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ABSTRACT

A research strategy that the National Institute of Education (NIE) has adopted to obtain information about what Title I of the Elementary and Secondary Education Act is accomplishing toward achievement of two of its objectives is presented. These two objectives are to fund special services to low achieving students in the poorest schools and to contribute to the cognitive, emotional, social, or physical development of participating students. In designing the research, NIE recognized that all of Title I's purposes cannot be addressed within a single research project, using a uniform research strategy. NIE therefore decided to implement separate studies to address each specific purpose of the Title I program. In keeping with this strategy separate studies were undertaken to describe compensatory education services currently being delivered and the effects of these services on children. The study uses data gathered from the research on selected programs to interpret the data on services and to determine, for selected instructional areas, the apparent potential for success of practices in use throughout the country. This paper illustrates the NIE research strategy and presents some preliminary findings from the survey of services. (RC)

THE STRUCTURE AND CONTENT OF COMPENSATORY EDUCATION PROGRAMS: A RESEARCH STRATEGY FOR EVALUATING TITLE I'S EFFECTS ON SERVICES AND EFFECTS ON STUDENTS

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The Education Amendments of 1974 (Public Law 93-380), the major education legislation considered in the 93d Congress, instructed the National Institute of Education (NIE) to conduct a study of compensatory education, including compensatory programs financed by States and those financed under authority of Title I of the Elementary and Secondary Education Act (ESEA). That title, the largest Federal education effort, provided $2 billion in 1976. Most of these funds were used to improve educational programs for low-achieving students in school districts serving children from low-income families.

Specifically, Section 821 instructed NIE to conduct a study of compensatory programs which would:

- Examine the fundamental purposes and effectiveness of compensatory education programs
- Analyze the ways of identifying children in greatest need of compensatory education
- Consider alternative ways of meeting these children's needs
- Consider the feasibility, costs, and consequences of alternative means of distributing Federal compensatory education funds

NIE's research is intended to help Congress during its deliberations on Title I of the Elementary and Secondary Education Act. NIE is required to examine compensatory education, in general, and to provide Congress with specific recommendations about the range of possible objectives, funding methods, administrative techniques, and educational programs.

Introduction

The provisions of Title I and its various amendments, accompanying House and Senate reports, and Congressional debates indicate that Title I of the Elementary and Secondary Education Act has three fundamental purposes: To provide financial assistance to school districts in relation to their numbers of low-income children and, within those school districts, to schools with the greatest numbers of low income students; fund special services for low achieving children in the poorest schools, and ; To contribute to the cognitive, emotional, social, or physical development of participating students. The purpose of this paper* is to present a research strategy NIE adopted to obtain information about what Title I is accomplishing toward achievement of two of these goals: the provision of special services and the fostering of student development.

Section 101 of Title I of ESEA entitled "Declaration of Policy" is a statement of the program's funding objectives. This Declaration of Policy states that local educational agencies are required to use Title I funds "to expand and improve their educational programs by various means... which contribute particularly to meeting the special educational needs of educationally deprived children." Although the Congressional originators of Title I may have differed about the degree to which school districts should be restricted in their use of funds, Congress clearly intended that funds be used for programs targeted on children with special needs. Section 141 of Title I expands upon the general instruction cited in the Declaration of Policy and makes school district eligibility

*This paper is based on Evaluating Compensatory Education: An Interim Report on the NIE Compensatory Education Study which was submitted to the President and Congress on December 30, 1976.

for Title I grants contingent upon assurances that funds would be used for programs: (1) designed to meet the "special educational needs of children in school attendance areas having high concentrations of low income children"; and (2) of "sufficient size, scope, and quality to give reasonable promise of substantial progress toward meeting those needs." Thus a fundamental purpose of Title I is: To fund special services for low achieving children in the poorest schools.

In addition, while neither a definition of the exact nature of the services to be delivered under Title I, nor of educationally disadvantaged children were provided, it appears clear that Congress was concerned with the connection between poverty and low achievement and hoped that the provision of Title I services in areas with concentrations of poverty might also help improve the school performance of children in poor areas. The 1965 House report accompanying ESEA spoke of the "close relationship between conditions of poverty... and poor academic performance." Moreover, members of the House Committee on Education and Labor commented in 1974 that compared to the funds allocation purposes of Title I, "the educational results that are achieved once this aid reaches school districts," are the "more important and more frequently discussed facet of the program." Nevertheless, the Committee stressed that Title I is not solely a program to enhance basic skills in reading and mathematics. Thus, another fundamental purpose established in Congressional intent is: To contribute to the cognitive, emotional, social, or physical development of participating students.

These three fundamental purposes of Title I (including funds allocation) are consistent with one another, but each is not equally important to

all members of Congress. Congressional debates, and even the language of different parts of committee and conference reports, suggest that Members of Congress differ over the relative importance of the respective purposes. Although some Congressional statements imply that the purposes form a hierarchy in which Title I delivers funds and services only to increase children's academic achievement (thus making the third fundamental purpose the most important), other statements make it clear that the allocations of funds and delivery of services are important ends in themselves.

Research Strategy

In evaluating the accomplishment of these purposes, the NIE Compensatory Education study started with the recognition that the program has several purposes, and the belief that to focus exclusively on one improperly ignores the others. The multiple focus differs significantly from that of earlier national evaluations which generally considered only what we have called the third purpose, fostering student development and did little to examine impact in other areas.

In designing our research we recognized that all of these purposes cannot be addressed within a single research project, using a uniform research strategy. The procedures appropriate for describing services for example, are not identical to and may in fact be in conflict with the procedures appropriate for describing the effects of these services on students.[2] NIE therefore decided to implement separate studies to address each specific purpose of the Title I program. In addition, these

[2] For a fuller discussion of the problems encountered by previous studies and the rationale behind the NIE approach see Evaluating Compensatory Education: An Interim Report on the NIE Compensatory Education Study, December 30, 1976.

studies, or in most cases, series of studies were structured to complement each other with the goal of providing at the end of the multi-year research program a coherent picture of Title I's accomplishments.

In keeping with this strategy separate studies have been undertaken to describe 1) compensatory education services currently being delivered and 2) the effects of these services on children. The goal of the first is to describe and evaluate the range of services supported by compensatory funds. The goal of the second is to provide an assessment of the effectiveness of selected services believed to have high potential for increasing student achievement. We will use data gathered from the research on selected programs to interpret the data on services and to determine, for selected instructional areas, the apparent potential for success of practices in use throughout the country. In this paper we illustrate the NIE strategy and present some preliminary findings from our survey of services.

NIE Survey of Compensatory Education -- To gather data on services delivered with Title I and state compensatory funds NIE commissioned a representative national survey. This survey was designed to provide detailed information on the kinds of services school districts provide with compensatory education funds, the characteristics of students receiving these services and how they are selected, the characteristics of compensatory instruction, and the extent to which the services are sufficient to have a reasonable chance of accomplishing their goals. Special features of this survey are its sampling strategy, and its use of multiple levels of respondents.

The population from which districts were sampled was defined as all operating public school districts in the continental United States

which received Title I funds, and which had at least one grade in the range K-8. The population was defined as Title I districts rather than Title I schools because it was i portant to be able to characterize the key local policy-making unit (school districts) to which the Title I funds are directed. The districts were stratified on the three dimensions of enrollment size, regional location, and receipt of State compensatory education funding. Three enrollment or size categories were established with cutting points at the 33.3 and 66.6 percentiles of number of students: Category I--lowest third, enrollment less than 4,359; Category 2 -- middle third, enrollment from 4,359 through 17,628; and Category 3-- highest third, enrollment above 17,628. For regional location, four categories based on Census Bureau definitions were used: Northeast, South, North Central, and West. The two categories under State compensatory education funding for the district were (1) presence of State compensatory education funds and (2) absence of State compensatory funds.

These three stratifiers were selected so that the research could examine whether the characteristics of compensatory services in Title I districts vary according to the district's enrollment, its location, or its receipt of State compensatory education funds. Because a number of states also fund their own State's compensatory programs, the third dimension allows the study to describe the services provided with these funds. More importantly, the study can examine whether, in Title I districts, Title I and State compensatory education funds are used for separate

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3 States with such programs included California, Connecticut, Georgia Hawaii, Maryland, Michigan, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, Utah, Washington, and Wisconsin.

programs or are pooled to provide a single set of compensatory services.

The sample selection strategy was designed to allow estimates from the data on both a per-district and a per-pupil basis. The sample was thus selected to ensure approximately equal reliability for both types of estimates. The probabilities of selection of districts for the sample were chosen as a compromise between the extremes of equal probability and probabilities proportional to size. One hundred school districts were selected on this basis, after which individuals to be interviewed within those districts were selected. Within districts, the most important decision was the strategy for sampling teachers.

Teachers in compensatory education schools were selected in two ways. First, lists were compiled of all teachers who had responsibility for taking attendance and who had at least one compensatory education student in the classroom. This procedures allows accurate estimates of the number and characteristics of compensatory education students. Because the survey was designed to provide information on State programs as well as on Title I, these students included those receiving services funded by Title I and/or State compensatory education funds. A sample of these homeroom teachers was then selected. In this way, duplicate counting of pupils was avoided, because no two teachers in the homeroom sample could report on the same pupil when asked about the number of compensatory education students.

Second, lists were compiled of all teachers who actually provide Title I-and/or State-funded compensatory instruction. The teachers providing this special instruction may or may not also have been homeroom teachers. A sample of these teachers was selected which permits

an accurate description of the characteristics of the instructional services delivered to compensatory education students.

In addition, because NIE was interested in information on services as actually implemented and not just intentions or plans, and because it was unlikely that any one individual could provide in-depth information on all aspects of compensatory education services, the information was collected from a number of different persons within each of the sample districts: district administrators, principals, and Parent Advisory Council chairpersons, as well as teachers -- over 5,000 individuals in all. While some public records and documents were collected, most of the data were gathered through face-to-face interviews ranging in duration from 30 minutes to 2 1/2 hours. The interviews were conducted during the 1975-76 school year and the response rate for these interviews was 99.4%.

