been held accountable and the real question is whether we are to continue to operate under a "One-Way Street Theory of Accountability," or under a "Two-Way Street Theory of Accountability."[28]

These two theories of accountability each require that program evaluation be performed. The first, the "One-Way Street Theory" requires evaluation for survival, and encourages "evaluation for justification." Kane agrees that the "Two-Way Street Theory" requires evaluation for "justice" and encourages professionalism in education. It also encourages the development and

---

[27]Helen Bain, "Self Governance Must Come First, Then Accountability," Phi Delta Kappan, April, 1970, p. 413.

[28]Robert M. Kane, "A System Approach, Accountability With Justice" (a report prepared for the California State Department of Education, 1970).

conduct of programs designed to the greatest student benefit, and not those designed to make schools look good.

Kane, argues, that the public is not going to continue to support programs which can only report "no statistical difference." The public is no longer interested in programs that are based on data that says "the teachers were enthusiastic, the kids enjoyed themselves, and the parents liked the program." The public wants hard data: student achievement related to cost. The public will support programs which demonstrate student learning at the same or less cost than programs which do not demonstrate student learning."[29]

Kane cited the Gallup Second Annual Survey of the Public's Attitude Toward the Public Schools as part of his defense. He commented that this national survey conducted by George Gallup indicates that a majority of citizens have been quite willing to take the word of the school board, the teachers, and administrators that the schools are doing a good job. The community has looked with pride on its school buildings and its winning

---

[29]Robert F. Kane, "Evaluation: What, Why, How" (paper presented at the California Audio Visual Education Association, Annual Conference, Fresno, California, January 29 and 30, 1971), p. 5.

football teams. However, Gallup's Second Annual Survey revealed that this method of judgment is in for a change.[30]

Gallup's survey revealed that most people would like to know more objective data on student achievement. In fact, it was reported in this study that a majority of the persons interviewed would like to have national tests administered in the local schools to measure student progress and achievement and further to relate this achievement to local costs as well as national costs and national levels of achievement.[31]

Gallup concluded by stating that if schools hope to avoid financial difficulties in the years ahead, they have to respond to the public's demand for accountability by informing the public of what they are trying to do, if they have succeeded in doing it, and how much it costs.[32]

To become educationally accountable, as apparently is being currently mandated by the electorate, school people must establish an objective basis for resource allocation. A new rationality must be brought into the

---

[30] Ibid.

[31] George Gallup, "The Second Annual Survey of the Public's Attitudes Toward the Public Schools" (a report prepared by Gallup International, Princeton, N.J., October, 1970), pp. 1-4.

[32] Ibid., p. 4.

decision-making process. Educators do not currently know how to accomplish this on an objective basis because as Merlin G. Duncan, University of Alabama professor of educational administration succinctly says, "We have no real, valid, objective measures of our outputs as they relate to our inputs."[33]

To facilitate educational program accountability, Duncan says that it is imperative that school people provide some measure of the quality of educational outputs and then relate these outputs to opportunity costs and dollar costs per unit of output.[34]

Duncan recommends a system of accomplishing educational program accountability as including the following:

1. It should measure program effectiveness based on stated real goal accomplishment in a time frame.
2. It should report results on a multi-dimensional format to the interested publics of the educational enterprise, both internal and external.
3. It should be a dynamic process that makes the educational system more responsive to the needs of society and its own clientele.
4. It should be related to comprehensive educational planning and show that the programs generated are economical in terms of opportunity costs.
5. The system by which accountability is satisfied should also be flexible enough to provide input to regenerate the system through constant evaluation and feedback which serves as a guide to program formulation, revision or termination.

---

[33]Merlin G. Duncan, "An Assessment of Accountability, The State of the Art," Educational Technology, January, 1971, pp. 27-30.

[34]Ibid., p. 28.

6. It should relate measurable educational goals, to societal goals, and demonstrate the ability to interface educational systems with other public and private systems serving society.[35]

The system suggested by Duncan demands an end to the currently used line item--object of expenditure, non-program related budgeting and reporting system. The current system is the kind of budget process that serves the purpose of administrators who are unable to make difficult program decisions, thereby protecting useless programs and activities, while questions of quality and cost cannot be answered using this method. "The questions can be answered," says Burton D. Friedman, Maryland State Department of Education Project Director, "if the movement to accountability is professionally based and serves to improve the quality of education and the effective utilization of scarce resources."[36]

L. Linton Deck, Jr., Assistant Superintendent, Metropolitan Public Schools of Nashville, Tennessee states:

> If educational program accountability is to be realistic, the criteria by which the schools will be assessed should be based on a systems approach. That is, school systems must systematically analyze the variability of their input, systematically

---

[35] Ibid.

[36] Burton D. Friedman, quoted by Duncan, Ibid., p. 29.

> develop operations to produce output in terms of clearly understood objectives and assess output for feedback to adjust the system.[37]

To systematically analyze inputs and relate them to outputs, it appears that school systems must design an evaluation system to provide the necessary information to its decision-makers to insure that wise educational decisions and resource allocations are made on the basis of viable documented data. Stanley Krugar, USOE staff member says, "such evaluation systems require that educational decisions be a result of a systematic examination of needs, objectives and the allocation or reallocation of resources based upon some ordering of priorities."[38]

If a systems approach recommended by Deck is utilized, it can also be a means of designing an effective evaluation system. In fact, if Roger Kaufman's (Professor of Education and Communication, Graduate School of Human Behavior, U.S. International University, San Diego, California) definition of a system as being "the sum total of parts working independently and

---

[37]L. Linton Deck, Jr., "Accountability and the Organizational Properties of Schools," Educational Technology, January, 1971, pp. 36-37.

[38]Statement expressed by Stanley Kruger, Michigan Association of State and Federal Program Supervisors Conference, Holiday Inn/North, Grand Rapids, Michigan, February 10, 1971.

together to achieve a required outcome"[39] is accepted, it would seem that a complete educational program could not be designed unless a system or process of evaluation be an integral part of such a program.

James D. Finn has listed the main or basic purposes of evaluation as:

1. Provide the implementors of a program with information that will allow for needed modifications in program design to increase the probability of the program achieving its objectives.
2. Provide data to decision-makers regarding the continuation of termination of programs.
3. Provide information as to the desirability of adoption and/or expansion of the program beyond its original scope. As such, evaluation is a basis prerequisite for effective program implementation and for dissemination and diffusion of results of educational programs.[40]

Kaufman has expanded Finn's definition by designing a six-step problem-solving model as a guideline for the design of evaluation systems. This system incorporates the six steps of Problem Identification, Solution Determination, Strategy Selection, Implementation, Determination of Performance Effectiveness and Revision.[41]

---

[39]Roger A. Kaufman, "System Approaches to Education: Discussion and Attempted Integration on Social and Technological Change Implications for Education" (report prepared for The Center for the Advanced Study of Educational Administration, University of Oregon, Eugene, Oregon, 1970), p. 135.

[40]James D. Finn, "Institutionalization of Education," Educational Technology, December, 1969, p. 16.

[41]Roger A. Kaufman, "Accountability, A System Approach and the Qualitative Improvement of Education--An Attempted Integration," Educational Technology, January, 1971, pp. 21-23.

This process model may have basic utility for the design and accomplishment of effective and efficient education. It suggests that a system of management for defining and achieving educational accountability should be included.

Another management system currently being considered by school people to accomplish educational program accountability is Program, Planning, Budgeting Systems. PPBS was first applied in the context of national defense.[42] PPBS provides another means for answering questions of education relative to "what do I give" and "what do I get." It identifies the relationships between product outcomes and costs for various alternative methods and means.

Dorsey Baynham, editor of Planning of Educational Change: PPBS, a monograph published by the Center for Effecting Educational Change, defines PPBS as an intelligent, orderly, and informative method of determining what is actually being received for educational effort.[43]

Baynham expands this basic definition to read:

> The process also answers to the names of systems analysis or systems approach, and it represents

---

[42]E. L. Katzenbach, "Planning, Programming, Budgeting Systems: PPBS and Education" (report made to the New England School Development Council, March, 1968).

[43]Dorsey Baynham, "PPBS and Several Good Reasons It Shouldn't Scare You Off," American School Board Journal (August, 1970), 27.

> a procedure for budgeting school funds in terms of the educational gains of students rather than "this many teachers with those many textbooks plus that many buses" and so on.[44]

Baynham states that:

> True, the process is a bit complex and, given the public's penchant for instant results, it may face tough going in education. But it is a natural for bringing reasonable order to public school management because of its emphasis on product (output) rather than on function (input).
>
> PPBS is not simply a matter of implementation. It's sort of a continuous flow over a multi-year period that is accompanied by continuous feedback and evaluation.[45]

Baynham says that it requires the greatest expertise to link programming, accounting, and reporting, with personnel management and systems analysis.[46]

It may be determined in the future that PPBS could be an economic science having impact on negotiations, bargaining, and compromise where choices must be made among alternative approaches and among alternative levels of a program by balancing needs against resources.

PPBS, thus, may become another strategy for transferring the school budget from a line item, input procedure, to a program-orientated, output procedure with the measure of these inputs to output giving emphasis to efficiency and initiating performance budgeting.

---

[44] Ibid., p. 28.

[45] Ibid.

[46] Ibid.

Martin Buskin, education editor of Newsday and president of the Education Writers Association, says that this new management technique can enable schoolmen to show taxpayers and the board just what it costs to run a good reading program, a good high school, a high-quality library.[47]

To further the concept of PPBS, R. E. Corrigan has developed the following assumptions:

ASSUMPTIONS:

1. The school system exists to produce a set of PRODUCTS--to achieve objectives expressed as specific changes in characteristics of LEARNERS.
2. The financial resources available to the school system are less than equal the demands of the system.
3. Objectives of a school system can theoretically be achieved in a multitude of ways (PROGRAMS), some of which are more effective and/or efficient.
4. Productivity of a school system can be enhanced by organization of activities and services into PROGRAMS specifically directed toward achieving carefully defined GOALS.
5. Better decisions regarding program selection and operation result when the COSTS thereof are considered on a long-term basis.
6. Better decisions regarding program selection and operation result when PRODUCTION (output) is methodically related to objectives.[48]

These assumptions are an extension of the type of thinking which has promoted many legislatures and educators to move toward a Program Budgeting System from

---

[47]Martin Buskin, "PPBS Means Better Money Management," School Management, November, 1969, p. 64.

[48]R. E. Corrigan, "The SAFE Planning, Programming, Budgeting, Evaluation System: An Approach to Relevance and Accountability in Education," R. E. Corrigan Associates, P.O. Box 5089, Anaheim, California, 92804, 1970, p. 11.

a Line Item Budget System, i.e., the perceived requirement to determine cost-effectiveness and cost benefit in education; the requirement for being able to effectively communicate to the public and the profession, what the exact costs are for effectively teaching a child to read; to do math, or to develop behaviors associated with good citizenship.

As a further adaptation of PPBS Kane submits that:

> Educational programs must be developed in ways other than by determining "How many bucks do we have?"; and "how many programs can we implement within the amount of bucks available?"; this has the effect of placing the decision-making power in the hands of the accountant, not the educator. What is required are educational programs based upon realistic performance objectives, derived from the amount of bucks available, but based upon high priority needs of learner! If we can do this, and then evaluate our effectiveness in producing learning, we will have finally developed a legitimate basis for going to our publics and requesting funds; a basis other than "we need more money for better education." Wouldn't it be nice if we could really identify how much money, for how much better education! Wouldn't it be satisfying to be able to go to the public and propose, with authority:
>
> "Given Y amount of money, we guarantee that 90% of all youngsters having X characteristics, will have a demonstrated reading level of 8 years at the end of the 8th grade."
>
> or
>
> "Given Z amount of money, we guarantee 75% of all youngsters having X characteristics will have a demonstrated reading level of 8 years at the end of the 8th grade."
>
> We would then truly be in the position of being involved in a "Two-Way Street" of Accountability; we could then honestly cast the public in the role

> of decision makers by making them decide "What Rate Will You Be Willing to Live With And Support?" I submit that what we have been doing has not been good enough; There Must Be A Better Way.[49]

"The Better Way" cited by Kane is then, one of program cost accounting. This cost data, once determined, could be useful in planning and decision-making at all levels of the educational enterprise. The major purposes of accounting system are: (A) to provide control over fiscal resources and (B) to provide relevant information for planning, decision-making, and evaluation of programs.

It appears that program cost accounting, to be most effective, should serve as one of many subsystems of a general program accounting system.

Charles S. Benson poses the difficulty of the problem of preparing a budget for such a system when he says:

> To prepare an ideal educational budget is difficult, more difficult than the corresponding process in a private business firm. The objectives of school systems are multiple, and there is not absolute agreement among parents, educators, and taxpayers on the importance--or relative weighting--of these different objectives. More distressing, it is very hard to measure closely the effects of given change in school practice. It is thus, an imposing task to choose rationally among alternative means to accomplish stated ends.[50]

---

[49]Kane, op. cit., p. 16.

[50]Charles S. Benson, The Economics of Public Education (Boston: Houghton Mifflin Company, 1961), p. 336.

However, educators must choose. The public schools will undoubtedly continue to operate in an economic system that has a scarcity of resources for many years to come due to the increasing demand from all other social and governmental services. The inner-budget competition for those resources which are available will increase in intensity as long as there are alternate uses. The decisions ideally should be made to select the minimum-cost mix of resources to achieve maximum educational goals. Benson concludes, " . . . that a necessary condition for sustained progress in education is the accumulation of information on the particular outcomes that result from specific combinations of inputs."[51]

Thus, the chief advantages of the three budget management techniques; systems analysis, PPBS, and program cost accounting, may be that of initiating a cost-effectiveness system that will relate a set of outputs (progress toward stated objectives) and a specified set of inputs (their related costs) in a manner that will facilitate an evaluation study that will define the processes that brought about the desired outcomes.

This relationship of inputs to outputs is often called cost-effectiveness. The struggle to determine degrees of cost-effectiveness in regard to educational

---

[51] Ibid., p. 361.

programs has been, and is likely to continue to be, filled with obstacles just as it has been for business, industry, and government for many of the same reasons. Benson states,

> . . . Possibly there will come a day when productivity measures will exist in education, and we ought thus to see what kind of data are required in order that such a tool of research can be made available. We will want to examine the process of weighing alternative costs to accomplish given, specific ends. . . . (also) from the economists' point of view, only as school systems go beyond the measurement of productivity to study the contribution of specific inputs (various types of human services and various types of physical goods) to educational ends, i.e., to explore the interrelations between inputs and outputs can productivity advance in education be assured. . . .
>
> . . . While a strong case exists a priority for the statement that advance in productivity in the industrialized nations cannot continue unless a certain (somewhat undefined) level of schooling is maintained, it is exceedingly difficult to relate a given change in expenditure on public education to a corresponding quantitative improvements in economic productivity. (Further) it is sometimes held that education is handicapped by not being able to relate changes in dollar value to inputs to some series of outputs. We do not have any widely accepted index of productivity for the education industry itself. It would be well if we could measure the <u>indirect</u> contribution of education of productivity, i.e., the effects of changes in quality of schooling on changes in output in the private economy say. But it would also be well if we could measure the <u>direct</u> contribution of changes in expenditures to change in outputs of the education industry itself.[52]

There are many factors which are closely related to changes in productivity which undoubtedly will have

---

[52] <u>Ibid</u>., p. 338.

to be defined and refined. Mills suggests the following general list as being worthy of consideration in this regard.

> The quantity of quality of capital equipment used.
> The quality of (human) efforts input (This may be a change in intensity or a change in average degree of skill. Such a change in average skill may result from a change in the competence of individuals or groups or from a shift in the composition of the work force).
> The ratio of effort input to productive instruments used or to natural resources used (A change in average productivity resulting from the play of diminishing returns would be included in this category).
> The quality of natural resources or material used.
> The quantity of materials or intermediate products used to produce a standard unit of final product.
> The amount of non-human power used or the manner of its use.
> The organization of productive units.
> Working conditions.
> The effectiveness of administration.[53]

The above list is not as appropriate for education as for business or industry, but it does point out that there is a large number of factors involved and an even larger number of possible combinations of factors and relationships in the development of a cost-effectiveness system which is designed to report productivity in terms of student performance and effectiveness of dollar expenditures.

Allan R. Lichtenberger, Chief, Terminology Compatibility Branch, U.S. Office of Education more

---

[53]C. Wright Mills, quoted by Benson, Ibid., p. 346.

specifically states that a school system which employs a program of cost-effectiveness should expect the following:

* Improved assessment of the efficiency of allocation of education resources.
  In plain words, this means that a better job can be done of assigning staff, plant use, equipment supplies and funds to accomplish what is believed to be worth accomplishing.
* A more continuous and consistent consideration and review of educational objectives.
  The very fact of planning, budgeting, and accounting for the comparatively small "units of behavior" or "programs" geared to specific, expected accomplishment virtually forces attention to objectives.
* Sharper and more consistent examination of essential sequences of educational development.
  Education is a highly sequential process. These sequences both within and among "program" are much more easily observed, studied, and managed when there is a process of deliberate planning, budgeting for, and accounting for each "program."
* More effective communication through all levels of management concerning processes and operations as they relate to achievement of objectives.
  One of the most difficult and often the most neglected processes in school system management, is communication upward, downward, and laterally in the organization with the central purpose of improving quality. With "programs" identified, planned through staff involvement, budgeted for with an understanding of what is economically feasible, and accounted for in terms of all resources committed to the objectives there is something definite to communicate about.
* Better understanding of how educational resources and effort relate to accomplishment.
  If more money and more effort do not result in more effective education, the educational enterprise is ironically unique. Still, education has seldom shown clearly that more resources result in improved accomplishment. With "programs" the opportunities to clarify this relationship are at their best.
* Disclosure of the kinds of educational development foregone when resources are limited.
  Entirely too often the statement, "We have a good school system," implies that the school system is meeting more needs that it really is. Frequently, too, a school system is criticized for

not providing certain kinds of educational development when their provision is not possible in terms of available resources. When "programs" go through the process of planning, budgeting, and accounting, the kinds of educational development they make possible show with clarity the kinds that are foregone. It is common sense to make such exclusions evident.

