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ABSTRACT

Data from the National Education Longitudinal Study of 1988 (NELS:88) and the Hopkins Enhancement Survey of NELS:88 Middle Grades Practices were used to examine the prevalence and antecedents of different types of remedial activities in the middle grades. Data were also used to estimate the effects of remedial activities on the mathematics and reading achievement of public school students who had fallen behind in school. Usable data were obtained from over 1,000 schools. Results indicated that pull-out programs, after- or before-school coaching classes, peer tutoring, and summer classes were the most common types of remedial activity. The probability of a school offering a particular type of remedial activity was moderately dependent on the school's geographic region, the socioeconomic characteristics of the student population, and whether the school was public or private. Remedial activities that provided students with substantial extra instruction were effective in raising achievement test scores. Peer tutoring, and before- or after-school classes, were not effective in raising test scores. A list of 13 references is provided. (BC)

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THE JOHNS HOPKINS UNIVERSITY

Helping Students Who Fall Behind: Remedial Activities In the Middle Grades

Douglas J. Mac Iver

Report No. 22

October 1991

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FOR DISADVANTAGED STUDENTS

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**Center for Research on Effective Schooling for Disadvantaged Students
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The Center

The mission of the Center for Research on Effective Schooling for Disadvantaged Students (CDS) is to significantly improve the education of disadvantaged students at each level of schooling through new knowledge and practices produced by thorough scientific study and evaluation. The Center conducts its research in four program areas: The Early and Elementary Education Program, The Middle Grades and High Schools Program, the Language Minority Program, and the School, Family, and Community Connections Program.

The Early and Elementary Education Program

This program is working to develop, evaluate, and disseminate instructional programs capable of bringing disadvantaged students to high levels of achievement, particularly in the fundamental areas of reading, writing, and mathematics. The goal is to expand the range of effective alternatives which schools may use under Chapter 1 and other compensatory education funding and to study issues of direct relevance to federal, state, and local policy on education of disadvantaged students.

The Middle Grades and High Schools Program

This program is conducting research syntheses, survey analyses, and field studies in middle and high schools. The three types of projects move from basic research to useful practice. Syntheses compile and analyze existing knowledge about effective education of disadvantaged students. Survey analyses identify and describe current programs, practices, and trends in middle and high schools, and allow studies of their effects. Field studies are conducted in collaboration with school staffs to develop and evaluate effective programs and practices.

The Language Minority Program

This program represents a collaborative effort. The University of California at Santa Barbara is focusing on the education of Mexican-American students in California and Texas; studies of dropout among children of recent immigrants are being conducted in San Diego and Miami by Johns Hopkins, and evaluations of learning strategies in schools serving Navajo, Cherokee, and Lumbee Indians are being conducted by the University of Northern Arizona. The goal of the program is to identify, develop, and evaluate effective programs for disadvantaged Hispanic, American Indian, Southeast Asian, and other language minority children.

The School, Family, and Community Connections Program

This program is focusing on the key connections between schools and families and between schools and communities to build better educational programs for disadvantaged children and youth. Initial work is seeking to provide a research base concerning the most effective ways for schools to interact with and assist parents of disadvantaged students and interact with the community to produce effective community involvement.

Abstract

Data from the base year of the *National Education Longitudinal Study* and the *Hopkins Enhancement Survey of NELS:88 Middle Grades Practices* are used to describe the prevalence and antecedents of different types of remedial activities in the middle grades. Then, the effects of these activities on the achievement of public school students who have fallen behind are estimated. The results indicate that pull-out programs, after- or before-school coaching classes, peer-tutoring, and summer classes are the most common types of remedial activities. The probability that a given school will offer a particular remedial activity to its students moderately covaries with the school's sector, region, and type of student population. Several of the remedial activities that schools sometimes offer are effective in raising the achievement test scores of public school students who have fallen behind in math or reading. Approaches in which students are provided with a substantial extra dose of instruction (e.g., extra subject periods and summer classes) are particularly effective. As typically implemented, peer-tutoring programs, mentoring programs, and before- or after-school coaching classes are not reliably effective in increasing student achievement. The discussion suggests possible reasons for the greater effectiveness of certain approaches, examines limitations of the current study, and offers specific suggestions for future research.