Effects of Services on Children- To understand the impact of Title I services on students a different data collection strategy was developed. Instead of a broad-based representative survey, efforts were launched aimed at synthesizing data and testing hypotheses about program effectiveness in the areas of reading and mathematics. The purpose of these not to provide some statistical estimate of the average impact of Title I participation - a strategy characteristic of past evaluations - but rather to povide data on what can work. Such information is necessary to both making recommendations about future program design and evaluating the potential adequacy of the existing program. Two of the approaches employed for gathering this data the Instructional Dimensions Study and the syntheses are described below.

Instructional Dimensions Study -- The Instructional Dimensions Study is the major data collection effort in the area of the effects of services on children. The study's major purpose is to assess the effects on achievement in reading and mathematics of variations in indivdualized instructional methods and in instructional setting (mainstreaming versus pullout instruction). Effects of instructional time and teacher training will also be examined, as will the impact of different program characteristics on such areas as students' attitudes toward reading and mathematics achievement and class attendance. Since all aspects of individualization could not be examined successfully within the constraints of the NIE study, a special attempt was made to carefully define the focus of the research. In this study individualized instruction is defined as specially structured curricula with the following four characteristics:

- o Specific learning objectives assigned to individual children
- o Small group or individual pacing
- o Diagnosis and individual prescription
- o Alternative learning paths and sequencing for individual children

The research model guiding the study is based on an adaption by Cooley and Leinhardt (1975) of the Cooley and Lohnes (1976) model of classroom learning. The study focuses on a sample of approximately 400 classrooms purposively selected to provide necessary variation along the instructional and setting dimensions of interest to the research. In addition, the sample has the following features: (1) the projects studied are currently being delivered in Title I-participating or Title I-eligible schools; (2) the classrooms being studied focus on reading and mathematics instruction in grades one and three; (3) nearly 12,000 students are included in the study; (4) the projects examined come from

five states and 14 geographically diverse districts, located in urban, rural, and suburban settings; and (5) the data collected will permit comparisons between demographic characteristics of districts selected for the Instrutional Dimensions Study and the nationally representative sample included in the National Survey of Compensatory Education.

The study includes a variety of data collection methods selected to provide indepth, convergent information on classroom practices. Students in the sample are being given in the Fall and Spring both an achievement test (CTBS) and a measure of their attitudes toward the learning of mathematics and reading (The SSA). Fall and Spring interviews are being conducted with district personnel, school principals, and regular and supplemental teachers to document selected aspects of program functioning. Regular and supplemental instruction will also be videotaped at midyear to obtain descriptors of actual classroom practices. Curricula will be analyzed to gather additional data on instructional approach as well as to assess the relationship between instructional content and achievement test requirements. The data analyses will be guided by the Cooley and Leinhardt model which prescribes both how each data item relates to the model of learning and how the data items as combined should be examined.

Syntheses-- To pull together current knowledge about the variables which influence program effectiveness, a series of small scale syntheses and secondary analysis of data are currently being conducted. These vary in emphasis from detailed analyses of achievement data collected by school distircts, to reanalysis of national survey data on reading, to reviews of data on how to teach reading and mathematics to compensatory

education students. These analyses will supplement our original data collection efforts and integrate what is known about features of effective compensatory instruction.

Preliminary Survey Findings

The first analyses of the survey data have been completed and some information can be presented about the characteristics of compensatory education services delivered by Title I school districts. The figures reported here represent national estimates based on the survey data. As a consequecnce of the survey design, statements made about compensatory education students, teachers and services reflect the characteristics of programs supported both by Title I and/or State compensatory education funds. Later analyses of the survey data will attempt to determine the extent to which Title I districts that also receive State compensatory funds either establish separate programs or use such funds for joint compensatory programs with a single group of recipients and services.

Two categories of findings will be reported here. The first set provide background data on the uses to which Title I and state compensatory funds are currently being put. These are presented not only to provide some general understanding of what the programs are about but also to point out the prominence of instructional, particularly reading and mathematics, services among the services offered. The second set of findings report survey data on selected features of these instructional services. The particular characteristics discussed are ones not only of descriptive interest, but also ones on which we have chosen to focus in linking descriptive and evaluative findings. Why these particular characteristics were selected and how the data will be linked are also discussed.

Overall Program Characteristics: Compensatory education involves most of the Nation's public school districts and many of its students and teachers, but constitutes only a small percentage of natioanl expenditures for education. In 1975-1976, educational expenditures in the United States for public elementary and secondary education were approximately $61.4 billion, of which $5.3 billion were supplied by Federal funds (NCES, 1975). In that year, Title I appropriations amounted to $1.8 billion, of which $1.6 billion went to support the operation of programs for the educationally disadvantaged by Local Educational Agencies.[4] Title I thus constituted 3% of the national expenditures for public elementary and secondary education but represented 34% of Federal expenditure. The total of State compensatory education appropriations for the 16 states with such programs was approximately $0.6 billion in 1975-1976.[5] Thus, combined Title I and State compensatory education expenditures generally amounted to $2.4 billion, or 4% of total national expenditures, for public elementary and secondary education.

Public school enrollment in grades K-8 was approximately 30.5 million in 1975-1976 (NCES, 1976). From the Survey of Compensatory Education, it is estimated that in the1975-1976 school year, approximately 5.9 million public school students in Title I districts received compensatory education services, including both Title I and State compensatory education

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4 Of the 15, 453 school districts in the continental United States serving some elementary (K-8) grades in 1975-1976, Title I funds were distributed to 13,877, or 90% of these districts (information from NIE Survey sampling frame).

5 Based on information collected by NIE on State compensatory education programs.

program participants.[6] This is 19.5% of the public school children enrolled in grades K-8.

Uses of Title I funds: The survey collected information on whether districts use Title I funds to provide instructional or supportive services for public school children.[7] In general, almost all Title I districts use some of these funds for compensatory instruction. Approximately 98% of the districts use some Title I funds for instructional services, while approximately 59% use some Title I funds for supportive services. From the expenditure data, it is estimated that the national average Title I per-pupil expenditure for instructional services is $263, or an average of 76% of the total Title I budget.[8] The amount and proportion of Title I funds used for instructional services, however, also varies with the economic status of the district (see Table 1). The poorest districts spend fewer Title I dollars per participant for instruction, and proportionately they spend about 20% less of their total budget for instruction than the wealthiest districts.

(Table 1 here)

The percentage of districts that are using at least some Title I funds to support specific kinds of compensatory instructional and support services can also be determined from the survey data. For purposes of data collection, compensatory services were divided into three general

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6 This is the best estimate based on the sample. The standard error of the estimate is 595,000. This means that the actual number falls within a range of 595,000 above or below our estimate. All standard errors for the data in this paper are for estimates at the 95% confidence level.

7 Supportive services refers to the expenditure of funds for any services which do not involve direct instruction of the participants.

8 Standard error=$25. As with total Title I per-pupil expenditures, this estimate may be revised when the data are corrected for possible underestimates in projected numbers of participants.

categories: support services that do not involve direct instruction of children, and two sets of instructional services. The first of these (Group A) consists of those areas where it was difficult to develop a meaningful set of standardized questions about instructional practices and thus where only general information about the incidence of such services was collected. These were preschool/kindergarten readiness activities, instructional programs for dropouts, Follow Through programs, industrial arts or home economics instruction, music or art instruction, instruction in health or nutrition, and general enrichment without a subject area focus. The second set of instructional services consists of those subjects about which we asked specific standarized questions concerning the characteristics of instruction. Group B included: remedial reading, mathematics, science, social/cultural studies, English as a second language, special education/learning disabilities, and language arts/communications skills.

Tables 2 and 3 give the percentage of districts using Title I funds for each instructional and support service. These tables present a detailed national picture of the uses of Title I funds. The support services most frequently funded are those most directly related to instruction--resource centers and libraries. However, a substantial percentage of districts are using Title I funds to provide medical, transportation, and even food services. The specific instructional services that Title I districts are most likely to offer are remedial reading, mathematics, language arts, and preschool/kindergarten readiness programs.

(Tables 2 and 3 here)

It should be noted here that remedial reading and language arts are separate types of programs. Language arts instruction as offered by districts is a broad program of instruction in communication skills, covering such topics as grammar and such skills as spelling, writing, and speaking. Because language arts instruction does frequently include a reading component, the percentage of districts offering remedial reading and language arts instruction can be combined to obtain a clearer picture of the general emphasis on language ability in compensatory instruction. About 95% of all Title I districts offer reading and/or language arts as part of their compensatory education activities.[9] A fact which further emphasizes the focus on language abilities in Title I is that while 39% of the districts offer reading but not mathematics only 11% offer mathematics, but not reading. Some information collected by the survey on the nature of compensatory instruction in remedial reading and mathematics is presented below.

Remedial reading is offered by 69.7% of Title I districts. Based on data in Title I applications, the share of the Title I instructional budget allocated to remedial reading instruction averages 53.3%.[10] nationally. In terms of the total Title I budget, 40.3%[11] is allocated to compensatory instruction in reading. In offering compensatory instruction in remedial reading, Title I districts have chosen to focus primarily on grades 1-6; fewer than 10% of all Title I districts offer compensatory reading in grades 9-12.

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[9] Most of these districts fund either a remedial reading or a language arts program, but not both. Only 8% of the districts offer both types of services.

[10] Standard error=7.4%.

[11] Standard error=6.83%.