* Better opportunity to set educational priorities. Seldom does a school system have sufficient resources to do all that needs to be done. Setting of priorities is essential. "Programs" bring these into focus, and the people who make decisions have a much better basis for determining orders of importance in view of resources available.[54]

A cost-effectiveness design is thus seen to be a part of the total process of program management. The advantages noted above, however, will not be fully realized unless program planning, program budgeting, and program accounting are all implemented.

Lichtenberger simply defines the terms as follows:

> The determination of what is to be done to achieve the objectives of a "program" is program planning.
>
> The process of carefully estimating the cost of doing what is to be done to achieve the objectives of a "program" is program budgeting.
>
> The recording of what is done in the operation of a "program," of what is spent, and of what is accomplished is program accounting.[55]

The development and application of a cost-effectiveness system which links learning to cost by

---

[54]"Program Planning, Budgeting, and Accounting in School System Operation" (a position paper by Allen R. Lichtenberger, Chief, Terminology Compatibility Branch, U.S. Office of Education, September 20, 1967), pp. 3-5.

[55]Ibid., p. 2.

coupling indicators of unit objectives achieved with indicators of unit costs may provide one powerful tool for a board of education to convince the electorate it has accepted its obligation to make wise decisions about prudent public policy and effective plans for education.

Using this rationale, it would appear that a cost-effectiveness management system might satisfy the public's demand for accountability. The question is, "How can schools link learning to costs and thus become accountable to the taxpayer?"

Leon Lessinger suggests that schools must develop new educational approaches. Schools must define output not as teaching done but as learning proven. And this must be substantiated by data that shows educational gain produced by specific sequences of teaching.[56]

Lessinger continues by stating:

> Once the output of schools is measured in proven learning instead of resources allocated or teaching done, the next step is to relate learning to costs. In theory, we can easily compare the money spent and the result achieved. We simply keep accounts of costs of a specific teaching sequence and measure the change in performance against a standardized evaluation given before and after it. This is seldom accurately done except in formal experiments. Now we must extend this kind of calculation to cover wide areas of teaching, especially the acquisition of basic skills such as reading.[57]

---

[56]Leon K. Lessinger, Every Kid a Winner, Accountability in Education (New York: Simon and Schuster, 1971), p. 9.

[57]Ibid.

Charles Blaschke, President and Chairman of the Board of Education, Turnkey Systems, Inc., a Washington, D.C. management consulting firm, suggests the performance contracting concept as one tool for school systems to manage reform.[58]

Performance contracting is a procedure whereby private industry contracts with a school district to guarantee a certain amount of student achievement for a set amount of money. This procedure is recognized by some as the simplest form of cost-effectiveness available.

Blaschke believes that this concept can provide a possible answer to the taxpayers' demand that schools be held accountable for productivity in terms of student performance and the effectiveness of dollar expenditures. He claims that, "Nothing could regain the confidence of the taxpayers more than a guaranteed result performance contract."[59] Blaschke defines the guaranteed result performance as a "program design in which a contractor achieves results or else he pays a penalty."[60] The taxpayer can understand the rationale of this system because he is probably in a business where he knows if the product is no good, the irresponsible individuals are fired, or the business goes into bankruptcy, but the

---

[58]Charles Blaschke, "Performance Contracting," IDEA, Winter Quarter, 1971, pp. 6-7.

[59]Ibid., p. 7.

[60]Ibid.

business does not keep getting more money year after year. Too often the typical response for schools when they have a failing product is to request additional monies.

Charles Blaschke, who is also recognized as the "father" of performance contracting, planned the Texarkana Dropout Prevention Program, the first performance contract in the country awarded for the school year 1969-70.

In his introduction of Performance Contracting in Education, Blaschke defines the Texarkana Project and performance contracting as:

> Performance contracting in public schools is a reality. During the 1969-70 school year in Texarkana schools, a private corporation, Dorsett Educational Systems, Inc., is removing math and reading deficiencies of approximately 400 students on a guaranteed performance basis. The contractor guaranteed an increase in student performance of one grade level in either math or reading in a specified number of classroom hours of instruction for a specified maximum cost. Payment is to be based on whether the contractor meets his guarantee. Initial testing of students has shown results better than the regular school in less time and at less cost.[61]

The following is Blaschke's description of the Texarkana experience and its history which could be repeated in many schools across the nation:

---

[61]Charles Blaschke, Performance Contracting in Education: The Guaranteed Student Performance Approach to Public School System Reform (Champaign, Ill.: Research Press, Educational Turnkey Systems, Inc., 1970), p. 2.

The Texarkana schools faced a variety of problems during the 1968-69 school year. The average dropout rate per year for grades 7 through 12 in the poverty area schools was fifteen percent. Twenty-seven percent of students were participating in school programs for the disadvantaged. Students were two or more grade levels deficient on the Iowa Test of Basic Skills after four years of participation of special programs. Eighty percent of federal funds were going directly into salaries with only twenty percent going into program enrichment.

The proposed programs were quite innovative, certainly not "pre-packaged." For example, Dorsett proposed utilizing for the first time in a large-scale effort an audio-visual learning system which had been under development for over twelve years. At the same time, it would utilize software developed by other corporations to insure that a total learning was available to students with different learning characteristics. Another corporation would have utilized a new math program; a second corporation proposed to combine three instructional management systems and to convert existent Job Corps materials to a new media format; a third corporation proposed to develop a computer-based counseling system for the Southwestern region, to be tested and validated in the Texarkana school system.

All of the bidders, with the exception of one, proposed to use self-paced instruction. To insure efficient scheduling and administration through the use of individualized self-paced instruction, sophisticated instructional management systems were part of each proposal. All recommended audio and visual means of presentation. Three of the top five proposals would have utilized the relatively new concept of contingency management integrated into the instructional program. It was obvious from an evaluation of the proposals that the competitive process had caused the ten bidders to enlist the resources of the nation's foremost educators in creating a program for Texarkana.[62]

The results of the Texarkana Project received a troublesome jolt when the independent auditor's report

---

[62] Ibid., p. 12.

questioned the validity of the first year's results.[63] The independent auditor questioned the gains in student scores because they found some of the test questions had been included verbatim in the instructional program.[64] How much contamination occurred and what effect it really had was not clear until Dr. Robert Kraner, President of Epic Diversified Systems, Inc., completed the audit report and stated that he agreed with internal evaluator's report that progress checks, and laminated panels of actual or closely related test items and the utilization of these materials in a concentrated manner just prior to an exit testing period were a gross violation of the rationale underlying, the normative concept of grade level achievement.[65]

Dr. Kraner, the Epic auditor, stated that his agreement is based upon the two reported activities of:

1. Concentrating test items in the instructional materials.
2. Intensively reviewing students over these materials prior to exit testing.

---

[63]"Clouds and Controversy Over Texarkana," Nation's Schools, LXXXVI, No. 4 (October, 1970), 85.

[64]Ibid.

[65]Robert E. Kraner, Final Audit Report, Texarkana Dropout Prevention Program (Tucson, Arizona: Epic Diversified Systems Corporation), p. 22.

> There was a violation of the norm concept of grade-level achievement which served as a basis for the previous agreements between the Texarkana Dropout Prevention Program and Dorsett Educational Systems, Inc.[66]

Despite the auditor's report that the objective of Texarkana Project, to reduce the dropout rate, had been achieved, many educators remained skeptical.

Wendall Pierce, executive director of the Education Commission of the States has stated that:

> Significant opposition has come from organized teachers' groups who argue that performance contracting is a gimmick which diverts attention from the real need for smaller classes, remedial programs and better counseling and that learning for rewards, as is done in some programs will undermine proper motives. They continue to argue that if performance contracting works, it will cost more because the greater the achievement, the larger the payment to the contractor. These groups feel that if this money were paid for their salaries, materials and reducing class size, they could do as well.[67]

Performance contracting is not seen as the panacea for determining cost-effectiveness nor even as an alternative process for providing education by many groups and individuals.

The strongest critic of the performance contracting concept has been the American Federation of Teachers. AFT President, David Sheldon, says that his concern is the eventual growth of educational gimmicks which is an

---

[66] Ibid.

[67] Wendall H. Pierce, "New Directives for Education," Compact, February, 1971, p. 2.

invasion of the responsibilities of teachers and grounds for strikes.[68] Mr. Sheldon resolved to sponsor a major nationwide campaign to oppose performance contracting.

Dr. John M. Lumley, the National Education Association's Executive Secretary for Government Relations and Citizenship, said in a statement to the Senate Appropriations Committee that the "NEA deplores the performance contracting concept because it can weaken the structure of the public school system and can discredit the schools in the eyes of the public.[69]

Many supporters of the performance contracting concept were quick to respond to the critics. Foremost, among the supporters was Dr. John W. Porter, Michigan State School Chief. Dr. Porter stated at the winter workshop meeting of the High Scope Educational Research Foundation that

> . . . we must guarantee minimal student performance in the primary and secondary schools. Someone has to require schools to guarantee student performance consistent with clearly spelled-out performance objectives, irrespective of the educational mumbo-jumbo related to learning theories.[70]

---

[68]David Sheldon, Statement made at the AFT Convention, August, 1970, Pittsburgh, Pennsylvania.

[69]"How Education Groups View Contracting," Nation's Schools, LXXXVI, No. 4 (October, 1970), 87.

[70]The Grand Rapids Press, "Porter Rips State Educators, Goals," December 3, 1970.

Dr. Porter continued to say that

> . . . education groups react nervously when he speaks this way because we haven't been able to transform the educational folklore to measurable productivity. Today's questions focus on productivity--the results obtained from the resources used and the public schools are now being held accountable for these results.[71]

"We must start to guarantee student performance, and you don't guarantee student performance by instituting remedial reading, writing and arithmetic programs," continued Porter.

> You institute guaranteed student performance by programs such as performance contracting where individualized instruction occurs. As a society, we profess to be interested in providing for the individual differences of children, but the schools are modeled after factories. As a society, we talk and talk about meeting the needs of children, but when confronted with the concept of performance contracting, some educators label it outside intervention and profit peddling.[72]

The Office of Economic Opportunity evidencing concern for the need that too little evaluation of such programs was available, launched into a $6.5 million year-long performance contracting experiment involving 28,000 students in twenty school districts in remedial reading and mathematics.[73]

The OEO experiment was designed to test the performance contracting concept in a variety of situations,

---

[71] Ibid.

[72] Ibid.

[73] Office of Economic Education, "Background: An Experiment in Performance Contracting" (program description, July, 1970), p. 1.

all carefully controlled and evaluated so that school people might have some concrete data on such programs before making the decision to enter into contracts with technological firms who claim through the use of a variety of techniques and educational hardware, to be able to guarantee student results. The OEO felt that many school systems across the nation have begun to enter into performance contracts with firms, paying them for grade gains achieved. While there is great promise in this approach, there has been too little evaluation of these programs and what has been evaluated has been small and isolated. The OEO felt that the grade gain data must be pinned down to a variety of student types and other crucial variables and company costs must be clearly isolated to determine cost effectiveness of the different programs.[74]

To give the reader a better understanding of the size and scope, the following recap from the Nation's Schools is herewith included:

> With 6.5 million in federal money, the Office of Economic Opportunity has launched a year-long performance contracting experiment which this fall will involve some 28,000 students in 21 school districts in remedial reading and mathematics.
>
> Of the 21 districts chosen from approximately 170 which had asked for funds, OEO will funnel $5.6 million into performance contracts between 18 school districts and six education companies. In the remaining three districts, OEO will sign

---

[74] Ibid.

contracts for programs utilizing a traditional educational framework, with local teacher groups, for example, operating under incentive contracts with OEO.

By employing these two types of contracts--public and private--OEO hopes to learn after a year whether the performance contracting approach should be applied nationwide. Dr. John O. Wilson, assistant director for planning, research and evaluation at OEO, said the experiment would help validate results in the first performance contracting project in Texarkana, Arkansas.

Wilson expressed "concern" that the performance contracting approach could lead to "teaching to the test" since payment is geared to achievement scores. In Texarkana, the contracting company, Dorsett Educational Systems, Inc., was reported to be preparing students for the tests, but the company was denied making a direct coaching effort.

Wilson added that OEO's experiment will contain precautions to guard against the possibility of teaching to the test. OEO will select three standardized tests, which will be administered on a random basis so that the company will not know ahead of time which test will be given. Also, 75 per cent of the payment will be based on the standardized test scores while 25 per cent will rest on performance on reading and mathematics tests (criterion reference tests).

The six private firms were selected on a competitive basis from a group of about 30. OEO said the firms chosen represent a "range of innovative technics, including incentives to students, teachers, parents, teaching machines and programmed learning technics. . . .

The contracts between the education companies and the 18 school districts will involve about 27,000 under achieving students in Grades 1-3 and 7-9. Approximately 1,000 more students will be involved in the three projects "to assess education incentive system only," OEO said. OEO officials said the performance contract would provide payments of $110 per grade level increase in each of the skills taught, adding that the companies would begin to make a profit at 1.6 grade level increases. The contracts provide a maximum payment ceiling of $220 per child per subject matter, or the fee at 2.3 grade level increases per year, according to OEO.

> According to the OEO, the skills of each student will be tested by the contractor at the beginning of the experiment, periodically throughout the school year, and at the end of the experiment.[75]

In addition to the OEO reading and math projects, thirty-two other school systems were engaged in performance contracting during the 1970-71 school year in which similar results of productivity and cost-effectiveness are yet to be measured. (OEO has summarily released interim data on the project this spring but the total data has not been released as of the completion of this study.)

There seems to be common agreement among educators that the two basic skills that all children need to master are reading and math. Since this thesis will be delimited to a small part of the total educational function as performed by schools, we will only concern ourselves with only one segment, the reading portion of the curriculum.

A brief description follows of the several programs that will be evaluated in this study on a cost-effectiveness basis.

All three of the performance contracting programs, the first to be listed herein, provide preservice staff training, in-service, and continuous program monitoring.

---

[75]"OEO Announces $6.5 Million Contract Program," Nation's Schools, LXXXVI, No. 2 (August, 1970), 33.

Each program specifies specific behavioral objectives and an evaluation design for measuring their attainment.

Alpha Learning Systems, Inc. Performance Contract.--Alpha Learning Systems, Inc. is based on the premise that regular teachers, given the training and tools of technology, can do as well as an outside, hardware-oriented private industry. The company uses all software materials, i.e., program materials currently available on the open market. The company does not produce any materials but blends and mixes a large reservoir of available materials according to the student's needs as determined by the teacher and test results. Heavy emphasis is placed on student and teacher incentives which are used as motivational and reinforcement techniques.

Combined Motivational and Educational Systems Performance Contract (CMES).--CMES is a highly structured technological approach using a variety of machines and programmed learning materials. The use of many paraprofessionals has initiated the differentiated staffing concept. An aid to developing self-concept is the achievement motivation program (rap sessions). Student incentives are utilized.

Westinghouse Learning Corporation Performance Contract (WLC).--Westinghouse Learning Corporation utilizes differentiated staffing. The program is based on a

diagnostic and prescriptive technique using a variety of existing published materials: both software and hardware. Student incentives are used as a contingency management technique.

Reading in the Regular Program.--The regular reading program is taught by the classroom teacher who uses an adopted textbook as well as teacher selected optional materials. In this program, the fundamentals of reading are taught through traditional techniques. It must be admitted there are many critics of the regular reading program who allege that the public schools give only lip service to individualized education based on a needs assignment. If differences are considered, they are met by dividing groups according to their abilities, i.e., slow, normal, and fast. The overall goal of the regular classroom is "to teach the whole child skills, understandings and attitudes so he can take his rightful place in our democratic society."[76] Critics say this approach is not based on attainable-measurable goals. The procedures used provide little or no pre-service for the classroom teacher in the use of the materials, except by way of previous training, little meaningful in-service or monitoring of teacher performance; no systematic

---

[76]Language Arts Study Guide, Grand Rapids Public Schools, 1960, p. 1.

evaluation or measuring design to determine student performance and little budget for teacher requests to supplement her teaching.

Traditional Remedial Reading (TRR).--To work with students who have reading difficulties, the public schools have developed a traditional type of remedial reading program. This program is usually operated by a reading consultant who works with small groups of identified remedial students for brief periods of a time on a once-a-week schedule using a variety of materials with limited follow-through to adapt to the student's regular classwork.

Project Read (PR).--Other programs currently being used in the public schools are "canned" programs, i.e., they are pre-packaged curricula produced by a book publisher which include tests, workbooks, etc. necessary to teach reading. The programs are often called program learning. The programs usually consist of a number of packaged workbooks designed to be used in a sequential manner by the classroom teacher. Project Read is such a a prepackaged program. Within the format listed above, the classroom teacher works on an individual basis only with those students who need tutoring, all other students work independently.

Because there are so many different kinds of programs in which reading is taught, the programs listed

above were chosen for this study because it appears to incorporate most of the commonly used techniques and resources found in such programs.

Evaluation

As noted earlier, the next portion of this study must address itself to the evaluation of the effectiveness of the approaches used in the aforementioned reading programs.

One part of the effectiveness determination then becomes a measurement of evaluation. Student evaluation is often based on student performance on a nationally normed commercially, available standardized achievement tests administered at the beginning and end of the school year. The measure of student achievement is the grade gain accomplishment for a given period of time. Standardized tests usually assume an average student will make one year's gain in one year of schooling.

Some controversy over the utilization of standardized tests to measure gains is currently being voiced. In researching this matter, Dr. Ralph W. Tyler, Director Emeritus, Center of Advanced Studies in the Behavioral Sciences was contacted by this writer. Dr. Tyler responded in a letter dated May 7, 1971, stating that the currently used tests are the best form of assessment now available on the market. However, Dr. Tyler said

that to improve testing in terms of the actual learning of students, educators have a responsibility to encourage reputable test makers to develop criterion-referenced tests.

The application of cost-effectiveness logically follows evaluation in that indicators of unit objectives-achievement, when coupled with indicators of unit costs, may then provide a basis for cost-effectiveness analysis.

It is the intent of this study to develop a cost-effectiveness design as one means of providing needed information for the Grand Rapids Public Schools on performance contracting programs, "canned" programs, and other traditional school programs in the subject area of reading and which may be applicable to other subject areas and to other school systems.

The cost-effectiveness model unit which will be outlined in Chapter III was purposely designed to provide a means of identifying and isolating the most probable important factors contributing to the efficiency with which resources are expanded for instructional activities in the programs studied.