Acknowledgments

The author is indebted to colleagues at CDS who collaborated in the design of the Hopkins Enhancement Survey, including Joyce L. Epstein, James M. McPartland, Jomills H. Braddock, III, and Henry Jay Becker. I am especially grateful to Stephen Ingels at NORC who directed the data collection and to the principals in NELS:88 schools who invested their time to provide information about remedial activities and other practices in the middle grades.

Introduction

All middle grades schools have some students who fall behind or learn more slowly than others. The Carnegie Task Force on The Education of Young Adolescents (1989) recommends that schools proactively address the needs of these students through remedial instruction activities:

Each middle school needs a plan for continuous correction to provide additional support for students needing more time, encouragement, or instruction to learn. This plan may require extending the school day, providing summer school or Saturday enrichment programs, specialized daily instruction, greater involvement of the home in learning activities, or combinations of these, depending upon a student's individual needs (p. 52.)

This study examines the most common forms of remedial instruction in a national sample of schools that serve young adolescents. It considers differences in remedial activities in schools of different types, in different locations, and with different types of student populations. Further, the study uses measures of students' achievement in mathematics and reading to begin to address the question: "Are the activities that are being implemented having positive effects on students?"

Recent research (Mac Iver & Epstein, 1991; Epstein & Mac Iver, 1990) with a nationally-representative sample of public middle grades schools has indicated that almost all public schools offer at least one remedial activity to students who fall behind. But schools vary greatly in the number of remedial programs that they offer and this variation is largely unassociated with grade organization, region, and family and student background variables (Mac Iver & Epstein, 1991).

Little data exist concerning the effects of different remedial instruction activities in the middle grades on students' outcomes. However, some limited evidence suggests that the practice of providing young adolescents who need extra help with an

extra subject period during the school day (e.g., instead of an elective or exploratory course) may be a particularly promising approach. This practice has some advantages compared to other more common remedial programs. Attendance is high because the elective period of academic instruction is part of the regular school day; it is not a pull-out program, so students do not miss regular academic instruction; and it does not stigmatize students because it is viewed as just another elective class to which students disperse. Also, principals in middle grades schools that use this approach to remedial instruction report lower expected dropout rates than do principals in comparable schools with comparable students where this approach is not followed (Mac Iver & Epstein, 1991).

In many schools, students have two or more periods for elective subjects, so students who receive extra help during one period are not excluded from exploring new subjects. In fact, previous research (Mac Iver & Epstein, 1990) indicates that public schools that use the extra-subject period approach to remediation have significantly more extensive exploratory programs than do other public schools. In these schools, even though some students devote some of their "elective time" to catching up, substantially greater proportions of students still receive the opportunity to explore traditional electives (e.g., foreign language and home economics) and take innovative minicourses in a variety of topics.

Other potentially effective approaches to remediation include having adult tutors (Cooledge & Wurster, 1985; Wilks, T. J., & Clarke, V. A., 1988; Wasik & Slavin, 1990) or peer tutors (Devin-Sheehan, Feldman, & Allen, 1976; Palincsar, Brown, & Martin, 1987) work one-on-one or one-on-two with students, especially if these tutors adapt the content and pace of instruction to the needs of individual students and if tutoring is provided in addition to regular classroom instruction and therefore adds to instructional time.

Data

The analyses in this paper were made possible by merging data from the base year surveys of the National Education Longitudinal Study of 1988 (Ingels, Abraham, Rasinski, Karr, Spencer, & Frankel, 1990) and the Hopkins Enhancement Survey of NELS:88 Middle Grades Practices (Epstein, McPartland, & Mac Iver, 1991). The base year study design used a two-stage procedure to select a nationally-representative sample of schools containing eighth graders and a random sample of eighth graders within each of these schools.

Collection of base-year surveys from students, teachers, and school administrators took place between February and June 1988. The data collected from the 24,599 eighth-grade students in the core NELS:88 sample include family background variables, achievement test scores, students' attitudes and aspirations, and other personal and school-related measures.