Compensatory reading instruction is received by 50.4% of all compensatory education students in Title I districts. Figure 2 graphs the percentage of these students in each grade K-8 who are receiving compensatory instruction in reading. The percentages of compensatory education students receiving reading in grades K-3 are not significantly higher than those for grades 4-6. Approximately 63% of the compensatory students in grade 6 receive remedial reading. Because language arts instruction frequently has a reading component, the combined percentage of compensatory education students receiving reading and language arts with reading by grade was calculated in order to see if this altered the grade distribution. The distribution remained essentially the same.

(Figure 2 here)

One way to describe the nature of the compensatory reading instruction students receive is in terms of class size. To some extent, this provides information on the extent to which compensatory education students are likely to receive individual attention. Figure 3 indicates that the average class size for compensatory instruction in remedial reading ranges from 7-12 students across grades K-8. These are small average class sizes. As the graph indicates, there is very little variation in class size between kindergarten and 6th grade; the average class is significantly larger in grades 7 and 8.

(Figure 3 here)

Compensatory instruction in mathematics is supported by Title I funds in 45% of Title I districts. These districts usually offer compensatory mathematics in grades 1-6. Nationally, the average share of the Title I instructional budget allocated to compensatory mathematics is 19.4%.[12]

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[12] Standard error=2.69%. This is an average of 14.7% (standard error=2.24% of the total Title I budget.

Compensatory mathematics instruction is received by approximately 44% of the compensatory education students. Figure 4 indicates the percentage of compensatory education students in each grade who receive it. As the graph indicates, higher percentages of compensatory education students are receiving compensatory mathematics in the upper elementary grades (4-6). There is a much higher percentage in grade 4 than in grade 3, and lower percentages in grades 7 and 8.

(Figure 4 here)

Figure 5 presents information on the average class size for compensatory mathematics instruction by grade. These average vary only slightly from grade to grade: Generally the classes are somewhat larger in grades 1-3 than in grades 4-8.

(Figure 5 here)

Selected Instructional Variables

Four variables- instructional setting, amount of instruction, instructional techniques, and cost - have been selected for special attention in our examination of services and their impacts. Presented in this section in addition to preliminary survey findings on their incidence nationally are a description of why these variables were selected and how we plan to further evaluate their contributions to program success.

Setting-- Compensatory services can be delivered to students in a wide variety of instructional settings: in the regular classroom, in a separate laboratory or classroom, or even in a separate building. Considerable debate surrounds the use and advantages of these alternative settings with regard to their educational as well as related social and practical consequences. The dilemma is as follows. On the one hand,

providing the compensatory instruction in a separate classroom may make it easier to meet the needs of low achieving children and to tailor the instruction to their individual problems. Further it may allow the use of teachers who specialized in a particular subject rather than more generally trained classroom personnel. On the other hand, the implementation of pullout programs for compensatory education students may also have consequences that are not desirable. For example, the use of pullout programs could increase the likelihood that compensatory education students would miss some portion of their regular instruction. It could also lead schools to track Title I students for their regular as well as their supplemental instruction in order to facilitate scheduling. Some earlier compensatory education survey data (Glass, 1970) indicate that this practice could promote de facto segregation in Title I schools. Finally, pull-out programs, because of the very features which make them appealing, tend generally to be a very costly way of providing instruction.

The National Survey was designed to provide information on the current prevalence of pullout programs designed for compensatory education students in various subjects. Preliminary analysis of the data indicates that the practice is widespread. Most compensatory education students receive compensatory reading instruction in pullout programs. Only 14.7%[13] of the compensatory reading students get this instruction in their regular classroom.

Of the students receiving compensatory mathematics, 37.4%[14] receive this instruction in their regular classroom, as opposed to being "pulled

[13] Standard error=2.2%.

[14] Standard error=5.7%.

out" for special instruction in a separate setting. This is a relatively high proportion in "mainstream" programs compared to reading, yet a majority of these students are also in pullout programs. Analyses of the survey data currently being conducted will explore the relationship between instruction offered in pullout vs. mainstream settings and other features of the instruction, including class size, type of instructional staff and amount of time. This will help answer questions concerning the practical consequences of the use of pullout programs.

Whether or not this reliance on the use of pullout program is desirable in terms of its effects on student outcomes remains the subject of much debate. Research evidence is sparse and inconclusive. Actual comparisons of achievement gains in mainstream and pullout situations are extremely hard to find. Most research in this area has focused on handicapped students, and the findings are not directly applicable. Data from related research areas, such as studies of ability grouping and the effects of peer group composition on achievement, are themselves difficult to interpret and therefore lend little clarity to the argument over instructional locations. NIE's research on student development is designed to assess directly the relative effectiveness of mainstream and pullout instruction for compensatory education students. In the Instructional Dimensions Study, in particular, student achievement and attitudes toward learning will be assessed in reading and mathematics for the different settings. The sample was designed to insure adequate representation of programs in each type of setting so that the relationship between this variable and student outcomes measures could be analyzed. Secondary analysis of data will also look at the setting question. These projects are intended

to define more clearly the conditions under which each type of instructional setting can be benefical, and provide program planners with better information on effective services for children.

Amount of Instruction-- Title I regulations require programs for compensatory education children to be of... "sufficient size, scope, and quality so as to give reasonable promise of substantial progress toward meeting the needs of educationally deprived children." Although the assessment of the "sufficiency" of services is a complex process, one reasonable index of the potential of compensatory services is the amount of time alloted to them.

That there is a relationship between time and learning has both face and empirical validity. A rapidly growing body of research literature focuses on the relationship between instructional time and learning, and models of learning have come increasingly to emphasis time as an important dimension (Carroll, 1963; Bloom, 1976; Cooley and Lohnes, 1976). The findings indicate that time is consistently related to achievement, with increases in time being associated with increased achievement. Studies have shown that time in school, defined as length of the school year, attendance rates, or length of the school day shows a positive relationship to achievement (Wiley and Harnischfeger, 1974; David, 1974; and Heyns, 1975). Studies comparing the effects of different amounts of instruction in specific subject areas, such as reading and mathematics, also, in general, support the existence of such a relationship (Stallings and Kaskowitz, 1975; Broward County, 1971; Jarvis, 1963; Beagle, 1971; and Zahn, 1966). A recent large scale study of innovative programs (Coles et al., 1976) found an association between

time spent in reading instruction and achievement although this association did not hold for mathematics.

The National Survey gathered considerable data regarding how much time is currently being spent in varied instructional programs by compensatory education students. For each student receiving compensatory reading, the average amount of time in such instruction is approximately 3 hours and 47 minutes per week.[15] If the amount of time in remedial reading is combined with the amount of time in language arts instruction with a reading component, the national average is approximately 4 hours per week per participant.[16] It should be noted that this is a smaller amount of time than is spent in compensatory instruction overall. This is a reflection of participation in several types of compensatory instruction.[17]

Variations by grade level in the length of the compensatory reading instruction received by participants were also examined, and this information is presented below in two ways: by minutes per week and by percentage of total time available for learning.

(Figures 6 & 7 here)

Both Figures 6 and 7 present the information for participants in remedial reading and for those participants combined with students participating in language arts instruction with a reading component. As Figure 6 indicates, there are some significant grade level variations in the absolute amount of time spent in compensatory reading instruction.

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15 227 minutes (standard error=8.18 minutes).

16 238 minutes (standard error=9.76 minutes).

17 Unfortunately, there are no national data available on the average amount of instructional time regular students spend in reading instruction with which to compare this information.

This amount is highest in 1st grade, with grade-by-grade shifts through 5th grade and slightly smaller amounts of time in grades 6-8. The pattern for reading combined with language arts reading is somewhat different. There is less variability between grades 1 and 7, and the largest amount of time is in 8th grade.

Figure 7 expresses duration of instruction as the percentage of total time available for learning, thus taking into account variations in the length of time available for all instruction by grade. First, it should be noted that the percentage of time spent in compensatory reading instruction is less than 20% in any grade. The range for reading is from 16.5% of available time in 1st grade to 12.5% in 8th grade. For both reading and reading combined with language arts program with a reading component, the largest percentage of available time spent in this instruction is in 1st grade. In comparing Figures 6 and 7, the reader should note that as a percentage of available time, instead of an absolute amount, the duration of compensatory instruction in reading and language arts reading is lowest in 8th grade.

On the average, students participating in compensatory mathematics programs are receiving approximately 3 hours per week of such instruction.[18] This is less time than is spent by participants in compensatory reading. Figure 8 graphs the percentage of total time available for learning spent in compensatory mathematics in grades K-8. As the figure indicates, the amount of time in compensatory mathematics appears to be highest in grade 4. There is also a significantly greater percentage of compensatory education students receiving mathematics in grade 4 than in grade 3.

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[18] 198 minutes (standard error=6.15 minutes).

Instruction in mathematics usually changes between 3d and 4th grades from simpler skills to more complex computational skills such as the concept of multiplication. Noticeable skill deficiencies in mathematics may thus appear more clearly for individual students in the transition from 3rd to 4th grade. If so, this may be reflected in the larger percentage of students receiving compensatory mathematics and the larger amount of time spent in such instruction in grade 4.

(Figure 8 here)

Plans for further analysis of the survey data include the question of the extent to which variation across districts in the amount of time for compensatory education instruction is a function of other characteristics at the district level, such as the number of students they are attempting to serve or the district's relative economic status.

Whether or not these amounts of instructional time are in fact "sufficient" we cannot at present say. The research on the effects of time on learning do not give us adequate guidance on the form of the relationship between the two variables or on whether there exist systematic floor or ceiling effects. Data to be collected in NIE's studies of effects of services on children cannot completely fill these gaps but will provide considerable additional information on the relationship. The most extensive analysis will be undertaken as part of the Instructional Dimensions Study, which will examine how time spent in reading and mathematics instruction is related to learning in a variety of instructional situations. Further, because this study distinguishes between regular (noncompensatory) and extra (compensatory) instructional time, it will be possible to make inferences about how much extra time is

needed to make a difference. Amount of instructional time is being measured in a variety of ways. Data collected in the interviews will include measures comparable to those used in the national survey. In addition, this study will have much more refined measures of time on task for reading and mathematics instruction. Other studies will examine the effects of time for different student populations and different instructional techniques.