The model may be described as an example of one of the "specified tools and techniques" previously noted. It is mainly concerned with obtaining cost data and relating that data to the objectives, evaluation, and differentiating characteristics in the different kinds of

reading programs (incentives, differentiated staffing, timeframes, materials, etc.) of the programs. The resultant information "package" related to output can then be used as relevant data for planning, and decision-making. The model was also concerned with analysis, the breaking down and distribution of costs, as an important prelude to synthesis of new and revised programs.

Stating the objectives for each program is a difficult task. It is assumed that all instructional programs have objectives and that they are not so obscure, mysterious, or secret that they cannot be expressed in written form. Stating the objectives in behavioral terms may be the most difficult of all, but it offers the important advantage of producing something observable and testable. This tends to make evaluation of progress made toward the objectives more measurable and useful in terms of cost-effectiveness considerations. Indeed, it would be almost impossible to measure cost-effectiveness of programs for which the objectives are expressed as to know, to enjoy, to believe, to understand, to grasp the significance of, and so forth. Mager has defined the problems related to stating objectives in behavioral terms and concludes that:

1. A statement of instruction objectives is a collection of words or symbols describing one of your educational intents.

2. An objective will communicate your intent to the degree you described what the learner will be DOING when demonstrating his achievement and how you will know when he is doing it.
3. To describe terminal behavior (what the learner will be DOING).
   a. Identify and name the overall behavior act.
   b. Define the important conditions under which the behavior is to occur (givens or restrictions, or both).
   c. Define the criterion of acceptable performance.[77]

Performance objectives as defined by a recent publication prepared by the Eric Diversified Systems, Inc., President Dr. Robert E. Kraner, "performance objectives are precise descriptions of educational goals in terms of desired behaviors outcomes, or material terms which can be reliable, validly and objectively measured."[78]

Performance objectives as defined by the U.S. Office of Education include the following essential elements:

1. The individual or group who is to perform in a desired way.
2. The behavior to be demonstrated or product to be developed. The behavior should be described as an action or a product that can be observed. Therefore, words such as understanding, appreciation, thinking, enjoying, etc., should be replaced with more precise behavioral terms.
3. The level of accomplishment of the minimum acceptable level of performance. Research and baseline data are important considerations in setting the levels of performance.

---

[77]Robert F. Mager, Preparing Educational Objectives (Palo Alto: Fearon Publishers, 1962), p. 53.

[78]Robert E. Kraner, "Developing and Writing Behavioral Objectives," Educational Innovators Press, Tucson, Arizona, p. 57.

4. Determining the units of performance measurement and the means of measurement. For instance, a statistically significant increase in an academic skill is one way to identify this element.
5. The conditions under which the performance is expected to be measured may include a restruction or limitation. A condition might also be a supportive service or resource need to assist the performance.[79]

James Lewis, Jr. describes behavioral objectives and their relationship to education as:

> The function of education is to change or modify behavior. Behavioral Objectives are designed to indicate the desired behavior; therefore, they can be defined as a collection of words, statements, or symbols which describes an education intent. Students learn to acquire knowledge, attitudes and skills. There are three domains of learning, i.e., the Cognitive (thinking), the Affective (attitude) and the Psycho-Motor Skills. Behavior results from thinking and learning. Therefore, in order to write clearly stated Behavior Objectives, the reader must be able to write these objectives realizing the seven Thought Processes and the Thought Derivatives, so that the aims and goals of the lesson are readily brought out and may be adequately evaluated in terms of the expectations.[80]

The process of evaluation regarding a large number of objectives and reporting results would involve voluminous records. For the purposes of this model and for managerial decision-making regarding the programs reported in the model, a more simplified expression of the objectives and evaluation must be used.

---

[79]USOE, ESEA Title VII Manual for Project Applicants and Grantees (Washington, D.C.: Government Printing Office, April 24, 1969), p. 5.

[80]James Lewis, Jr., Administering the Individualized Instruction Program (West Nyack, N.Y.: Parker Publishing Co., Inc., 1971), p. 79.

The "quality" of the program is simply an expression of its effectiveness. The important question regarding whether or not the class or activity is appropriate to the needs of the pupils enrolled is involved only peripherally. The model assumes that the objectives will be as appropriate as those who select them know how to make them and that the task of expressing the objectives in summary form, evaluate the progress made toward them by whatever means seem best, and compare the results with the costs. Progress toward an appropriate objective may be of little educational value. However, that is the basis of another set of studies and is outside the limits set for the model.

Instructional programs accounting is, in sum, a system whereby what is to be done (objectives) is carefully formulated, methods of evaluation defined, resources (personnel, facilities, supplies, and equipment) assigned according to a plan and schedule, after which the program is implemented, evaluation made, and costs determined. A new cycle, based in part on the experiences with the last cycle, is then planned for and implemented.

The implementation of the model will not fulfill all of the many requirements of instructional programs accounting--it has not been designed to do so. It will, hopefully, serve to move a district closer to that goal. Districts are presently performing many, perhaps most,

of the acts required to relate costs to programs. Implementation of the model should help the district take the few remaining steps toward that goal. The next chapter includes a description of the model and some suggestions concerning its implementation.

Summary

The articles and studies reviewed in this section generally support the need for cost-effectiveness studies in the public schools. In the planning of a cost-effective study, it can be determined that inputs must be related to outputs. Another way of specifying this concept is to say that learning must be linked to cost.

It has been determined that the teaching of reading in the public schools is a matter of priority. Several different reading programs have been defined. It may be concluded that these programs should be evaluated in terms of student achievement and cost per program.

To begin this process, program objectives have to be defined. It must be assumed that the program objectives in this study shall be defined as certain goals in reading skills and comprehension that must be achieved by students. Although evaluation to determine how well students achieve those goals is limited, we have to accept the fact that there is no better way at this point in time. The logical next step that follows is to relate student achievement to program costs.

The establishment of a cost-effectiveness model to relate student gains to program costs in several types of reading approaches in the Grand Rapids Public Schools is that logical next step: the purpose of this study.

CHAPTER III

DEVELOPING AND FIELD TESTING THE MODEL

Introduction

This cost-effectiveness model has been developed to provide a way of determining "what is spent for what is received" for each program. This information can be used for planning and budgeting as well as for cost analysis and evaluation. The model suggests a way of identifying the program which includes such information as the nature of the program, who was effected, how many full-time certified teachers were required for its implementation, how many paraprofessionals were required, what methods and facilities were used, what incentives were available to students and staff, what additional staff training was required, what start-up cost incurred, what material and supply costs were incurred, and what objectives were involved and what progress was made toward those objectives and reported in terms of student grade gains.

The model is intended to be consistent with one form of systems analysis. A general description of systems analysis has been defined as:

> . . . inquiry to aid a decision-maker to choose a course of action by systematically investigating his proper objectives, comparing quantitatively where possibly the costs, effectiveness, and risks associated with the alternative policies or strategies for achieving them, and formulating additional alternatives if those examined are found wanting.[81]

In addition to the systems analysis approach, this model will attempt to relate the input factors (costs) with the resulting outputs (student grade gains).

Description of the District to be Studied

The cost-effectiveness model will be field tested in the Grand Rapids Public Schools located in Grand Rapids, Michigan. The Grand Rapids Public School district is part of the Kent County Intermediate district and is the largest of the nineteen districts of which the Intermediate district is composed. The Grand Rapids Public Schools operates a comprehensive educational program--prekindergarten through the Community Junior College.

The Grand Rapids Public Schools have a current enrollment of about 39,000 full-time students. Approximately 34,500 of these are in the kindergarten through twelfth grade division, including Special Education and other special programs. Almost 4,500 full-time students attend the Grand Rapids Junior College. The school system has operating units consisting of fifty-four elementary

---

[81]Richard A. Johnson; Fremond E. Kast; and James E. Rosenzweig, The Theory and Management of Systems (New York: McGraw-Hill Book Co., 1967), p. 144.

schools, four middle schools, five junior high schools, four high schools, a school for the deaf, an orthopedic school, and a school for the mentally handicapped.

Reading Programs Within the District

Several different reading programs operate within the school system. Appraisal of the cost-effectiveness of these several programs requires that the objectives of these programs be stated, that evaluation of the progress made toward these objectives be measured and reported, and that the costs of these programs also be determined and reported. This model will relate the evaluation of progress to costs. It will also accept the common objectives that "all programs are designed to teach students to read."

To begin the presentation of the model and its development, a brief description of the programs to be studied will be made.

Regular Reading Program (Elementary)

The regular reading program is designed to be taught by the classroom teacher using an adopted textbook plus teacher optioned supplementary materials. For the purposes of this study, we will limit this control group to levels 2-3. Student minutes of exposure time to reading may vary but will be reflected in the cost analysis.

Regular Reading Program
(Secondary)

The regular reading program in the secondary schools is structured in the seventh grade by enrolling each seventh level student for one 55-minute period of reading per day for one semester. The eighth and ninth level curriculum includes English and literature. Students are enrolled for one 55-minute period per day per year. Therefore, levels 7-9 will be studied.

Traditional Remedial Reading

This program is designed to remediate those students who were not successful within the regular school program. The program operates in levels 2-9. For the purposes of this study, we'll be concerned only with grades 2, 3, and 7. This program traditionally is operated by master teachers who function within the specific school buildings. Most teachers are assigned to more than one building. The teachers use a wide variety of materials and techniques based on their professional experiences. Time allotments for student instruction vary but will be analyzed in detail for cost-effectiveness. In addition to remedial reading, it is assumed that the identified students may receive some reading instruction in the regular classroom.

Project Read

This program is a prepackaged program using a publishing company's format known as the Sullivan materials published by Behavioral Research Laboratories. According to the program description, this material is designed to lift a child from the status of "non-reader" to the status of "good" reader. This program is taught by the regular classroom teacher who does not present original material to the students but tutors them in their programmed instruction materials only when they require assistance. A sixty-minute daily session is allocated in each grade level, 1-6. We will study levels 2-3 in this study.

Alpha Learning Systems, Inc.
Performance Contracting Project

The Alpha Program utilizes existing facilities, software programmed materials, regular classroom teachers who have been trained to diagnose and prescribe a curriculum based on student needs, paraprofessionals as teacher assistants, behavioral modification and contingency management techniques of student incentives and teacher incentives plus a student reinforcing events room.

This program is part of the OEO Remedial Performance Incentive Program and services students in levels 1-3, and 7-9. The elementary grades meet for 55-minute

periods and the secondary groups for 45-minute periods. This study will include grades 2, 3, 7, 8, and 9.

Westinghouse Learning Corporation Performance Contracting Project

The Westinghouse Learning Corporation program operates in learning centers within a school building. This environment utilizes motivational techniques, self-instructional materials and an individually prescribed curriculum designed to meet the learning needs of the students. Students are given a diagnostic test upon entering the program. The results of this test are telexed to the Westinghouse Learning Corporation home office where a prescription is written for the student. A center manager (teacher) and paraprofessionals man the center and assist the students with their work, using both software and hardware materials. All students in levels 1-6 within a school participate in the program but for this study we are concerned with only those students in levels 2-3. Time allotted for learning center work is 37.5 minutes per day.

Combined Motivational and Educational Systems Performance Contract Project

The CMES project is a motivation-centered instructional program that is hardware orientated. After students are diagnosed, it is assumed that they are

appropriately placed in the curriculum where they work in their individual carrel. An integral part of the program is the self-concept development A.M.S. (Achievement Motivation Session). Students are reinforced for doing a "good" job by being rewarded with "free" time in a games room.

Students in grades 6-9 attend the MES center. Students spend 45 minutes in the center. For the purposes of this study, we will deal with students in grades 7-9.

The three performance contracting projects mentioned above held two-week preservice workshops for the staffs in addition to the regular school system orientation sessions to train them in the philosophy and materials of the program. This time spent in the workshop will be treated as an additional cost in the cost-effectiveness model

Student Body

The studied programs operate within the Title I area (inner city) identified as being eligible for compensatory education funds. A population sample was drawn from each of the programs. The students have been identified as the lowest performing students in reading in that grade level in selected schools as verified by the school system previous spring testing scores.

Residents of the Title I area are defined and designated by federal guidelines issued by the U.S. Office of Education are low income families with the majority being on public assistance. The universe of this study includes students from black, Caucasian and Spanish-speaking families. The criteria for compensatory education funds as defined by the U.S.O.E. is used herein in determining the population in this study. It is not within the scope of this study to differentiate between black, Caucasian or Spanish-speaking students and their abilities to perform toward established goals in reading. However, all students were at least two years below grade level.

In order to reduce class size and instructional time variables to a common denominator upon which to allocate the variable costs all student time will be reported in student minutes of exposure.

Evaluation Instruments

Students have been identified to participate in this study on the basis of their Title I residency and school attendance and their low performance in reading based on the 1969-71 school year spring tests.

Students studied represent grade levels 2, 3, 7, 8, and 9 and were enrolled in the reading program for the entire year. All students were tested on a standardized, nationally-known, commercially available achievement test.

They were post-tested on an alternate form of the same test (see Appendices).

To minimize the problem of "teaching the test" as occurred in the Texarkana Project, all tests were scanned (blinded) by National Testing Service, Lancaster, Pennsylvania. All tests were administered and scored by a disinterested "outside" evaluator, Battelle Memorial Institute of Columbus, Ohio. The tests were identical for each student on a given grade level regardless of the treatment group, i.e., each grade level received a different standardized test. All tests used in this study were selected by the Office of Economic Opportunity and concurred in by the local school system. To insure added integrity, attempting to determine the name of the test used was considered a contractual violation.

All pre-tests were administered within the first ten days of the 1970-71 school year while the post-tests were administered within the last ten days of the 1970-71 school year.

To further insure the credibility of the tests used and because of the students involved, historical difficulties, test identifications and specifications were outlined in the following memo to project directors from the OEO:

> This is to inform all parties, particularly subcontractors, of the level of test used for pre and post testing. As provided in clause 2.05.1

section D of the subcontract (TAC will make recommendations to the Project Manager regarding the appropriate test levels to be used. The Project Manager shall determine the level of test to be used), the following is a general description of the levels chosen.

In primary grades, the test levels were one level below that level normally used and recommended by the publisher. Example: Grade three was given a Level II test or grade two a Level I test.

In the secondary grades, the level used was Intermediate--grades 4, 5, and 6 for 7th grade and Advanced--grades 7, 8, and 9 for 8th and 9th grades.

The rationale for test selection was that students in this experiment were contractually required to be below grade level. As a class, regardless of their assigned grade level in school, they were functioning below grade level.

The decision to administer the **same** level test, alternate form, for the post as was given on the pre-administration was to prevent distortions due to imprecision of conversation between scores at one test level and another, even within the same test series.

We believe, due to the distortion involved in different level tests, that provisions for dealing with the test ceilings and the expected deficiencies of the students as shown on the pre-tests, that our action is reasonable.[82]

Statistical Techniques

Using an analysis of gain scores (from pre to post) achievement test scores, this study will be testing for the difference on the gain scores for achievement to determine if there is any significant difference between programs. The total cost differential will be related to the amount of gain to determine a total cost for the student's score in an attempt to identify the critical

---

[82]Charles Stalford, Office of Economic Opportunity memo, June 4, 1971.

variables that may have accounted for a student's achievement in the reading programs.

Program Variables

Traditionally, the instructional programs of the Grand Rapids district as well as other districts represent the conversion of the financial resources of the district into professional and non-professional services, facilities, and materials. These costs vary greatly from subject to subject, level to level, program to program, and building to building. Most districts used a line-item system of accounting for the operating costs of the district. This system provides a measure of control but is limited in budgeting and costing individual programs.

The accounting systems currently used in the nation's school districts serve their basic purpose, that of accounting for resources spent. The cost-effectiveness system outlined below is not intended to supplant the system but to supplement it and make it more valuable for planning.

The cost-effectiveness model designed for this study has accepted the basic objectives of the reading programs to teach children to read and has attempted to fulfill those objectives by means of an identified curriculum with a specified budget for the program for which an attempt is being made to account for the results. A complete set of line-item budgeting information is

currently available for each program. In addition to the budgetary factors, other program identification information such as who were the students, the nature of the curriculum, materials used, time scheduled, instructor and facilities used, is also available. The nature of the problem is then to relate these inputs to the outputs, i.e., the measured student grade gains.

To facilitate the distribution of costs of a specific reading program and other instructional programs included in the normal day of a student, six program variables have been identified by Dr. Stanley Hecker, Department of Administration and Higher Education, Michigan State University, recognized educational cost analysis expert in Michigan. He suggests the program "variables" are salaries, staff training, operating costs, incentives, facilities, materials and supplies.[83]

Simply defined, these basic variables help to define the program parameters.

The descriptive factors as defined by Dr. Hecker, and used in the construct of this study are as follows:

Salaries

Salaries consist of that remuneration paid to the professional and non-professional staff member who is directly involved in reading programs.

---

[83]Stanley Hecker, consultation with writer, April 29, 1971.

Staff Training

Staff training costs will report those costs spent by the technological firm or school district for the purpose of pre-service training of the staff in the operation of the specific programs studied.

Start-Up Costs

These costs represent district expenditures known as start-up costs only. These include hardware supplies such as teaching machines. The regularly commonly known normal operating costs will not be used because it is assumed that differences in these costs would be negligible in the different programs.

Incentives

Incentives costs are relegated to two categories: staff and students. They encompass the incentive bonuses paid to the staff and bonuses paid to students as reinforcement techniques.

Facilities

Facility costs are computed for only those costs incurred because of required remodeling or those costs for additional space other than that which is required for a regular classroom. It is a commonly accepted practice to amortize such initial remodeling costs over a ten-year period.

Materials and Supplies

Materials and supply costs include all of the software and other consumable supplies used in the program.

Programs cost analysis using the six variable dimensions listed above for the programs studied will be computed on the basis of student minute of exposure costs.

It was agreed for the purposes of this study, costs of system-wide administration, custodial care, transportation, student support services, facilities, and fixed costs across the system, will be assumed as being prorated equally among the reading programs studied, as well as to other educational programs operating within the district. This assumption is based upon the recommendation of Dr. Stanley Hecker, who also recommended the omission of possible payments to the performance contracting companies since this study is concerned with costs to the school district to turnkey or replicate the program.[84]

Summary

In summary, it appears that this cost-effectiveness model has the potential for providing information relevant to decision-making regarding resource allocation. In the case of performance contracting, it may also provide information for the school district as to the costs for turnkeying the operation, i.e., taking over that system of teaching reading.

