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AUTHOR Huseby, Jane R. O.; Hentschke, Guilbert  
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ABSTRACT

The study presented in this paper is part of the National Institute of Education's effort to study federally sponsored compensatory education programs through demonstration projects. One aspect of the study of demonstration projects concerns the cost associated with the changes in allocation procedures and concentration levels which result from the demonstration. This paper describes the framework of the cost study, the nature of the data to be collected and the general approaches to data analysis. Along with a discussion of the modified analytic model of the study, the paper focuses on the following: (1) allocation policies to be used by Demonstration Local Educational Agencies, (2) factors likely to influence Title I resource use and costs, (3) hypotheses concerning the effects of allocation policy and other factors on program delivery and program costs, and (4) program delivery. Data will be collected for each of the three years of the project. Baseline data for the demonstration planning year, 1975-1976 is presently being analyzed. Analysis of the first Demonstration year, 1976-1977, is expected to be completed in December, 1977. (Author/AM)

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STUDYING COSTS OF TITLE I  
UNDER ACHIEVEMENT AND POVERTY  
ALLOCATION CRITERIA

Jane R. O. Huseby  
Senior Analyst  
Abt Associates Inc.

U.S. DEPARTMENT OF HEALTH,  
EDUCATION & WELFARE  
NATIONAL INSTITUTE OF  
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Guilbert Hentschke  
Associate Professor, College of Education  
and Graduate School of Management,  
University of Rochester

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As part of its study of federally sponsored compensatory education projects, the National Institute of Education (NIE) is sponsoring a study of the "Effects of Compensatory Education Demonstration Projects." This "Demonstration" provides waivers of the regulations governing Title I of the Elementary and Secondary Education Act, in order that individual local education authorities (LEAs) may allocate their Title I resources according to their own priorities, rather than those stipulated by the legislated Title I procedures. It is a three-year project for the LEAs in which the first year, 1975-76, is for Demonstration Planning and baseline comparisons, followed by a two-year Demonstration of revised Title I resource allocation procedures.

One aspect of the study of the Demonstration Projects concerns the cost associated with the changes in allocation procedures and concentration levels which result from the Demonstration.\* This paper outlines the scope and methodology of the cost study of the Demonstration. First and second year results will be available in September, 1977.

### 1. Introduction

The Demonstration allows 13 districts to redefine intra-district allocation policy in order to redistribute Title I services. Although funding procedures to the LEA have not changed, many of the Demonstration LEAs intend to increase the number of schools, and/or students receiving Title I services. It is expected that this change will cause

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\* Other areas of research are: 1) Changes in the organization and administration of the compensatory programs and services delivered, 2) changes in services received by students, 3) effects on the characteristics of schools and students served, 4) effects on teaching and testing practices, 5) achievement outcome results, and 6) community response to changes. All of these areas of research, including costs, are topics of the complete Demonstration Research Study (hereinafter referred to as the Demonstration Research) being performed by Abt Associates Inc., Cambridge, Massachusetts, under contract to NIE.

change in the resource mix used for Title I and therefore lead to changes in program costs and/or per student costs in Title I. The basic research objective of the cost study is:

- to determine the effects of change in eligibility and allocation criteria for Title I programs upon changes in resource use and resource cost.

In order to meet this objective, the cost study will identify and measure changes in Title I services, program resource use, and program costs in order to determine if the Demonstration LEAs provide increased or decreased Title I services for the same amount of Title I funds under different allocation policies.\*

The analytic model for the cost study is a modified version of the analytic model used for the Demonstration Research, shown in Figure 1.1A below.

Boxes C (Allocation Policy) and D (Program Delivery), which represent policy issues, are directly related to Title I program resource use and costs. They are repeated exactly as in the Analytic Model. However, other factors, in addition to Allocation Policy, determine what resources are used for Title I programs and hence the costs of Title I programs. Therefore, for the cost study the model has been modified as shown.

There are four components of the cost study analytic model, shown in Figure 1.1B:

The Setting: The State Education Agency (SEA) distributes the Title I funds it receives from the federal Title I office to the Local Education Agency (LEA). The LEAs, in turn, distribute funds (or resources purchased with Title I funds) to individual schools.

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\* The amount of Title I funds received by an LEA is determined at federal and state levels. Although the amount of funding and how it is determined is important, this cost study will concentrate on the effects of changed policy on intra-district allocation only.