Despite the richness and usefulness of the base year surveys, these surveys did not obtain information concerning the components and practices of middle grades reform. The Hopkins Enhancement Survey obtained additional information from principals of NELS:88 schools on

remedial instruction activities, school organization, guidance and advisory periods, interdisciplinary teams of teachers, transition and articulation practices, involvement of parents, and other practices recommended for middle grades reform.

The National Opinion Research Council (NORC) acted as the data collection subcontractor for the enhancement survey. Of the 1037 schools in the NELS:88 spring sample, 1025 still contained grade 8 in October of 1988. At that time, NORC sent principals in these 1025 eligible schools the Hopkins questionnaire. Nonresponding principals were sent a postcard prompt and a second copy of the questionnaire. Principals who had still not responded by December were interviewed by telephone using an abbreviated version of the questionnaire.

In the end, usable data were obtained by mail from 826 schools and by telephone from 182 schools, for a participation rate of 98% of the eligible schools. The Hopkins Enhancement survey, when combined with the base-year surveys, provides valuable cross-sectional data which can be used to describe eighth-grade educational practices in the U.S. and to explore the influence of these practices on students.

Prevalence of Remedial Activities of Different Types

Principals who completed the mail questionnaire reported the remedial activities offered in their schools and provided a rough estimate of the number of eighth-graders who regularly participate in each type of activity in a typical school year (Epstein et. al, 1991, Question 20). Over 95% of the principals report at least one program to help students who fall behind.

Table 1 lists various remedial programs and shows the percent of schools that offer them. Public schools, Catholic schools, and secular private schools were more likely than non-Catholic religious schools to offer at least one remedial program.

Insert Table 1 about here

The most common remedial activities are extra work or homework (in 56% of the schools that contain 8th-graders), pull-out programs in reading or English (50%), after- or before-school coaching classes (46%), peer tutoring (45%), pull-out programs in math (43%), and summer school (41%). Schools are less likely to offer students adult tutors to work with them one-on-one (35% in Math, 34% in English) or an extra subject period in lieu of an elective or exploratory course (17%), and rarely offer remediation through mentoring programs (6%) or Saturday classes (3%).

Antecedents of Remedial Activities

Linear probability analyses using Goldberger's (1964) weighted least squares (WLS) approach were performed to identify significant antecedents of offering remedial activities of different types. Table 2 reports these data. The antecedents considered were grade organization, type of school, region, urbanicity, percent minority students, percent students living in poverty, average ability of students upon entry to the school, length of 8th-grade class periods, and eighth-grade enrollment.

Insert Table 2 about here

Each coefficient estimate in Table 2 indicates how a given antecedent influences the probability that a school will offer a particular remedial activity after controlling for the effects of the other antecedents. For example, the .28 coefficient estimate in row 8 of column 1 indicates that secular private schools are 28% more likely than public schools to assign extra classwork or homework to students who need remediation. As another example, the .03 coefficient in row 15 of column 2 indicates that if the percentage of students living in poverty in a school is increased by 10 percentage points, the probability that the school will offer a pull-out program in reading or English is increased by 3%.

Grade organization

Rows 1-5 of Table 2 indicate how other grade organizations compare to middle schools. K-8 and junior high schools do not differ significantly from middle schools in their probabilities of offering the listed remedial activities. K-12 schools are significantly more likely than middle schools to offer pull-out programs in reading or English but are significantly less likely to offer remediation through a summer school program. Grade 7-8 schools are also less likely than middle schools to offer summer school. Finally, 7-12 schools are less likely than middle schools to offer math pull-outs.

Type of school

Private schools of all types are more likely than public schools to assign extra work or homework to students who need remedial help and are much less likely to use a pull-out or summer school approach to remediation. Non-Catholic religious schools are significantly less likely than public schools to provide students with adult tutors. Catholic schools and secular private schools do not differ significantly from public schools in their use of adult tutors and are more likely than public schools to offer peer tutors. The extra-subject-period approach to remediation is significantly more likely to be found in secular private schools than in other types of schools.