Instructional Techniques-- Our studies are looking closely at the kinds of instructional techniques being used in Title I classrooms, specifically at techniques associated with individualized instruction. This emphasis was chosen because of the attention individualization has received from educators and because of the interest in individualization shown by Congress in its 1974 consideration of Title I. In addition, evidence from past research suggests that successful compensatory reading and mathematics programs use individualized techniques.

Findings on the effectiveness of individualized programs come from two kinds of studies: evaluations of educational programs and research on teacher effectiveness. However, the results of these studies are not entirely consistent, and individualized programs are not uniformly reported to be effective. Support for the effectiveness of individualization was found in early evaluations of successful compensatory education programs. A review of exemplary projects conducted by Wargo et al, (1971,1973) found the following features, many of which describe individualized programs, to be characteristic of successful Title I projects: (1) academic objectives clearly stated; (2) individual or small group instruction; (3) directly relevant instruction; (4) high treatment intensity; (5) active parent involvement; and (6) teacher training related to program methods. Similarly,

a review of compensatory program evaluations by the U.S. Office of Education (NSPRA Report, 1973) reports that successful projects often included (1) clear written objectives; (2) attention to individual needs, including individual diagnosis and prescription; (3) flexible grouping to permit frequent individual attention; and (4) structured sequential instruction.

More recent evaluations of individualized programs (Coles et al., 1976; Schoen, 1976 a,b; Miller, 1976 a,b) yield mixed results. Only Miller finds the results from program evaluations encouraging. In these studies, however, individualized instruction is defined in various ways, and it is difficult to determine whether the programs being evaluated are sufficiently similar to be placed under the single label individualized.

In examining why individualized instruction may or may not work, some of the most relevant findings come not from evaluations of individualized programs per se, but from studies aimed primarily at identifying effective teacher behavior. These provide considerable information on the methods of instruction that are related to increased achievement in the early elementary grades. Research on reading and mathematics instruction by MacDonald (1976), Soar (1973), Stallings and Kaskowitz (1975), and Brophy and Everston (1974) suggests that the following characteristics are associated with effective instruction: (1) instruction structured by the teacher, proceeding in small steps through the material; (2) frequent questions by the teacher directly related to the factual content of the material, and positive feedback; (3) supervision of students' study; and (4) time spent on direct instruction. Rosenshine (1975) suggests that these characteristics define what might be called "direct

instruction." They also characterized well-implemented, individualized curricula which employ a structured approach to teaching.

In our studies of instructional techniques we have chosen to focus on those techniques which largely reflect the direct instruction approach to individualization. We are looking at both how prevalent these instructional processes are in current compensatory programs and whether there exists a relation between their use and achievement. Thus, as part of the National Survey, an attempt was made to estimate, from compensatory education teachers' responses, the incidence of a number of dimensions of individualized instruction.

Table 4 reports the survey results for compensatory reading instruction in terms of the percentage of compensatory reading teachers using various techniques of individualization. Basically, the items in the table reflect four dimensions of individualization also studied in the Instructiona Dimensions Study. These are (a) the existence of alternative learning paths and sequencing for individual children-items 1 and 2; (b) the use of indivdual or small group pacing -- item 3; (c) the assignment of speicfic learning objectives or activities to individual children -- item 4; and (d) the use of diagnostic and prescriptive activities -- items 5,6, and 7.

(Table 4 here)

It is clear from the results that several of these dimensions were defined in such general terms that many teachers could report that they individualized their instruction. There are, however, some interesting variations and some features of individualization were less likely to be used than others. Note, in particular, that sequencing and pacing for individual children are reported in widespread use, while the

other dimensions indicate much less individualization of compensatory reading instruction. Less than 40% of the compensatory reading teachers establish specific performance objectives, and even those who do often also report that they set these objectives for the whole class, as well as for individual children. With respect to the use of diagnostic and prescriptive activities (items 5,6, and 7), it should be noted that while a number of teachers report the use of individualized skill inventories for initial placement, many more report using standardized achievement test scores which reflect a student's performance in relation to others as opposed to measuring individual abilities. In addition, in assessing progress during the school year, most do not use the tests which are most appropriate for individualized instruction, i.e., criterion-or objective-referenced tests.

Table 5 presents the percentages of compensatory mathematics teachers who report using various individualized practices in providing this instruct The pattern of responses reported in this table does not differ significantly from that reported for compensatory reading instruction.

(Table 5 here)

Variations in the use of these techniques associated with differences in setting, class size, amount of time, and type of instructional staff will be analyzed using the survey data. The relationship between these instructional processes and student acheivement is a major focus of several research projects in student development. A synthesis of previous evaluations will help to summarize the features shared by individualized programs previously identified as "successful". Secondary analyses of data from reading programs will further address the relationship between

these processes and achievement. Finally, and most importantly, the Instructional Dimensions Study will look directly at the relationship between features of direct individualized instruction and both achievement and attitude outcomes.

Cost-- Title I funds have never been sufficient to serve all eligible schools or children; ways of maximizing the return from available monies have therefore been sought. A number of studies have attempted to describe the relationship between costs and learning and whether some critical mass of resources must be made available to the student before a positive impact can be expected to occur. Early studies of exemplary or successful Title I programs which found high costs associated with success appeared to provide support for this assumption. Yet findings from a large number of other studies have been inconclusive or inconsistent. Unfortunately, they have also suffered from defects in design, sampling, analysis or interpretation. For example, frequently these studies have taken an input-output approach that treates school as a "black box" into which resources inputs are made and from which outputs, in the form of student achievement, are derived. The problem with this approach is that it ignores the practices which the dollars buy. The same amount of money may buy a variety of different treatments or it may buy increased intensity of a particular instructional treatment.

Other studies, which have focused on those resources which contribute most of the cost variations in programs (i.e. class size, or salary determining characteristics of teachers such as educational attainment, experience, etc) have also produced inconclusive results, with equal numbers of studies finding a significant relationship or no relationship between various resources and achievement.

In the NIE Compensatory Education Study we will be examining questions of program cost in a number of ways. The National Survey collected cost information on Title I programs from applications and financial statements. It is necessary to make corrections in these data to more accurately reflect the number of students served and cost differences across districts. Work is currently being done which will allow us to estimate Title I per pupil expenditures for various types of instructional services and to assess the degree to which there is variation in these expenditures natioanlly. In addition, analysis of the survey data will indicate the extent to which higher expenditures are in fact related to differences in the intensity of the services delivered to students, including the number of such services students receive, amount of time, class size and type of instructional staff.

The relationship betweem cost and outcomes will be directly examined in the Instructional Dimensions Study. Two kinds of cost data will be gathered. Data on per pupil expenditures will be collected in order to compare the expenditures in the specially selected sample with those in the representative survey. The question of interest here is how the per pupil expenditure in districts with more effective programs compares to per pupil expenditures nationally. Do more effective programs cost more than districts typically spend? More detailed cost data will also be gathered to specify more clearly the program resources necessary for program implementation. This data will aid us in filling in the black box relating cost to outcomes and help to clarify what it is about how resources are allocated that relates to more effective programs.

For each of the four variables discussed above, NIE's research strategy involves the use of results from our studies of effects of services on children to interpret the national picture of compensatory education programs provided by the survey data. Depending particularly on the results of the Instructional Dimensions Study, we hope to examine the extent to which practices indicated as effective in raising student achievement in that study are typically found in Title I reading and mathematics programs throughout the country.

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Table 1

TITLE I EXPENDITURES ON INSTRUCTION IN DISTRICTS CLASSIFIED BY AVERAGE FAMILY INCOME

Average Family Income Within District	Percent Spent on Instruction	Average Title I Instructional Expenditure per Participant
Less than $6,749	69.6	$212.91
$6,749-$ 9,765	82.8	303.03
$9,765-$12,789	89.2	319.58
More than $12,780	91.1	363.74

Table 2

VARIOUS SUPPORT SERVICES
FUNDED BY TITLE I

Type of Service	Percent of Districts Providing Service	Type of Service	Percent of Districts Providing Service
Resource center	28.5	Social work	12.2
Libraries	21.3	Counseling	9.5
Medical/dental	19.6	Community services	9.4
Psychiatrict and diagnostic	18.8	Student body activities	7.9
Transportation	14.6	Clothing	5.5
Food	14.2		
Speach and hearing therapy	13.8		

Table 3

INSTRUCTIONAL SERVICES
FUNDED BY TITLE I

Instructional Group A	Percent of Districts Offering Services	Instructional Group B	Percent of Districts Offering Services
Preschool/kindergarten readiness activities	38.1	Remedial reading	69.1
General enrichment	8.5	Math	45
Follow-through	6.9	Language arts/ communication	29.7
Music and/or art	3.8	English as a second language	10.2
Special instructional program for dropouts	1.9	Special education/ learning disabilities	7.8
Health/nutrition	1.3	Social/cultural	1.8
Industrial arts/home economics	1	Science	1.2

Table 4

DIMENSIONS CHARACTERIZING INDIVIDUALIZATION OF INSTRUCTION IN CE READING PROGRAMS

Instructional Characteristic	Percent of Teachers Employing Characteristic
1. Level of difficulty of instructional materials:	
All approximately same level	20.9
Vary in level of difficulty	78.4
2. Sequence in which skills are taught:*	
All students receive in same order	25.0
Students receive in different sequence	63.0
3. How tasks are assigned:*	
To whole class	17.0
To small groups	32.0
To individual students	38.0
4. Use of performance objectives:	
Specific performance objectives used	38.5
Of those using specific objectives, goals are set for:	
Each child	90.4%
Subgroups	64.9%
Whole class	73.1%
Flexible definition of objectives	61.0
5. Measures used by teachers to assess performance level at beginning of instruction:	
Standardized achievement test scores	77.1
Standardized diagnostic test scores	45.7
Criterion or objective referenced tests	19.4
Students age	14.8
Teacher judgment	72.7
Individualized skill inventory	47.6

*These questions were asked only of teachers with more than three students, so the percentages do not add to 100.