FIGURE 1.1 A

THE ANALYTIC MODEL FOR RESEARCH ON  
DEMONSTRATION COMPENSATORY EDUCATION PROJECTS

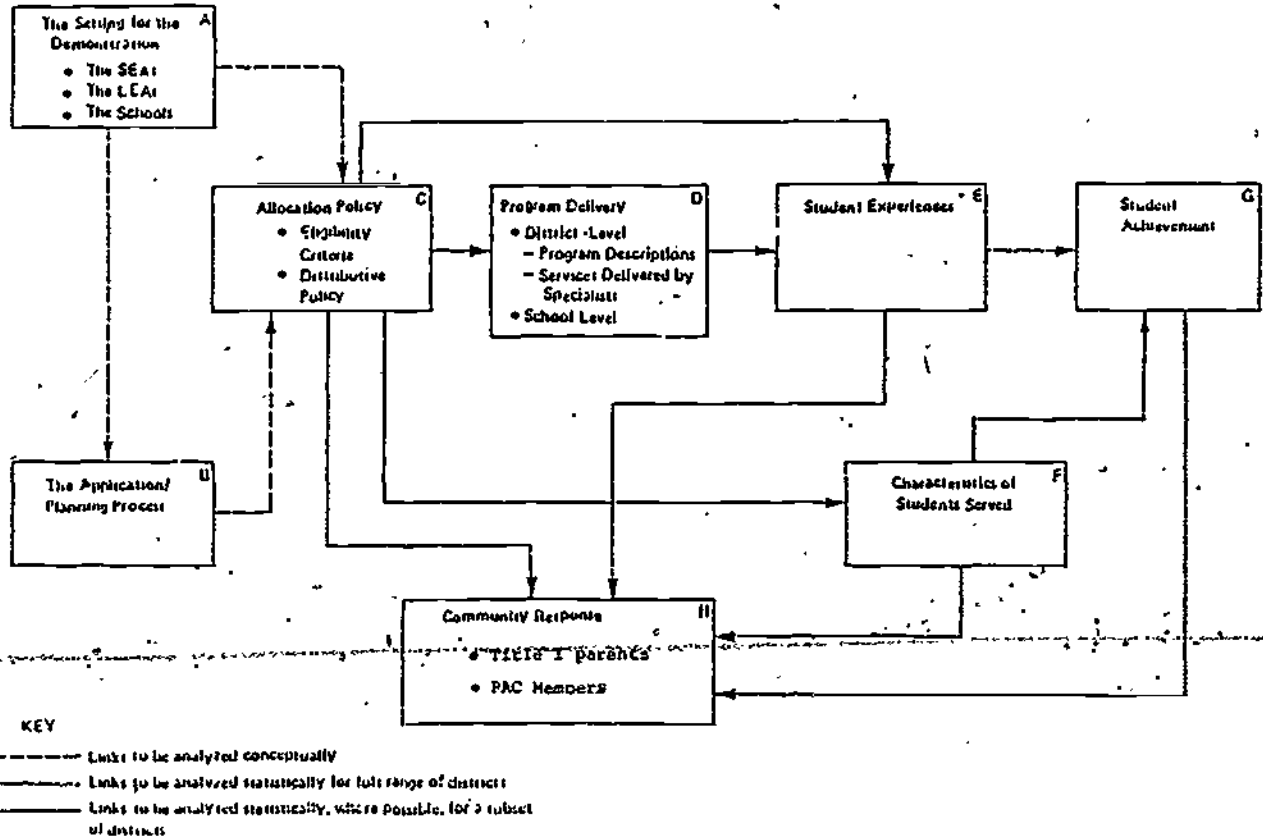
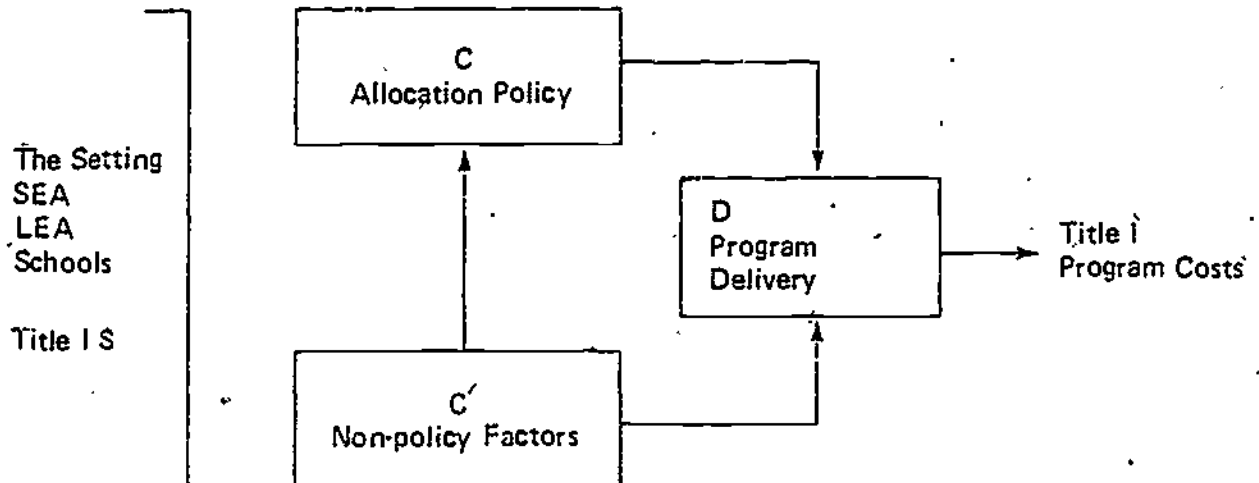


FIGURE 1.1 B

DEMONSTRATION COST STUDY MODEL



Box C: Allocation Policy is composed of two major steps. At the school level, each LEA determines eligibility, targeting, and distribution of resources. Similarly, at the student level, eligibility, targeting and the distribution of resources are determined. The primary focus of the cost study will be the numbers of schools and students which receive Title I services and what the pattern of resource distribution to students and schools is for each year of the Demonstration Study.

Box C': Factors other than allocation policy (or non-policy factors) affect resource distribution. These factors fall into three groups: a) availability of LEA resources; b) LEA characteristics and, c) unit cost differentials among districts. The individual LEAs' abilities to donate resources to Title I programs, and district characteristics such as the presence and effects of other (non-Title I) compensatory programs and the relative costs of resources are examples of (a), (b), and (c), respectively, which are likely to influence how an LEA selects resources to be used for Title I programs. Such considerations are likely to be highly interdependent with both choice of allocation policy and program delivery.

Box D: Program delivery will be described in terms of the actual resources used for Title I programs for which a dollar cost may be defined. Such resources include administrative and instructional personnel, materials and equipment, and physical facilities.

