DOCUMENT RESUME

ED 074 583 EA 004 780

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TITLE Population Growth and Resource Requirements for U.S. Education.
INSTITUTION Rand Corp., Santa Monica, Calif.
SPONS AGENCY Commission on Population Growth and the American Future, Washington, D.C.
REPORT NO RAND-R-1033-CPG
PUB DATE Feb 72
NOTE 99p.
AVAILABLE FROM Publications Department, Rand Corporation, 1700 Main Street, Santa Monica, California 90406 (Order No. R-1033-CPG, $3.00.)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Demography; *Educational Change; *Educational Finance; Educational Improvement; Educational Needs; *Educational Planning; Enrollment Influences; Enrollment Projections; Expenditure Per Student; Higher Education; *Population Growth; Population Trends; *Prediction; Preschool Education; Public Education; Resource Allocations; Student Teacher Ratio
IDENTIFIERS *Educational Expenditures

ABSTRACT

This document describes how American education may be organized and operated three decades hence and investigates the effects of population growth on the cost of providing this future schooling and on the number of instructional personnel it will require. Projections resulting from this research suggest that relatively more resources will probably go to the prekindergarten and elementary levels in the year 2000; many students will earn high school and college diplomas through instructional television and computer-assisted instruction; and college degrees will be earned with an average of 2 years' work after high school. This report also investigates the effects of population growth -- 2-child versus 3-child families -- on the cost of future schooling. The investigation also led to the conclusion that more rapid growth rate will lead to about 45 percent higher educational spending in the year 2000 and to relatively more spending at the prekindergarten and elementary levels. However, educational expenditures are deemed unlikely to rise as rapidly in relation to the gross national product (GNP) as they did between 1960 and 1970. (Author)

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POPULATION GROWTH AND RESOURCE REQUIREMENTS FOR U.S. EDUCATION

PREPARED FOR THE COMMISSION ON POPULATION GROWTH AND THE AMERICAN FUTURE

WILLIAM P. BUTZ AND PAUL L. JORDAN

R-1033-CPG
FEBRUARY 1972

Rand
SANTA MONICA, CA. 90406

This report was sponsored by the Commission on Population Growth and the American Future. Views or conclusions contained in this study should not be interpreted as representing the official opinion or policy of Rand or of the Commission.

Published by The Rand Corporation

PREFACE

This report was prepared for the President's Commission on Population Growth and the American Future, which was established with the passage of Public Law 91-23. The Commission was charged, among other duties, with estimating the "resources in the public sector of the economy that will be required to deal with anticipated growth in population." Rand, under contract to the Commission, has prepared studies which examine the relationship between population change and the requirements for services in the education, passenger transportation, welfare and health sectors. The present report analyzes the effects of alternative rates of population growth on educational spending over the next three decades. An initial version was submitted to the President's Commission in October 1971.

This study may be of interest to persons concerned with the economic and political prospects for alternative teaching methods, instructional technologies, and administrative organization in American schools. It may also interest those who are investigating methods of projecting costs and public resource requirements. Finally, this report will be useful to readers concerned with broader questions of the impact of population growth on our national life.

SUMMARY

This study of the financial requirements of American education during the next 30 years has two primary purposes. The first is to construct, on the basis of trends and prospects in educational methods and technology and school and classroom organization, a descriptive outline of the way schools may be organized and operated three decades hence. The second purpose is to investigate the effects of population growth on the cost of providing this future schooling and on the number of instructional personnel it will require.

Four underlying demand and supply factors will influence the course of future educational expenditures as they have in the past. Identifying their separate roles focuses the forecasting effort on the most important underlying trends. On the demand side are (1) the size of the school-age population, and (2) the types and amounts of skills people will want to acquire, to use in their increasing leisure time and to meet the economy's demand for manpower with the abilities that schooling at various levels produces. The supply factors are (3) the development of more productive inputs into the educational process, and (4) changes in the prices of schooling inputs due to demand and supply changes outside the education sector.

For the first objective of this study, these underlying factors are anticipated to result in a variety of changes in American schooling. A review of the recent literature of educational criticism along with evaluations of the costs and effectiveness of various organizational and technological innovations suggests several principal differences between today's schools and those of the year 2000.

- A larger proportion of educational resources will be allocated to the prekindergarten and elementary levels in 2000.
- Schools at all levels will use their physical plant and equipment for more of the calendar year.
- Specially trained paraprofessional instructional personnel will be heavily used at the prekindergarten, elementary, and secondary levels.
- Relatively low-cost instructional television and computer-assisted instruction will be widely used in classrooms and elsewhere in the community.
- To insure that each graduate is prepared to continue in school or to support himself in the economy, secondary schooling will include a variety of work-study programs in which students can have many work experiences and learn several

trades. Most material formerly taught in college survey courses will be taught in high school.

- Many students will earn high school and college diplomas through instructional television and computer-assisted instruction, while away from a campus.
- College degrees will be earned with an average of two years' work following high school graduation, though many persons will attend college intermittently throughout their working careers.

The second main purpose of this report is to investigate the effects of population growth on the cost of providing these educational changes and on the number of instructional personnel they will require. Costing the resource requirements implied by these changes and assuming three different rates at which society will adopt them yield alternative annual projections of expenditure per student at four schooling levels—prekindergarten, elementary, secondary, and higher education—and for four categories of expenditure—personnel, plant, equipment, and other. Similar procedures produce projections of per-pupil requirements for instructional personnel. These expenditure and personnel figures are then multiplied by various enrollment projections that reflect the differences between rapidly growing populations implying an average three-child family in 2000 (Census Series B) and a slowly growing population implying an average two-child family (Census Series E).

The resulting projections indicate that population and enrollment growth rate will be significant determinants of total expenditures on schooling and of the proportions spent at the various school levels. Rapid population growth implying an average three-child family in 2000 will lead to about 45 percent higher educational spending in 2000 than will slow population growth implying an average two-child family. Rapid population growth will also lead to relatively more spending at the prekindergarten and elementary levels.

Requirements for teachers and parateachers will be similarly affected, but the distribution of noncollege educational spending among broad categories—instructional personnel, physical plant, and equipment—does not appear sensitive to population growth or enrollment rate variations.

Educational expenditures are unlikely to rise as fast, relative to GNP, as they did in the decade of the 1960s, even with substantial infusions of new technology and even at the highest projected enrollment growth rate. If the educational improvements identified in this report are adopted relatively quickly, rapid growth in school enrollment (based on Series B) will require about 13 percent of GNP to be spent on education in the year 2000. Slow enrollment growth (based on Series E) will require about 8 percent, an increase of only one-half percent over the 1970 figure. Slower adoption of improved methods and technologies will slow the growth of educational spending accordingly.

There will be a large financial tradeoff in the coming decades between the quality of education and the number of people to be educated. This tradeoff can be illustrated by assuming that enrollment rates will increase relatively rapidly and that we will spend 10 percent of our GNP on education in the year 2000. With the "three-child" population this expenditure would provide 7 percent of the students with all of the educational improvements identified in this report, while 93 percent

would receive education characterized by the same kind of school inputs used in 1970. With the same proportion of GNP spent on education of the "two-child" population, all students could receive high quality schooling.

ACKNOWLEDGMENTS

The authors are indebted to Rand colleague Stephen J. Carroll for methodological advice at this study's inception and to colleagues Stephen M. Barro, David S. Chu, David H. Greenberg, Sue A. Haggart, Emmett B. Keeler, Herbert J. Kiesling, Anthony H. Pascal, and T. Paul Schultz for useful criticisms and suggestions at intermediate stages. Mary Rudolph's library assistance and John Enns' computational work are gratefully acknowledged.

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I. INTRODUCTION

This study of the financial requirements of American education during the next 30 years has two main purposes. The first is to construct, on the basis of trends and prospects in educational methods and technology, several alternative pictures of how American education may change in the next three decades. The second is to investigate the effects of population growth on the cost of providing this changing educational system and on the number of instructional personnel it will require.

For the first objective, we have examined current trends in teaching methods, educational technology, and school and classroom organization.[1] We also reviewed the growing literature of research and opinion that is critical of American schooling[2] and evaluated the costs and effectiveness of various technological innovations that now exist but have not yet been widely adopted in schools.[3] These considerations suggest features of school organization, teaching methods, and technology that seem likely to characterize American schools of the year 2000. Combining these features, we construct a broad descriptive outline of the way schools may be organized and operated three decades hence. Although this outline can be only an informed guess, we intend it to be internally consistent, technologically and politically possible, and useful in evaluating the aggregate financial effects of population growth.

For the second objective, the per-pupil requirements for instructional personnel, physical plant, and equipment of various kinds are estimated for 1970 and 2000 and costed at 1970 prices. Then, by adjusting these prices for demand and supply changes and assuming three alternative rates at which society will adopt the future types of schools, we construct three paths of per-pupil expenditure over the next 30 years. These expenditure figures are multiplied by various enrollment projections that reflect the differences between a rapidly growing population, implying an average three-child family in 2000 (the Census "B" projection), and a slowly growing population, implying an average two-child family (the Census "E" projection). The result is alternative forecasts of educational expenditures that illuminate the tradeoffs between population growth and improvement in school quality.

THE DETERMINANTS OF AGGREGATE EDUCATIONAL EXPENDITURES

Understanding the probable determinants of future educational spending requires prior identification of the causes of recent spending trends. Between 1960 and 1970 educational expenditure per pupil in constant dollars increased 170 percent in the United States.[4] This 5 percent annual increase resulted from rising teacher wages and prices of other inputs, as well as from increasing teacher-pupil ratios and amounts per pupil of other broad categories of inputs. Accompanying this trend was a 2.4 percent average annual increase in enrollment at all levels from kindergarten to graduate school. As a result, total educational expenditures as a percent of GNP rose from 5.4 percent in 1960 to 7.5 percent in 1970.