Table 4 (cont'd)

DIMENSIONS CHARACTERIZING INDIVIDUALIZATION OF INSTRUCTION IN CE READING PROGRAMS

Instructional Characteristic	Percent of Teachers Employing Characteristic
6. Measures used to assess students progress during the year:	
Review of homework/workbook	17.1
Criterion or objective referenced tests	24.8
Students oral participation in class	31.9
Student self-evaluation	5.0
Other methods	20.6
7. Frequency with which student progress is systematically recorded:	
5 or more times a week	23.1
1-4 times a week	46.0
1-3 times a month	21.6
Less than 1-3 times a month	8.8

DIMENSIONS CHARACTERIZING INDIVIDUALIZATION OF INSTRUCTION IN CE MATHEMATICS PROGRAMS

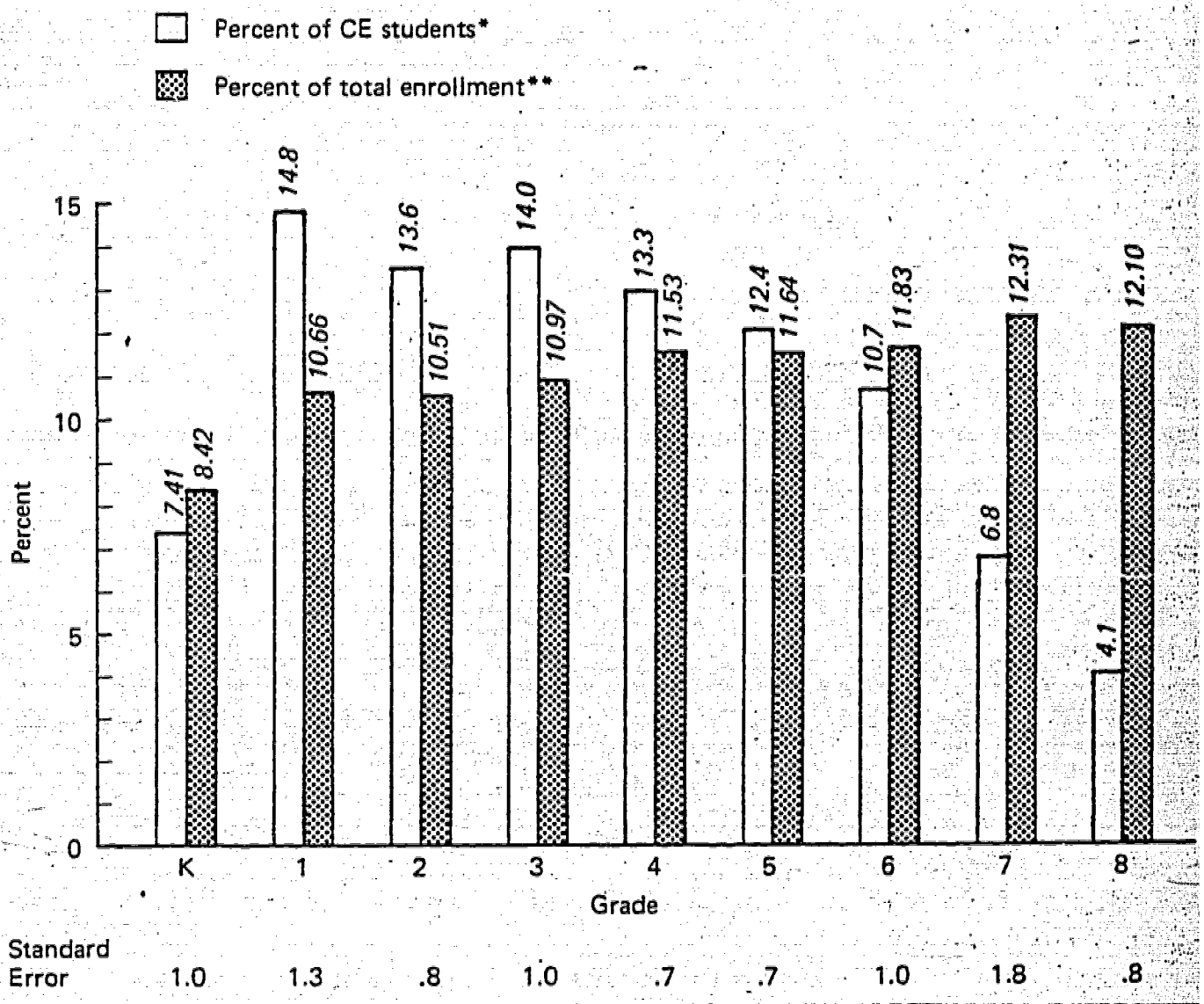
Instructional Characteristic	Percent of Teachers Employing Characteristic
1. Level of difficulty of instructional materials:	
All approximately same level	21.7
Vary in level of difficulty	75.8
2. Sequence in which skills are taught:*	
All students receive in same order	31.0
Students receive in different sequence	57.0
3. How tasks are assigned:*	
To whole class	17.0
To small groups	29.0
To individual students	43.0
4. Use of performance objectives:	
Specific performance objectives used	44.0
Of those using specific objectives, goals are set for:	
Each child	83.8%
Subgroups	59.4%
Whole class	70.0%
Flexible definition of objectives	55.9
5. Measures used by teachers to assess performance level at beginning of instruction:	
Standardized achievement test scores	63.9
Standardized diagnostic test scores	35.1
Criterion or objective referenced tests	24.5
Students age	11.1
Teacher judgment	68.1
Individualized skill inventory	36.4
Other methods	11.6

*These questions were asked only of teachers with more

Table 5 (cont'd)

DIMENSIONS CHARACTERIZING INDIVIDUALIZATION OF INSTRUCTION IN CE MATHEMATICS PROGRAMS

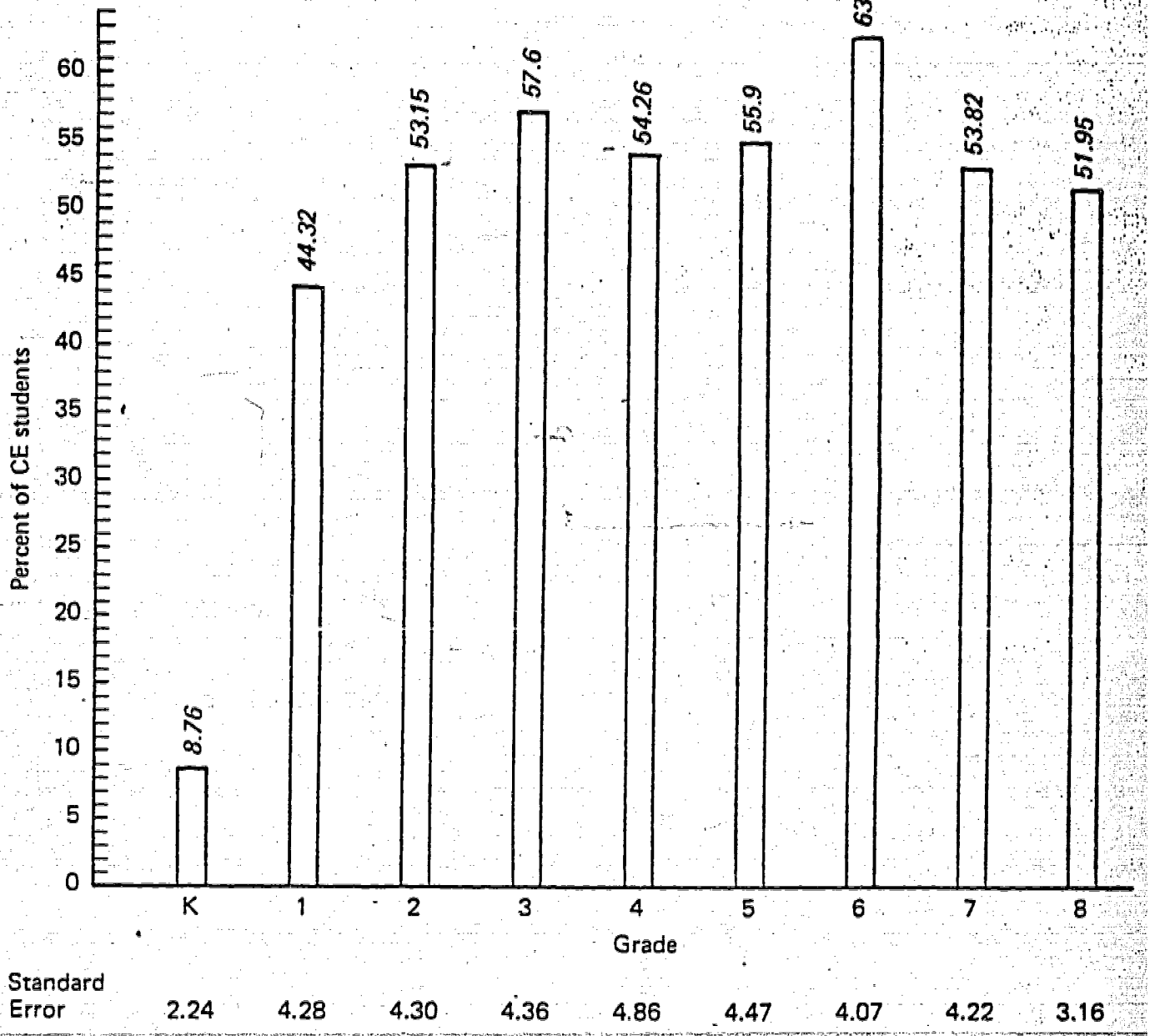
Instructional Characteristic	Percent of Teachers Employing Characteristic
6. Measures used to assess students progress during the year:	
Review of homework/workbook	15.0
Criterion or objective referenced tests	31.9
Students oral participation in class	32.0
Student self-evaluation	4.3
Other methods	16.6
7. Frequency with which student progress is systematically recorded:	
5 or more times a week	25.0
1-4 times a week	45.1
1-3 times a month	23.3
Less than 1-3 times a month	6.5



Standard Error	1.0	1.3	.8	1.0	.7	.7	1.0	1.8	.8

*1975-1976 NIE Survey data.
**1973-1974 total enrollment from *Digest of Educational Statistics: 1974 Edition*, NCES.