In addition, Box D will describe the amount and type of services which result from use of those resources. Amount of services will be defined by hours and type of instruction. Type of instruction will be described by staffing pattern, class size, and length of program.

Box D will use as measures per-student costs, per-student FTE costs, and per-hour-of-instruction costs, as well as total costs.

The arrows between boxes indicate links between the connected sets of variables. The effects of allocation policy directly influence program delivery (C-D). Non-policy factors also influence resource choice, and therefore have an effect upon program delivery (C'-D) and, ultimately, program costs. In addition, non-policy factors influence the choice of allocation policy (C'-C).

### 1.2 Focus of the Cost Study

The primary unit of measurement and analysis will be the individual LEA. Comparisons of resource use and cost will be made among districts each year and between years as well as among groups of LEAs using similar allocation policies and/or LEAs with similar Title I programs. Within each district Title I programs will be divided into program components (according to the type of program activity) and further sub-divided into activity units (again by type of activity), where appropriate. Each LEA and all program breakdowns will be described by the type, amount, and costs of resources used as well as by student and school type. Thus, these types of comparisons can be made for all LEAs and their Title I programs and can be disaggregated down to individual types of resources.

### 1.3 Policy-Related Aspects

#### Cost-Effectiveness

An important aspect of the cost study is to identify the costs associated with the sets of resources which districts use to provide Title I services. As mentioned above, the cost study will determine the costs of the resources which LEAs use to provide Title I services to students. In order to do this,

the study will identify the types and amounts of services offered by the LEAs during the Demonstration, the resources which the LEAs use to produce these services, and the total costs associated with these services, thereby providing policy-makers with information about the costs of different types of Title I services. In this way, the types and amounts of services and the costs can be associated with the various allocation policies implemented by the LEAs. Thus, the cost study will identify and compare the types and amounts of services provided by LEAs using various allocation policies in terms of costs so that those policies which are relatively more cost-effective can be identified.

#### "Seed"-Money for Compensatory Education Efforts

For a program such as Title I compensatory education, federal funding is the primary means of implementing social policy. When Title I was legislated, Congress was, in effect, spending public funds to provide resources which would produce socially desirable effects; in this case, the desired effect is improved educational opportunity for children who are from low-income backgrounds and/or are educationally "disadvantaged." One way of examining Title I funding is by regarding those funds as "seed" money. That is, Title I is intended to provide funds with which districts could initiate compensatory educational efforts with the aim that ultimately the district would assume responsibility for additional compensatory services. By identifying the resources used by Title I programs in the Demonstration districts and their costs, the cost study will identify those resources provided to the program by the LEA, as well as those funded by Title I. Assessing the extent to which districts supplement Title I programs with their own resources is an indicator of the effectiveness of federal Title I funds as "seed" money.

#### 1.3 Organization of the Remainder of This Paper

The remainder of this paper will discuss the modified analytic model (Figure 1.15). This discussion is organized as



follows:

Section 2

Allocation policies to be used by Demonstration LEAs (Box C)--definitions for cost study purposes;

Section 3

Other factors likely to influence Title I resource use and costs (Box C')--definitions;

Section 4

Hypotheses concerning the effects of allocation policy and other factors on program delivery (Links C/C'-D) and on program costs;

Section 5

Program delivery: 1) data collection, data description, and data sources; and 2) measurements and analysis of the effects of allocation policy and other non-policy factors on program delivery (Link C/C'D).

2. Changes in Allocation Policy (Box C)\*

The type of Title I allocation policy used by the Demonstration districts will determine how many schools and students receive Title I services and will also influence the type of resources used, thereby influencing Title I costs.

2.1 School Eligibility

Under present Title I guidelines, LEAs are required to identify eligible schools from among the schools in the district by using a student-poverty criterion, select target schools (those which will in fact receive Title I services), and distribute Title I services among those schools. Eleven of the 13 Demonstration districts have elected to substitute

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\*This paper outlines allocation policy for use in the cost study. For a more detailed description of allocation policy during the Demonstration, see Vanecko, J., Archambault, F., and Ames, N. "ESEA, Title I Allocation Policy: Demonstration Study Implementation Decisions and Research Plan." Cambridge, Mass. Abt Associates Inc. February 11, 1977. Prepared for National Institute of Education, Educational Equity Group. Report No. AAI-77-19.

achievement measures in 1976-77 for poverty measures used in 1975-76 to determine school eligibility. The procedures used by the Demonstration LEAs are categorized into four types of school eligibility policies:

1. Direct LEA to Student Allocation: Seven districts have chosen to bypass "school" as a factor in eligibility and targeting: all schools (within a grade span) are eligible for, and receive, services.
2. Substitution of Achievement for Poverty: Two districts have elected to establish arbitrary achievement cut-offs for school eligibility: any school with a specified percentage of students performing below a given percentile on a standardized test will be deemed eligible for compensatory services.
3. Educational Need with Poverty Hold-Harmless: Two districts have chosen allocation policy type (2) with an additional "hold harmless" provision that allows schools previously served under poverty eligibility guidelines to continue to be served.
4. Poverty: The remaining two districts have elected to continue using poverty criteria to select eligible schools.

## 2.2 School Targeting

The most important change in school targeting in the Demonstration districts is that 12 of the 13 districts have increased the number of schools served.\* This is particularly true in Type 1--"Direct LEA to Student" districts where the average number of schools served has more than doubled.