Four basic demand and supply factors underlie these trends. By identifying their separate roles and determining which of the many possible interactions among them could have produced the recent history of spending and resource use in education, we improve our ability to forecast future trends.

1. The first underlying factor is the size of the school-age population, which itself depends on fertility, mortality, and international migration during the previous two or three decades. The generally rising birth rate in this country between 1945 and 1955, for example, was the primary cause of the increasing enrollments of the 1960s, though the proportion of the population enrolled, particularly in colleges, also rose.

2. A second basic factor which influences both enrollment and expenditure per student is the types of skills people want to acquire to meet the economy's demand for people with the abilities and skills provided by schooling and to use in their increasing leisure time. This influence is reflected in the amount of resources that people, individually and collectively, are willing to spend on schooling for themselves and others. Their expenditures may take various forms: direct payments for tuition, supplies, and living expenses; tax obligations at federal, state, and local levels; purchases of bonds for school construction and improvement; and use of their time and abilities in classrooms and laboratories instead of in leisure or income-producing activities.

This factor along with the first—the population of school age—determines the aggregate demand for schooling, which may be thought of as the amounts of schooling of a given quality which the community is willing to pay for (in both money and students' time) at various prices. This demand will be larger if (1) the school-age population is larger, and (2) the economy's demand for skilled workers and peoples' personal desire for skills and knowledge are higher.

3. There are similarly two basic factors affecting the supply of schooling. One is the development of more productive inputs to the educational process, allowing the same quality and amount of schooling to be produced at lower cost (of money or of teachers' or pupils' time), or enabling pupils to learn more at the same cost than they could before. These more productive inputs may take the form of more highly trained teachers, better designed school buildings, or improved teaching methods and instructional technologies.

4. The other factor affecting the supply of schooling consists of demand and supply changes outside the education sector. For example, a general increase in the demand for people with a college education and the resulting rise in their salaries can be expected to result in higher teacher salaries, even though neither the demand for schooling nor the productivity of teachers has increased.[5] Such effects may occur whenever an input—in this case, educated labor—can be employed in several industries, and its price initially increases in one of them.[6] The same effect may result if resources used in the education of teachers, the production of textbooks and equipment, or the construction of school buildings experience price rises in excess of their productivity increases.

How did these demand and supply forces interact during the last decade? In the first place, enrollment increases resulting from the first two factors clearly contributed to rising total educational spending. Since our subsequent analysis is based in part on alternative enrollment projections, we are able to identify the effects on future educational spending of differences in the growth of this component of the demand for schooling.

It is also necessary to forecast expenditures per student over the next three decades in order to calculate projected total educational spending. We must therefore seek an explanation for recent trends in per-student educational spending. During the last decade the real wages of instructional personnel and real prices of broad categories of school equipment and facilities increased steadily. In the same period, pupil-teacher ratios in elementary and secondary schools declined and the average per-pupil amounts of other broad categories of inputs rose. These trends could have resulted from several combinations of demand and supply changes. Under certain demand conditions, increasingly effective educational inputs (the third factor) would have led to rising prices and larger expenditures and amounts of schooling per pupil, even with no aggregate change in the demand for education expressed on behalf of each student (from the second factor).[7] Alternatively, if demand has increased, the supply of schooling inputs may not have changed, or they may have become more productive (the third factor) or simply more expensive (from the fourth factor); in either case, the amount of educational resources and expenditure per pupil would have risen.[8]

Unfortunately, no clear evidence points to a particular combination as the cause of the increases in expenditure per pupil that have characterized American education in recent years. Because of great conceptual and statistical difficulties in measuring the "output" or "product" of educational processes, and in defining inputs and changes in their effectiveness, the data required to answer the question have been neither defined nor collected.[9]

Despite this uncertainty, past experience suggests a continuing rise in real educational wages and the prices of conventional schooling inputs, whether due to increasing demand for schooling inputs or changes in their supply. In our consideration of the emerging needs for compatibility between the American school system and the social, economic, and political changes that are taking place in this country, we anticipate that several innovations in teaching methods, educational technology, and school and classroom organization are likely to gain increasing acceptance and

adoption in the coming decades. The costs of these innovations and changes in the prices of conventional school inputs will determine anticipated per-pupil expenditures in our future schools.

FACTORS OMITTED FROM THE ANALYSIS

In order to concentrate attention on the effects of population growth and changing educational organization, methods, and technology, the following simplifying assumptions have been made. The effects of relaxing several of these assumptions are explored later.

1. Elementary and secondary enrollment projections were made by the Bureau of the Census. Although we have altered the Census projections of enrollment in institutions of higher education and constructed our own projections of prekindergarten enrollment, there has been no attempt to account for changes in the demand for elementary and secondary schooling as reflected in enrollments.

2. We assume that the prices of all resources used in schooling will increase as fast as productivity growth in the whole economy. A rough measure of productivity increase is the change in per capita real disposable income. Since the Department of Commerce projections yield an average annual growth in per capita real disposable income of 2¾ percent,[10] the costs of all resources in both "current-input" schools and future schools are projected to increase at this annual rate.[11] No attempt has been made to foresee changes in relative prices of educational inputs or the future course of inflation.

3. Foregone earnings of students are omitted as a cost of education at all levels. Although they form the largest component of the cost of higher education and a sizable part of the cost of high school education,[12] they are not included in public expenditures for schools, which is the concern of this study. Since the future school system described later implies substantial savings of students' time at the higher levels, we comment at that point on the significance of this saving.

4. We do not consider the separate prospects for public and private schooling or changes in school financing (for example, a voucher system) that might affect the demand for or supply of schooling.

5. Possible changes in administrative costs, as might arise from planning, programming, and budgeting systems and electronic data processing, seem relatively insignificant and are neglected.[13]

6. The effects on educational expenditures of the spatial distribution of the population seem to be dominated by the impact of total enrollment growth and the adoption of educational innovations.[14] We have therefore abstracted from issues of spatial distribution.

7. Alternative tax and expenditure programs to pay the projected costs of education are not considered.

II. PROJECTIONS OF ENROLLMENT AND PER-PUPIL EXPENDITURE

Having described the conceptual relationships between enrollment growth and changes in expenditure per pupil on the one hand, and aggregate educational expenditures on the other, we now turn to a discussion of our enrollment and per-pupil expenditure projections. These shape the aggregate expenditure and teacher requirement projections discussed in the last section of this report.

THE ENROLLMENT PROJECTIONS [15]

The 1970 prekindergarten enrollment of children aged three to six, adjusted to its full-day equivalent, constituted 6.5 percent of the children in that age group.[16] Our low enrollment rate projection assumes that this percentage will increase by the same amount each year until it reaches 30 percent of the relevant age group in the year 2000. The high projection grows to 83 percent in 2000.[17]

For elementary schools, the 1970 enrollment rate was 95.6 percent. This rate is projected to be 96.4 percent and 97 percent in 2000, under the low and high assumptions concerning enrollment rate growth, respectively.[18] Similarly, whereas 85 percent of the relevant population were enrolled in secondary school programs in 1970, the low and high projections for 2000 are 87 percent and 89 percent, respectively. For higher education, the 1970 figure was 27 percent and the two projections for 2000 are 35 percent and 44 percent.[19]

The age-specific enrollment rates implied by these proportions were multiplied for each year of the forecast period by the population size projected in both Series B and Series E of the Census population projections. At each of the four levels of schooling, therefore, there are four enrollment projections, the highest assuming large enrollment rate increases and Series B population, and the lowest assuming small enrollment rate increases and Series E population.

The compound growth rates of enrollment which these four projections imply appear in Table 1. The largest increases are projected for prekindergarten and

Table 1

COMPOUND GROWTH RATE OF PROJECTED ENROLLMENT

Level	Compound Growth Rate (percent)			
	Series B		Series E	
	High	Medium-High	Medium-Low	Low
Prekindergarten	10.3	7.0	8.7	5.3
Elementary	1.4	1.3	-0.0	-0.1
Secondary	1.7	1.5	0.1	0.0
Higher	3.3	2.6	2.3	1.6

SOURCE: Appendix Tables C-1 through C-4.

higher education; it is at these levels also that the difference between rapidly and slowly growing enrollment rates would make the most difference. Both results are caused by the lower rates at these two levels in 1970 which leave more room for increase over the forecast period.

Figure 1 suggests the magnitude of difference between rapidly and slowly growing populations, anticipating some of the results reported below. The number of children reaching school-entering age, which foreshadows future school enrollments, is plotted in actual and projected values. It reached a peak of 4.3 million children in 1967 when it was 11 percent higher than in 1960 (and 60 percent more than in 1951).

With high fertility, the number of children reaching age six will continue to fall until 1974, and only in 1979 will it recover its 1967 peak. Series E population growth, however, yields a declining number until 1977 and never again reaches the 1967 peak. In either case, the recent fall in numbers reaching school age will work its way through the education system and is even now affecting the lower grades.