FIGURE 1. PERCENT OF CE STUDENTS AND TOTAL ENROLLMENT IN EACH GRADE, K-8



Standard Error	2.24	4.28	4.30	4.36	4.86	4.47	4.07	4.22	3.16

FIGURE 2. PERCENT OF CE STUDENTS RECEIVING COMPENSATORY READING IN EACH GRADE

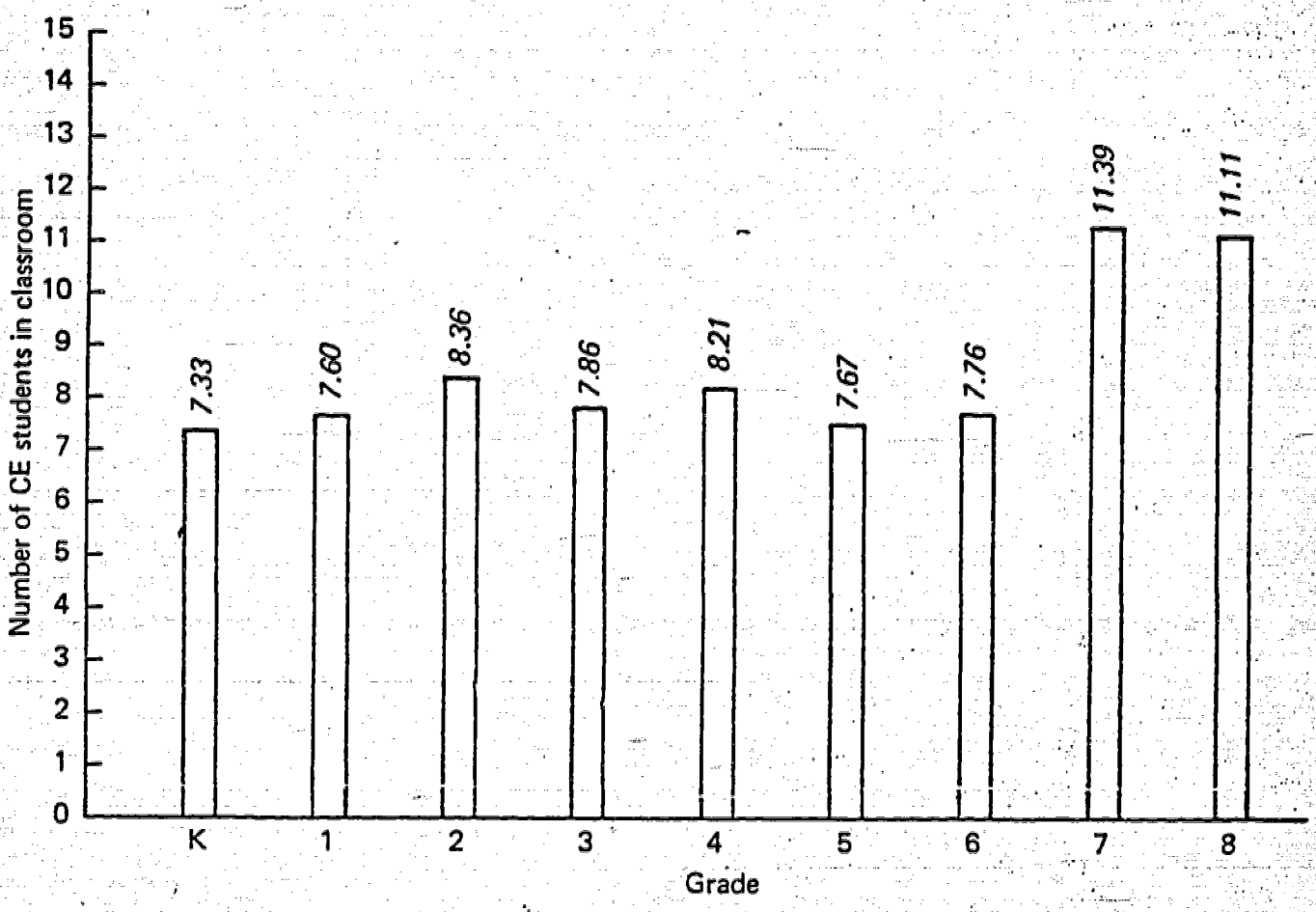


FIGURE 3. AVERAGE CLASS SIZE FOR COMPENSATORY READING INSTRUCTION

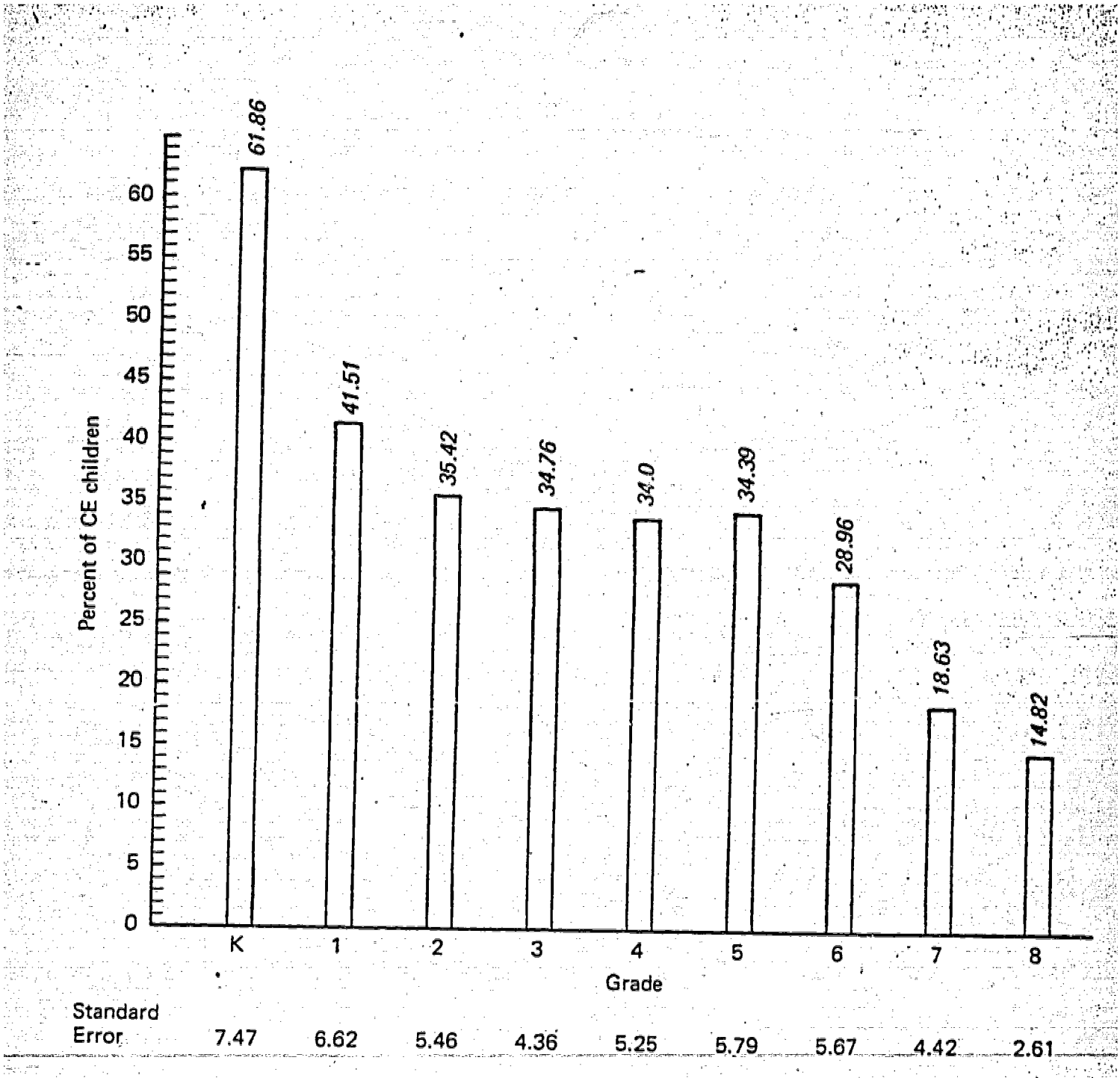
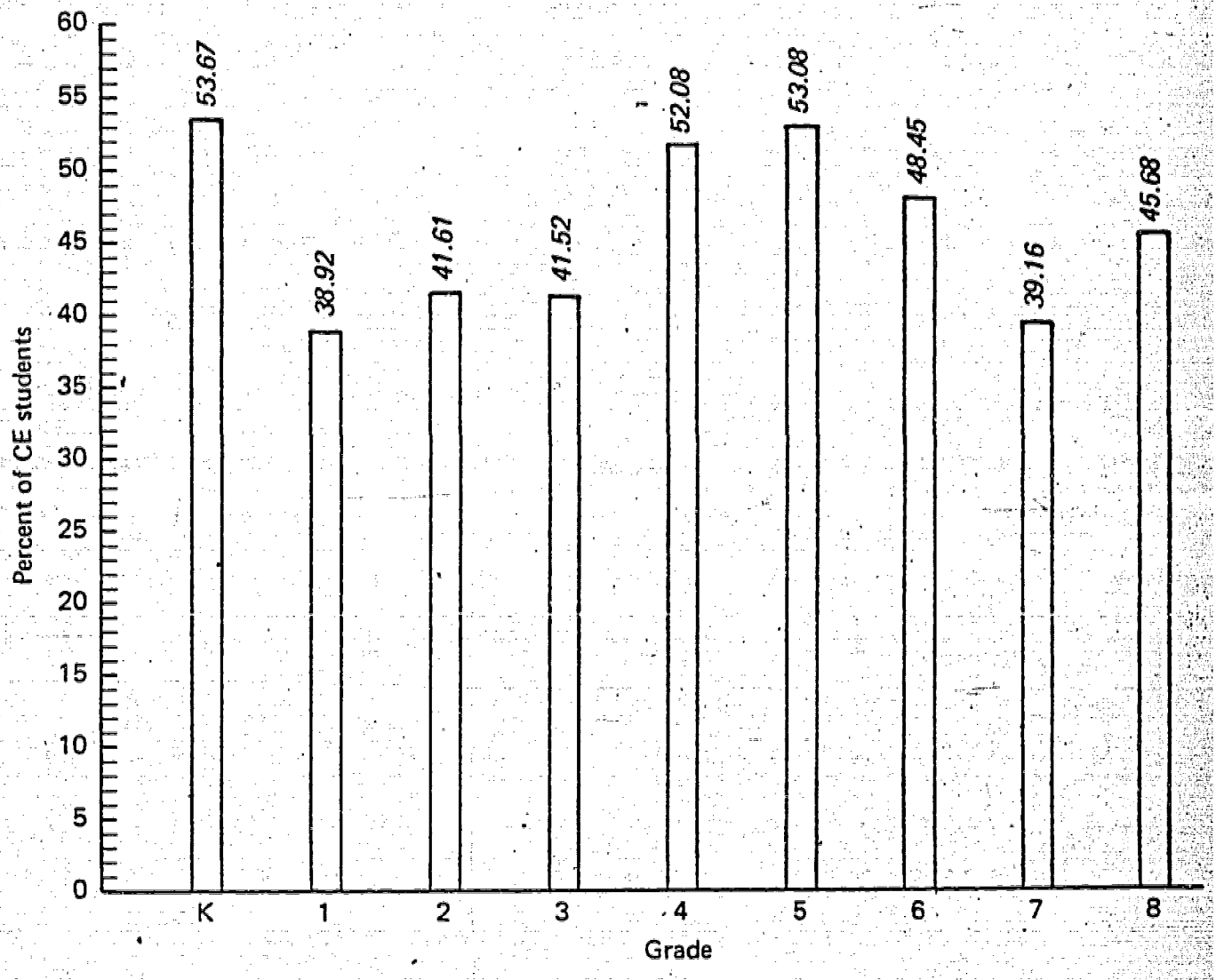