## 2.3 Distribution of Title I Resources to Schools

Because the number of schools targeted for Title I services in 1976-77 has increased, the average funding per school can be expected to decrease if the overall level of Title I funding remains constant. However, the amount of the per school decrease in funding will not necessarily be constant across schools because the procedures for distributing resources

\*See Appendix 1.

to schools have also changed. In 1975-76, a variety of distribution formulas and procedures were used to distribute resources to schools. The range of formulas included use of the number and/or proportion of low-income students to the incidence or severity of educational need. In 1976-77, 12 of the 13 districts are distributing funds to schools according to the number of educationally needy students in each school. The effects of changed distribution of Title I funds to schools do not have clear implications for change in program costs until student eligibility and targeting are also considered.

#### 2.4 Student Eligibility and Targeting

As links in the allocation "chain," the student eligibility and student targeting procedures are perhaps least affected by the Demonstration. Present Title I guidelines specify that eligible students in targeted schools be identified by using an educational achievement criteria and that those students in greatest need of assistance be targeted. While the achievement cutoff level may have changed in 1976-77 for the Demonstration, the procedures for targeting have remained the same. The numbers of students targeted in 1976-77 has increased in 11 districts, and decreased in the remaining two districts.\* Thus, if Title I funds remain constant, Title I expenditures per student are expected to decrease in those districts which have increased students served, and to increase in those which have decreased students served. However, the change in funding per student may not be constant across students unless type and distribution of services remain constant.

For purposes of the cost study, the most important result of both school and student targeting procedures is the change in the number of schools and/or students who receive Title I services. If a change in allocation procedure involves a simultaneous change in type or distribution of Title I services, the amount and/or composition of student

services (Box D) is expected to change. Such changes are expected to affect program total and/or per student costs. Therefore, for the cost study, the various allocation policies will be treated in terms of their effects on school and student targeting. That is, policy will be identified in terms of the magnitude of change in numbers of schools and numbers of students targeted for the Demonstration.

### 3. Non-Policy Factors (Box C')

Since Title I fund use occurs within the district context and Title I funds represent a relatively small portion of district expenditures (generally, less than 8%), it is important to consider the effects of other district characteristics on Title I fund allocations.

District characteristics which in addition to allocation policy, are likely to influence Title I resource use and cost may be described as three groups of factors: district resources, contextual characteristics, and unit cost differentials among districts. It should be noted that these factors are likely to be interdependent and that although they are treated separately here for purposes of definition, their effects are likely to be related to one another.

The three groups of factors and how they may influence program costs are defined below:

(1) Of the three groups of factors above, availability of other resources for use in Title I, is likely to be the most important. If an LEA is able to expand Title I services without receiving increased Title I funds, it is likely that additional resources necessary to expand services will come from an internal reallocation within the district. Thus, the ability and willingness of a district to supplement with other resources the Title I funds it receives is likely to have a strong effect on Title I resource use and cost. For example, a district which has an abundance of instructional materials and allows them to be used for Title I activities may be able

to hire more instructional staff with Title I funds, thus providing Title I services to more students than it would if it has to use its Title I funds to purchase materials.

a) Program Expenditures vs. Total Costs--In order to determine the amount of resources used in Title I programs which are not purchased with the current year's Title I funds, the cost study will describe resource use and cost of Title I programs in terms of 1) Title I program fund expenditures by type of resource, and 2) total program costs which describe the actual or estimated costs of all resources used by a Title I program, whether or not they were purchased with current year Title I funds. This important conceptual distinction will be made by describing fund expenditures and total program costs for each Title I Program in the Demonstration. (Description of how these will be identified and measured follows in Section 5.)

Program fund expenditures are defined as the expenditures made by the district for different types of resources with current year Title I funds. Thus, the program fund expenditures description of Title I resource use describes how each district spends its Title I allocation each year of the Demonstration.

Total program cost is defined as the cost of every resource used whether or not the resource was purchased with the current year's Title I funds. Total costs include resources contributed by the LEA (such as physical facilities, or non-Title I administrative or instructional staff time), imposed private costs (such as volunteer time or private purchase of materials), and use of resources purchased with Title I funds in prior years. Total program costs describe the costs of all resources utilized in a Title I program for one year, regardless of the source.

The ratio of program fund expenditures to total program costs indicates the extent to which the program funds received by the district reflect the actual resource cost of the program. If total program costs are significantly greater than fund expenditures, the magnitude of the difference indicates the extent to which the present program utilizes and is supplemented by either non-program and/or previously-purchased program resources. If program fund expenditures are significantly larger or different from total costs, investment from the current year's program fund expenditures in resources which are used for more than one year is suggested. Observed differences between program fund expenditures and total costs will be defined in terms of resource type and resource source.

b) Other means of determining the availability and use of district resources for Title I activities include assessments of the physical facilities of the district and its general wealth and identifying the existence of scale economies in resource use. Both the availability of physical facilities and the general fiscal condition of the LEA indicate the extent to which the LEA has resources to make available to Title I. The most important of this will be the availability and amount of any Title I carryover funds (unspent funds from previous Title I allocations) and resources from other compensatory programs. The existence of scale economies will be influenced by the nature of the costs of both district and program resources, i.e., whether they are fixed or variable. It is likely that the existence of an economy of scale will influence LEA choice of resources.

(2) Contextual characteristics, such as the history of Title I in the district, school population characteristics and policy shifts in district pedagogical objectives are contextual characteristics which may influence resource choice for Title I. The demographic composition of the student

population and enrollment trends will affect district pedagogical objectives, Title I history, and the presence of other compensatory programs.