GENERAL FEATURES OF CURRENT-INPUT SCHOOLS AND FUTURE SCHOOLS

To project education expenditures per pupil, it has first been necessary to estimate the amount per pupil spent on several categories of educational resources in the United States in 1970. We have then made similar estimates for schools in the year 2000, based upon a conception of the ways in which these schools will differ from the present ones. After describing some general features of schools which use current 1970 inputs and of schools considered most likely to be common in 2000, we

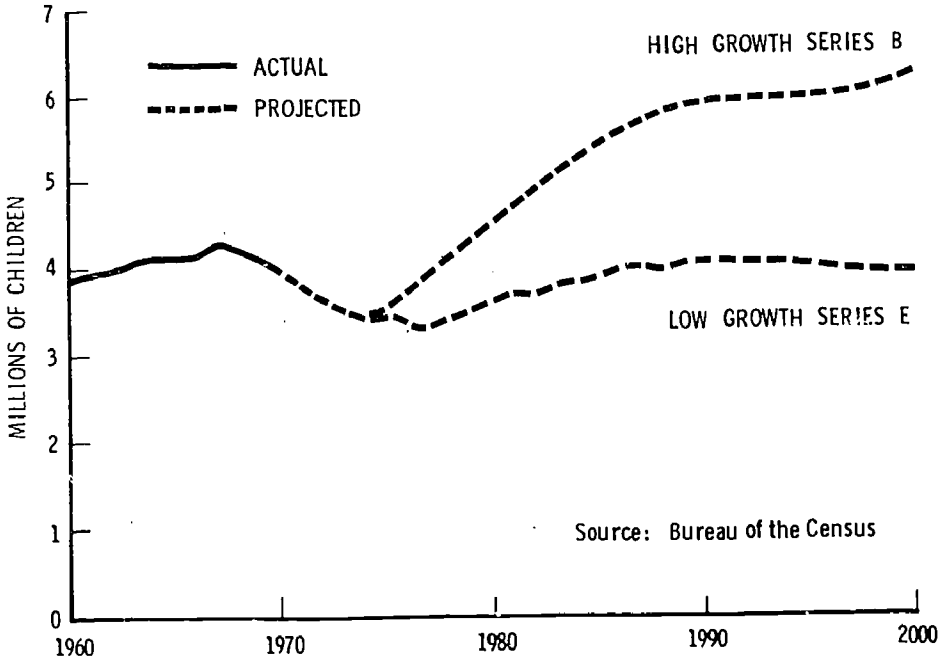


Fig. 1—Children reaching age six

turn to specific features and expenditures of the future schools, taking each school level separately.

Although schools at different levels and in different geographic areas can vary immensely in their organization, size, and teaching methods, most of American education in 1970 can be fairly characterized in a brief description. The teaching strategy at all school levels has proved durable over many decades: for each class, a single teacher who relies on textbooks as the most important medium of instruction. The teacher uses some films and records and perhaps a small amount of instructional television, and he alone carries most of the burden of course organization without outside help in planning. Nor does he receive assistance in instruction from paraprofessional people.[20] For the school system as a whole, what pupils are to learn is laid out in advance by years, months, perhaps days, and regular progression through the grades is expected of most pupils. Employing physical facilities which are in reasonably full use for only about 180 days of the year, the process of instruction is at all levels largely a matter of teachers telling and questioning, and pupils answering.

The opinions of leading educators and public decisionmakers, as well as current trends in American education and prospects for different but effective teaching methods and technologies[21]—all considered together—point to several pervasive differences between these current schools and the educational system that will evolve during the next 30 years. To begin, it seems evident that a primary function

of schools, taken increasingly seriously, will be to insure that each pupil is prepared, at the upper school levels, either to continue in school or to support himself by employing his personal resources usefully in the economy.[22] To achieve this and other goals, schools will try to pattern each student's educational program after his own abilities, interests, and goals. There will accordingly be greater diversity in teaching methods and in the time patterns of schooling. Students at the upper levels may freely intersperse on-the-job training, travel, military service, or leisure with their schooling—even on a day-to-day basis.[23] At all levels, a much greater part of the effort of teachers and administrators will be devoted to frequent counseling of individual pupils—keeping abreast of their changing interests and goals, advising them in educational matters, and planning their curriculum for the short and the long run. Counselors will seek out pupils on a regular basis as well as be available for special problems, as they are in most current-input schools.

Today many school administrators would make these changes if sufficient resources—particularly personnel—were available. Whereas most cannot now afford them, we foresee five developments which will make these changes possible.

• First, *relatively low-cost instructional television and computer-assisted instruction will come into widespread use* freeing instructional personnel from some classroom responsibilities. Multi-channel cable television networks with digital or voice feedback have enormous capabilities for providing varied and extensive instruction at all levels and in most subjects.[24] The weight of experimental evidence indicates that many kinds of material can be taught just as well over television, and at lower cost per pupil.[25] As cable systems proliferate and as knowledge about teaching by television accumulates, instructional television will become increasingly cost-effective.

Similarly, computer-assisted instruction has been shown effective in teaching a limited but important set of subjects; its fuller possibilities are unknown.[26] These capabilities and possibilities, along with the costs of experimental systems now in existence, give us reasonable confidence that computer-assisted instruction will be commonplace in the United States in 30 years.[27] To the extent that television and computers are adopted in the schooling process, the time of teachers will be freed for the individualized instruction and counseling discussed above. Although it is possible in these circumstances that school administrators will employ fewer instructional personnel, experience indicates that they will not do so.[28] Instead, existing teachers will probably spend more time with individual pupils and, upon retiring, be replaced by more specialized instructors and counselors.

• A second development that will facilitate the broad changes we expect schools to undergo is *increasing use of specially trained paraprofessional instructional personnel.* Many of these people will have completed a six-month to two-year training program after high school and will be prepared to assist in specific facets of instruction and classroom administration. Their efforts, which may be of particular use in supervising instructional television classes and computer-assisted instruction, will enable professional teachers to spend more time with individual pupils.

• A third contributing factor will be the *increasing allocation of schooling resources to the lower levels.* Many children will begin formal schooling as early as age

three,[29] and expenditures per pupil will grow more rapidly at the lower two levels than at the upper two.

- Fourth, it seems very likely that *schools at all levels will increasingly find ways to use their physical plant and equipment for more of the calendar year.*[30]
- A final factor is the expected *proliferation of so-called extended campus programs in which students can take courses and earn degrees while physically removed from the classroom.* Instructional television and remote-access computer-assisted instruction may enable people to continue their schooling while living at home or holding a full-time job. With periodic visits to a school or campus for counseling and testing, these programs will surely be less expensive than conventional schooling.

All these changes should enable pupils to learn much of the material covered today in college survey courses while still in high school or to devote considerable time to learning skills that can be used in jobs after graduation. We accordingly anticipate that such survey courses will be offered typically at the secondary level and that academically prepared high school graduates will be able to earn a Bachelor's degree in an average of two years. Further, we foresee the development of well-organized work-study programs affording students a variety of work experiences and perhaps the opportunity to learn several trades before finishing high school. Business firms, unions, and schools may establish mutually advantageous cooperative programs to accomplish this end.

Most high school graduates who continue in school will attend two-year degree-granting community colleges, after which they may join the labor market, travel, or continue their education in graduate universities or professional schools. *On the average, therefore, college graduates will begin their productive careers two years earlier than at present.* Their lifetime incomes will be increased on this account, and society will reap the benefits of their longer participation in productive activities. The discounted value of their additional output is part of society's payoff for its allocation of resources to schooling in the early years.

PREKINDERGARTEN SCHOOL CHARACTERISTICS [31]

More than at the elementary and secondary levels, prekindergarten instructional programs differ markedly in their organization, methods of teaching and learning, and types and amounts of materials and equipment. Since information about these factors and the expenditures they imply has not been systematically collected as for higher level institutions, we have derived estimates of expenditures per pupil in current-input schools from the experiences of several federally funded programs and from elementary school estimates. These per-pupil expenditure figures for prekindergarten programs are listed in Table 2.[32] They suggest the important roles of paraprofessional instructional personnel and of medical, dental, and nutritional services which are included in "other expenditures." Professional teachers and equipment, on the other hand, account for smaller proportions of total expenditure than in elementary and secondary schools.

Table 2

ANNUAL EXPENDITURE PER PREKINDERGARTEN PUPIL

Item	Annual Expenditure ($)			
	Current-Input Schools	Percent	Future Schools	Percent
Professional instructional personnel	140	17	340	13
Paraprofessional instructional personnel	265	32	1470	58
Physical plant	185	22	395	16
Equipment	40	5	160	6
Other	200	24	180	7
Totals	830	100	2545	100

SOURCE: Appendix A.

Future prekindergarten schools can best be characterized by their objectives: to prepare children for future social interaction in school and to provide rudimentary language, counting, and study skills.[33]. Peer group and "next cohort" associations, and free exploration of the adult world of reading, writing, speaking, and computing via frequent presentation of artifacts and activities are the main instruction methods. Children who did not learn at home to speak "standard English" are exposed to it here as a second language, and all pupils have televised instruction for an average of one hour daily. There is a minimum of IQ categorization, overt testing, and discipline control whereas talking and group play are encouraged. Intensity of participation in new activities is an important part of learning at this level, and the children's progress is appraised in written reports by teachers and parateachers who observe their daily activities.[34]

Preschool systems are administered locally and share, where possible, the medical, custodial, secretarial, cafeteria, and transportation services of existing primary schools.[35] Physical facilities are in full use for 240 days of the year and may be available to the community from early morning to late evening for custodial care of children.

Although the size of classes varies widely among schools and even from day to day within the same school, it is useful here to think of an average class as consisting of 20 children. A professional teacher is in charge of three such classes. He has at least a Bachelor's degree in child education including training in child and group psychology, the use of instructional equipment and techniques, paramedical practice, the counseling of parateachers and parents, and the management of school activities. Each class under his supervision has two parateachers and a teacher aide.

The parateachers have high school diplomas and certificates of completion of or examination from a six-month to two-year course in prekindergarten education including child and group psychology, first-aid training, and familiarity with two instructional specialties—for example audio-visual techniques and handicrafts. Teacher aides are high school or college students or parents who volunteer their time.

Classrooms consist of an open area containing most of the tables and chairs and a quiet corner for reading and puzzles. Along one wall is a work surface with running water and electricity. Every two classrooms share an audio-visual area which offers a television, and a tape/ cassette/record playing machine with a speaker and five to ten headsets. They also share a handicraft area containing potting wheels and various art materials.

Costing these resources at 1970 prices and augmenting the resulting figures for anticipated increases in the costs of educational inputs during the next three decades gives the expenditure estimates listed in Table 2. These figures suggest that future prekindergarten schools will devote a much larger proportion of their total expenditure to paraprofessional instructional personnel than do current-input schools.