Region

There are substantial regional differences in the probability of offering certain remedial activities. These regional differences in the prevalence of specific remedial approaches may reflect differences in states' policies, guidelines, and programs concerning remedial instruction. For example, principals in the Northeast are much more likely than principals in other regions to report that their school's remedial instruction practices have been strongly influenced by state policies and recommendations, which may be one reason why pull-out programs are more common in the Northeast than in other regions. Other regional differences include: (a) schools in the Northeast are slightly less likely than schools in other regions to offer Saturday classes, (b) after-school or before-school classes, peer-tutoring, and summer school programs are more common in the West than in other regions, and (c) use of adults to provide one-on-one tutoring is significantly more common in the Western and North Central states than in the Northeast.

Urbanicity

After- or before-school classes are more common in urban areas than in other settings, perhaps because the greater availability of public transportation in urban areas allows students to travel more easily to or from school before or after the regular school buses have departed. Other types of remedial activities tend to be

somewhat more common in suburban areas than in urban or rural areas.

Characteristics of Students

With one exception -- after taking poverty levels and entering ability levels into account -- one cannot predict schools' remedial offerings based upon the percentages of minority students present. The exception is summer school. All-minority schools are 35% more likely than all-white schools with similar socio-economic and ability profiles to offer a remedial summer school.

Perhaps because schools that serve higher concentrations of students living in poverty are more likely to receive federal and state compensatory education funds, these schools are more likely to offer pull-out programs. Summer school programs -- which are not common in compensatory education (Means, Schlager, &

Knapp, 1990) -- are less likely in schools that have higher percentages of students living in poverty. On the other hand, schools that have high proportions of students living in poverty are more likely than other schools to adopt peer tutoring plans.

Ironically, after taking account of the effects of other antecedents, the likelihood of finding pull-out programs, after-school programs, summer school, and adult reading tutors in a school is higher when the average ability of students upon entry to the school is higher. For example, pull-out programs in reading or English are 16% more likely in schools where the average entering ability of students is at the national norm than in schools where it is considerably below the national norm. These findings replicate earlier results with a national sample of public schools that serve seventh-graders (Mac Iver & Epstein, in press).

Effects of Remedial Activities on the Achievement of Public School Students

Because most educationally disadvantaged students attend public schools (and because of the difficulty of adequately controlling for sector differences in students' characteristics), the analyses in this section include data from the public sector only.

Math Achievement

To estimate the benefits of different types of remedial activities on students' achievement in math, one must first identify the students who are receiving remedial help. The NELS:88 student questionnaire asked students to indicate whether they attend "a remedial math class at least once a week." Students who answer this question affirmatively are almost certainly participating in at least one of their school's remedial programs. The analyses presented in this section focus on these students only.

For each remedial activity, we estimated the effect on students' math achievement test scores of being in a school that offered that activity. These estimates were obtained after controlling for five other school characteristics (% minority students

in the school, % free lunch students, grade organization, urbanicity, and region) and six student characteristics (socio-economic status, past math grades, past participation in handicap program, current participation in handicap program, sex, and race.)

Table 3 summarizes an ordinary least squares (OLS) regression model used to estimate the effects on math achievement of offering extra subject period classes, Saturday classes, summer classes, and tutoring to students who need remedial help. As anticipated, these students obtain significantly higher math achievement if they attend a school where students who fall behind are encouraged or required to take an extra subject period instead of an elective or exploratory course. The effect size of 15 associated with this type of remedial program indicates that students receiving extra help in schools that use this approach to remediation achieve 15/100ths of a standard deviation better in math than do similar students who are receiving remedial help at schools that do not schedule extra subject periods.

The estimated benefits of attending a school that offers Saturday classes are even greater (i.e., achievement is increased by almost 1/2 of a standard deviation in mathematics.) However, because Saturday classes are offered in so few schools (e.g., in about 3% of the nation's public schools), the estimated benefits may not generalize to the broader public school population. On the other hand, the linear probability analyses reported earlier (Table 2) suggest that schools that offer Saturday classes are not "outlier schools" but rather are near the national average on most school and student characteristics.

The average effect of attending a school that offers summer classes for those who fall behind is positive but only marginally significant. Also, tutoring programs that match adults with individual students in math have a small but reliable effect on the achievement of students who attend remedial math.