(3) The cost of individual units of resources, such as teacher salary, will also affect what resources the LEA chooses to use to provide Title I services. Unit costs, over which the LEA has no control, and which are likely to vary significantly among the Demonstration Title I programs, are personnel salaries, fringe benefits for staff and indirect charges. If the Title I program uses instructional personnel, it probably will pay the salary and the amount of fringe benefits that other similarly qualified teachers in the district receive. The cost of instructional staff relative to other instructional resources, such as audiovisual equipment, is likely to influence LEA choice of resources. Thus, a district which faces teacher salaries which are high relative to other instructional resources, for example, may be less likely to use teachers as program resources than a district in which teacher salaries are relatively lower.

### 3.1 C' - C: The Effects of Non-Policy Factors On LEA Choice of Allocation Policy

It is important to note that the non-policy factors which are related to district and program costs (Box C', Figure 12.1) are very likely to influence LEA choice of allocation policy. As described above, those factors are 1) district resources and their availability to the Title I program; 2) contextual characteristics; and 3) unit costs of individual resource.

District resources which are available for Title I activities can be expected to affect both the nature of the program offered and the extent to which the LEA extends Title I services to more schools and/or more students. For example, if

a district is not physically crowded, a pull-out Title I program (in which students receive Title I services in a classroom other than their regular room), is more likely to be found than in a district which has very crowded conditions. In addition, if many schools in a district have space facilities which are not heavily used, the LEA may be more likely to extend Title I services which use space facilities to those schools in which they are available. A further hypothetical example of the effect of the availability of district resources would be a case in which Title I may use audio-visual equipment previously purchased by the district to serve added students. Because of the presence of this equipment, the LEA may feel it is feasible to serve more students than it would otherwise, and therefore target increased numbers of students for the Demonstration.

District characteristics also are likely to affect allocation policy, both in general and during the Demonstration. For example, a district which has built up a large carryover may choose to target more students, since it knows that the carryover funds are available for the purchase of additional resources with which to serve more students. The existence of other compensatory programs is also likely to be an influential factor. For example, a district which already has a state-funded remedial reading program in lower elementary grades is likely to target Title I remedial reading services to older students, in order to avoid duplication. Another district characteristic, the relative saturation (proportion, of eligible students actually receiving Title I services) of students receiving Title I services in 1975-76 may be a limiting factor on the percentage increase in students served in 1976-77. For example, a district which served 75% of all eligible students in 1975-76 is less likely to double the number of students served for 1976-77 as a district which served 25% of all eligible students in 1975-76.



Finally, unit costs of resources will influence district's choice of program resources, and thus indirectly influence allocation. For example, an LEA which has relatively low teacher salaries may use more teachers than would a district whose teacher salaries are higher. Increased use of teachers makes deconcentration among schools more feasible than would increased use of large physical facilities such as language labs, since it is easier to distribute teachers among schools and use them fully than to have several schools use a language lab which can be housed in only one school site. Another example of how a unit cost may affect district selection of allocation concerns indirect charges.\* A district which receives a larger indirect charge may feel itself in a better position to expand Title I services, and thus target more schools and/or students, than one which has a relatively small indirect charge which is completely used for supporting district expenses of Title I.

Thus, the non-policy factors (Box C') may exert a variety of influences on how an LEA selects a particular allocation policy, as well as influence program costs. Although it will not be possible in most instances to quantify the impact of LEA characteristics which are not susceptible to policy intervention (C'), it is necessary to take such characteristics into account as influencing factors on both policy options and effects of policy choices. The existence of the impacts of these factors may be identified by measuring the relation of LEA characteristics (C') to both policy choices (C) and policy outcomes (C), i.e., resource use and cost. The analysis implied by such conditions is multivariate. However, statistically analyzing the simultaneous effects of Title I policy choices and of nonpolicy LEA characteristics is not

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\* Indirect charge is a charge made by the district to the Title I program. It is usually expressed as a percentage of Title I expenditures. It is intended to cover the indirect costs to the district of operating the Title I program.

feasible with only thirteen cases. Thus, inferences from that analysis must be observational and judgmental rather than statistical.

#### 4. Effects of Allocation Policy and Other Factors on Program Costs (C/C' → D)

In order to build a framework for the cost study, we have developed hypotheses concerning the effects of allocation policy and other factors upon the resources used for program delivery and their costs. The purpose of this section is to describe the cost implications of the relationship between allocation policy (Box C) and Program Delivery (Box D). Because we are particularly interested in cost, we will not be exploring many of the otherwise important relationships between policy and program delivery which do not bear directly on costs. However, nonpolicy factors (Box C') and their effects on program delivery will be taken into account.

##### 4.1 Potential Effects of Allocation Policy and Other Factors on Resource Use and Costs

If Title I allocations to the Demonstration districts do not change significantly between 1975-76 and 1976-77, we would expect:

- (a) As the number of schools targeted increases, funds per school will decrease; and
- (b) As the number of students targeted increases, funds per student will decrease,

other things being equal.

Within this framework, the effects of the new allocation policies used by the Demonstration districts fall into seven sets of school and student targeting changes. These effects are described in terms of magnitude of change between 1975-1976 and 1976-77 in number of schools and number of students served, and may be summarized as follows:

FIGURE 4.1

CHANGE IN NUMBER OF SCHOOLS SERVED	CHANGE IN NUMBER OF STUDENTS SERVED*			
		Large Increase	Small Increase	No Increase
	Large Increase	A	B	C
Small Increase	D	E	(does not apply)	
No Increase	F	G	(does not apply)	

In this section we examine the three most extreme effects of these seven allocation policy outcomes: cases A, C and F in Figure 4.1. We will describe how policy and non-policy factors which affect costs are likely to be associated with changes in program delivery for those three cases. Because of the close relationship between policy and non-policy factors and their joint effects upon program delivery, our data gathering and analysis procedures do not permit us to determine the statistically separate effects of these characteristics. Instead, we use district characteristics in combination with allocation policy to help explain program delivery.