ELEMENTARY SCHOOL CHARACTERISTICS [36]

More than half the per-pupil expenditure of current-input elementary schools was devoted in 1970 to professional instructional personnel. A large proportion was also spent on physical plant, as Table 3 indicates, but relatively little on equipment and paraprofessionals.

For future elementary schools, these proportions would be considerably altered, reflecting differences in objectives, organization, and methods. The objectives of future elementary schools are the following: to help children understand the philosophy and basic skills of research and acquisition of knowledge; to provide settings and accessories with which children can acquire specific skills in language and computation; to encourage understanding of the universe and man's social relationships and responsibilities; and to insure adequate nutrition. To accomplish these goals, future elementary schools emphasize interaction and self-instruction among pupils, encouraging development of interests and knowledge in specific areas selected by the individuals themselves. To this end there is less rigid scheduling of specific activities and freer and more random access to literary, audio-visual, graphic, and mechanical materials. The pupils, individually or in groups, pursue their own interests during part of the school day with teachers observing, asking questions, and suggesting related activities the children might also want to investigate. During the rest of the day teachers direct group activities, with the same child belonging to different groups for different subjects, depending on his interests and abilities. Rather than a complex structure of specific skills, the school seeks to teach affection for the learning process itself.

Table 3

ANNUAL EXPENDITURE PER ELEMENTARY PUPIL

Item	Annual Expenditure ($)			
	Current-Input Schools	Percent	Future Schools	Percent
Professional instructional personnel	430	52	1155	43
Paraprofessional instructional personnel	15	2	600	22
Physical plant	265	32	395	15
Equipment	40	5	360	13
Other	80	9	180	7
Totals	830	100	2690	100

SOURCE: Appendix A.

Overt testing and IQ categorization are minimized; instead, teachers evaluate pupils' and groups' total progress relative to "where they were." Nevertheless, the learning of students and classes is compared at several points with preestablished goals, and administrators periodically evaluate the use and success of school resources in meeting these goals. Evaluations by secondary school administrators of their incoming students' preparation is another useful check on elementary schooling.

The ratio of pupils to professional instructional personnel seems likely to continue falling, reaching 20:1 in future elementary schools. It stood at 24:1 in 1970. These professional teachers have at least a Bachelor's degree in primary school education, and each is assisted by a parateacher and teacher aide, who have qualifications similar to those described in the prekindergarten section.

Future elementary schools are within walking distance of children's homes in most areas and are used at full intensity for 240 days of the year. For each class of 20 children there is a large classroom with movable wall partitions. In their normal state these rooms have, in addition to an open central section, a quiet corner for individual activities, and audio-visual and laboratory areas. Contained in the latter are a television, a tape/cassette/record playing machine, a microfiche reader-printer, two or three typewriters, several Bunsen burners, chemistry laboratory equipment, and a small electric motor. Additional materials can be borrowed from the school library.

Instructional television and computer-assisted instruction are used, on the average, for two hours every school day by each student. Regional and national programming networks supply schools' needs in regard to both these capabilities.

Costing these resources at 1970 prices and correcting for anticipated increases in the costs of all educational inputs yields the expenditure estimates listed in Table 3. Paraprofessional teachers and equipment account for a larger proportion of expenditure in future schools, whereas professional teachers and physical plant are less important than in current-input schools. Overall, the savings from more intensive operation of the fixed physical facilities go into both personnel and equipment.

SECONDARY SCHOOL CHARACTERISTICS [37]

Future secondary schools are designed to accept pupils who have progressed through prekindergartens and elementary schools of the future type. The objectives of these secondary schools are interrelated: to encourage individual pacing of learning in various disciplines, to offer structured training in fields of individual interest, to encourage a comprehensive appreciation of the interrelationships among facts and disciplines, to prevent students from committing themselves to specific life goals without exposure to many areas of skill and knowledge, to develop understanding of the operations and requirements of their social, political, and biophysical environment, and to insure that each person is prepared to employ his resources usefully upon graduation, either in a job or in additional schooling.

School organization and curriculum are arranged to achieve these goals. In particular, academic and vocational education are much less distinctly separated than in current-input schools. All education is directed toward achieving students' goals, whether they be extensive higher education or development of special skills which can be put to direct use in working and living. In this sense, schooling in fine arts, music, cinematography, and chiropractic are "vocational."

Similarly, future secondary education provides much of the basic knowledge previously taught in required lower-division college courses. Formerly upper division college courses of a "how to" nature are now also taught in high schools. These include nursing, computer programming and operation, and medical technology. To aid in learning these and other skills, off-campus apprentice practicums are widespread. Students with every kind of interest, including academic, may spend part of each month in a training program or job, though these experiences are concentrated during vacation periods which come during any part of the calendar year, leaving school facilities in year-round use. Through these practicums and other means, students and other members of the community have varied school-related contacts which should make school more a part of real life for students.

Learning-by-doing is also emphasized within the school by extensive use of literary, audio-visual, mechanical, electronic, and graphic materials. Students pursue their own interests with these materials but are encouraged to relate their interests to other disciplines and to general techniques of research and investigation. Individual work is not necessarily a virtue; studying, working, and testing together are encouraged.

Students are counseled frequently concerning their interests, short and long

term goals, and current and planned activities. Instead of being categorized by currently perceived potential and objectives, they are given every opportunity to change interests and goals. Upon leaving high school, they receive complete placement services—for college, specialized training programs, jobs, and independent study and travel. At this point, each pupil has had many opportunities to do what he enjoys doing, pursuing these interests as far as he wishes with the assistance of teachers and others in the community. In cooperation, they have charted courses of skill acquisition or research in his interest areas. But he has been free to change interests and to learn at his own pace. Each student has also learned something of how skills and knowledge are acquired in many different disciplines; all his schooling has been directed toward skill in asking questions and finding answers in a variety of disciplines. Most important, he is now prepared to do something with his life which is both personally satisfying and useful to his community.

The pupil-professional teacher ratio remains at 20:1, the level at which it settled in the late 1960s in current-input secondary schools. These teachers are more highly trained than their prekindergarten and elementary colleagues since they teach many courses formerly offered only in colleges. A higher proportion of them are specialists—in audio-visual techniques, computer-assisted instruction, and counseling, for example—than in current-input secondary schools. For every three professionals, there is a parateacher who assists primarily in administrative and record-keeping matters.

Libraries and laboratories are upgraded to levels found in 1970 junior colleges, and equipment and materials needed for career education are much more extensive. In addition to these resources, the average student uses instructional television and computer-assisted instruction for two hours daily. Each student may have sufficient disc storage at his disposal to facilitate on-going computer research projects. The schools are in full use for 240 days of the year and may be used to varied extents by persons not directly in pursuit of a diploma.[38]

Table 4 lists the expenditure estimates generated by costing all these resources at 1970 prices and adjusting for the anticipated increases in the prices of all educational inputs. Current-input and future schools at this level differ chiefly in the proportions of expenditure devoted to physical plant and to equipment.

HIGHER EDUCATION CHARACTERISTICS [39]

The major difference between current-input and future institutions of higher education is organizational. The latter institutions consist of two types: colleges with two-year programs leading to Bachelor's degrees and various certificates of competency, and universities which offer advanced research and professional degrees.

With most of the required survey course work completed in high schools of the future type, undergraduate education in two-year colleges concentrates from the beginning on the student's primary fields of interest. Upon completion of a two-year degree program, he is prepared to (1) immediately enter useful employment, holding

Table 4

ANNUAL EXPENDITURE PER SECONDARY PUPIL

Item	Annual Expenditure ($)			
	Current-Input Schools	Percent	Future Schools	Percent
Professional instructional personnel	560	49	1535	50
Paraprofessional instructional personnel	35	3	260	9
Physical plant	360	32	540	18
Equipment	90	8	520	17
Other	85	8	190	6
Totals	1130	100	3045	100

SOURCE: Appendix A.

either a certificate of competency in some set of skills or a Bachelor's degree, (2) enter a university to begin professional study leading to a Master's degree, professional degree (LL.B., M.D., and so on), or certificate of competency in an advanced skill, or (3) enter a university to begin study toward an advanced teaching or research degree (D.Phil., Ph.D.).

In most respects these two-year colleges resemble the middle two years of our present colleges[40] in which students are usually clear about their broad areas of interest (for example, physical science, literature, business) but are not encouraged to specialize further. For example, a student interested in doing graduate work in anthropology would cover a wide range of topics in the social sciences during his two college years. Survey courses in the arts and physical and biological sciences are behind him already, though he may take more work in these areas if he wishes. Another student, planning to get a job after two years of college, may specialize in social work or economics or may study for a teacher's license.

These examples illustrate the major objective of future higher education: to insure that each person, upon graduation, is prepared to employ his resources usefully, either in a job or in additional schooling. To reach this objective, good teaching, rather than research, is emphasized in colleges, and students are counseled frequently regarding their goals and present and planned progress.

In the graduate universities and professional schools where teaching is more a matter of example and individual guidance, research and its direction is a more important responsibility of the faculty than classroom teaching. These universities receive students who are already familiar with the areas of knowledge and methodology on the periphery of their fields of primary interest. They are now ready to specialize.

In the future institutions of higher education there is considerably more opportunity for people at any age to enroll. They may study for a year, work or travel for one or many years and then return. As a result, a much higher proportion of people learn their skill in secondary schools, work for several years, and then enter college. Similarly, course examinations are not as important as subject matter proficiency tests, which a student may take whenever he feels prepared. He need not have attended any particular classes.