None of the other remedial programs included in the survey are significantly associated with the math achievement scores of these students. Thus, there is no evidence that pull-out programs in math, peer-tutoring, after-school classes, or mentoring programs, as typically implemented, are producing positive benefits for students in the target population studied here (e.g., students who report attending a remedial math class once a week.) The null results found for these types of remedial activities replicate even if a broader definition of the target population is used (e.g., if the analysis is conducted using all students with poor past math grades regardless of whether or not they report attending a remedial math class).

Insert Table 3 about here

The student-level regression analysis reported in Table 3 ignores the multilevel nature of the NELS:88 data and the dependence among students' responses in the same school. Therefore, a follow-up analysis was conducted using a two-level hierarchical linear model (HLM) to take account of the multilevel data structure and to combine individual- and group-level analyses into a single appropriate analytic model.

At level-1, the units were students and each student's math achievement was represented as a

function of two individual characteristics (i.e., socio-economic status and past math grades). At level-2, the units were schools, and the school's adjusted mean on the mathematics achievement test for students who attend remedial math was the outcome variable hypothesized to depend on specific school characteristics (percentage of free-lunch students, percentage of minority students, region) and remedial offerings.

In order to obtain estimates, it was necessary to use fewer controls in the HLM model than in the earlier regression model. One reason is that the level-1 model is estimated within each school and few students within each school's sample fall in our target population (i.e., on average, only about 2 out of the 24 students in each school's sample indicated that they attended remedial math classes).

Table 4 reports HLM estimates of the effects of offering extra-subject period classes, Saturday classes, summer school, and adult one-to-one tutoring on the adjusted mean math achievement of students who report attending remedial math. The results closely parallel the OLS results presented earlier and suggest that each of these four types of remedial activities is associated with better student achievement in mathematics. In the HLM analyses, the estimated benefits of Saturday classes are somewhat smaller than those obtained earlier and the estimated benefits of summer classes are somewhat larger.

As was true in the OLS analysis, additional HLM models testing the benefits of other remedial activities (e.g., pull-out programs in math or after-school classes) yielded no evidence that these other approaches to remediation were predictive of achievement in this subpopulation of students.

Insert Table 4 about here

Schools differ in the number of effective remedial programs that they offer to help students catch up in mathematics. A composite variable was created measuring the number of those remedial programs listed in Table 4 that schools' offered to their eighth-graders. An HLM analysis (controlling for the same between- and within-school

variables listed in the note to Table 4) was performed to estimate the effect of the number of effective remedial programs offered on the math achievement of public school eighth-graders who attend remedial math. The results indicated that schools with extensive programs obtained substantially better math achievement than did schools with limited or non-existent remedial programs (GAMMA = 1.00, $p < .0005$). For example, in a school offering all four of the remedial programs listed in Table 4, the math achievement of target students is predicted to be over two-fifths of a standard deviation higher than in a school offering only one of these programs.

Reading Achievement

The NELS:88 student questionnaire did not ask students to describe their past performance in reading or to indicate whether they regularly receive extra help with reading. Students were asked, however, to indicate their past English grades and to report whether they attend a remedial English class at least once a week. Students who have past English grades of mostly C's or worse and students who attend remedial English classes are quite likely to be among the main recipients of schools' remedial program services in reading and language arts. The analyses reported in this section include data from these "targeted" students only.

For each remedial activity, we estimated the effect of being in a school that offered that activity on the reading achievement of targeted students. Table 5 reports both OLS and HLM estimates.

The estimates suggest that extra subject periods, summer classes, and pull-out programs in reading or English are all effective in raising the average reading achievement levels of these students. The effects are modest in size, but this is not surprising because they are "lower bound" estimates.¹ The positive effect on reading achievement associated with being in a school which offers after- or before-school coaching classes was significant in the student-level OLS analysis but not in the multi-level HLM analysis.