[84] Ibid.

The study of the Grand Rapids reading programs using an analysis of variance statistical technique and then relating the annual program cost factor variables to the student grade gains, may result in an acceptable model to make future cost-effective studies.

Providing this kind of information for program planning is available in a local district and combining this information with program objectives and evaluation, educators may have relevant data to more effectively compete with other societal and governmental units for resources available.

Cost-effectiveness is identified in this model as a comparison between the costs of a program (inputs) and the benefits (outputs) resulting from the program.

CHAPTER IV

ANALYSIS OF SELECTED CRITERIA

In this chapter selected criteria are analyzed. The first section deals with the establishment of the cost factors affecting the operating costs of selected reading programs in the Grand Rapids Public Schools. The second section deals with the analysis of grade gain data of students in the studied programs. The third section deals with a comparison to determine the cost-effectiveness of the programs under study.

Cost Categories

Cost analysis is concerned with the determination of fiscal resource requirements for the studied programs. Within this analysis, six cost categories have been identified by Dr. Stanley Hecker, school finance expert at Michigan State University, as program variables and parameters.[85] They are staff salaries, costs for staff training, "start-up" costs of new programs, facility

---

[85] Ibid.

costs, student and teacher incentive costs, and costs for materials and supplies. Several other operational costs necessary for the comparison of all the programs were considered either as equal for each program or not considered at all because the total amount of cost was insignificant in relationship to other measurable costs. The descriptive factors of the measured costs are as recommended by Dr. Hecker and outlined in Chapter III. The development and computation of these factors follows.

Salaries

The annual remuneration paid to certified teachers and paraprofessionals directly involved in the reading programs was obtained from the Grand Rapids Public Schools' business office records. In the program analysis following this section, staff time spent in reading activities is prorated in proportion to the full teaching day activities of the teachers, aides, etc.

It was recommended by Dr. Hecker that building principal services, district-wide administration, custodial services, etc. be omitted from this study as they could be considered prorated equally for all programs in the district.[86] In other words, there was no more nor less support services in the performance contracting or prepackaged program than in the control programs.

---

[86] Ibid.

Staff Training

Extra staff pre-service and in-service costs have been incurred by the school district or technological firm in some instances. All such training time and costs have been recorded as being in addition to the regular working hours and costs thereof. When training costs were assumed by the outside company, costs were provided from company records requested by the school district. Extra staff training was done during the summer in workshops. Training obtained during the regular school year was not at an additional cost. This time was considered part of the normal reading activities time and included in that time/cost framework.

Start-Up Costs

District expenditures for such things as teaching machines and other similar hardware items were considered a part of start-up costs. Usual normally used consumable items such as chalk, paper, pencils, etc. were not considered to have a cost effect on the outcome of the analysis.[87] The costs for non-consumable items are amortized over a three-year period as is common practice in Grand Rapids.

---

[87] Ibid.

Incentives

Student incentives such as motivational rewards are computed separately from teacher incentives. All costs for incentives were obtained from company records.

Facilities

Facility costs are computed for those costs incurred because of required remodeling such as installation of carpeting, air-conditioning, carrels, etc., or those costs for added classroom space due to special extra space needs of the specific program. These costs were obtained from the school district files and records. It is a commonly accepted practice in Grand Rapids to amortize such initial remodeling costs over a ten-year period.

Materials and Supplies

The costs include all consumable software materials used in the programs such as program instruction books, workbooks and unit teaching materials.

Cost Category Summary

The services and items listed above, required for the educational program and identified in these cost categories were to be considered as the basic cost elements necessary to implement and operate the six reading programs. This structure, then, provides the basic framework for identifying the variable costs of each program studied.

Structure of the Model

The cost analysis model used here in this study develops a program description in terms of number of staff members involved in reading activities, numbers of students, and unit time elements and other resources required. Due to the variety of programs and different time allotments for the reading activities in the several programs, it was necessary to determine a specific unit of time as a common denominator to later develop total cost data. The student minutes of exposure (SME) appeared to be the most accurate basis to determine costs. It was recommended by Professor Stanley Hecker and developed by James J. Gallagher, Director of Budget and Finance for the Grand Rapids Public Schools.[88]

The student minutes of exposure (SME) is determined according to the following formula: Number of Students (NS) multiplied by Instructional Time (T) multiplied by 180 school days per year equals Student Minutes of Exposure (NS x T x 180 = SME).

All costs are determined on the basis of SME (student minutes of exposure) and computed to the sixth decimal place as recommended by Mr. Gallagher.[89] Mr. Gallagher used the rationale that computing costs in the Grand

---

[88] Ibid. James J. Gallagher, consultation with writer, May 13, 1971.

[89] Gallagher, op. cit.

Rapids school district for 35,000 students with a total of 2,268,000,000 SME per year, a one numeric decimal of the sixth place is equal to $2,268.

Program Description and Costs

For the purposes of this study, reading instruction time is defined as the total time spent by staff members in the reading activities of preparation, presentation (individual as well as group instruction), evaluation, etc. Some staff members in several of the programs had other teaching assignments which were prorated to determine the time spent and costs incurred in the program studied.

Following are brief descriptions of the six reading programs, their instructional strategy, and the cost development for each. The costs have been computed on the student minutes of exposure basis in the six cost categories previously mentioned. However, after all computations are made, a final annual cost per student will be generated to more easily evaluate the cost-effectiveness of the programs studied. It is this resulting program cost that will be the comparable determinant in relating output (student achievement gains) to input (costs) or as Lessinger says "Links learning to costs."[90]

---

[90]Lessinger, op. cit., pp. 9-11.

The cost per unit of achievement will be reported for grades 2, 3, 7, 8, and 9. The reader will note that computed costs for several grade levels not studied in depth in this research was necessary in order to develop more accurate average costs for those programs being studied. Specifically, grades 1 through 9 will be reported in terms of cost per student minutes of exposure; grades 1, 4, 5, and 6 will not be used in terms of student performance. This was done because in-service time, supplies, etc., were part of the total costs for all students in the total reading program in the school. Since this study only uses certain grade levels, the need for prorating the actual costs for only those students in the programs studied existed.

The decision was made after consultation with the author's advisor and Michigan State University Research and Evaluation staff director and statistician not to include grade one in the study, because of an inadequate testing measure to determine first grade level student achievement.[91]

The relationship between cost (input) and effectiveness (output) will be reported for the following grade levels as listed below for the six programs studied.

---

[91]Norman P. Weinheimer, Andrew Porter, and Geoffry Yager, consultation with writer, March 3, 1972.

Reading Program	Grade				
	2	3	7	8	9
Alpha Learning	x	x	x	x	x
Westinghouse	x	x			
Combined Motivation and Education			x	x	x
Project Read	x	x			
Traditional Remedial Reading	x	x	x		
Control (Regular School)	x	x	x	x	x

The Alpha Learning Systems program cost data reported below, follows the model used in determining costs of staff, start-up, training, incentives, facilities, and materials and supplies. Each of the other five programs are developed according to this model. Narrative detail will not be used unless deviation from the model format is necessary. The deviation will then be explained.

Variable Cost Data Summary sheets follow each program's cost development description.

ALPHA II LEARNING SYSTEMS, PERFORMANCE CONTRACTING PROJECT

The Alpha contract learning project in reading and math served 100 students in each of grade levels 1, 2, 3, 7, 8, and 9 for a total of 600 students. Seven teachers and twelve aides were assigned to this project. In the elementary grades (1, 2, 3), four teachers and six aides taught 300 students reading and math for approximately 55 minutes in each subject. All elementary students were

assigned to project classroom for 55 minutes daily for reading. Students were assigned on the basis of their educational needs rather than by school-identified classroom grade level. While student schedules were flexible, all students met the daily time requirements. For the purposes of this study, the reinforcing events (R.E.) room is also considered a classroom area.

The 300 middle (7, 8, 9) school students were assigned to a daily 45-minute period for reading. Three teachers and six aides served them.

Fifty per cent of the total staff (teachers and aides) time was spent in reading activities and 50 per cent in mathematics activities.

The following was developed for the Alpha reading program using the SME formula, number of students (NS) multiplied by instructional time (T) multiplied by 180 school days per year equals Student Minutes of Exposure (NS x T x 180 = SME).

Grade Level	Student Minutes of Exposure Reading	
1	100 x 55 x 180 =	990,000
2	100 x 55 x 180 =	990,000
3	100 x 55 x 180 =	990,000
7	100 x 45 x 180 =	810,000
8	100 x 45 x 180 =	810,000
9	100 x 45 x 180 =	810,000
	Total SME for Reading =	5,400,000
	Total Program SME =	10,800,000

To determine accurate costs, it was necessary to include the first grade level x student time (SME) as well as the total project time of 10,800,000 SME. Total SME is the sum of both subjects (reading and mathematics) SME.

In the Alpha program, the six cost variables of salaries, staff training, start-up costs, incentives, facilities and materials and supplies are computed using the total grade level SME as the common denominator.

Salary Costs

Salaries consist of that remuneration paid to professional and non-professional staff members directly involved in the programs. The salaries are totaled and divided by the number of teachers to determine the average salaries. Because there were an uneven number of teachers for grades taught, salary cost statistics had to be converted to "average" salaries for further development of the cost statistics. It was also argued by the chairman of the author's committee that "averages" were more realistic than attempting to prorate actual salaries of individual teachers from $8,200 in one classroom to $14,000 in another. "Averages" tend to more effectively reflect a regular school system situation in more realistically establishing staff costs.

The average of the elementary teacher's salary in the Alpha program is $9,437.50 for teaching reading and

Professional Staff Salary Data

Elementary Teacher	Salary
A	$11,750.00
B	9,800.00
C	8,000.00
D	8,200.00
	$37,750.00 ÷ 4 = $9,437.50

Middle Teacher	Salary
E	$ 8,000.00
F	8,000.00
G	8,400.00
	$24,444.00 ÷ 3 = $8,133.33

mathematics. Because 50 per cent of the project time is spent in reading activities the average reading salary is $4,718.75.

The average of the middle school teacher's salary in the Alpha program for reading and mathematics is $8,133.33. Average salary cost for teaching reading is $4,066.00.

Paraprofessional salaries are also developed on the average for the elementary and middle school programs. The average elementary paraprofessional salary cost is $2,957.66. Fifty per cent of this cost is allocated to reading. That cost is $1,478.00. The average middle school paraprofessional salary cost is $2,676.00. The cost allocated to reading is $1,388.00.

Paraprofessional Staff Salary Data

Staff Member	Salary
A	$ 2,676.00
B	2,676.00
C	4,500.00
D	2,676.00
E	2,676.00
F	2,542.00
	$17,746.00 ÷ 6 = $2,957.66
G	$ 2,542.00
H	2,542.00
I	2,810.00
J	2,810.00
K	2,542.00
L	2,810.00
	$16,056.00 ÷ 6 = $2,676.00

Summary of Staff Average Costs for Reading

Elementary	
Professional	$4,718.75
Paraprofessional	1,478.00
Middle School	
Professional	4,066.00
Paraprofessional	1,388.00

To determine salary cost of instruction per minute of student exposure, the average salary costs are divided by the number of staff members, number of subjects taught, and by the total grade level SME per subject.

The following chart represents these salary costs (cost ÷ number of staff members ÷ number of subjects ÷ total SME = cost per SME):

Elementary Professional Salary (Grades 1, 2, 3)

$9,437.50 x 1-1/3 ÷ 2 = $6,275.94 ÷ 990,000 = $.006339

Elementary Paraprofessional Salary (Grades 1, 2, 3)

$2,957.66 x 2 ÷ 2 = $295.66 ÷ 990,000 = $.002987

Middle School Professional Salary (Grades 7, 8, 9)

$8,133.33 ÷ 2 = $4,066.67 ÷ 810,000 = $.005020

Middle School Paraprofessional Salary (Grades 7, 8, 9)

$2,676 x 2 ÷ 2 = $2,676 ÷ 810,000 = $.003303

Staff Training (Pre-Service and In-Service

Staff training costs reflect those added costs spent by the technological firm or school district for the purpose of pre-service and in-service training of the staff in the specific operation of the specific programs studied.

Alpha spent $1,688.00 for pre-service training. Distributed over $10,800,000 SME (total project time), this cost equals $.000156 per minute of SME ($1,688.00 + 10,800,000 = $.000156).

Start-Up Costs

These costs represent district expenditures known as start-up costs only. They include hardware supplies such as teaching machines, etc. The regularly known normal operating costs are not used because it has been assumed that differences in these costs would be negligible in the different programs.[92] There were no Alpha start-up costs.

Incentives

Alpha student incentive costs totaled $4,946.50. This cost divided by the total project SME (10,800,000) equals $.000458 per student minute of exposure ($4,946.50 ÷ 10,800,000 = $.000458).

Alpha staff incentive costs totaled $14,172.96. This cost divided by the total project SME (10,800,000) equals $.000386 per student minute of exposure $4,172.96 ÷ 10,800,000 = $.000386).

Facilities

Facility costs are computed for only those costs incurred because of required remodeling or those costs for additional space other than that which is required for a regular classroom. It is commonly accepted practice to amortize such initial remodeling costs over a ten-year period of time.

---

[92]Hecker, op. cit.

Remodeling costs in the Alpha project were $217.70. This cost divided by the total project SME and spread over ten years equaled $.000002 ($217.70 ÷ 10,800,000 ÷ 10 = $.000002).

The Alpha program for 600 students required the equivalence of seven classrooms for instruction and three additional classrooms for reinforcing events rooms. Assuming that the regular class size per room in Grand Rapids is thirty, the 600 Alpha students would have required twenty classrooms. Because students are only in the reading program for approximately one-half of their instructional time, the required room space is ten classrooms. Since ten rooms were used, it can be stated that no additional costs for additional space was required.

Materials and Supplies

Materials and supplies costs include all of the software and other consumable items used in the program.

Alpha's cost for this item was $14,929.35. This figure divided by total SME (10,800,000) equals $.001336 per student minute of exposure ($14,929.35 ÷ 10,800,000 = $.001336).

As was stated earlier, it was also agreed for purposes of this study, costs of system-wide administration, custodial care, transportation, student support services, facilities, and fixed costs across the system, are assumed

as being prorated equally among the programs studied, as well as to other programs operating within the district.[93]

Variable Cost Data annual totals were computed using specific salaries (see Variable Cost Data Chart I). The grade level totals equal the sum of the costs per student minute of exposure in the six cost indexes: salaries, staff training, start-up costs, facility costs, student and teacher incentive costs, and material and supplies costs multiplied by the SME for a particular grade level. These figures were totaled and divided by the number of students in the project to determine the annual cost per student. Thus, the annual cost per student formula is the cost totals multiplied by the SME divided by the number of students to determine the annual cost per student.

Alpha Reading--Comparative Cost Data per SME
(Cost x SME = Annual Cost)

Grade Level	Total SME Cost	Annual Cost
1	$.011664	$11,547.00
2	.011664	11,547.00
3	.011664	11,547.00
7	.010661	8,635.41
8	.010661	8,635.41
9	.010661	8,635.41
		$60,547.23

[93] Ibid.

CHART I

Variable Cost Data--Alpha II Learning Systems

Salaries Cost Data and Student Information	Level Category--Reading						Project Totals
	1	2	3	7	8	9	
Number of Students	100	100	100	100	100	100	600
Student Minutes of Exposure	55	55	55	45	45	45	. .
Total Student Minutes of Exposure	990,000	990,000	990,000	810,000	810,000	810,000	10,800,000
Professional Staff	1-1/3	1-1/3	1-1/3	1	1	1	7
Professional Staff Cost:	$4,718.75	$4,718.75	$4,718.75	$4,066.67	$4,066.67	$4,066.67	. .
Para-Professional Staff	2	2	2	2	2	2	12
Para-Professional Staff Cost:	$1,478.88	$1,478.88	$1,478.88	$2,338.00	$2,338.00	$2,338.00	. .
							1,688.00
Start-Up Costs							217.70
Staff Training							
Facilities							4,172.96
Incentives:							4,946.50
Professional							
Student							14,429.35
Materials and Supplies							
Cost Per Student Minute by Category							
Specific Salary:							
Professional	$.006339	$.006339	$.006339	$.005020	$.005020	$.005020	$.005020
Para-Professional	$.002987	$.002987	$.002987	$.003303	$.003303	$.003303	$.003303
Start-Up Costs:							
Staff Training	$.000156	$.000156	$.000156	$.000156	$.000156	$.000156	$.000156
Facilities	$.000002	$.000002	$.000002	$.000002	$.000002	$.000002	$.000002
Incentives:							
Professional	$.000386	$.000386	$.000386	$.000386	$.000386	$.000386	$.000386
Student	$.000458	$.000458	$.000458	$.000458	$.000458	$.000458	$.000458
Materials and Supplies	$.001336	$.001336	$.001336	$.001336	$.001336	$.001336	$.001336
Totals	$.011664	$.011664	$.011664	$.010661	$.010661	$.010661	$.010661

Reading program cost ÷ number of students = annual cost per student $60,547.23 ÷ 600 = $100.91.

As previously stated, the following five other programs (CMES, Westinghouse Learning Corp., Traditional Remedial Reading, Project Read, and Control Schools) will be reported using this same model. Detail or further explanation will not be reported unless a deviation from this model is necessary.

WESTINGHOUSE LEARNING CORPORATION,

PERFORMANCE CONTRACTING PROJECT

Elementary Program: Reading and Math

Grade Levels: 1-6

Professional Staff: 2

Paraprofessional Staff: 6

Students Enrolled

Grade Level	
1	53
2	53
3	48
4	54
5	56
6	64
Total	328

Student Minutes of Exposure (SME)

Grade Level

1	53 x 37.5 x 180 =	357,750
2	53 x 37.5 x 180 =	357,750
3	48 x 37.5 x 180 =	324,000
4	54 x 37.5 x 180 =	364,500
5	56 x 67.5 x 180 =	680,400
6	64 x 67.5 x 180 =	777,600
	Total Reading SME	2,862,000
	Total Program SME	5,724,000

Staff Salaries

Professional

A	$11,516.00
B	8,700.00
	$20,216.00 ÷ 2 = $10,108.00

Paraprofessional

A	$ 2,542.00
B	2,542.00
C	2,542.00
D	2,542.00
E	2,542.00
F	2,542.00
	$15,252.00 ÷ 6 = $2,542.00

As in the Alpha program, one-half of a staff member's day is spent in reading activities, therefore, 50 per cent of that salary is allocated to reading.