About one-fifth of the students are enrolled in extended-campus degree programs in which day-to-day instruction is received at their homes via television. They are able to respond to questions through digital feedback cable television capabilities and to practice and request additional information by using a computer terminal in their home or community which is on-line to central processing and storage facilities at the college or university. These students return periodically to the campus or a regional center for counseling and testing, though much of this is also accomplished by television and computer.[41]

At the college and university level the caveat in footnote 32 concerning per-student expenditure figures becomes particularly important. Because student education is only one product of these institutions—new knowledge through research, and community service through extension activities are two other important outputs—the level of expenditures may not be as closely related to the number of students as at the lower levels.[42] We have therefore not broken down our expenditure estimates at the higher education level into broad categories. Instead, results dependent on forecasts by these categories are based only on the more meaningful figures pertaining to the lower levels.

Expenditure per student in 1970 current-input institutions of higher education is $3435. Future undergraduate colleges and graduate universities are estimated to spend $8400 and $13,455 per student, respectively. Anticipating that one-fourth of all students in future institutions of higher education will be enrolled in graduate universities, total expenditure per student in both kinds of institutions is $9665. These estimates are the basis of our forecasts of total expenditures of colleges and universities, but it should be borne in mind that society's future demand for the products of research and extension activities will affect the true course of these expenditures quite independently of enrollment growth.

THREE PROJECTED RATES OF SCHOOL QUALITY IMPROVEMENT

The foregoing discussions describe two types of schools at each level. One type, current-input schools, is representative of actual schools in 1970. The other type, future schools, uses different kinds and amounts of educational resources, reflecting the schools' changed objectives and operations. Although all schools in 1970 are of the current-input type by definition, it is impossible to predict the speed at which our schools will change and improve. Three alternative assumptions about this rate of change are therefore made. The first is that schools will continue to employ the

same resources in the same proportions as in 1970. The prices of these resources will rise and they may become more productive for reasons discussed above on pages 2-4, but the magnitude of resources devoted to each pupil will not change, according to this assumption.

The second assumption is that by the year 2000, 30 percent of American schools will be of the future type. This possibility, referred to hereafter as *medium rate of improvement,* entails year-by-year changes in the kinds and amounts of resources per pupil employed in our nation's schools. The third assumption is that 80 percent of the schools will be of the future type by the year 2000. This *high rate of improvement* implies more rapid change and more expensive schooling in every year of the forecast period. The compound growth of expenditure per pupil implied by each of the three alternative projections is shown in Table 5.

Table 5

COMPOUND GROWTH RATE OF PROJECTED ANNUAL PER-PUPIL EXPENDITURE

Level	Compound Growth Rate (percent)		
	Current Inputs	Medium Rate of Improvement	High Rate of Improvement
Prekindergarten	2.7	3.1	3.5
Elementary	2.7	3.1	3.7
Secondary	2.7	2.9	3.2
Higher[a]	2.7	2.5	2.1

SOURCE: Tables 2, 3, 4, and text.

[a]The growth rates for higher education expenditures are computed on the basis of students ever attending an institution of higher education. Although future institutions at this level spend more per year for every enrolled student than do current-input institutions, the total amount spent for each student who ever attends a college or university is actually lower. This is because the average time required to earn a Bachelor's degree is two years less for students who came up through the future education system. How this adjustment was made in projecting aggregate expenditures is summarized in Appendix A, p. 38.

III. THE IMPACT OF FUTURE DEMOGRAPHIC TRENDS ON EDUCATION

Appendix Tables C-5 to C-30 give the detailed annual projections of expenditure per student and total expenditures by school level and cost category derived in this study. Projections of requirements for professional and paraprofessional instructional personnel are detailed in Appendix Tables C-31 through C-40. These data are the central product of this research and constitute raw material for many comparisons and contrasts concerning resource requirements of American education during the next three decades. In order to characterize the most important features of the projections and the manner in which some of our assumptions affect them, we will highlight the most important comparisons in the text.

EDUCATIONAL EXPENDITURE PROJECTIONS

According to Fig. 2, differences in population growth will affect relative spending by school level during the next three decades. Population Series B (column 5) will create requirements for relatively more expenditure at the prekindergarten and elementary levels and relatively less at the higher education level than will population Series E (column 3).[43] This result is due to the fact that higher fertility causes a lower population age structure and applies equally to the case of low enrollment rate growth (compare columns 4 and 6).[44]

Columns 3 and 4 or 5 and 6 indicate the effects of enrollment rate growth, holding constant the underlying population growth rate. In both comparisons, a relatively large proportion of total spending is at the lowest and highest levels when enrollment rates grow more rapidly (columns 3 and 5). For example, with population Series E, elementary and higher schooling combined account for 47 percent of total educational expenditure when enrollment rates grow quickly (column 6) but for only 38 percent when they grow slowly (column 5). These variations arise because by far the largest differences between the fast and slow enrollment rate projections occur at the prekindergarten and higher education levels.[45] These results, as well as those

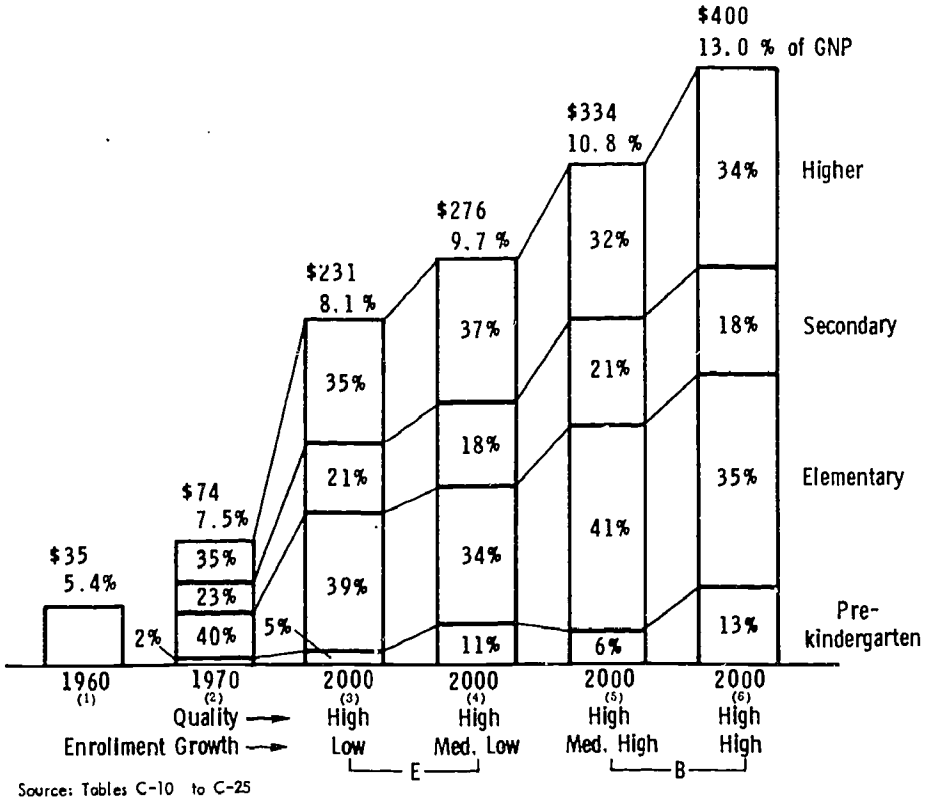


Fig. 2—The effects of population and enrollment growth on expenditures by level
(In $ billion)

due to population growth differences, are substantially unchanged in the cases of current-input schooling and medium rate of improvement schooling (not shown). Furthermore, expenditures on prekindergarten schooling are a higher proportion of the total, and expenditures on secondary schooling a lower proportion in the year 2000 than in 1970, if schools improve at the high rate. This is true for all four enrollment projections.

The top of the columns in Fig. 2 indicates how various combinations of population growth and enrollment rate growth would affect total expenditures. Even for the high rate of improvement and the highest projected population growth (column 6), expenditures in the year 2000 would be less, relative to GNP, than the expenditure which results from simply projecting forward the growth of educational expenditures as a percent of GNP between 1960 and 1970. The latter proportion would be 13.8 percent in the year 2000. Of course, a slower rate of improvement, slower enrollment rate growth, or slower population growth will all reduce the level of expenditures in 2000. Based on our assumptions, then, educational expenditures are likely to grow less rapidly relative to GNP than they have in the past decade.[46]

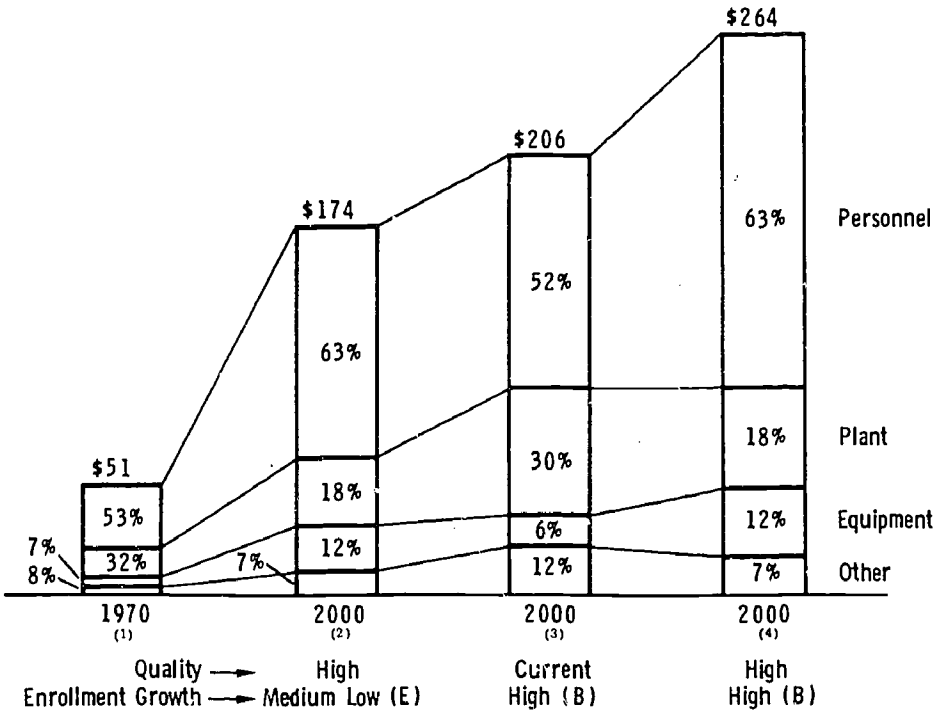
In 2000, a high rate of school improvement could be bought for only 8.1 percent of GNP if enrollment grows at the lowest projected rate (column 3). However, providing higher quality at about the same relative cost of society's resources as in 1970 must be balanced against the costs borne by persons who depend, directly or indirectly, upon the education sector for their livelihood. Some of these people—teachers, contractors and construction workers, manufacturers and sellers of educational equipment and materials, and their employees—will feel the pinch generated in an industry whose rate of growth is steadily declining. Indeed, many are already feeling it. In the long run—that is, by the year 2000—it is likely that requirements for instructional personnel will have continued to grow and that manufacturers and suppliers will have adjusted to changing market conditions in education and the rest of the economy.[47] In the interim, however, the recent decline in numbers of children reaching school age is causing and will continue to cause economic and social problems, as in any industry whose growth levels sharply.[48]