Insert Table 5 about here

One final HLM model examined how the reading achievement of target students was associated with the extensiveness of a school's remedial activities (after controlling for the same between-school and within-school variables as the HLM analysis in Table 5). In this model, the number of remedial practices from Table 5 offered in each school was used to predict each school's adjusted mean reading achievement for students who had poor past English grades or who reported attending remedial English at least once a week. Schools that offered more extensive remedial programs obtained better reading achievement from these students than did other schools (GAMMA = .57, $p < .0005$). For example, in a school offering all four of the remedial programs, the reading achievement of target students is predicted to be almost one-fifth of a standard deviation higher than in a school offering only one of these programs.

Discussion

Our analyses provide a national description of remedial instruction activities in middle grades and identify activities that are predictive of

increased achievement by students who need extra help. The averages and patterns of results reported here provide a useful starting point for middle grades educators to take stock of their present remedial practices and consider alternatives.

1. The estimates may reflect the lower bounds of the true effect sizes because the estimates were obtained using reading achievement test scores from all students who had fallen behind in English, even students who might not have been participating in reading-related remedial programs.

Overall, the results suggest that several remedial activities that schools sometimes offer raise the achievement levels of public middle grades students who are struggling in math or reading.

For example, the results suggest that by offering extra subject periods or summer classes, schools can increase students' achievement in math and reading. Both of these approaches to remediation guarantee that students who need extra help receive a substantial "extra dose" of instruction in areas in which they are struggling.

In addition, the provision of Saturday classes and adult tutors was related to higher mathematics achievement, and the implementation of pull-out programs in reading or English was associated with higher reading achievement. Programs that offered a variety of remedial activities were more effective than were programs that offered a less extensive set of activities.

On the other hand, certain activities -- such as peer-tutoring, mentoring programs, and after- or before-school coaching classes -- were not reliably effective in increasing student achievement. As typically implemented, these approaches may not be helping enough students who have fallen behind to make significant strides toward catching up to their peers. Schools whose current programs include only these approaches to remediation might consider additional activities that provide more expert help in larger doses to larger numbers of students.

Some evidence suggests that pull-out programs and tutoring programs are, on average, somewhat less effective than the extra-subject period approach to remediation. Some of the apparent advantages of the extra-subject period approach to these more common approaches have already been mentioned. In addition, the extra subject period approach may be more cost-effective than pull-out and tutoring approaches because it is able to serve a greater number of students without requiring any additional staff or volunteers. A middle school that currently offers elective and exploratory courses to all students can institute a meaningful extra-subject period program that can serve 150 or more students by hiring one fewer elective-subject teacher and one more academic-subject teacher than in the past. Whereas the typical pull-out program or one-on-one tutoring program serves only between 15% to 17% of a school's eighth-graders, the typical extra-subject period program serves almost 30% of a school's eighth-graders.

Perhaps the most obvious limitation of this study (and of other studies examining naturally-occurring associations between instructional offerings and students' outcomes) is that some of the observed relations may be spurious. Although the analyses controlled for a reasonable set of the most obvious "confounding variables," other important variables may have been ignored. Thus, the conclusions presented here must be viewed as tentative, rather than as definitive. The conclusions should be seen as working hypotheses to be further tested.

Another limitation of the current study is that the level of detail obtained from principals concerning their schools' remedial practices was fairly shallow. For example, the measures allow us to distinguish schools who use any variety of an extra-subject period approach from schools who do not offer extra subject periods, but the measures do not allow distinctions between schools with different types of extra-subject programs. Thus, schools that provide intensive help during the extra subject period are lumped together with schools that provide little direct instruction during the extra subject period (e.g., schools in which the period is more like a "study hall" than an extra dose of academic instruction). The benefits of having extra-subject periods of intensive, well-organized instruction are undoubtedly larger than the "average benefits" of generic extra-subject periods.

Future research needs to examine the variation across schools in how the major types of remedial programs are implemented, in order to find out whether there is significant variation between schools in how pull-out, after-school, and tutoring programs are organized and whether this variation is associated with students' outcomes. For example, although math pull-outs were not generally effective in increasing students' math achievement, it may be that some schools have developed an effective version of this approach.

Schools need additional and more detailed information than is currently available to guide their efforts at identifying, developing, and evaluating effective programs for middle grades students who have fallen behind. Such information will help our nation's schools to equip a greater proportion of young adolescents with the knowledge and skills that they need to succeed as effective learners, workers, and citizens.