Summary of Staff Average Costs for Reading

Professional Salary

$10,108.00	$5,054.00

Paraprofessional Salary

$ 2,542.00	$1,271.00

Average of Specific Salary Costs per Student Minute of Exposure

(Salary x Staff ÷ Subjects ÷ SME equals cost per SME)

Grade Level 1

Professional Salary

$10,108 x 1/3 ÷ 2 = $1,684.66 ÷ 357,750 = $.004709

Paraprofessional Salary

$2,542 x 1 ÷ 2 = $1,271 ÷ 357,750 = $.003353

Grade Level 2

Professional Salary

$10,108 x 1/3 ÷ 2 = $1,684.66 ÷ 357,750 = $.00709

Paraprofessional Salary

$2,542 x 1 ÷ 2 = $1,271 ÷ 357,750 = $.003353

Grade Level 3

Professional Salary

$10,108 x 1/3 ÷ 2 = $1,684.66 ÷ 324,000 = $.005200

Paraprofessional Salary

$2,542 x 1 ÷ 2 = $1,271 ÷ 324,000 = $.003923

Grade Level 4

Professional Salary

$10,108 x 1/3 ÷ 2 = $1,684.66 ÷ 364,500 = $.004622

Paraprofessional Salary

$2,524 x 1 ÷ $1,271 ÷ 364,500 = $.003487

Grade Level 5

Professional Salary

$10,108 x 1/3 ÷ 2 = $1,684.66 ÷ 680,400 = $.002476

Paraprofessional Salary

$2,542 x 1 ÷ 2 = $1,271 ÷ 680,400 = $.001868

Grade Level 6

Professional Salary

$10,108 x 1/3 ÷ 2 = $1,684.66 ÷ 777,600 = $.002166

Paraprofessional Salary

$2,542 x 1 ÷ 2 = $1,271 ÷ 777,600 = $.001635

Staff Training

Costs ÷ total SME = Cost per SME

$2,000 ÷ 5,724,000 = $.000349

Start-Up Costs

Cost ÷ amortization time - total SME = Cost per SME

$8,000 ÷ 3 ÷ 5,724,000 = $.000466

Incentives (Student)

Cost ÷ total SME = Cost per SME

$1,200 ÷ 5,724,000 = $.000209

Facilities--Remodeling

Cost ÷ amortization time ÷ total SME = Cost per SME

$10,500 ÷ 10 ÷ 5,724,000 = $.000183

Materials and Supplies

Cost ÷ total SME = Cost per SME

$7,000 ÷ 5,724,000 = $.001222

Westinghouse Reading Comparative Cost Data per SME
(See Chart II)

Grade Level	Totals	Annual Cost
1	$.010691	$ 3,824.71
2	.010691	3,824.71
3	.011552	3,742.85
4	.010538	3,841.10
5	.006773	4,608.35
6	.006230	4,844.45
		$24,686.17

Chart II

Variable Cost Data--Westinghouse Learning Corporation

Salaries Cost Data and Student Information	Level Category--Reading						Project Totals
	1	2	3	4	5	6	
Number of Students	53	53	48	54	56	64	328
Student Minutes of Exposure	37.5	37.5	37.5	37.5	67.5	67.5	. .
Total Student Minutes of Exposure	357,750	357,750	324,000	364,500	680,400	777,600	5,724,000
Professional Staff	1/3	1/3	1/3	1/3	1/3	1/3	2
Professional Staff Cost:	$1,684.66	$1,684.66	$1,644.66	$1,684.66	$1,684.66	$1,684.66	. .
Para-Professional Staff	1	1	1	1	1	1	6
Para-Professional Staff Cost:	$1,271.00	$1,271.00	$1,271.00	$1,271.00	$1,271.00	$1,271.00	. .
Start-Up Costs							$2,000.00
Staff Training							$10,500.00
Facilities							
Incentives:							
Professional							
Student							$1,200.00
Materials and Supplies							$7,000.00
Cost Per Student Minute by Category							
Specific Salary:							
Professional	$.004709	$.004709	$.005200	$.004622	$.002476	$.0002166	
Para-Professional	$.003553	$.003353	$.003923	$.003487	$.001868	$.0001635	
Start-Up Costs:							
Staff Training	$.000349	$.000349	$.000349	$.000349	$.000349	$.000349	
Facilities	$.000183	$.000183	$.000183	$.000183	$.000183	$.000183	
Incentives:							
Professional	. .	. .	. .	. .	. .	. .	
Student	$.000209	$.000209	$.000209	$.000209	$.000209	$.000209	
Material and Supplies	$.001222	$.001222	$.001222	$.001222	$.001222	$.001222	
Totals	**$.010691**	**$.010691**	**$.011552**	**$.010538**	**$.006771**	**$.006230**	

Annual Reading Cost Per Pupil

Total cost ÷ number of students = Annual Reading Cost per Student

$24,686.17 ÷ 328 = $75.26

COMBINED MOTIVATION AND EDUCATIONAL SYSTEMS,

PERFORMANCE CONTRACTING PROJECT

Middle School Program: Reading and Mathematics

Grade Levels: 6-9

Professional Staff: 4

Paraprofessional Staff: 9

Students

Grade Level	
6	190.5
7	124
8	120
9	50
Total	484.5

Student Minutes of Exposure (SME)

Grade Level		
6	190.5 x 45 x 180 =	1,543,050
7	124 x 45 x 180 =	1,004,400
8	120 x 45 x 180 =	972,000
9	50 x 45 x 180 =	405,000
	Total per Subject	3,924,450
	Total Program	7,848,900

Staff Salaries

Professional

A	$11,600.00
B	8,000.00
C	9,000.00
D	9,400.00
	$38,000.00 ÷ 4 = $9,500.00

Paraprofessional

A	$ 2,676.00
B	2,676.00
C	2,676.00
D	2,810.00
E	2,542.00
F	3,075.00
G	2,943.00
H	2,676.00
I	2,810.00
	$24,884.00 ÷ 9 = $2,764.88

Summary of Staff Average Costs for Reading

Professional Salary	$9,500.00	$4,750.00
Paraprofessional Salary	$2,764.88	$1,382.44

Specific Salary Costs per Student Minute of Exposure

(Salary x number of staff ÷ number of subjects ÷ SME = Cost per SME)

Grade Level 6

Professional Salary

$9,500 ÷ 2 = 4,750 ÷ 1,543,050 = $.003078

Paraprofessional Salary

$2,764.88 x 2.25 ÷ 2 = 3,110.49 ÷ 1,543,050 = $.002016

Grade Level 7

Professional Salary

$9,500 ÷ 2 = 4,750 ÷ 1,004,400 = $.004729

Paraprofessional Salary

$3,110.49 x 2.25 ÷ 2 ÷ 1,004,400 = $.003097

Grade Level 8

Professional Salary

$9,500 ÷ 2 = 4,750 ÷ 972,000 = $.004886

Paraprofessional Salary

$3,110.49 x 2.25 ÷ 2 ÷ 972,000 = $.003200

Grade Level 9

Professional Salary

$9,500 ÷ 2 = 4,750 ÷ 405,000 = $.011728

Paraprofessional Salary

$3,110.49 x 2.25 ÷ 2 ÷ 405,000 = $.007680

Staff Training

Cost ÷ total SME = Cost per SME

$1,500 ÷ 7,848,900 = $.000191

Start-Up Costs

Cost ÷ amortization time ÷ total SME = Cost per SME

$51,000 ÷ 3 = 17,000 ÷ 7,848,900 = $.002165

Incentives (Student)

Cost ÷ total SME = Cost per SME

$1,000 : 7,848,900 = $.000127

Facilities--Remodeling

Cost ÷ amortization time ÷ total SME = Cost per SME

$9,500 ÷ 10 ÷ 7,848,900 = $.000121

Materials and Supplies

Cost ÷ total SME = Cost per SME

$35,000 ÷ 7,848,900 = $.004459

CMES Reading Comparative Cost Data per SME
(See Chart III)

Grade Level	Total SME Cost	Annual Cost Specific
6	$.012158	$18,760.40
7	$.014890	14,955.52
8	$.015150	14,725.80
9	.022024	8,919.72
		$57,361.44

CHART III

Variable Cost Data--Combined Motivation and Educational Systems

Salaries Cost Data and Student Information	Level Category--Reading				Project Totals
	6	7	8	9	
Number of Students	190.5	124	120	50	484.5
Student Minutes of Exposure	45	45	45	45	. .
Total Student Minutes of Exposure	1,543,050	1,004,400	972,000	405,000	7,848,900
Professional Staff	1	1	1	1	4
Professional Staff Cost:	$4,750.00	$4,750.00	$4,750.00	$4,750.00	. .
Para-Professional Staff	2.25	2.25	2.25	2.25	9
Para-Professional Staff Cost:	$1,382.44	$1,382.44	$1,382.44	$1,382.44	
Start-Up Costs					$51,000.00
Staff Training					$ 1,500.00
Facilities					$ 9,500.00
Incentives:					
Professional					
Student					$ 1,000.00
Materials and Supplies					$35,000.00
Cost Per Student Minute by Category					
Specific Salary:					
Professional	$.003078	$.004729	$.004886	$.011728	
Para-Professional	$.002016	$.003097	$.003200	$.007680	
Start-Up Costs:	$.002166	$.002166	$.002166	$.002166	
Staff Training	$.000191	$.000191	$.000191	$.000191	
Facilities	$.000121	$.000121	$.000121	$.000121	
Incentives					
Professional					
Student	$.000127	$.000127	$.000127	$.000127	
Materials and Supplies	$.004459	$.004459	$.004459	$.004459	
Totals	**$.012158**	**$.014890**	**$.015150**	**$.022024**	

Annual Reading Cost per Student

Total cost ÷ number of students = Annual reading cost per student

$47,361.44 ÷ 484.5 = $118.39

PROJECT READ--"CANNED" PROGRAM

Elementary Program: Reading

Grade Levels: 1-5

Professional Staff: 17

Paraprofessional Staff: 8

Students

Grade Level	
1	66
2	58
3	95
4	83
5	73
Total	375

Student Minutes of Exposure (SME)

Project Read teachers have documented that they spend the required 60 minutes per day teaching reading. The Grand Rapids Public Schools GREA Master Agreement specifies 1,575 minutes of classroom exposure for elementary students in the total curriculum area. One day of exposure of the professional or paraprofessional is equal

to 315 minutes. Reading time is 60 minutes of this 315. The relationship of reading time to the total day's curriculum is .190476 (60 ÷ 315 = .190476). This factor will be used as a determinant in allocating the costs for reading.

Grade Level

1	66 x 60 x 180 =	712,800
2	58 x 60 x 180 =	626,400
3	95 x 60 x 180 =	1,026,000
4	83 x 60 x 180 =	896,400
5	73 x 60 x 180 =	788,400
	Total	4,050,000

Staff Salaries

Grade Level 1

Professional

A	$ 8,200.00	
B	8,200.00	
C	8,000.00	
	$24,400.00 ÷ 3 =	$8,133.33

Paraprofessional

B	$ 2,542.00	
C	3,075.00	
D	2,810.00	
	$ 8,427.00 ÷ 3 =	$2,809.00

Grade Level 2

Professional

A	$ 7,800.00
B	9,800.00
C	10,900.00
	$28,500.00 ÷ 3 = $9,500.00

Paraprofessional

A	$ 3,075.00
B	2,676.00
	$ 5,751.00 ÷ 2 = $2,875.50

Grade Level 3

Professional

A	$ 8,400.00
B	8,400.00
C	10,300.00
D	10,300.00
	$37,400.00 ÷ 4 = $9,350.00

Paraprofessional

A	$ 2,676.00
B	2,542.00
	$ 5,218.00 ÷ 2 = $2,609.00

Grade Level 4

Professional

A	$ 8,700.00
B	11,600.00
C	11,600.00
D	8,200.00
	$40,100.00 ÷ 4 = $10,025.00

Paraprofessional

A	$ 2,542.00
B	2,676.00
	$ 5,218.00 ÷ 2 = $2,609.00

Grade Level 5

Professional

A	$ 7,800.00
B	8,200.00
C	9,008.00
	$25,008.00 ÷ 3 = $8,336.00

Summary of Staff Average Costs

Professional

Grade Level

1	$ 8,133.33
2	9,500.00
3	9,350.00
4	10,025.00
5	8,336.00

Paraprofessional

Grade Level

1	$ 2,809.00
2	2,875.00
3	2,609.00
4	2,609.00
5	-0-

The average of the specific professional and paraprofessional salaries are computed by grade level in Project Read because it is possible to determine that the teachers and aides teach only students on that grade level, whereas, in the performance contract programs, salaries were computed on a total of grade levels served since students were "in and out" of the program taking

other subjects in other classrooms utilizing the learning center as opposed to the self-contained classroom.

Average of the Specific Salary Costs per SME

Grade Level 1

Professional

$8,133.33 x .190476 ÷ 712,800 x 3 = $.006519

Paraprofessional

$2,809.00 x .190476 ÷ 712,800 x 3 = $.002252

Grade Level 2

Professional

$9,500 x .190476 ÷ 626,400 x 3 = $.008664

Paraprofessional

$2,875.50 x .190476 ÷ 626,400 x 2 = $.001748

Grade Level 3

Professional

$9,350 x .190476 ÷ 1,026,000 x 4 = $.006940

Paraprofessional

$2,609 x .190476 ÷ 1,026,000 x 2 = $.000969

Grade Level 4

Professional

$10,025 x .190476 ÷ 896,400 x 4 = $.008520

Paraprofessional

$2,609 x .190476 ÷ 896,400 x 2 = $.001180

Grade Level 5

Professional

$8,336 x .190476 - 788,400 x 3 = $.006039

Paraprofessional

Staff Training

No costs

Start-Up

No costs

Incentives

No costs

Facilities

No costs

Materials and Supplies

Software materials used are programmed for individual student instruction. The school district pays the technological firm $20 per student enrolled. There were 375 students enrolled in the Project Read Program in the elementary school studied. Thus, the costs were $7,500.00 ($20.00 x 375 = $7,500.00).

Costs ÷ total SME = Cost per SME

$7,500 ÷ 4,050,000 = $.001852

Project Read--Reading Comparative Cost per SME
(See Chart IV)

Grade Level	Totals	Annual Cost
1	$.010623	$ 7,562.07
2	.012264	7,682.17
3	.009770	10,024.02
4	.011561	10,363.28
5	.008791	6,930.82
		$42,572.36

Annual Reading Cost
per Student

Total cost ÷ number of students = Annual cost per student

$42,572.36 ÷ 375 = $113.53

TRADITIONAL REMEDIAL READING

Elementary and Middle School Program

Grade Levels: 1-7

Professional Staff: 16

Paraprofessional Staff: 0

Students

Grade Level	Number
1	55
2	120
3	111
4	108
5	72
6	26
7	66
Total	558

CHART IV

VARIABLE COST DATA--PROJECT READ

Salaries Cost Data and Student Information	Level Category--Reading					Total
	1	2	3	4	5	
Number of Students	66	58	95	63	73	375
Student Minutes of Exposure	60	60	60	60	60	
Total Student Minutes Of Exposure	712,800	626,400	1,026,000	896,400	1,050,000	
Professional Staff	3	3	4	4	3	17
Professional Staff Cost:	$1,549.20	$1,809.52	$1,780.95	$1,909.52	$1,582.80	. .
Para-Professional Staff	3	2	2	2	. .	7.5
Para-Professional Staff Cost:	$535.04	$547.71	$496.96	$496.96	. .	
Start-Up Costs						
Staff Training						
Facilities						
Incentives:						
Professional						
Student						
Materials and Supplies						$7,500
Cost Per Student Minute by Category						
Specific Salary:						
Professional	.006519	.008664	.006949	.008529	.006939	
Para-Professional	.002252	.001748	.000969	.001180	. .	
Start-Up Costs:						
Staff Training						
Facilities						
Incentives:						
Professional						
Student						
Materials and Supplies	.001852	.001852	.001852	.001852	.001852	
Totals	.010623	.012264	.009770	.0011561	.008791	

Student Minutes of Exposure (SME)

Student minutes of exposure per a given grade level were computed by documenting the number of students exposed to all teachers teaching on that grade level and multiplying that number by the number of minutes spent in reading activities (see Chart V for computation).

Grade Level	
1	510,840
2	2,303,640
3	1,779,660
4	1,132,560
5	821,700
6	353,340
7	627,480
Total	7,528,860

Traditional Remedial Reading
Staff Salary Cost Data

Professional	Salaries
A	$ 12,516.00
B	14,416.00
C	14,716.00
D	14,416.00
E	14,966.00
F	10,016.00
G	12,716.00
H	14,566.00
I	12,816.00
J	14,566.00
K	12,516.00
L	14,866.00
M	14,716.00
N	15,116.00

CHART V

TRADITIONAL REMEDIAL READING TIME FACTOR RELATIONSHIPS

Name	Level 1			2			3			4			5			6			7 and Other		
	Stu.	Time	SME	Stu.	Time	SME	Stu.	Time	SME	Stu.	Time	SME	Stu.	Time	SME	Stu.	Time	SME	Stu.	Time	SME
Teacher A	4	30	120	13	41	1833	15	141	2115	-	-	-	2	10	20	-	-	-	-	-	-
Teacher B	3	17	51	13	71	923	8	69	552	4	80	120	1	36	36	4	30	120	-	-	-
Teacher C	-	-	-	26	174	4524	9	84	756	5	30	150	-	-	-	-	-	-	-	-	-
Teacher D	8	20	160	7	53	371	14	51	714	12	60	720	1	33	33	1	30	30	-	-	-
Teacher E	-	-	-	7	87	609	9	100	900	16	30	480	4	40	160	3	27	81	-	-	-
Teacher F	7	41	287	5	75	375	12	101	1212	4	29	116	5	30	150	-	-	-	-	-	-
Teacher G	14	68	952	9	68	612	6	68	408	7	68	476	7	30	210	-	-	-	-	-	-
Teacher H	1	29	29	-	-	-	-	-	-	-	-	-	4	54	216	7	54	378			197
Teacher I	-	-	-	1	26	26	1	26	26	3	53	159	9	53	477	2	53	106			264
Teacher J	2	18	36	19	68	1292	7	88	476	8	68	544	5	68	340	1	30	30	-	-	-
Teacher K	10	21	210	2	8	16	6	78	468	18	69	1242	14	62	868	-	-	-	-	-	-
Teacher L	1	23	23	8	51	408	8	66	528	8	66	528	5	66	330	1	47	47	-	-	-
Teacher M	5	34	170	11	65	715	7	65	455	4	70	280	5	65	325	-	-	-	-	-	-
Teacher N	-	-	-	6	49	294	9	53	477	9	53	477	10	68	600	7	53	371			
Teacher O			800			800			800			800			800			800			3025
Teacher P																					
																		1963			3486
Student Minute Per Day			2838			12798			9887			6292			4565						
																		353340			627480
Student Minute Per Year			510840			2303640			1779660			1132560			821700						
Grand Total Minutes																					7,528,860

Professional	Salaries
O	$ 15,216.00
P	14,566.00
Total	$227,706.00

There are no paraprofessionals employed in this program.