Turning now to Fig. 3, note first that with a high rate of improvement at the lower three school levels (columns 2 and 4), relatively less would be spent in the year 2000 on physical plant and "other resources," but relatively more on personnel and equipment than in current-input schools in 1970 or 2000 (columns 1 and 3). Furthermore, it appears that the rate of population growth does not influence the proportion of spending allocated to each category. For high enrollment rate growth this can be seen by comparing column 2, based on population Series E, with column 4, based on population Series B. A similar comparison for low enrollment rate growth (not shown) yields the same result.

Figure 3 also suggests the projected magnitude of the tradeoff between the quality of education and the number of people to be educated. Our projections indicate that by the year 2000 it will cost society $32 billion more to support a school system characterized by current inputs (column 3) than one resulting from high rate of improvement (column 2), if in the first case population grows at the highest projected rate and in the second case at the lowest projected rate, and if enrollment in both cases grows at the high rate.

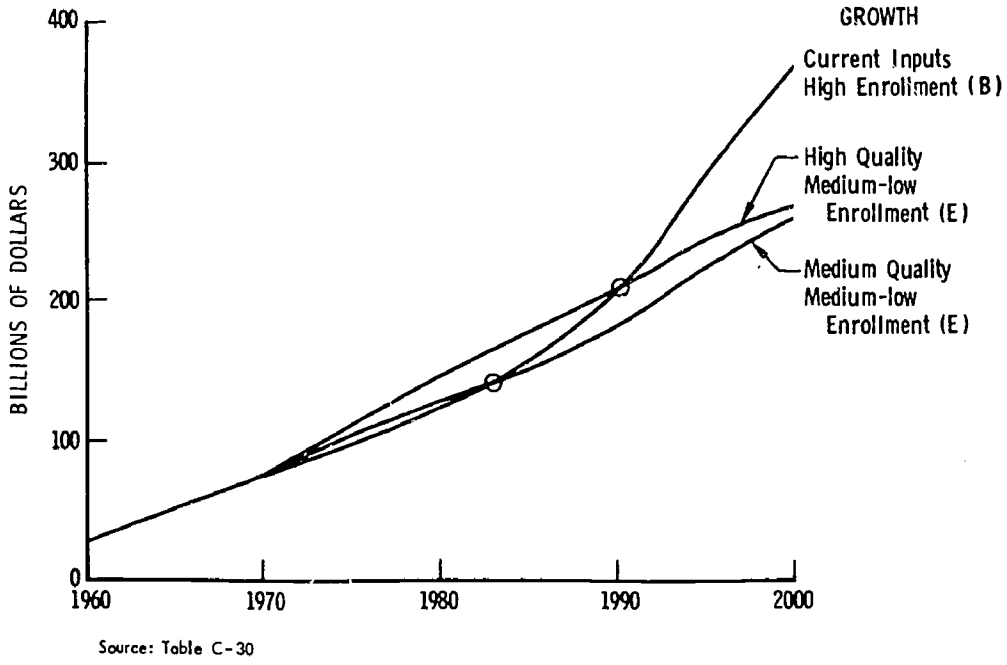
The variety of such choices that will face society is indicated in Fig. 4. Until 1983 it will be less expensive to provide current-input schooling for a rapidly growing enrollment than to assure medium or high rate of improvement schooling for an enrollment resulting from the lowest projected population growth. After 1983, on the other hand, medium rate of improvement schooling for a slowly growing enrollment becomes less expensive than schooling of a lower improvement rate for a rapidly growing enrollment. Even high improvement rate schooling is less expensive under these conditions after 1991. And by the year 2000, current-input schooling for the most rapidly growing enrollment is clearly the most expensive of these three alternatives.

Table 6 provides a summary of these tradeoffs by showing the percent of GNP in 2000 that will be spent on education under various assumptions concerning population growth, enrollment rate growth, and the improvement rate achieved for schooling. Looking down the columns, one sees that for the same enrollment growth, educational expenditures will be somewhat higher for higher rates of school im-



Source: Tables C-10, C-12, C-14, C-16, C-18, C-20, C-22, C-24

Fig. 3—The effects of quality and population growth on types of non-college expenditures (In $ billion)



Source: Table C-30

Fig. 4—The effect of population growth on the cost of a given quality of education

Table 6

EDUCATIONAL EXPENDITURES AS A PERCENT OF GNP IN THE YEAR 2000, BY RATE OF QUALITY IMPROVEMENT AND ENROLLMENT GROWTH

	Educational Expenditure (% of GNP)			
	Enrollment Growth Rate			
Quality-Improvement Rate	High	Medium-High	Medium-Low	Low
Current inputs	12.0	9.9	9.0	7.5
Medium rate of improvement	12.3	10.3	9.2	7.7
High rate of improvement	13.0	10.8	9.7	8.1

SOURCE: Table C-30.

provement. Now looking across the rows, note that educational expenditures will be a larger proportion of GNP if either enrollment rates or the population grow more rapidly. Of the three factors—rate of quality improvement, enrollment growth, and population growth—population growth clearly makes the largest difference in the size of educational expenditures in 2000.

Comparing cells in different columns and rows of Table 6 shows that schooling of superior quality can be had for a lesser proportion of our national output if population grows less rapidly. This point can be illustrated more vividly by assuming that we will spend 10 percent of our GNP on education in the year 2000. What type of education would this buy under the two population projections if enrollment rates increase relatively rapidly? With the larger population (Series B) this expenditure would provide 7 percent of the students with our assumed high quality education, while 93 percent would receive education characterized by the same kind of school inputs used in 1970. With the same proportion of GNP spent on education of the smaller population (Series E), all students could receive high quality schooling.

PROJECTIONS OF REQUIREMENTS FOR INSTRUCTIONAL PERSONNEL [49]

The detailed projections of instructional personnel requirements which occupy Appendix Tables C-31 through C-40 are summarized in Fig. 5. A comparison of the four columns representing the year 2000 suggests that prekindergarten teachers and prekindergarten parateachers, combined, will be a larger proportion of the total if either population or enrollment rates grow rapidly. In any case, they will consti-

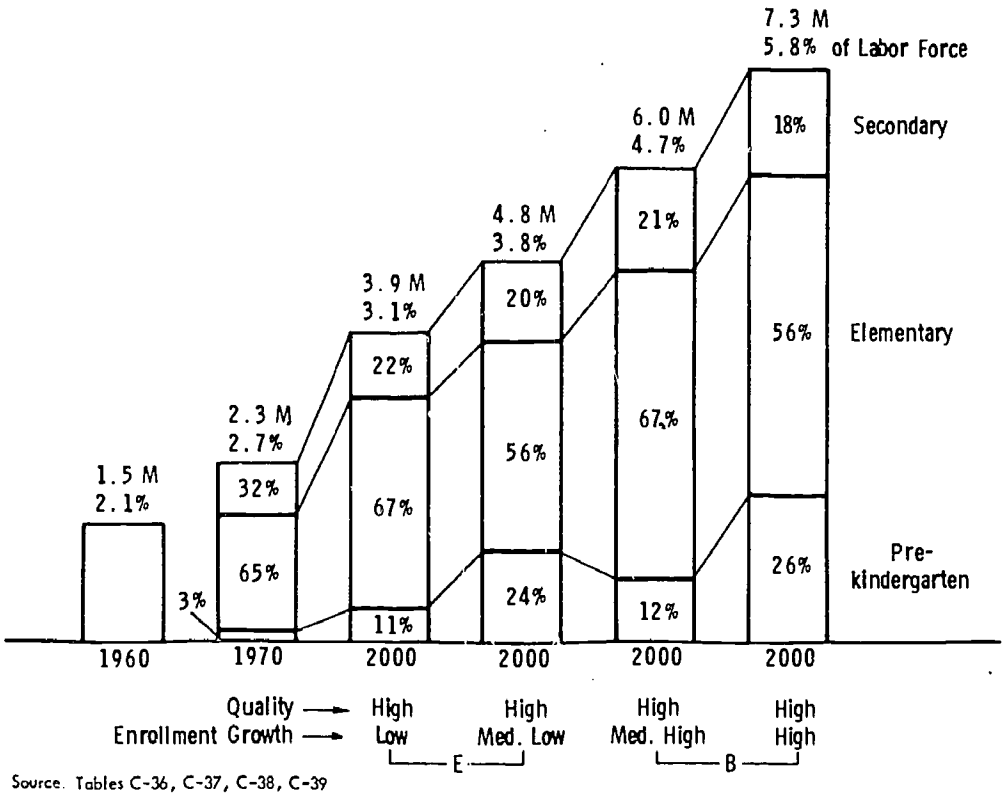


Fig. 5—The effect of population and enrollment growth on requirements for instructional personnel

tute a much larger proportion than in 1970, and secondary school teachers and parateachers will constitute a much smaller proportion. As in the case of expenditures by school levels (Fig. 2), the reasons for these relationships are that (1) the two enrollment rate assumptions differ more markedly at the prekindergarten level, and (2) faster growing populations have lower age structures. A figure drawn for current-input schooling or medium rate of improvement schooling would show similar percentage distributions, though the height of the year-2000 columns would be somewhat reduced.