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Table 1
Percent of Schools Offering Various Remedial Programs

% of Schools that Offer...	All Schools (n = 812)	Public Schools (n = 488)	Catholic Schools (n = 142)	Private, Other Religious (n = 149)	Private, Secular Schools (n = 33)
At least one remedial program	95.6	98.3	96.3	87.1	98.5
Extra-work or homework from classroom teacher	55.7	51.5	65.0	55.9	76.5
Pull-out program in reading or English	50.4	64.7	42.9	20.4	7.4
After-school or before-school classes or coaching classes	46.2	44.7	54.2	41.2	55.8
Peer tutoring in any subject	44.9	44.1	51.8	38.9	54.2
Pull-out program in math	43.4	53.8	35.5	25.6	4.4
Summer school	41.3	49.8	40.0	19.8	17.9
Adult tutors who work one-on-one with students in math	34.9	39.6	32.5	21.0	34.6
Adult tutors who work one-on-one with students in reading or English	33.5	38.9	27.8	18.2	46.3
Extra subject period instead of elective or exploratory course	17.4	19.5	14.4	10.2	31.3
Mentoring program	5.5	7.0	6.2	0.4	2.5
Saturday classes	2.8	3.4	1.8	2.5	1.1
Other remedial programs	6.0	8.5	1.0	3.5	3.1
# of remedial programs: \bar{X} (SD)	3.82 (2.09)	4.26 (2.05)	3.74 (2.03)	2.58 (1.78)	3.35 (1.71)

Table 2

WLS Coefficient Estimates from Linear Probability Analyses Exploring the Antecedents of Offering Selected Remedial Instruction Activities to Students who Fall Behind or Learn More Slowly

	Extra Work or Homework From Teacher	Pull-Out Program in Reading or English	After- School or Before- School Classes	Peer Tutoring in any Subject	Pull-Out Program in Math	Summer School	Adult Tutors in Math	Adult Tutors in Reading or English	Extra- Subject Period	Mentoring Program	Saturday Classes
Grade Organization:											
1) K-8 vs. Middle School	.08	.03	-.01	.02	-.03	-.05	-.03	-.05	-.01	-.02	.00
2) K-12 vs. Middle School	.02	.19**	.04	-.01	-.02	-.14*	-.06	-.05	-.02	-.03	.03
3) 7-12 vs. Middle School	-.06	-.07	-.06	.07	-.15*	-.03	.03	.06	-.04	-.03	.00
4) Junior High vs. Middle School	.00	.01	.01	-.03	-.07	-.04	-.08	-.06	-.02	.00	-.01
5) 7-8 vs. Middle School	.00	-.03	.04	-.05	-.11	-.13*	.07	.09	-.02	-.02	.00
Type of School:											
6) Catholic vs. Public	.15*	-.29***	.14*	.15*	-.23***	-.09	-.06	-.08	.03	.03	.00
7) Other Religious vs. Public	.16*	-.51***	-.06	-.06	-.32***	-.21***	-.17**	-.22***	.00	-.02	-.01
8) Secular Private vs. Public	.28**	-.64***	.07	.22*	-.57***	-.27***	-.07	.03	.19*	.00	-.02
Region:											
9) North Central vs. Northeast	-.08	-.20***	.03	.08	-.22***	.05	.12*	.11*	-.02	.00	.03**
10) South vs. Northeast	-.14*	-.18***	.02	.05	-.19***	.07	.02	.10	.01	.00	.03*
11) West vs. Northeast	-.05	-.11	.16**	.30***	-.07	.11*	.13*	.28***	.01	.01	.03
Urbanicity:											
12) Suburban vs. Urban	.06	.06	-.15**	.11*	.07	.01	.09*	.02	.04	.01	.02
13) Rural vs. Urban	.01	-.01	-.22***	.04	-.03	-.07	.06	-.02	.05	-.01	-.01
Characteristics of School's Students:											
14) % Minority (0 = "none" to 7 = "91-100%")	.02	.02	.01	.00	.00	.05***	.01	-.01	.01	.00	.00
15) % living in poverty (in 10s)	.03***	.03**	.03	.05***	.02*	-.01*	-.01	.00	.00	.00	.00
16) Average ability upon entry (1 = "considerably below the national norm" to 5 = "considerably above the national norm")	.02	.08***	.04*	.02	.06***	.03*	.03	.05**	.01	.01	.00
Length of Class Periods:											
17) Minutes per 8th-grade class (in 10s)	.07***	.10***	.06**	.02	.12***	.06***	.04*	.03	.01	.00	-.01
Size:											
18) Number of 8th-Graders enrolled (in 100s)	.01	-.05*	.03	.02	-.05*	.05***	-.02	-.01	.06**	.02*	.01*
OLS R Square ^a	.07	.23	.10	.08	.15	.20	.06	.09	.05	.05	.03