Due to the great variance in teaching schedules and student minutes of exposure, as evidenced in Chart V, it was necessary to determine the total per cent of exposure time per grade level and determine its relationship to the total SME. Teachers' total time (100%) is devoted to remedial reading activities. As specified in Chart V, total SME for all grade levels equals 7,528,860.

Factor development follows using the formula: Grade level SME ÷ total SME = Grade level salary allocation.

Grade Level				
1	510,840	÷ 7,528,860	=	.0678
2	2,303,640	÷ 7,528,860	=	.3062
3	1,779,660	÷ 7,528,860	=	.2363
4	1,132,560	÷ 7,528,860	=	.1504
5	821,700	÷ 7,528,860	=	.1091
6	353,340	÷ 7,528,860	=	.0469
7	627,480	÷ 7,528,860	=	.0833

Average of the Specific Salary Costs per SME

Grade Level	Factor	Salary	Cost per SME
1	.0678	$ 15,100.00	$.029559
2	.3062	68,193.00	.029602
3	.2363	52,625.00	.029570
4	.1504	33,495.00	.029575
5	.1091	24,297.00	.029569
6	.0469	10,445.00	.029561
7	.0833	18,551.00	.029564
		$222,706.00	

Staff Training

No costs

Start-Up

No costs

Incentives

No costs

Facilities

No costs

Materials and Supplies

Costs ÷ total SME = Cost per SME

$7,200 ÷ 7,528,860 = $.000965

Traditional Remedial Reading Annual
Comparative Cost Data
(See Chart VI)

Grade Level	Specific Salaries	Annual Cost
1	$.030524	$ 15,592.88
2	.030567	70,415.36
3	.030535	54,341.92
4	.030540	34,588.38
5	.030534	25,089.79
6	.030526	10,786.06
7	.030529	19,156.34
		$229,970.73

Annual Traditional Remedial
Reading Cost per Student

Total cost ÷ number of students = Annual cost per student

$229,970.73 ÷ 558 = $412.13

CONTROL GROUP--READING

Control group reading activities consist of the traditional methods used in the regular school.

Elementary and Middle School Program

Grade Levels: 1-3, 7-9

Professional Staff: 23

Paraprofessional Staff: 2.5

CHART VI

VARIABLE COST DATA--TRADITIONAL REMEDIAL READING

Salaries Cost Data and Student Information	Level Category--Reading							Total
	1	2	3	4	5	6	7	
Number of Students	55	120	111	108	72	26	66	558
Student Minutes of Exposure	(Varies according to individual teacher program design, see Chart V)							
Total Student Minutes of Exposure	510,840	2,303,640	1,779,660	1,113,560	821,700	353,300	627,480	7,528,860
Professional Staff	11	14	14	13	14	9	3	16
Professional Staff Cost:	$15,100.00	$68,193.00	$52,625.00	$33,495.00	$24,297.00	$10,445.00	$18,551.00	
Para-Professional Staff								
Para-Professional Staff Cost:								
Start-up Costs								
Staff Training								
Facilities								
Incentives:								
Professional								
Student								
Materials and Supplies								$7,200.00
Cost Per Student Minute by Category								
Specific Salary:								
Professional	.029550	.029602	.029570	.029576	.029569	.029561		
Para-Professional	-	-	-	-	-	-		
Start-Up Costs:								
Staff Training								
Facilities								
Incentives:								
Professional								
Student								
Materials and Supplies	.000965	.000965	.000965	.000965	.000965	.000965		
Totals	.030524	.030567	.030535	.030540	.030534	.030526		

Students

Grade Level	Enrollment
1	123
2	121
3	125
7	364
8	350
9	270
Total	1,353

Staff Salaries (Average of Specific Salary Development)

Grade Level 1

Professional

A	$ 7,800.00
B	9,400.00
C	8,700.00
D	8,400.00
E	8,400.00
F	7,800.00
	$50,500.00 ÷ 6 = $8,416.60

Paraprofessional

A	$ 3,075.00 (1/2 time) = $1,537.50

Grade Level 2

Professional

A	$ 8,700.00
B	9,000.00
C	7,800.00
D	9,000.00
E	7,800.00
F	11,600.00
	$43,900.00 ÷ 6 = $8,983.33

Paraprofessional

A	$ 3,075.00
B	2,626.00
	$ 5,751.00 ÷ 2 = $2,875.50

Grade Level 3

Professional

A	$ 8,000.00
B	9,400.00
C	10,900.00
D	8,000.00
E	11,600.00
	$47,900.00 ÷ 5 = $9,580.00

Paraprofessional

A	$ 2,943.00
B	2,676.00
	$ 5,619.00 ÷ 2 = $2,809.50

Grade Level 7

Professional

A	$14,416.00
B	11,516.00
	$25,932.00

Grade Level 8

Professional

A	$12,208.00
B	8,700.00
C	7,800.00
	$28,708.00

Grade Level 9

Professional

A	$11,900.00
B	11,562.00
	$23,462.00

Student Minutes of Exposure (SME)

SME were computed by using the following formula: SME = number of students x exposure time x 180 days. Because student time varies from classroom to classroom, it was necessary to document each teacher's time report. Example:

Grade Level 1

77 students for 60 minutes each and 46 students for 97 minutes each times 180 days = 639,360 SME
(77 x 60) = (46 x 97) x 180 = 1,634,760 SME.

Grade Level 2

(77 x 75) = (44 x 110) x 180 = 1,910,700 SME

Grade Level 3

(85 x 80) = (40 x 60) x 180 = 1,656,000 SME

Grade Level 7

364 x 27.5 x 180 = 1,801,800 SME
Seventh grade students are exposed to reading for one semester only, therefore, annual time allocated was 27.5 minutes.

Grade Level 8

350 x 55 x 180 = 3,465,000 SME

Grade Level 9

270 x 55 x 180 = 2,673,000 SME

Total Reading SME

Grade Level		
1	1,634,760	
2	1,910,700	
3	1,656,000	
7	1,801,800	
8	3,465,000	
9	2,673,000	
	10,060,560	Total Reading SME

Average of Specific Salary Costs per SME

Computation formula:
Average salary x per cent daily time in program x number of teachers ÷ total SME = Cost per SME

Grade Level 1

Professional

$8,416.60 x .229629* x 6 = $11,596.17 ÷ 1,634,760 = $.007093

Paraprofessional

$3,075 x .5* = $1,533.33 ÷ 1,634,760 = $.000940

(Two paraprofessionals spend one-fourth of their time in reading activities.)

*Reading time computation:
315 daily minutes of exposure x 6 teachers = 1890 total daily minutes (60 minutes spent by 4 teachers) = (97 minutes spent by 2 teachers) = 434 daily minutes of exposure to reading.

434 ÷ 1890 = .229692 daily per cent of time spent by students in reading activities.

Grade Level 2

Professional

$8,933.33 x .235449* x 5.5 = $11,633.13 ÷ 1,910,700 = $.006088

Paraprofessional

$2,875.50 ÷ 1,910,700 = $.001504

(Two aides spend 1/2 time in reading activities. This equals one full-time salary allocation to reading.)

*Reading time computation:
315 x 6 = 1890 total daily minutes of exposure (77 minutes spent by 4 teachers) = (110 minutes spent by 2 teachers) = 445 daily minutes of reading exposure, 445 ÷ 1890 = .235449 daily per cent of time spent by students in reading exposure.

Grade Level 3

Professional

$9,580 x .228571* x 4.5 = $9,853.69 ÷ 1,656,000 = $.005950

Paraprofessional

$2,809.50 ÷ 1,656,000 = $.001696

(One aide spends full time assisting teachers in reading.)

*Reading time computation:
315 x 5 = 1575 total daily minutes of exposure (80 minutes spent by 3 teachers) = (60 minutes spent by 2 teachers) = 360 daily minutes of reading exposure, 360 ÷ 1575 = .228571 daily per cent of time spent by students in reading exposure.

Grade Level 7

Formula:
Specific salaries ÷ total SME = Cost per SME
(There are no paraprofessionals assigned to the secondary level.)

$25,932 ÷ 1,801,800 = $.014392

Grade Level 8

$27,708 ÷ 3,465,000 = $.008285

Grade Level 9

$23,462 ÷ 2,673,000 = $.008777

Staff Training

No costs

Incentives

No costs

Facilities

No costs

Materials and Supplies

Cost ÷ total SME = Cost per SME

The costs for materials and supplies represents the school system's projected prorata costs. It was apparent in seeking cost information that the school system could not break out the exact cost per subject matter, but costs have been developed for this study by the Board of Education Business Office by projecting actual costs for the year previous for the following year (the year under study).

The following method of determining costs was developed by James J. Gallagher, Director of Budget and Finance for the Grand Rapids Public Schools.

369 elementary students (grade levels 1-3) and 984 middle school students equals 1,796 students.

Class teaching supply costs per building (1969-70):

$12,078.50
3,974.57
3,310.04
$19,363.11

Using the 6-1/2 per cent increase per year, the 1970-71 instructional supplies cost can be projected to be $20,621.00 ($19,363.11 x .065 = $20,621.00). One-fifth of this cost can be allocated to reading, $20,621 x 1/5 = $4,124.50.

The per capita cost for textbooks is $14.00. Using five subjects as the basis, reading supplies represents one-fifth of the cost, or $14.00 x 1/5 = $2.80. This cost for 1,353 students at $2.80 per student equals $3,788.40.

Totaling the instructional supplies cost and the textbook costs, the total spent is $7,912.60 ($4,124.20 + $3,788.40 = $7,912.60).

$7,912.60 total cost per subject ÷ 1,796 students equals $4.40 cost per student.

369 elementary students in grade levels 1-3 and 984 students in grade levels 7-9 equals 1,353 students in the research design.

$4.40 cost per student x 1,353 students equals $5,953.20 cost for materials and supplies.

Cost ÷ total SME = Cost per SME
$5,953.20 ÷ 13,141,260 = $.000453

Control School Reading Comparative Costs
(See Chart VII)

Grade Level	Totals	Annual Cost
1	$.008486	$ 13,872.57
2	.008045	15,371.58
3	.008099	13,411.94
7	.014845	26,727.72
8	.008739	30,277.17
9	.009230	24,671.77
		$124,352.77

Annual Reading Cost per Student

Cost ÷ student = Cost per student

$124,352.77 ÷ 1,353 = $91.91

Reading Annual per Student
Cost Summary

Program	Annual Cost
Alpha	$100.91
Westinghouse	72.26
CMES	118.39
Project Read	113.53
Traditional Remedial Reading	412.13
Control	91.91

CHART VII

VARIABLE COST DATA--CONTROL GROUP

Salaries Cost Data and Student Information	Level Category--Reading						Total
	1	2	3	7	8	9	
Number of Students	123	121	125	364	350	270	
Student Minutes of Exposure	(Varies--see previous page for computation)						
Total Student Minutes Of Exposure	1,634,760	1,910,700	1,656,000	1,801,800	3,465,000	2,673,000	10,060,560
Professional Staff	6	5.5	4.5	2	3	2	23
Professional Staff Cost:	$11,596.17	$11,633.14	$9,853.90	$25,932.00	$27,708.00	$23,462.00	
Para-Professional Staff	.5	1.0	1.0				
Para-Professional Staff Cost:	$1,533.33	$2,875.55	$2,809.50				
Start-Up Costs							
Staff Training							
Facilities							
Incentives:							
Professional							
Student							
Materials and Supplies							$5,953.20
Cost Per Student Minute By Category							
Specific Salary:							
Professional	.007093	.006088	.005950	.014392	.008285	.008777	
Para-Professional	.000940	.001540	.001696	. .	. .	. .	
Start-Up Costs:							
Staff Training							
Facilities							
Incentives:							
Professional							
Student							
Materials and Supplies	.000453	.000453	.000453	.000453	.000453	.000453	
Totals	.008486	.008045	.008099	.014845	.008738	.009230	

Per Program Student Achievement Gains

The second part of this chapter is intended to indicate the results of the study of student achievement gains which has previously been described. This section is composed of two major sections: (1) a reporting of the statistical analyses which compared the various reading programs based on their respective mean gains in grade level equivalencies, and (2) a descriptive analysis concerning the cost-effectiveness analysis of each of the various reading programs.

Statistical Analyses of Gain Scores

Pre and post reading achievement tests (see Appendices for specific information) were administered by an outside "evaluator," Battelle Memorial Institute, to each pupil in each of six different reading programs in the Grand Rapids Public Schools during 1970-71 school year. As can be readily determined from Table 1, not every grade level was exposed to the same treatments. The second and third grades were exposed to five different treatments: Alpha Program, Control, Traditional Remedial Reading, Westinghouse Learning Corporation Systems, and finally, Project Read. The seventh graders participated in four different programs: Alpha, Control, Traditional Remedial Reading, and CMES. A third group, the eighth and ninth graders, were exposed to only three treatments: Alpha, Control, and CMES. This unequal assignment of treatments

TABLE 1.--Distribution of Reading Programs Across Grade Levels (Numbers of Students)

Grade	Control	Traditional Remedial Reading	Alpha	Project Read	Westinghouse	CMES
2	73	24	75	41	28	--
3	69	31	81	54	24	--
7	71	22	81	--	--	55
8	74	--	71	--	--	35
9	63	--	65	--	--	27

prohibited any overall analysis covering all of the data at one time. Thus, three separate analyses of variance were performed on the data: (1) second and third grades, (2) seventh grade, and (3) eighth and ninth grades. In each case, the dependent variable under investigation was the gain from pre to post on a reading achievement test. In each, the treatment factor was the independent variable of major interest. In the second and third and eighth and ninth grade studies, however, the grade factor was included in the analysis to increase the precision of the tests for treatment main effects.

Analysis on Second and Third Graders

Table 2 illustrates the statistical design employed in the analysis of the gain scores for second and third graders. The cell means for each of the ten cells specified in the design are reported in Table 3. Examination of

TABLE 2.--Statistical Design Employed in Analysis of Achievement Gain Scores for Second and Third Grades

Grade	Alpha	Control	Traditional Remedial Reading	Project Read	Westinghouse
2	75Ss	73Ss	24Ss	41Ss	28Ss
3	81Ss	69Ss	31Ss	54Ss	24Ss

TABLE 3.--Mean Gain Scores by Cell for Second and Third Grade Analysis

Grade	Alpha	Control	Traditional Remedial Reading	Project Read	Westinghouse
2	.4453	.7041	.7708	.6927	.5643
3	.5296	.3797	.8774	.6963	.6615

Table 3 indicates that each program at each grade level did show a positive amount of average gain, although none showed an average gain of one grade equivalent or more.

Table 4 presents the traditional analysis of variance table for the second and third grade study. It is clear from the table that there is neither a significant grade by treatment interaction nor a significant main effect for grade. These two findings indicate that the two grades are not responding in any significantly different way from one another across the five treatments. There is,

in fact, some evidence that the use of the grade variable did little, if anything, to increase the precision of the test for the effects of the treatment variable.

TABLE 4.--Analysis of Variance on Pre and Post Reading Achievement Gain Scores for Second and Third Grade Programs

Source of Variance	Sums of Squares	d.f.	Mean Squares	F	Prob.
Program	5.7312	4	1.4328	4.7672	.0009
Grade	.0234	1	.0234	.0777	.7805
Program x Grade Interaction	1.0836	4	.2709	.9015	.4629
Error	147.8952	492	.3006		

Table 4 does indicate a significant program effect. The means for the five treatments could only have been as different as they were found to be in the given sample by chance along 9 times out of 10,000. Thus, there are strong indications that the means of the different programs are significantly different.

Given that there were significant differences between programs, the next logical step in the analysis was to investigate which programs were more or less effective than others. With unequal cell size and the possibility of multiple comparisons, the Scheffé post hoc technique was

selected for this part of the analysis.[94] The Scheffé procedure is one of several similar post hoc methods which successfully control for "experimentwise" error rate. The means across programs were obtained by weighting the means of the two grades using the numbers of subjects within each grade level. These new means are given in Table 5. The means from Table 5 were employed in the Scheffé post hoc procedures. All post hoc techniques were tested with a preset error level of .05 or 5 out of 100 possibilities that a significant finding could have occurred by chance alone. Table 6 shows the values of the desired sample contracts and the calculated values needed for significance under the Scheffé procedure. In order for the contrasts to be significant at the .05 level, they must be greater than the value calculated by the Scheffé technique.

TABLE 5.--The Gain Score Means for Programs Combined Across Second and Third Grades for Use in the Scheffé Post Hoc Procedures

Program	Mean Gain in Reading Achievement
Control	.6437
Traditional Remedial Reading	.8309
Alpha	.4483
Project Read	.6947
Westinghouse	.6111

[94]Roger E. Kirk, Experimental Design: Procedures for the Behavioral Sciences (Belmont, Calif.: Brooks Cole Publishing Co., 1968), pp. 90-91.