FIGURE 4. PERCENT OF CE STUDENTS RECEIVING COMPENSATORY LANGUAGE ARTS INSTRUCTION IN EACH GRADE



	K	1	2	3	4	5	6	7	8
Standard Error	7.65	6.42	5.01	5.15	5.65	5.33	5.39	8.25	9.89

FIGURE 5. . PERCENT OF CE STUDENTS RECEIVING COMPENSATORY MATH IN EACH GRADE

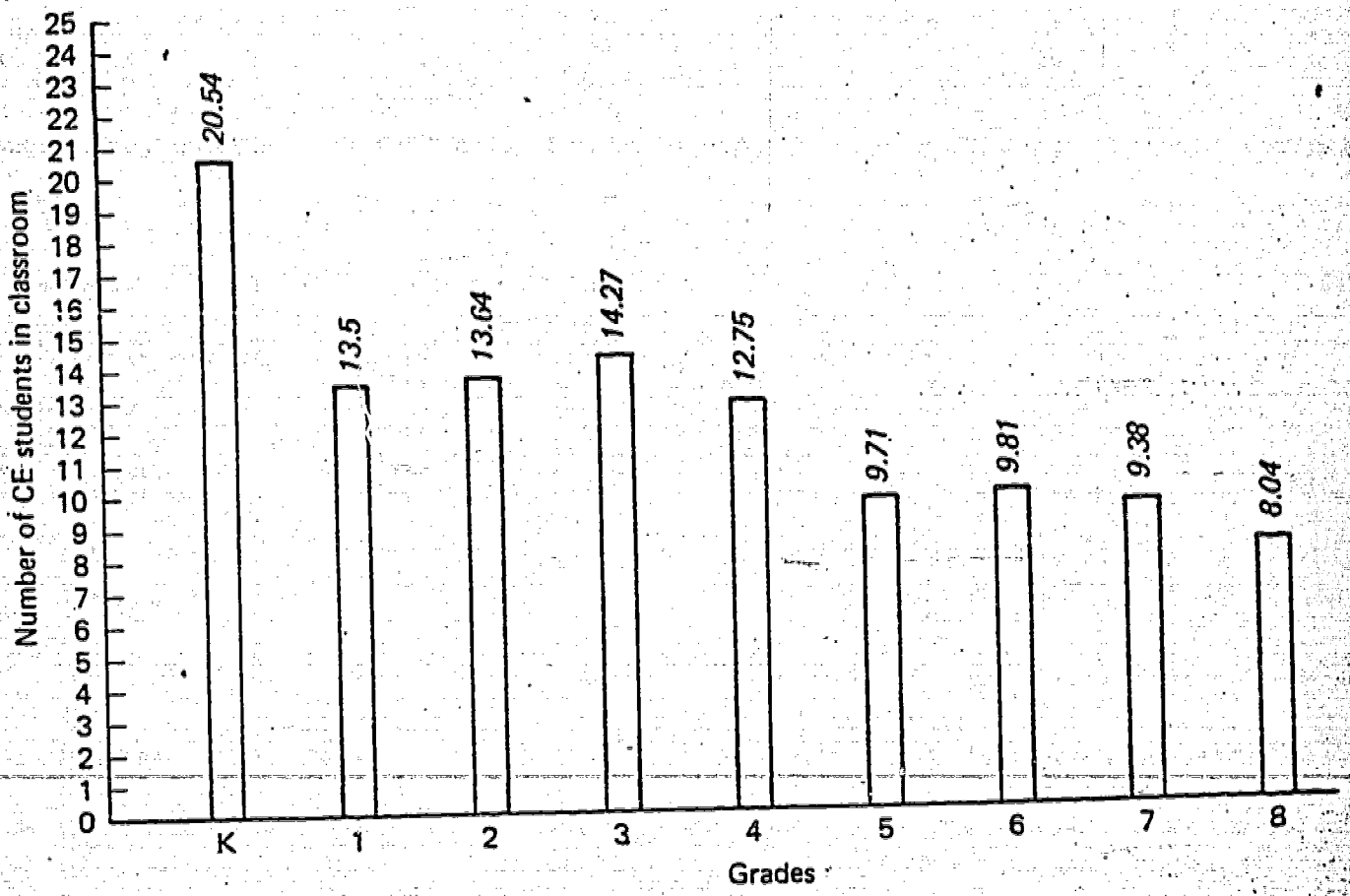
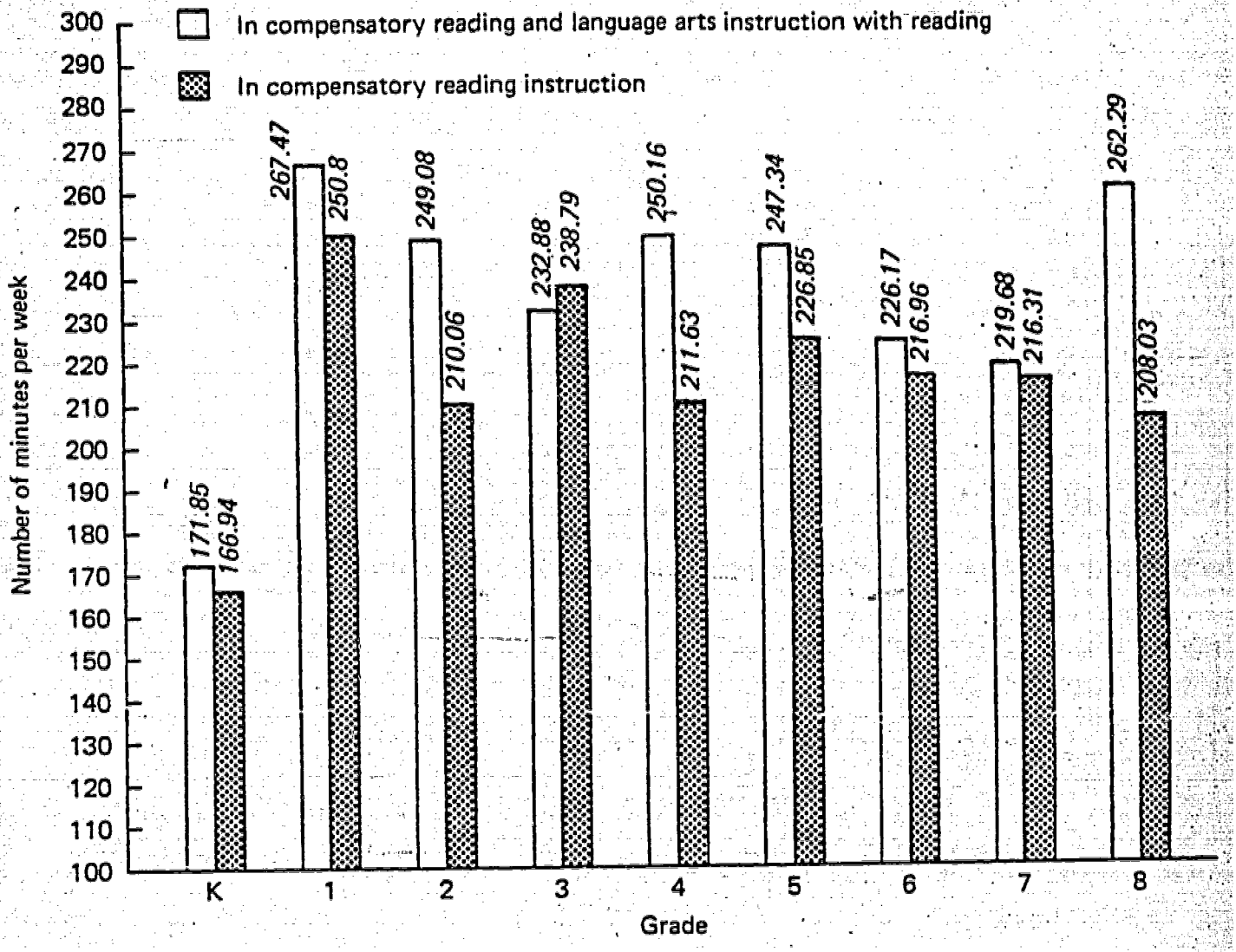
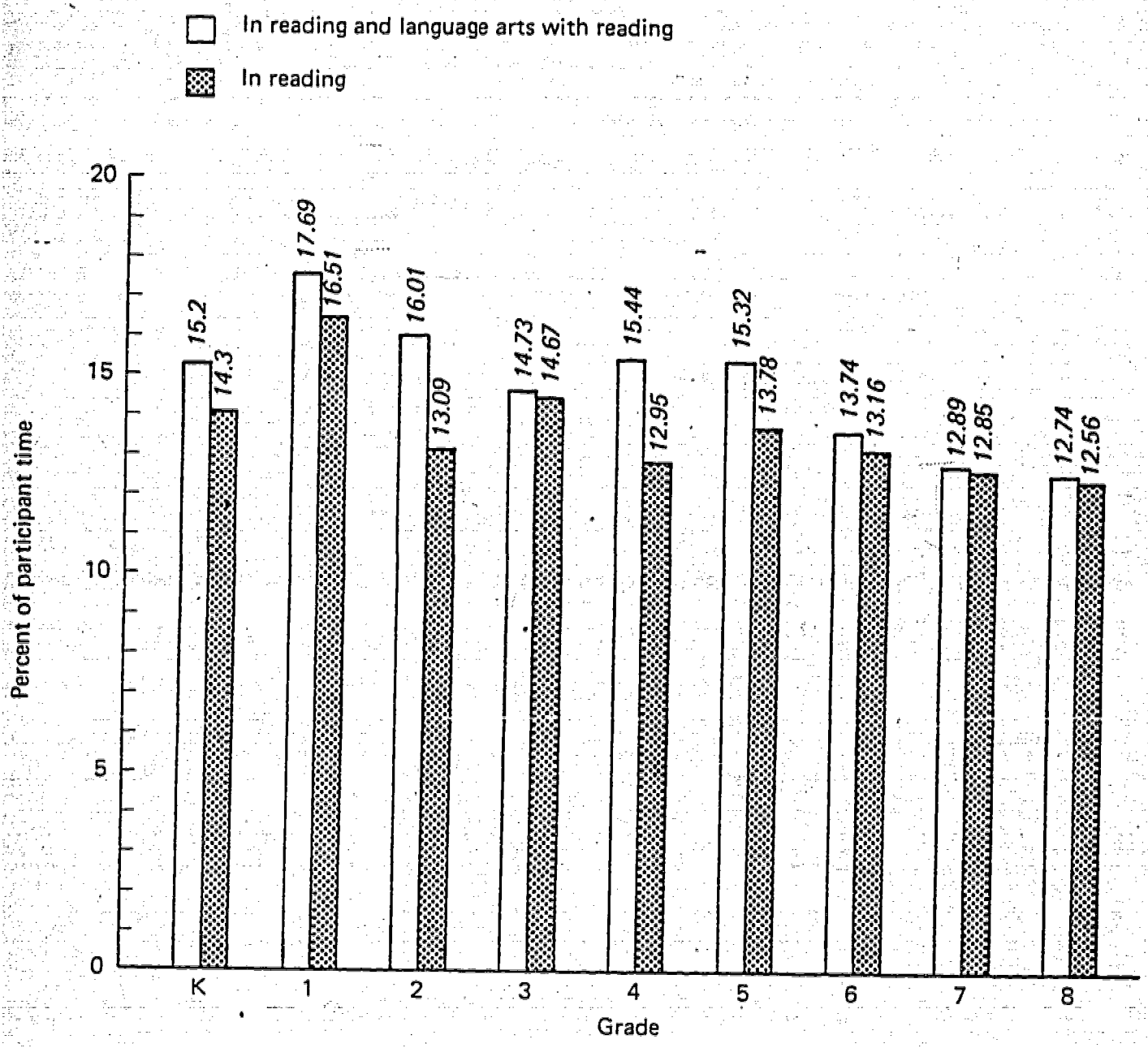