Case A: Districts serve relatively many more schools and relatively many more pupils with no significant change in Title I funds.

This can be accomplished by increasing total program cost (as opposed to program fund expenditures), by changing the composition of instructional programs in such a way as to reduce per-pupil costs, or by combining elements of each of these. Total program costs can be increased several ways

\*The letters in the figure indicate outcomes which will be referred to later in the text. Applicability of outcomes is determined from Appendix 2.

without changing the amount of Title I funds a district receives. These include: increased use of carryover funds; increased use of other federal and/or state funds; and increased local contributions (of funds or stocks of goods and services already on hand).

Carryover funds which may have been allowed to accumulate for a number of years, may be used to serve more students. Using up carryover funds represents a "one-time solution", because when the carryover funds have been depleted, the number of dollars available to the program in the following year will be limited solely to that provided through the current entitlement. Other federal and/or state funds might become available to the LEA, enabling it to provide "local" (general operating) funds, or to supplement Title I funds. In addition, the LEA can provide additional stocks of goods which have been purchased in other periods (equipment, facilities), or allocate more indirect services. For example, more principals are likely to be involved in supervising building-level Title I activities if more schools are involved in the second year. This represents a form of district contribution to the program.

A second factor which might enable a district to provide relatively large increases in services among schools and students is a shift in emphasis from start-up to operation. This would take the form of a shift away from expenditures for capital goods and orientation-type training to expenditures for program operation. For this factor to operate, it would be necessary to assume that equipment and facilities were not used to capacity in previous years and that orientation expenditures are disproportionately large in the first year of the program.

Third, there may be some economies of scale operating as the program expands. For example, increases in the central office administration of Title I may be less than proportionate to increases in numbers of schools/students served. This may be a contributing factor to reducing per-pupil expenditures although total expenditures may still increase.

Fourth, decreases in unit prices make it possible to purchase more units of that good or service. Salaries for teachers is often the largest single expenditure item in education programs, typically representing 70-80% of total expenditures. If, for a variety of reasons, the average salary paid to a teacher in the district's Title I program goes down, it will free money to hire more teachers and purchase other resources. The same type of reasoning applies to paying for the fringe benefits of personnel. By reducing commitments for fringe benefits for example, by hiring a greater proportion of part-time teachers (who typically receive a much smaller fringe benefit package), money is freed to expand the program.

These factors are likely to be interrelated, and the unique effect of any one will be extremely difficult to ascertain. However, these factors can, as a group, make it possible for a district to serve a much larger number of students in a much larger number of schools without changing the composition of the Title I instructional program than an individual student receives (or total expenditures). This allocation policy can also be achieved by modifying the services provided each student in such a way that costs per student are reduced. More specifically, the increases in total cost resulting from serving more pupils in more schools is offset by decreases in the cost per pupil of the program. Examples would include: reducing the length of time each class meets and/or the number of times it meets during the school year; increasing average

program class size; shifting from a "pull-out" operation of the program to one taking place in the regular classroom; and changing the mix of resources in the program to greater use of less costly resources, such as changing from teachers to teacher aides. These changes (classroom services per pupil) not only can interact with each other, but also with the factors described earlier.

Case C: Districts serve relatively many more schools without increasing the number of students served with no significant change in Title I funds.

Increasing the number of schools served without increasing the number of students served suggests a smaller decrease in Title I funds per student than in Case A. The extent to which non-Title I resources or funds could be used to cover the costs of expanding to new schools makes the availability of federal or state funds, resources from other programs and district resource or fund contribution important factors in maintaining previous levels of per-student Title I services, although perhaps not as crucial as in Case A. Shifts in the mix of resources devoted to direct instruction are likely to be in the direction of increased use of resources which are relatively divisible, i.e., those which can operate at capacity with relatively fewer students. Instructional programs requiring a relatively large minimum number of students to be fully utilized and operate efficiently are likely to be replaced by programs which require fewer pupils. For example, a reading diagnostician who can serve 40 Title I students in one school may be able to serve only 30 students in two schools because of time spent travelling between schools. In such a case, the district may decide to fund the training of compensatory teachers in diagnostic techniques rather than to rehire the diagnostic specialist. However, central administrative functions may be able to expand the number of schools without change in their costs, although the total amount of individual school administration may increase.

The same types of reduction in total costs per student (and services) as those mentioned in Case A would also contribute to a district's ability to serve students in an increased number of schools. The likelihood and amount of such changes would depend on the size of the set-up and transfer costs of adding new schools and facilities, so that if facilities (space in particular) were readily available in newly-served schools, and there were fewer transfer costs (such as travel expense for staff serving more than one school), reductions in services per pupils (as measured in class size, minutes of instruction, and number of staff per student) would be less.

Case F: Districts serve relatively many more students without changing the number of schools served with no significant change in Title I funds.

Again, the factors outlined in Case A can be expected to operate similarly for Case F. The availability and use of other resources (from the district, other programs, or other fund sources) is a critical factor.

However, Case F is unlike Case C in that there would be a relatively larger number of students served per school (and at fewer schools). Therefore, districts using a policy which results in serving more students in the same number of schools would be expected to operate (or shift towards) resources which are not necessarily readily divisible among schools and which can be utilized by relatively large numbers of students. Such resources are often characterized by high initial (or fixed) costs. An example of such a resource which had previously been underutilized would help to maintain levels of students services without increasing total costs per student.