TABLE 6.--Scheffé Post Hoc Analyses on Second and Third Grade Sample

Sample Contrast	Calculated Scheffé Value	Significant at .05
$\bar{X}_3 - \bar{X}_1 = .1954$	.1961	Significant
$\bar{X}_2 - \bar{X}_1 = .186$	.269	n.s.
$\bar{X}_5 - \bar{X}_1 = .0334$	.271	n.s.
$\bar{X}_4 - \bar{X}_1 = .0502$	.225	n.s.
$\bar{X}_1 - \frac{\bar{X}_4 + \bar{X}_5}{2} = .0134$	.203	n.s.
$\bar{X}_2 - \frac{\bar{X}_4 + \bar{X}_5}{2} = .1730$	.270	n.s.
$\bar{X}_3 - \bar{X}_2 = .3826$	.265	Significant
$\bar{X}_3 - \bar{X}_4 = .2464$	.220	Significant

Note: $\bar{X}_1$ = Mean for Control

$\bar{X}_2$ = Mean for Traditional Remedial Reading

$\bar{X}_3$ = Mean for Alpha

$\bar{X}_4$ = Mean for Project Read

$\bar{X}_5$ = Mean for Westinghouse Project

Examination of Table 6 reveals that the performance of students enrolled in the Alpha program was significantly lower than the performance of students in the Control group, in the Traditional Remedial Reading program, and in the Project Read program. There are no significant differences in a positive direction between any of the planned and the control group.

Analysis on the Seventh Grade Programs

As has been mentioned earlier, the seventh graders were exposed to four reading programs during the 1970-71 school year. These four programs included Alpha, Control, Traditional Remedial Reading, and CMES. A simple one-way analysis of variance (ANOVA) was performed on the data obtained from the seventh graders. The program means are both contained in Table 7.

TABLE 7.--Means for the Analysis of Reading Achievement Gain Scores for the Seventh Grade Sample

Alpha	Control	Traditional Remedial Reading	CMES
.5074	.3859	.1500	.7273
N=81	N=71	N=22	N=55

The results of analysis of variance for the seventh grade is found in Table 8. The independent variable of interest is, of course, programs, and the dependent variable is, again, gain scores. There is a significant program effect with a reported probability of less than .0328.

TABLE 8.--Analysis of Variance Table for the Analysis of Reading Achievement Test Gain Scores for the Seventh Grade Sample

Source of Variance	Sums of Squares	d.f.	Mean Squares	F	Prob.
Between (Program)	6.4326	3	2.1442	2.97	.0328
Within (Error)	162.4725	225	.7221		

A set of Scheffé post hoc analyses were performed to attempt to determine where the significant differences between programs might be found. All simple contrasts were performed and each was insignificant (see Table 9). Thus, although there were significant differences between programs, the differences present must have been of a more complex nature. There is no guarantee that any further investigation or more complex contrasts would result in a significant finding, and, in addition, there is even less chance that such a complex contrast would be interpretable in any meaningful manner. In other words, the differences might be attributed to teacher attitudes, amount of materials, carpeting, or other such undocumented items.

TABLE 9.--Scheffé Post Hoc Analyses on Seventh Grade Sample

Sample Contrast	Calculated Scheffé Value	Significant at .05
$\bar{X}_1 - \bar{X}_2 = .1215$	.3866	n.s.
$\bar{X}_3 - \bar{X}_2 = .2359$	.5792	n.s.
$\bar{X}_4 - \bar{X}_2 = .3414$	.4263	n.s.
$\bar{X}_1 - \bar{X}_3 = .3574$	.5706	n.s.
$\bar{X}_4 - \bar{X}_1 = .2199$	.4145	n.s.
$\bar{X}_3 - \bar{X}_4 = .5773$	.5988	n.s.
$\bar{X}_2 - \frac{\bar{X}_1 + \bar{X}_3 + \bar{X}_4}{3} = .0776$	.3561	n.s.
$\bar{X}_3 - \frac{\bar{X}_1 + \bar{X}_2 + \bar{X}_4}{3} = .3902$	.5318	n.s.

Note: $\bar{X}_1$ = Mean for Alpha Program

$\bar{X}_2$ = Mean for Control Program

$\bar{X}_3$ = Mean for Traditional Remedial Reading Program

$\bar{X}_4$ = Mean for C.M.E.S. Program

Analysis on the Eighth and Ninth Grade Programs

Within the eighth and ninth grade sample, there were three programs: Alpha, Control, and CMES. This allowed for a 2 x 3 analysis of variance with two levels of grade and three levels of program. The analysis of variance employed tested the significance of the effects for grade, for program, and for the interaction between the two. Table 10 presents the statistical design employed on the reading achievement gain scores.

TABLE 10.--Statistical Design Employed in Analysis of Achievement Gain Scores for Eighth and Ninth Grade Sample

Grade	Alpha	Control	CMES
8	71Ss	74Ss	35Ss
9	65Ss	63Ss	27Ss

Table 11 reports the means for each of the cells as presented in the statistical design. An examination of these means does point out that there were two cells that did average over one year grade gain in reading (both on the eighth grade level): one in the Alpha program, the other in the CMES program.

TABLE 11.--Mean Gain Scores by Cell for Eighth and Ninth Grade Sample

Grade	Alpha	Control	CMES
8	1.0760	.3081	1.1171
9	.8415	.4302	.6148

The analysis of variance table (Table 12) indicates that there were no significant interactions between grade and program. The same table reports a nonsignificant grade effect. But again, as was found earlier, there is a significant effect for program reported. The difference between the program means obtained in this sample could have occurred by chance alone only one time out of 10,000.

TABLE 12. Analysis of Variance Table for the Analysis of Reading Achievement Test Gain Scores for the Eighth and Ninth Grade Sample

Source of Variance	Sums of Squares	d.f.	Mean Squares	F	Prob.
Program	27.3476	2	13.6738	10.91	.0001
Grade	1.5788	1	1.5788	1.260	.2625
Program x Grade Interaction	4.6406	2	2.3203	1.852	.1586
Error	412.2370	329	1.2530		

The Scheffé post hoc procedure was employed to attempt to tease out the location of the differences between programs. The means for programs were calculated across grades by weighting with the sample sizes within each grade level. These program means are presented in Table 13.

TABLE 13.--The Gain Score Means for Programs Combined Across Eighth and Ninth Grades for Use in the Scheffé Post Hoc Procedures

Program	Mean Gain in Reading Achievement
Alpha	.9640
Control Group	.3642
CMES Program	.8984

Table 14 presents the results of the Scheffé analysis. Here, the tests indicate a significant difference between both the Alpha and the CMES programs and the Control Group. There was, however, no difference between the means for the two performance contracting programs.

Descriptive Analysis of Program Cost-Effectiveness

The remaining section of this chapter is devoted to the descriptive analysis of the respective cost-effectiveness of each of the programs studied.

TABLE 14.--Scheffé Post Hoc Analyses on the Eighth and Ninth Grade Sample

Sample Contrast	Calculated Scheffé Value	Significant at .05
$\bar{X}_1 - \bar{X}_x = .5998$	.3312	significant
$\bar{X}_3 - \bar{X}_2 = .5342$	.4183	significant
$\bar{X}_1 - \bar{X}_3 = .0656$	.3728	n.s.

Note: $\bar{X}_1$ = Mean for Alpha Program

$\bar{X}_2$ = Mean for Control Program

$\bar{X}_3$ = Mean for CMES Program

A comparison of average mean gain in the reading programs studied and the annual instructional costs of those programs were computed in terms of costs per one-tenth (.1) grade gain. This was done by the simple arithmetical formula of dividing the annual average one-tenth grade gain of the students in each grade level block (grades 2, 3, 7, 8, 9) of the specific program under study divided into the annual cost per student as established in the first part of this chapter.

The following table is enclosed for easy analysis of the data.

TABLE 15.--Annual Cost per One-Tenth Student Achievement Gain

Program	Alpha	WLC	P. Read	T.R.R.	CMES	Control
Annual Cost per Student	$100.91	$72.26	$113.53	$412.13	$118.39	$91.91
Grades 2-3						
Mean Gain	.4483	.6111	.6947	.8309		.6437
One-tenth Grade Gain	4.483	6.111	6.947	8.309		6.437
Cost per .1 Gain	$ 22.51	$11.82	$ 16.34	$ 49.60		$14.28
Grade 7						
Mean Gain	.5074			.1500	.7273	.3859
One-tenth Grade Gain	5.074			1.500	7.273	3.859
Cost per .1 Gain	$ 19.89			$274.75	$ 16.28	$23.82
Grades 8-9						
Mean Gain	.9640				.8984	.3642
One-tenth Grade Gain	9.640				8.984	3.642
Cost per .1 Gain	$ 10.47				$ 13.18	$25.24

Summary

This chapter began with the rationale and development of the student costs per year for the six reading programs under study. Per student instructional costs were developed.

The second part of the chapter dealt with an analysis of the grade gain achievement records of the students in the several programs to determine any significant differences among the programs at the different grade levels.

The third portion of this chapter dealt with the equating of grade gains to costs of the programs under study.

The next, and final chapter, summarizes the results of the investigation along with conclusions, implications, and recommendations for further studies.

CHAPTER V

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Introduction

The major purpose of the study was to determine a cost-effectiveness relationship between inputs (instructional cost) and outputs (student achievement gains) in six reading programs in the Grand Rapids Public Schools. Subsequently, the design shown could establish a model upon which school officials can make future decisions regarding the use of resources available.

The inputs (instructional costs) were determined on a basis of student minutes of exposure (SME) in six cost categories that were defined as being the most appropriate definable variables that constitute the differences in costs among the programs studied. The six cost categories were identified as staff salaries, both professional and paraprofessional; start-up costs; added facility costs; staff training costs, incentive costs, and costs for materials and supplies. A per student annual cost for the reading programs studied included

three performance contracting programs: Alpha II, Westinghouse Learning Corporation (WLC), Combined Motivation and Education (CMES); Project Read--a publishing company's (canned) program; Traditional Remedial Reading and a regular (control) school program.

A pre/post testing program measured the student achievement gains in the reading programs studied.

A relationship between costs and gains (inputs and outputs) was established to compute the cost of one-tenth year (.1) or one month student achievement gain in reading.

The relationship is summarized for easy reference in this final chapter; conclusions are listed; implications of the findings are discussed; limitations and suggestions for further research are mentioned; and the chapter is concluded with final comments by the researcher.

Review of Cost-Effectiveness Results

As evidence in Table 15, Chapter IV, the cost for one-tenth (.1) student grade gain in the six reading programs is:

Elementary Grades 2 and 3

Alpha	$ 22.51
Westinghouse Learning	11.82
Project Read	16.34
Traditional Remedial Reading	49.60
Control (Regular Program)	14.28

Middle School Grade 7

Alpha	$ 19.89
Combined Motivation and Education (CMES)	16.23
Traditional Remedial Reading	274.75
Control (Regular Program)	23.82

Middle School Grades 8 and 9

Alpha	$ 10.47
Combined Motivation and Education (CMES)	13.18
Control (Regular Program)	25.24

Interpretation of Results and Conclusions

As previously stated, all grade levels were not exposed to the same reading program treatment. Because of this different grade and program treatment, it was necessary to define three levels of reading instruction within the design. They were (1) elementary grades [2 and 3], (2) seventh grade, and (3) eighth and ninth grades. The following conclusions and implications of the previously listed data have also treated these three groupings separately.

Specific Results of the Study

Early Elementary Grades (2 and 3)

1. All the reading programs under study in the early elementary grades resulted in less than one year reading achievement grade gain.

2. There were no significant differences in grade gain achievement among the five programs (Alpha, WLC, Project Read, TRR, and Control), within the two studied grade levels (second and third grades), i.e., the second grades performed as well as the third graders in a specific program.

3. There is a significant difference in reading achievement of the several programs studied. The performance of students enrolled in the Alpha program were significantly lower than the students in the control group program, Traditional Remedial Reading program and Project Read Program. However, there were no significant differences in a positive direction between any of the planned programs and the control group.

4. Cost-effective analysis leads one to conclude that Traditional Remedial Reading programs are the most costly (more than four times as costly as the least expensive), with no significant positive direction toward greater achievement except over Alpha and control.

5. The Westinghouse program is indicated to be less expensive per grade gain but it, too, has a mean achievement gain level limitation of less than the usual expected one year gain per one year of instruction.

Seventh Grade Programs

1. There is a significant program effect with the achievement gain of the programs being determined in this order from the lowest to highest--Traditional Remedial Reading, control, Alpha, CMES.

2. The Traditional Remedial Reading program had the highest cost per achievement grade gain (almost twelve times the control group cost) with the Alpha and CMES programs less costly per gain than the control group.

3. A comparison of learning gains with costs shows that for this grade level the CMES program results in the most cost-effective yield.

Eighth and Ninth Grade Programs

1. There was a significant difference between the control group and both Alpha and the CMES programs in favor of the latter.

2. There was no significant difference between the results of the eighth and ninth grades.

3. The control group was the most expensive group per one-tenth grade gain with the Alpha program being only slightly over 41 per cent the cost of the control group and the CMES program cost being 68 per cent of the control group while each of the

latter two programs, Alpha and CMES, also having a significant difference in achievement positively in favor of the less expensive programs.

General Conclusions

Early Elementary Grades (2 and 3)

The statistical analysis of each of the five early elementary programs shows a positive amount of "average gain" although none showed an average gain of one year equivalent or more. However, the "means" for the five programs indicate a significant difference between some of the programs. When the grade gain is related to the cost, the results suggests that Westinghouse, Project Read, and the control reading programs are the most cost-effective, i.e., producing the greatest gains for less cost. All three are within a $4.00 cost per one-tenth grade gain. However, the control group was over 20 per cent more expensive than WLC, Project Read was over 38 per cent more expensive. This would suggest that in addition to costs, student needs and learning patterns might be the additional determinants as to which program a school district may choose. The overall mean gain for Traditional Remedial Reading was considerably higher than the other four programs. The cost is over four times as much per unit of grade gain as the least costly program. This leads one to very seriously question the feasibility and practicality

of continuing the current TRR program in this grade. The WLC program was the most cost-effective program, i.e., the least cost per the amount of grade gain. One could speculate arithmetically that twice the amount of dollars invested in the WLC program might result in twice the student gain and still be only half the cost-effectiveness of the Traditional Remedial Reading. However, the process of student learning has not been proven to necessarily follow in the same proportion as in the increased costs.

Middle School--Seventh Grade

The seventh grades were exposed to four reading programs, Alpha, CMES, TRR, and control. In terms of the mean gains there were significant differences between all four programs. When these gains are related to the costs in the cost-effectiveness design, it is clearly evident that CMES performance contract program provides the most learning for the dollar expended followed by the Alpha performance contract program, the control group, and the most expensive program being the TRR program. The control group performed half as well as the performance contracting programs under study. The Traditional Remedial Reading Program appeared to be quite ineffective, both achievement and cost wise. In other words, the two performance contracting programs and control groups appear to be more cost-effective than traditional remedial reading, which was eleven times as costly as the next highest cost group.

TRR was seventeen times as costly as the most cost-effective program, CMES.

Eighth and Ninth Grades

Three reading programs, Alpha, CMES, and control, were studied for these two grade levels. An examination of the reading achievement grade means points out that the two eighth grade performance contracting reading programs; Alpha and CMES, students achievement gains were slightly above one grade level, whereas the control group only gained approximately one-third as much. At the ninth grade level, the same pattern existed but not as pronounced. Applying the cost-effective formula to these student gains, a school district decision-maker would be encouraged to select one of the two performance contracting programs over the control program. In any event, he would have additional information from which to make decisions.

Discussion of Findings

The writer would like to mention and speculate on the impact of some of the uncontrolled variables that may have affected certain of the findings.

It has been common knowledge that performance contracting has probably been advanced as an accountability design. This movement has been improperly interpreted as threatening to some teachers and teacher groups. Much hostility had surrounded some aspects of this research

which was also experienced by others studying and evaluating performance contracting. Some of the more critical problems faced by this researcher are listed below.

1. Governmental design. The Office of Economic Opportunity (OEO) selected portions of the research evaluation design and identified the student population as an adjunct to the OEO performance contracting project. While rigid design is accepted practice for scientific research, one questions the necessity for such rigidity in terms of treatment of the program design. It was clearly seen early in the research study that the Alpha elementary (grades 1, 2, and 3) reading approach was basically remedial in nature and may not have been an appropriate treatment for the initial learning process for very young children. The overall study of the Alpha achievement gains indicates better results and decreasing costs as the grade and age level of the student rises (e.g., second grade compared to eighth and ninth grade). However, governmental contractual constraints prevented the firm from making any major program or curriculum changes during the contractual period.

2. It appeared to this researcher that the elementary control staff may have expended additional effort

in teaching reading during the period of time the program was studied. Teachers may have been motivated to compete with the other programs studied. One wonders if such commitment will be continuous.

3. The elementary Traditional Remedial Reading student sample may be suspect because the performance contracting programs and prepackaged program were operating in the very lowest performing schools in the district. Thus, the lowest producing students were enrolled in these programs. The TRR groups were also in low performing schools but did not fully qualify nor were eligible for the other programs. In other words, the TRR student chosen may have been from a slightly higher potential universe. In addition to the TRR program, it is assumed that the TRR students received some additional reading instruction in the regular classroom which was not considered in this study.

4. All groups studied were aware that they were being studied which could have provided a "Hawthorne" effect or "halo" effect in varying degrees among the programs depending upon the perception and concerns of the staff and students involved.

5. The apparent failure of significant gains in achievement of the TRR program at the seventh grade level, clearly indicated that somewhere between grade 3 and grade 7, the point of diminishing returns of the program may be met but not determined due to the limitations of this study.

6. The failure of a significant gain in achievement of the eighth and ninth grade control groups indicates that reading skill classes may be more helpful for those students not performing at or near grade level at that age group level, than the traditional literature and English classes.

Limitations of the Study

It must be recognized that the initial year of operation of the performance contracts studied may have placed further limitations of success or failure due to the newness of the concept, delays in "start-up," etc. All of the other programs have been in existence for three or more years in the schools studied.