FIGURE 6. AVERAGE CLASS SIZE FOR COMPENSATORY MATH INSTRUCTION



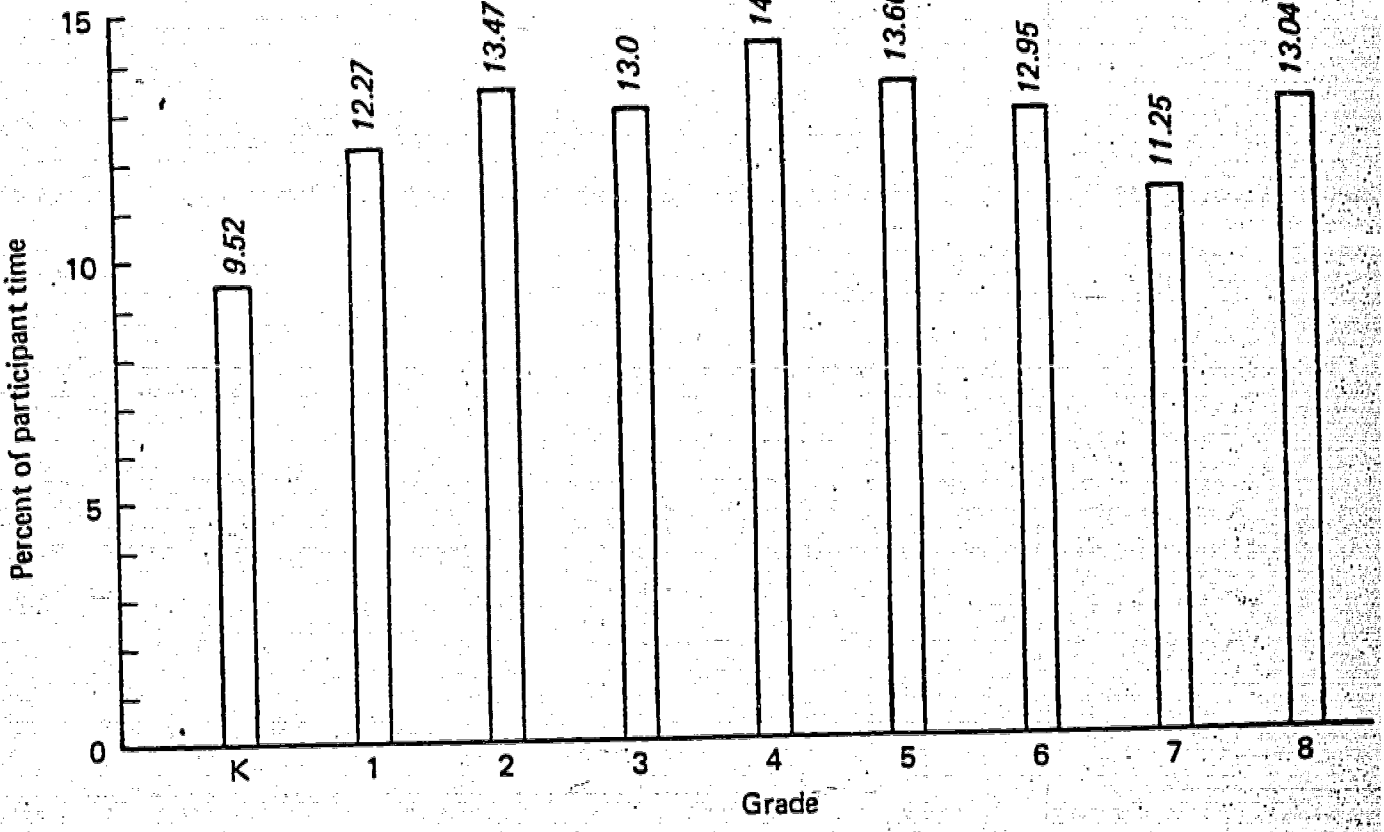
		K	1	2	3	4	5	6	7	8
Standard Error	□	15.40	19.79	16.38	12.91	15.91	10.60	12.12	10.78	25.69
Standard Error	▨	44.45	23.56	11.37	14.94	12.86	11.47	11.17	8.19	12.42

FIGURE 7. MINUTES PER WEEK PER PARTICIPANT



Standard Error	K	1	2	3	4	5	6	7	8
In reading and language arts with reading	2.16	1.38	1.23	.90	1.13	1.04	.97	.73	.65
In reading	4.67	1.53	.82	.96	.91	.70	.89	.67	.83

FIGURE 8. PERCENT OF INSTRUCTIONAL TIME DEVOTED TO CE INSTRUCTION



Standard Error	1.16	.93	1.70	.71	.61	.88	.99	.55	1.12

FIGURE 9. PERCENT OF INSTRUCTIONAL TIME DEVOTED TO COMPENSATORY MATH INSTRUCTION