At the top of the columns are the numbers of instructional personnel in millions at the lower three school levels, as well as corresponding percentages of the labor force. Series B population growth, with either of the enrollment rate assumptions, implies that instructional personnel will be a larger proportion of the labor force in the year 2000 than would be expected on the basis of projecting their growth between 1960 and 1970. Such a projection yields a figure of 4.5 percent in 2000. Hence, although it is anticipated that a higher proportion of the labor force will be employed

as instructional personnel at these school levels 30 years hence, the rate of population growth will make a considerable difference, in both the proportion and the absolute number.[50]

Although we have not projected requirements for instructional personnel in institutions of higher education, several speculations seem warranted. First, to the extent that society rapidly adopts schools of the future type, these requirements should be lessened. This is expected because of (1) the elimination of two years of college work in Bachelor's degree programs in future colleges and (2) the participation of up to one-fifth of all students in extended-campus programs which make extensive use of television and computer-assisted instruction.[50] Second, more rapid enrollment rate growth will induce higher requirements for instructional personnel, as will increased population growth with an 18 to 25 year lag.[51] Third, it is an entirely different matter to speculate about society's future demand for the products of research and extension activities. And this factor, perhaps as much as population and enrollment rate trends, will influence the number of "instructional" personnel in colleges and universities of the future.

On balance, it seems reasonable to expect that classroom teachers in institutions of higher education will decrease as a percent of the labor force and perhaps absolutely if society adopts a high rate of schooling improvement and if population and enrollment rates grow slowly. Nevertheless, the number of professional personnel employed by these institutions may grow, even in this situation, if society's demand for the products of research and extension rises sufficiently quickly.

IV. CONCLUSIONS

The projections resulting from this research suggest the following conclusions:

1. Expenditures on education in the United States will be very sensitive to population growth during the next 30 years. For given rates of school quality improvement and enrollment rate growth, total expenditures on education in the year 2000 will be about 45 percent higher with population growth implying an average three-child family in 2000 (Series B) than with population growth implying an average two-child family (Series E).

2. Educational expenditures will be significantly affected by enrollment rate growth. Expenditures in 2000 will be about 20 percent higher if enrollment rates increase at the faster pace, given the same rates of school quality improvement and population growth.

3. Expenditures at the lower schooling levels—prekindergarten and elementary—will be a larger proportion of total educational expenditures if population growth is rapid than if it is slow.

4. Similarly, the proportion of prekindergarten, elementary, and secondary instructional personnel who are employed at the lower two levels will be larger for higher population growth and enrollment rates.

5. The distribution of non-college educational spending among broad categories—instructional personnel, physical plant, and equipment—does not appear sensitive to population growth or enrollment rate variations.

6. Educational expenditures are unlikely to rise as fast, relative to GNP, as they did in the decade of the 1960s, even with substantial infusions of new technology and even at the highest projected enrollment growth rate. If the educational improvements identified in this report are adopted relatively quickly, rapid growth in school enrollment (based on Series B) will require about 13 percent of GNP to be spent on education in the year 2000. Slow enrollment growth (based on Series E) will require about 8 percent, an increase of only one-half percent over the 1970 figure. Slower adoption of improved methods and technologies will slow the growth of educational spending accordingly.

7. There will be a large financial tradeoff in the coming decades between the quality of education and the number of people to be educated. This tradeoff can be illustrated by assuming that enrollment rates will increase relatively rapidly and

that we will spend 10 percent of our GNP on education in the year 2000. With the "three-child" population (Series B) this expenditure would provide 7 percent of the students with all of the educational improvements identified in this report, while 93 percent would receive education characterized by the same kind of school inputs used in 1970. With the same proportion of GNP spent on education of the "two-child" population (Series E), all students could receive high quality schooling..

NOTES

1. The best entries into this field are *Education Daily,* Capital Publications, Inc., Suite G-12, 2430 Pennsylvania Ave., N.W., Washington, D.C. 20037, and the monthly "Education in America" supplement in *Saturday Review.* Also see John K. Folger and Charles B. Nam, *Education of the American Population,* A 1960 Census Monograph, Bureau of the Census, Washington, D.C., 1967; Kenneth A. Simon and W. Vance Grant, *Digest of Educational Statistics, 1970 Edition,* Department of Health, Education and Welfare, Office of Education, National Center for Educational Statistics, September 1969; and other publications of the Office of Education.

2. Much of the research is summarized and reviewed in Harvey Averch et al., *How Effective is Schooling? A Critical Review and Synthesis of Research Findings,* R-956-PCSF/RC, The Rand Corporation, Santa Monica, January 1972. In addition, the last several years have witnessed considerable critical writing based on observation and opinion rather than formal research. Particularly important are: "85 Theses to Stimulate Academic Reform," Assembly on University Goals and Governances, reprinted in *The Chronicle of Higher Education,* January 18, 1971. John I. Goodlad, "A Radical Concept of 'School' in A.D. 2000," *Washington Post,* December 13, 1970. *Less Time, More Options: Education Beyond the High School,* by the Carnegie Commission on Higher Education, McGraw-Hill, New York, 1971. *Open Door,* Center for Urban Education, Washington, D.C., 1971. *Report of the Governor's Commission on Educational Reform,* State of California, Sacramento, January 1, 1971. Charles E. Silberman, *Crisis in the Classroom,* Random House, New York, 1970. *Urban School Crisis: The Problem and Solutions,* Final Report of the Task Force on Urban Education of the Department of Health, Education and Welfare, January 5, 1970; and the works of George Dennison, Caleb Gattegno, Paul Goodman, James Herndon, and John Hold.

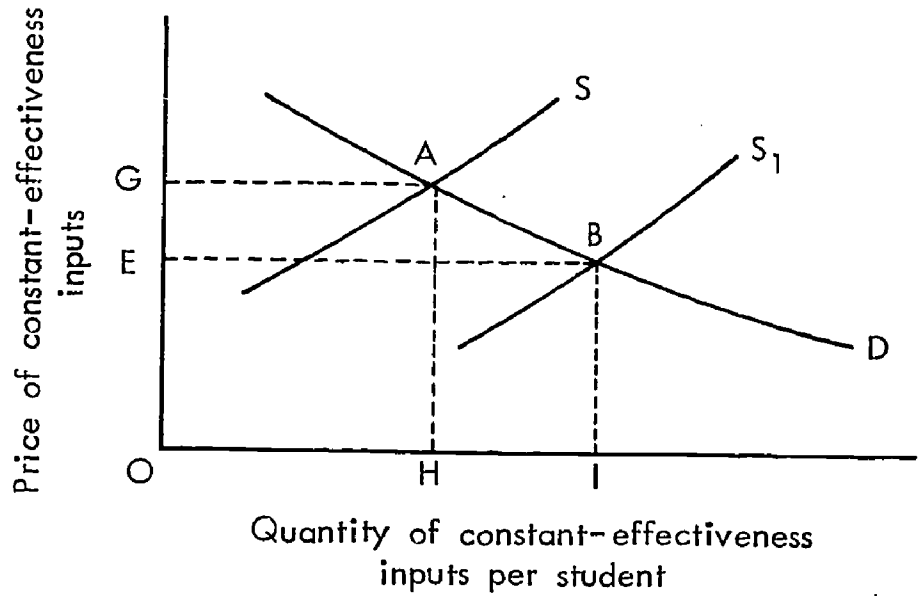
3. Much technical information and informed speculation in this area is contained in Roger E. Levien (ed.), *Computers in Instruction: Their Future for Higher Education,* R-718-NSF/CCOM/RC, The Rand Corporation, Santa Monica, July 1971, and Sidney G. Tickton (ed.), *To Improve Learning: An Evaluation of Instructional Technology,* R. R. Bowker Company, New York, Volume I, 1970 and Volume II, 1971.

4. All prices and expenditures in this report are in dollars of constant 1970 purchasing power.

5. William J. Baumol and William B. Bowen have analyzed the general phenomenon of rising input prices in industries which experience insufficient corresponding productivity increases. They apply their insights in an exhaustive study of the performing arts; see Baumol and Bowen, *Performing Arts—The Economic Dilemma,* The M.I.T. Press, Cambridge, 1966, especially pages 162-172.

6. Resources are drawn into the industry that pays them a higher price. Consequently, the supply of these resources to other industries is reduced, and their price rises there as well. In the case of labor resources, a higher wage for similarly trained people in other industries is often a powerful bargaining tool in union negotiations.