^a Although the concept of "explained variance" is not very useful in analyses involving dichotomous variables, we report R square (estimated using ordinary least squares regression) as an expedient because it gives a sense of differences in overall predictive power across the several remedial activities.

*p ≤ .05 **p ≤ .01 *** p ≤ .001

Table 3

OLS Estimates of the Effects of Offering Extra Subject Period Classes, Saturday Classes, Summer School, and Tutoring on the Mathematics Achievement of Public School Eighth-Graders Who Report Attending a Remedial Math Class at Least Once A Week

Remedial Program Offered	Metric (b) Coefficient	Effect Size
Extra subject period instead of elective or exploratory course	1.08**	.15
Saturday classes	3.32***	.46
Summer school	.70+	.10
Adult tutors work one-on-one with students in math	.81*	.11

Note. Analysis includes only public school eighth-graders who indicated that they attend a remedial math class at least once a week, minimum pairwise $n = 870$. Estimates were obtained while controlling for five school characteristics (% minority students, % free lunch students, grade organization, urbanicity, region) and six student characteristics (socio-economic status, past math grades, sex, race, past participation in handicap program, and present participation in handicap program).

+p < .10

*p < .05

**p < .025

***p < .005 (one-tailed tests)

Table 4

HLM Estimates of the Effects of Offering Extra Subject Period Classes, Saturday Classes, Summer School, and Adult Tutoring on the Mathematics Achievement of Public School Eighth-Graders Who Report Attending a Remedial Math Class at Least Once A Week

Remedial Program Offered	Metric (γ) Coefficient	Effect Size
Extra subject period instead of elective or exploratory course	1.07*	.15
Saturday classes	2.15*	.30
Summer school	1.15**	.16
Adult tutors work one-on-one with students in math	1.00*	.14

Note. Analysis includes only public school eighth-graders who indicated that they attend a remedial math class at least once a week, listwise $n = 796$. Estimates were obtained while controlling for three between-school variables (school's % minority students, % free lunch students, and a "south vs. other regions" dummy variable) and two within-school variables (student's socio-economic status and past math grades).

+p < .10 *p < .05 **p < .025 ***p < .005 (one-tailed tests)

Table 5

OLS and HLM Estimates of the Effects of Remedial Program Offerings on the Reading Achievement
of Public School Eighth-Graders Who Have Fallen Behind

Remedial Program Offered	b (OLS)	γ (HLM)	Effect Size (HLM)
Extra subject period instead of elective or exploratory course	.58**	.73***	.08
Summer school	.38+	.80****	.09
Full-out program in reading or English	.50**	.47*	.05
After-school or before-school classes or coaching classes	.41*	.32	.03

Note. The analyses are limited to eighth-graders in public schools who indicated that they attend a remedial English class at least once a week or whose self-reported past English grades were mostly Cs or worse, minimum pairwise $n = 4,867$. OLS estimates were obtained while controlling for five school characteristics (% minority students, % free lunch students, grade organization, urbanicity, region) and six student characteristics (socio-economic status, past English grades, sex, race, past participation in handicap program, and present participation in handicap program). HLM estimates were obtained while controlling for three between-school variables (school's % minority students, % free lunch students, and a "south vs. other regions" dummy variable) and two within-school variables (student's socio-economic status and past reading grades).

+p < .10 *p < .05 **p < .025 ***p < .01 ****p < .005 (one-tailed tests)