There currently exists much controversy over the appropriateness of the testing vehicles. The OEO contractors in their "Joint Summary Statement," question the relevance of the data collected due to the selection of

the standardized tests which test general educational achievement rather than reading skills as a separate knowledge area.[95]

The contractors state that:

> General measures of education achievement do not measure basic learning skills or basic knowledges; either in toto or, which is more to the point, in their separate subject area subtests; they measure instead a wide range of highly complex skills in somewhat cursory fashion.[96]

Testing conditions within the local school districts including Grand Rapids were cited by the OEO Project Directors as being impractical. They substantiated the variation in conditions by citing inadequate pre-planning time, an inability of some local districts to perform mass pre-testing due to a lack of space, personnel, materials, etc., within a ten day period, and the use of hurriedly trained substitute teachers as testers as the three major weaknesses of the testing program.[97]

Similarily the Grand Rapids performance contractors also experienced the logistical problems of becoming operational. James A. Mecklenburger, nationally recognized

---

[95] OEO Contractors, "Joint Summary Statement" (unpublished paper presented to OEO, March 15, 1972), pp. 7-9.

[96] Ibid.

[97] OEO Project Directors, "OEO Project Director's Evaluation Chapter," submitted to the OEO, December 22, 1971, pp. 11-12.

expert on performance contracting states the OEO experiment design was inadequate due to a lack of adequate start-up time. He says that:

> While claiming to have conducted a rigorous experiment, OEO actually began the experiment in a whirlwind fashion, forcing companies to create and staff programs, purchase materials, train teachers, and refurbish facilities during the summer months. Although one of the reasons for the experiment was to provide comparative test data on companies' instruction versus conventional instruction, conventional instruction began in September, while at many sites, contractors were not able to get their programs going in full gear until mid-autumn or later.[98]

The evaluation design of the OEO and this study which measured only student achievement grade gains, left unmeasured many related areas such as the internal reform brought about in the schools, the defining of a truly individualized program of study for students, the organization of learning to be structured and sequenced and the diagnostic and prescriptive methods of teaching children to read.

There are further limitations which must be placed upon the results of this study. The universe was limited to certain reading programs in the Grand Rapids Public Schools. Furthermore, the students studied were selected from one section of the city with a previously defined socio-economic background. One must be aware and most

---

[98]James A. Mecklenburger, "How OEO Failed Performance Contracting," Nation's Schools (April, 1972), 31-32.

careful not to draw upon the conclusions suggested, herein, to be of a universal nature.

Suggestions for Future Research

A careful generalization of this cost-effectiveness model may be adopted to study any population of subjects regardless of the similarity or dissimilarity to those subjects studied in this research.

Variations of this research might include the following types of studies:

1. Conduct studies of student reading needs and relate them to the behavioral objectives of a specific program. If needs and objectives are closely related, a better cost-effective model and program may ultimately result.
2. Use the grade levels of 4, 5, and 6 to determine if the cost-effectiveness pattern of performance contract programs and TRR programs are more cost effective from grades 2 to 9. There is a suspicion that there is a transferance of cost-effectiveness and achievement gain from one type program to another between these grade levels.
3. Conduct similar studies using similar programs with populations in the inner-city to determine if socio-economic conditions have different effect

on the learning rate and ultimately cost-effectiveness of programs.

4. Compare like programs in various school districts to determine what effect geographical location and/or other enviromental factors have on costs as well as student achievement.

5. Conduct a second year study of the programs used in this study, after program modifications have been made, to determine if the changes can make a significant difference in the student gain and thus the cost-effectiveness of the program.

6. Consider an evaluation design that uses criterion referenced tests based upon performance objectives rather than standardized achievement tests for measuring student gains.

Implications

The findings of this study seem to indicate that certain implications for the reviewer's consideration must be mentioned.

Herewith are presented several of these implications which should be given further deliberation:

1. The apparent implications created by the inter-grouping of students in learning situations may have some sociological impact. In the performance contracting programs, there appeared to be an

effective social relationship established among students for self-help and a help-one-another attitude, one student tutoring another which could have a further positive effect on better achievement.

2. Students who could evaluate their progress in the more structured and individualized programs appeared to have an improved attitude towards themselves, their peers, and the school.

3. Student attendance in school did improve in the performance contract and programmed instruction programs which may have been a result of (a) better student self-image, due to the student's perception of his success, (b) the contract obligation of the contractor and staff which required a minimum number of days attendance, and (c) or greater sensitivity of the school system keeping more accurate records.

4. Very serious consideration must be given the feasibility of continuing the traditional remedial reading programs as they are being carried on today. There are implications in this study for a more structured program. There are also implications for improving the methods of selecting students and the sociological impact upon the student who is chosen and identified with the

remedial program. The isolation factor of a remedial reading setting may prove a hindrance to the student's ability to learn.

5. The role of the building principal may need to be redefined. The principal, in order to fulfill the requirement of a two-way street of accountability must have the autonomy to make decisions in implementing learning programs which should include day to day changes in program design as well as adequate local latitude in financial decisions affecting the immediate implementation of program changes.

6. This study would indicate that schools have just begun to develop criteria for performance objectives of the education function. Schools will need to more clearly define these objectives as well as develop methods of evaluating the success or failure in achieving these objectives.

Final Comments by the Researcher

When one completes a research study which has required much effort over an extended period of time, with its numerous delays and frustrations beyond the researcher's control, it is extremely difficult to state in a few words how one views her results; however, this will be attempted.

The author can only apologize for the one year delay in reporting the final data. It had been hoped at the onset that the results would have been forthcoming immediately following the programs studied conclusion in order that the results could be used in the decision-making process for the local school district for the current school year. This was not possible. Although the study was researched during the 1970-71 school year, test results were not available to the educational and scientific communities from OEO, until late March, 1972. The OEO has not yet released its own final report on that part of its own experiment which was included in this study. A June, 1972 date has been announced.

The author has attempted to isolate some of the major costs factors in instructional programs in hopes of providing a small step in developing a cost-effective accountability model.

This accountability model is a part of a feedback loop through which inputs are linked to outputs. This feedback loop does seem to provide a means for establishing responsibility between a school, a technological firm or book publisher and the staff. Further refinement may also provide a means for a "contract" for productivity and cost-effectiveness which may also specify the conditions under which each party will be responsible for a given program in the future. If further refinement is possible,

responsible firms and responsible staffs may one day be expected to accept greater responsibility in guaranteeing results in some forms of learning. In the past, too often, school districts have been sold materials and programs with no one really accepting the responsibility for student results. It is the opinion of the author that each party involved must have an active interest in the students' success or failure.

If this study will add one more small facet in our quest for knowledge in the area of accountability, the author will be exceedingly pleased. It is hoped this small contribution may chart a path for developing a more sophisticated cost-effective model for others to detail and refine. Shortcuts may eventually be found which will lead to the ultimate objective of educational quality through cost-effectiveness data.

BIBLIOGRAPHY

BIBLIOGRAPHY

Bain, Helen. "Self Governance Must Come First, Then Accountability." Phi Delta Kappan (April, 1970).

Barro, Stephan M. "An Approach to Developing Accountability Measures for the Public Schools." Phi Delta Kappan (December, 1970).

Baynham, Dorsey. "PPBS and Several Good Reasons It Shouldn't Scare You Off." American School Board Journal (August, 1970).

Benson, Charles S. The Economics of Public Education. Boston: Houghton Mifflin Company, 1961.

Blaschke, Charles. "Performance Contracting." IDEA (Winter Quarter, 1971).

_____. Performance Contracting in Education: The Guaranteed Student Performance Approach to Public School System Reform. Educational Turnkey Systems, Inc. Research Press, Champaign, Illinois, 1970.

"The Board of Education of the City of Grand Rapids, Michigan: Final Budget, 1970-71."

Buskin, Martin. "PPBS Means Better Money Management." School Management (November, 1969).

"Clouds and Controversey Over Texarkana." Nation's Schools, LXXXVI, 4 (October, 1970).

Corrigan, R. E. "The SAFE Planning, Programming, Budgeting, Evaluation System: An Approach to Relevance and Accountability in Education." R. E. Corrigan Associates, Anaheim, California, 1970.

Davies, Don. "The 'Relevance' of Accountability." The Journal of Teacher Education (Spring, 1970).

Deck, L. Linton Jr. "Accountability and the Organizational Properties of Schools." Educational Technology (January, 1971).

Duncan, Merlin G. "An Assessment of Accountability, the State of the Art." Educational Technology (January, 1971).

Finn, James D. "Institutionalization of Education." Educational Technology, IX, 12 (December, 1969).

Gallagher, James J. Consultation, May 13, 1971.

Gallup, George. The Second Annual Survey of the Public's Attitudes Toward the Public Schools. A report prepared by Gallup International, Princeton, N.J.: October, 1970.

Gravue, Robert J. "Accountability: Comments and Questions." Educational Technology, XI, 1 (January, 1971).

Hecker, Stanley. Consultation, April 29, 1971.

"How Education Groups View Contracting." Nation's Schools, LXXXVI, 4 (October, 1970).

Johnson, Richard A.; Kast, Fremont E.; and Rosenzweig, James E. The Theory and Management of Systems. New York: McGraw-Hill Book Co., 1967.

Kane, Robert M. A System Approach, Accountability With Justice. A report prepared for The California State Department of Education, 1970.

Kane, Robert F. "Evaluation: What, Why, How." Paper presented at the California Audio Visual Education Assocation, Annual Conference, Fresno, Calif., Jan. 29 and 30.

Katzenbach, E. L. Planning, Programming, Budgeting Systems: PPBS and Education. Report made to the New England School Development Council, March, 1968.

Kaufman, Roger A. "Accountability, a System Approach and the Qualitative Improvement of Education--An Attempted Integration." Educational Technology (January, 1971).

Kaufman, Roger A. System Approaches to Education: Discussion and Attempted Integration on Social and Technological Change Implications for Education. Report prepared for The Center for the Advanced Study of Educational Administration, University of Oregon, Eugene, Oregon, 1970.

Kirk, Roger E. Experimental Design: Procedures for the Behavioral Sciences. Belmont, Calif.: Brooks Cole Publishing Co., 1968.

Kraner, Robert E. Developing and Writing Behavioral Objectives. Tucson, Arizona: Educational Innovators Press, 1971.

_____. Final Audit Report, Texarkana Dropout Prevention Program. Tucson, Arizona: Epic Diversified Systems Corporation.

Krueger, Stanley. Statement expressed by speaker. Michigan Association of State and Federal Program Supervisors Conference, Holiday Inn North, Grand Rapids, Michigan, February 10, 1971.

Language Arts Study Guide. Grand Rapids Public Schools, 1960.

Lessinger, Leon. "Engineering Accountability for Results in Public Education." Phi Delta Kappan, LII, 4 (December, 1970).

_____. Every Kid a Winner, Accountability in Education. Simon and Schuster, 1970.

_____. "The General Concept of Independent Accomplishment Auditing." Presented at the Institute on Independent Educational Accomplishment Auditing, Hotel Newporter, Newport Beach, Calif., Nov. 10-12, 17-19, 1969.

_____. "Robbing Dr. Peter to Pay Paul: Accounting for Our Stewardship of Public Education." Educational Technology (January, 1971).

_____. "White House Memo Defining Performance Contracting." December, 1969.

Lewis, James Jr. Administering the Individualized Instruction Program. West Nyack, N.Y.: Parker Publishing Co., Inc., 1971.

Lichtenberger, Allan R. "Program Planning, Budgeting, and Accounting in School System Operation." A position paper by Allan R. Lichtenberger, Chief, Terminology Compatibility Branch, U.S. Office of Education, September 20, 1967.

Love, Byron K. "The Development of a Suggested Instructional Programs Cost Model for K-12 Districts of the State of Michigan." Unpublished doctoral thesis, Michigan State University, 1968.

Mager, Robert F. Preparing Educational Objectives. Palo Alto: Fearon Publishers, 1962.

Mecklenburger, James A. "How OEO Failed Performance Contracting." Nation's Schools (April, 1972).

Moynihan, Daniel P. "To Solve a Problem, First Define It." New York Times, January 12, 1970.

Nixon, Richard M. "Excerpts from the President's Special Message to Congress on Educational Reform." New York Times, March 4, 1970.

_____. "Transcript of the Nixon Speech." New York Times, January 27, 1970.

Office of Economic Education. "Background: An Experiment in Performance Contracting." Program description, July, 1970.

"OEO Announces $6.5 Million Contract Program." Nation's Schools, LXXXVI, 2 (August, 1970).

OEO Contractors. "Joint Summary Statement." Unpublished paper presented to OEO, March 15, 1972.

OEO Project Directors. "OEO Project Director's Evaluation Chapter." Submitted to the OEO, December 22, 1971.

Pierce, Wendall H. "New Directives for Education." Compact (February, 1971).

Porter, Andrew, Consultation, March 3, 1971.

Porter, John W. "Porter Rips State Educators, Goats." The Grand Rapids Press, December 3, 1970.

Randall, Ronald. The Cost-Ed Model. Educational Turnkey Systems, Inc., October, 1970.

Rosenthal, Jack. New York Times story, May 15, 1970.

Semple, Robert B., Jr. "Nixon Proposes Re-examination of Aid to Schools." New York Times, March 4, 1970.

Sheldon, David. Statement made at the AFT Convention, Pittsburgh, Pennsylvania, August 21, 1970.

Stalford, Charles. Office of Economic Opportunity memo, June 4, 1971.

USOE. ESEA Title VII Manual for Project Applicants and Grantees. Washington, D.C.: Government Printing Office, April 24, 1969.

Vruggink, Elmer H. "A Study of the Contribution of Compensatory Programs in Large Urban School System." Unpublished doctoral thesis, Michigan State University, 1970.

Weinheimer, Norman P. Consultation, March 3, 1971.

_____. "From the Desk of the Executive Director." Michigan School Board Journal (July, 1971).

Yager, Geoffrey. Consultation, March 3, 1971.

APPENDICES

APPENDIX A

GODMER LETTER

STATE OF MICHIGAN

DEPARTMENT OF EDUCATION

Lansing, Michigan 48902

JOHN W. PORTER
Superintendent of
Public Instruction

March 12, 1971

Miss Joan Webster
Turner School
959 Turner, N.W.
Grand Rapids, Michigan 49504

Dear Miss Webster:

Re: Operational Millage and Bond Issue

The following results indicate the voter reaction concerning operational millage and bond issue by fiscal year.

Operational Issues

1968-69	598 total	366 passed	232 defeated
1969-70	656 "	458 "	198 "
1970-71 (Thru Jan.)	73 "	44 "	29 "

Bond Issues

1968-69	122 total	41 passed	81 defeated
1969-70	112 "	42 "	70 "
1970-71(Thru Jan.)	48 "	19 "	29 "

Sincerely,

Raymond L. Godmer

Raymond L. Godmer, Consultant
School Management Services

APPENDIX B

TYLER LETTER

SRA SCIENCE RESEARCH ASSOCIATES, INC
A Subsidiary of IBM

259 East Erie Street
Chicago, Illinois 60611
(312) 944-7552
Cable SCIRESUS, Chicago

May 7, 1971

Joan M. Webster
Director
Contract Learning Project
Grand Rapids Public Schools
Grand Rapids, Michigan 49501

Dear Dr. Webster:

Thank you for your letter of May 3.

There are probably many steps that can improve testing in terms of the actual learning of students. One immediate step is to encourage reputable test makers to develop criterion-referenced tests, assuring them that the schools will use them.

Another possibility is the construction of some tests of this type by a cooperative effort of several schools or school systems.

It was good to visit with you. I hope our paths will soon cross again.

Sincerely,

Ralph W. Tyler

RWT:ac

(Transcribed and mailed in Dr. Tyler's absence)

APPENDIX C

STALFORD LETTER

OFFICE OF ECONOMIC
OPPORTUNITY

EXECUTIVE OFFICE OF THE PRESIDENT
WASHINGTON, D.C. 20506

April 14, 1972

Mrs. Joan Webster
7695 Cascade Road, S.E.
Grand Rapids, Michigan 49508

Dear Joan:

The tests used for evaluation in the Office of Economic Opportunity Performance Contract Experiment are as follows:

In grade 1, the pretest was the Stanford Early Achievement Test. The posttest was the California Achievement Test, level 1 Form B

In grades 2,3,7,8 and 9, the Metropolitan Achievement Test, 1970 edition was used, Form F for pre and Form G for post. The levels were:

Grade 2 - Primary I
Grade 3 - Primary II
Grade 7 - Intermediate
Grade 8 - Advanced
Grade 9 - Advanced

I hope this information meets your needs.

Sincerely,

Charles Stalford
Project Manager
Performance Contract Experiment
Experimental Research Division
Office of Planning, Research and Evaluation

APPENDIX D

READING GAIN SCORE DISTRIBUTION CHART

Reading Gain Score Distribution 1049 Students

Student Achievement Gain	1 Alpha					2 Control					4 TRR			5 CMES			6 WLC		7 PR	
	Grade Level																			
	2	3	7	8	9	2	3	7	8	9	2	3	7	7	8	9	2	3	2	3
Minus	1	9	22	15	14	1	7	17	26	19	1		10	7	6	9	1	1		4
.0	5	6	3	3	6	6		0	5	1		0	1	3			1	1	1	1
.1	8	5	1	0	0		1	3	1	4			1	1	1		1		5	2
.2	11	4	2	2	4	5	7	4	2	3		2	1	3	1		3		3	2
.3	8	8	5	1	2	11	6	6	1	3	3			2		4	2	1	6	6
.4	7	8	8	0	1	7	5	5	1	2	2	4	2	2	1		5	4	3	4
.5	9	8	5	2	2	7	9	6	1	3	1	3	1	4	1		5	3	2	1
.6	9	7	1	1	3	6	6	1	6	1	3	1	1	3	1	2	4	5	3	4
.7	4	5	3	1	3	4	6	5	6	3			1	2	2		2	7	3	5
.8	2	6	6	2		2	6	1	2	2	7	3	1	3	2			3	5	4
.9	5	5	3	1	3	5	1	3	4	7	1	3	1	2	1	1	1	1	1	4
1.0	4	2	3	2	2	2	1	4	2	3	1	1		2		2			2	7
1.+	2	8	19	41	25	15	9	12	16	13	4	12	2	19	19	9	3	4	8	1
	75	81	81	71	65	71	57	67	73	64	23	29	22	53	35	27	28	30	42	55