## 5. Program Delivery: Data Collection and Analysis

For purposes of the cost study, Program Delivery (Box D) will be described and analyzed in terms of the resources used in Title I programs and their costs.

### 5.1 Data Collection, Data Description and Data Sources

Each Title I program in the Demonstration will be divided into organizational units, and then be described in terms of the resources used by each unit. In this way, the data will be presented by year, by district, and by program. Title I programs will be divided into program components according to the type of activity and the grade level of participating students, and further sub-divided into activity units, where appropriate. For example, a Title I program may be divided into reading, math, and social services components. The reading component may be further sub-divided into elementary and high school reading activity units. In this way similar types of Title I activities may be compared across programs, and shifts in program services among grades identified.

For the cost study, each component/activity unit, or whole program description will have two versions. One version will display program fund expenditures (e.g., expenditures from Title I funds), by resource type for each program component or activity unit. The other will display the total costs of all resources used by the program or component/activity unit by resource type.

Resources used and their costs will be described in nine groups of variables:

(1) Fund source lists the amount and percentage of total funds or costs originating from Title I funds, Title I carryover funds, non-Title I federal funds, state compensatory



program funds, local funds (compensatory or other) and any other source of support. Program gradespan for private and public school is listed. Also listed is the number of schools participating in the activity unit by type (using a simplified version of the school type categories of the Demonstration Research, in which I = Title I school 75-77; II = Title I school 76-77 only, III = Title I school 75-76 only, and IV = never Title I school).

(2) Program clients are subdivided into two sections. Students are described by number of students enrolled by school type (I-IV) and by full-time equivalent students by school type. The FTE is computed from instructional scheduling information and represents a standardized unit for measuring students served by a component/activity unit. Other (non-student) program clients are preschool children (for preschool or home programs), parents (for parent participation or PAC activities), and instructional staff (for teacher inservice activities).

(3) Instructional scheduling data include length of the regular school day, length of the instructional day, length of the regular school year, average regular class size, average program class size, length of program section meeting, section meetings per week, and length of the component/activity unit.

(4) The administrative and instructional support information indicates the number of persons, their full-time equivalencies, their salary compensation rates, and the amount of compensation received for participation in the component/activity unit broken down by staff function. Position functions include non-program professional and clerical support (for persons such as school principals who act as a significant program resource); program administration, professional and clerical (e.g., Title I directors); research and evaluation, professional and clerical (to reflect such personnel resources specifically used by the component/activity unit); and fringe

benefits (if not included in salaries). In addition, instructional support personnel (i.e., those involved in working with the instructional staff) are listed by function: professional (e.g., teachers acting as resources to other teachers), auxiliary staff (nurses, therapists, counselors, etc.) and their fringe benefit amounts.

(5) Data collected about instructional personnel breaks staff into several types: regular classroom teacher (who in addition to regular instruction, provides some compensatory instruction), professional teachers whose primary function is to provide compensatory instruction (and who may be further subcategorized by specific function or salary scale), and para-professional aides (subcategorized into paid and volunteer aides).

(6) Number of staff by staff type working at instruction in the component/activity unit, the sum of FTEs by staff type for instructional time spent, is computed from the instructional scheduling information. Salaried FTE for the staff in the component/activity unit is reported. Unit salary rates (averaged) for each position, compensation received and fringe benefit amounts are reported.

(7) Materials, supplies, services and equipment costs are categorized into instructional and administrative uses. Those used specifically for testing are so noted and included under administration. For both administration and instruction, equipment (which can be used for more than one year) is noted separately from materials, supplies and services. (Services include the cost of contracted services for which the program does not pay fringe benefits separately.

(8) Transportation, indirect (or overhead) charges (including rate) and operations and maintenance charge costs are also listed.

(9) Data on the use and cost of instructional space use four categories of space: students' regular classroom, pull-out classrooms, specially equipped resource room or laboratory and other types of spaces. The type(s) of space used by the component/activity unit, the extent of its use (a calculated FTE) and an imputed unit rent for each type of space are displayed and used to calculate the estimated cost of space for the component. Costs associated with the use of instructional space will only be used for displaying total costs as fund expenditures do not include space charges. (Although in some cases, if an overhead charge is made it may be intended to reflect space charges. This will be duly noted).

(10) Summary statistics will be displayed for each program and program component: total expenditures or costs for the entire component/activity unit, for all personnel, for all non-personnel, for administration and for instruction will be listed as totals, per total clients per student FTE, and per hour of student instruction (where appropriate).

This data will be drawn from a computerized file. Samples of individual activity unit descriptions, program combination and comparison descriptions, and variable definitions are in Appendix 3.

There are two primary sources for the data files. Data on numbers and types of students served, instructional scheduling, staffing, equipment and space used, and expenditures are taken from the site description files and interviews with Title I and district administrators. All expenditure information by resource type and resource use is verified from district documents such as expenditure reports and program evaluations. Title I programs\* will be described in three

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\*Other compensatory programs will also be described, but in less detail than the Title I programs.

segments: total program, grades 1-6, and grades 3-4.\* Where appropriate, each of these segments will be broken down into components or activity units. All of these will be taken from the case study files and district documents, as described above. When appropriate, instructional scheduling variables will be based on data from the Instructional Schedule and the Classroom Activities Log (CAL), instruments which are part of the Demonstration Research.

Appendix 4 lists intra-year and inter-year comparisons to be made among the Demonstration districts and their compensatory education programs.

#### 5.2 Measurements and Analysis of the Effects of Allocation Policy and Other Factors on Program Delivery (Boxes C/C' → D)

This section describes how the data in the preceding section will be used to determine the effects of policy and non-policy factors on resource distribution and program cost.

As discussed in earlier sections,\* the use of non-Title I resources to provide Title I services is probably the single most important factor in explaining how LEAs can extend Title I services to increased numbers of schools and/or students without significant change in Title I funding. The sources of outside funds or resources are likely to be Title I carryover funds, district donation of resources, other programs in the district and other federal/state funds. As discussed in Section 5.1 above, each program's resource use and resource cost description will be described in terms of both Title I fund expenditures and total costs. Thus, the total cost version will include time spent by regular district administration and instructional personnel on Title I activities, use of space whose cost is not borne by Title I, annualized costs of previously purchased resources, etc. The source of all non-Title I resources will be identified, and the use of such

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\*Although the rest of the Demonstration research is based on data from grades 3-4, the cost analysis will focus on resource use in the elementary grades (1-6) because of the

resources will be compared among years and among districts and programs in order to determine if the use of outside resources increased during the Demonstration.

The use of district-supplied resources will be compared to nonfederal district expenditures per student, equalized assessed valuation per student and local tax rates, in order to determine if there is a relationship between the general wealth of a district and the use of district resources for Title I activities.

Other district characteristics, such as the presence and composition of other compensatory programs, recent Title I history (including the extent of saturation) and changes in district situation (from changes in enrollment patterns and/or demographic characteristics) will be reviewed and compared to the extent of non-Title I resource use.

Changes in specified unit costs (i.e., instructional staff salary level, fringe benefits and indirect charges) will also be determined and compared by allocation type across districts in order to estimate: 1) a relationship between unit price change and resource use, and 2) a relationship between unit price change and allocation policy. In order to determine the magnitude of the effect of price changes on program costs, the cost of each district's Title I program during the Demonstration will be calculated using pre-Demonstration unit costs (in "real" or deflated dollars). Direct comparisons will be made, and simple linear relationships estimated. In order to assess the magnitude of the effect of differences in unit costs on resource choice in the Demonstration districts, a resource model of "typical" Title I programs will be constructed, and program costs for each district will be calculated using each district's unit costs. These calculated costs for the "typical" program in each of the districts will be compared to the model and compared to national average unit costs which may be interpreted as a baseline against which the relative "expensiveness" of program costs in the individual Demonstration districts can be judged.

Certain shifts in resource use, which will be measured in the change comparisons described in Section 5.1 above must be observed within the context of the individual district in order to judge if they suggest indivisibility of a resource type or represent a shift from start-up to recurrent costs. For example, a decrease in inservice costs when there is no basic change in program objectives and resource use between years suggests that the inservice represented a one-time cost. However, a shift in instructional resources to instructional personnel in a district which is deconcentrating suggests that the instructional equipment was not readily "divisible" for use in the new Title I schools.

#### Conclusions:

The objective of the Cost Study section of the "Effects of Compensatory Education Projects Research" is to assess the impact of changing intra-district Title I allocation procedures on Title I program costs. This paper describes the framework of the cost study, the nature of the data to be collected and general approaches to data analysis.

Data will be collected for each of the three years of the project. Baseline data for the Demonstration planning year, 1975-76, is presently being analyzed. Analysis of the first Demonstration year, 1976-77, is expected to be completed in December, 1977.

APPENDIX 1

TITLE I ALLOCATION POLICY, AND CHANGES IN  
SCHOOLS AND STUDENTS SERVED:  
1975-76 TO 1976-77

Typology	Number of Districts	Number of Districts Increasing the Number of Schools Served	Schools Served $\frac{1976-77}{1975-76}$	Range of Percentage Increase	Students Served $\frac{1976-77}{1975-76}$
1. Direct LEA to student allocation	7	7	210%	120%-320%	139%
2. Substitution of Achievement for Poverty	2	2	151%	116%-185%	121%
3. Educational need, poverty hold-harmless	2	2	115%	112%-117%	110%
4. Poverty	2	1	105%	100%-110%	172%

APPENDIX 2

Demonstration Districts: Magnitudes of Changes  
in Schools and Students Targeted;  
1975-76 to 1976-77

	Districts												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Allocation Typology:*	I	I	IV	III	II	I	III	I	I	I	I	II	IV
Increase in TI dis- tribution across schools:													
Large (>200%)	✓								✓	✓	✓		
Medium (60-120%)		✓						✓				✓	
Small (<40%)			✓	✓	✓	✓	✓						✓
Increase in TI dis- tribution across students:													
Large (>80%)	✓		✓			✓			✓	✓			
Small (0-80%)		✓			✓		✓				✓	✓	✓
Negative (decrease)				✓				✓					

- \* I: Direct LEA to Student Allocation
- II: Substitution of Achievement for Poverty
- III: Educational Need with Poverty Hold-Harmless
- IV: Poverty





#### APPENDIX 4

- a) Intra-Year Comparisons: Among Programs for Both "Fund Expenditures" and "Total Costs"
1. All component/activity unit "summary" figures
  2. Administration staff
  3. Support staff
  4. Research/evaluation staff
  5. Research/evaluation staff plus testing materials, equipment, supplies and services
  6. Instructional staff
    - Teacher
    - Specialist
    - Aide
  7. Instructional materials, supplies, services, equipment
  8. Instructional staff, and instructional materials, supplies, services, and equipment

These will be described in terms of

number of schools by number of schools by school type,  
number of clients by student type,  
student instructional FTE, and  
hours of instructional activity per year, as well as  
by total resource use and cost.