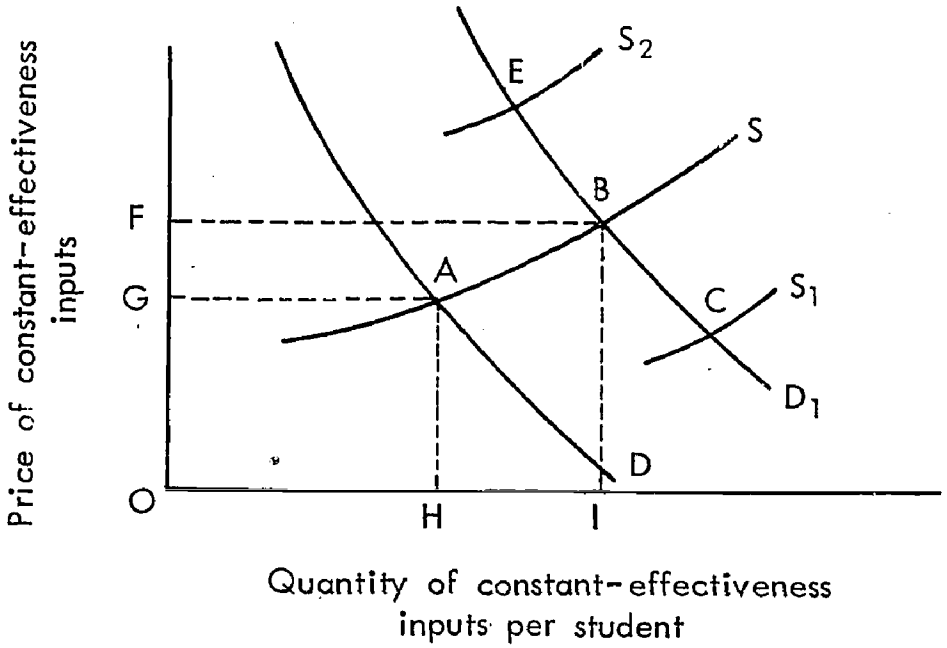
7. Increased effectiveness of educational inputs can be interpreted as an increase in the supply of constant-effectiveness inputs from S to S_1. The quantity purchased then rises from OH to OI. If the demand



for these inputs is elastic over the relevant input range, expenditure on inputs increases from AGOH to BEOI. Even though the price of an input of constant effectiveness has fallen from OG to OE, actual inputs have increased in quality and now command a higher price. The increase in total expenditure is shared among them.

In actuality, although school inputs may have become more productive during the last decade, it is unlikely that demand for them has remained constant and that it is sufficiently elastic for all inputs and at all school levels to account for the observed behavior of expenditures and resources per pupil.

8. An increase in demand from D to D_1 raises expenditures on educational resources from AGOH to BFOI, while the amount of resources used increases



from OH to OI and their price rises from OG to OF. However, the same expenditure increase could also have resulted from increasing demand accompanied by growing productivity of school inputs (shifting the supply curve out to S_1) or rising prices of inputs without corresponding productivity gains (shifting the supply curve back to S_2).

In the special case of unitary demand elasticity, the demand shift produces the same expenditure change, regardless of supply shifts. However, the nature of the supply shift determines the amount of additional resources bought with the greater expenditure. If rising resource productivity increases the supply of constant-effectiveness inputs, the amount of those resources per pupil increases to the level corresponding to point C. Alternatively, if pressures from other sectors cause input prices to rise without corresponding productivity increases in education, the same expenditure increase raises resources per pupil only to the level corresponding to point E.

In the general case, different combinations of demand and supply shifts are required to produce the same expenditure change, but the conclusion is unchanged. The only quantity we are able to observe—expenditure per pupil—is the same in any case, but differences in the quality of schooling may be substantial. Without better conceptual and statistical measures of input effectiveness, we can only guess the extent to which we have bought better educational resources with our rising expenditures.

9. For a short and perceptive discussion of some of these problems, see June O'Neill, *Resource Use in Higher Education: Trends in Output and Inputs, 1930-1967,* Carnegie Commission on Higher Education, Berkeley, 1971, Chapter 5. Also of interest is Harvey Averch et al., op. cit. Problems of defining and measuring outputs

in several other service industries are analyzed in Victor R. Fuchs (ed.), *Production and Productivity in the Service Industries,* Studies in Income and Wealth, No. 34, National Bureau of Economic Research, New York, 1969.

10. This number is the mean of the eight annual growth rates implied by the income projections prepared as of March 10, 1971 by the Department of Commerce for the Commission on Population Growth. The eight projections are based on the B, C, D, and E population projections and two assumptions concerning future reductions in annual hours of work per man.

11. One might expect that such increases in real prices would be more likely for personnel than for buildings and equipment, since the latter are produced in industries that presumably share in general technological improvement. New buildings and equipment should accordingly be increasingly productive at the same prices. In fact, however, all broad categories of physical plant and equipment have grown more expensive, in real terms, during the decade of the 1960s, as we indicated above on page 2. There seems no reason to assume that this trend will change.

12. T. W. Schultz estimates that foregone earnings were about 60 percent of total expenditures on education at both the high school and college levels in the United States in 1956. See *The Economic Value of Education,* Columbia University Press, New York, 1963, pp. 27-32. W. Lee Hansen and Burton A. Weisbrod in a study of California higher education indicate that the same proportion in 1964-65 ranged from 49 percent for lower division students at the University of California to 70 percent for students at California junior colleges. *Benefits, Costs, and Finance of Public Higher Education,* Markham, Chicago, 1969, pp. 41-49.

13. Administrative costs were less than 4 percent of the current expenditures of U.S. public elementary and secondary schools in 1967-68, the latest year for which data are available.

14. Furthermore, we know of no evidence to suggest that the cost of providing *comparable* schooling varies widely by regions of the country. Nevertheless, since the projections presented later in the report are reported for alternative rates of quality improvement in education, one could evaluate their relative likelihood according to his expectations about the speed of population movements to areas with better quality schools.

15. See Appendix A for data sources and methodology for the enrollment projections. The annual projections appear in Tables C-1 through C-4.

16. In this study, we follow the Census convention of restricting prekindergarten schools to institutions having instruction as an important and integral part of their programs.

17. At the high growth rate, the prekindergarten enrollment rate will reach in 2000 the low rate of enrollment of children aged five in kindergarten and elementary school projected by the Bureau of the Census for that year. These year-2000 percentages correspond to pupils attending a full six-hour school day. The expenditure projections for the slow enrollment rate increase apply to a 60 percent half-day enrollment rate in 2000 as well as to a 30 percent full-day rate. Similarly, the projections for the fast enrollment rate increase are consistent with 66 percent of the pupils attending full day and 34 percent attending half day.

18. Most of the 4.4 percent not enrolled in 1970 are institutionalized children not capable of attending regular elementary schools. Any decreases in this number will result essentially from reductions in congenital health defects and early environmental deprivation.

19. These figures represent the number enrolled in the most important age group (5 to 13 for elementary, 14 to 17 for secondary, and 18 to 24 for higher education) as a percent of total population in that age group. The actual projections for each level include pupils outside these age limits.

20. Paraprofessionals are defined in this study as persons directly involved in the instructional process who are not licensed teachers.

21. The tendencies and goals summarized in the following paragraphs have been widely discussed in the popular and professional literature concerning education. They can be found repeatedly in the references cited in footnotes 1, 2, and 3. We will accordingly try neither to trace each idea to its original source nor to give the impression, by citing lists of supporting sources, that informed opinion overwhelmingly agrees with our predictions. The first effort would be impossible; the second misleading. Further, it is not argued here that these changes are necessarily desirable, only that they are probable.

22. The importance of this function has been stressed with increasing frequency in the last several years, particularly with regard to the place of vocational or career education in the secondary curriculum. For example, U.S. Education Commissioner, Sidney P. Marland, Jr., has often emphasized this function (see summaries of his speeches in *Education Daily*, op. cit., January 25, 1971 and May 7, 1971), as did the 1971 California Governor's Commission on Educational Reform (see their *Report*, page 32).

23. Breaking of the so-called "educational lockstep" has been proposed by, among others, the Higher Education Secretariat, an informal group including 12 major organizations such as the American Council on Education and the Association of American Universities. See *The New York Times*, August 8, 1971, page E7.

24. Frederick Breitenfeld, Jr., "Instructional Television: The State of the Art," in Sidney G. Tickton (ed.), op. cit., 1970.

25. Goodwin C. Cheu and Wilbur Schramm, *Learning from Television*, National Association of Educational Broadcasters, Washington, D.C., 1967; Herbert J. Kiesling, "On the Economic Analysis of Educational Technology," in Sidney G. Tickton (ed.), op. cit.; and *Television-in-Instruction: The State of the Art*, by National Association of Education Broadcasters, in Tickton, 1970.

26. R. C. Atkinson, J. D. Fletcher, H. C. Chetlin, and C. M. Stauffer, "Instruction in Initial Reading Under Computer Control: The Stanford Project," Educational Technology Research Reports Series, Englewood Cliffs, N. J., Educational Technology Publications, 1971; Lawrence Parkus, "Computer Assisted Instruction in Elementary/Secondary Education: The State of the Art," in Tickton, op. cit., 1970. F. W. Blackwell, "The Probable State of Computer Technology by 1980, with Some Implications for Education," P-4693, The Rand Corporation, Santa Monica, September 1971; K. L. Zinn, "List of Projects Using Computers in Instruction" (unpublished paper), 1969.

27. Our confidence is not complete. See Appendix B.

28. See page 2.

29. The Bureau of the Census reports that the proportion of children aged three to five enrolled part or full time in any preschool program rose from 25 percent in 1964 to nearly 38 percent in 1970.

30. *The Wall Street Journal,* September 14, 1971, reports that about 100 school districts now have some sort of a year-round program, whereas only a few had such programs five years ago. More than 1000 other districts are studying their feasibility. Also see Thomas R. Driscoll, "School Around the Calendar," *American Education.* March 1971.

31. Appendix A gives data sources and methodology for the prekindergarten expenditure estimates.

32. Measures of inputs or expenditures per pupil are in general not very reliable guides to school decisionmaking or to cross-school comparisons. See Sue A. Haggart et al., *Program Budgeting for School District Planning: Concepts and Applications,* RM-6116-RC, The Rand Corporation, Santa Monica, November 1969. However, these measures produce usefully broad comparisons and contrasts for our specific purposes—i.e., to study aggregate tradeoffs between future enrollment and future school quality.

33. The proponents of early childhood education argue not only that young children are able to learn much more than they are customarily exposed to, but also that early learning tends to produce better adjusted persons with larger capacities to continue learning. See Robert D. Hess and Roberta Meyer Bear (eds.), *Early Education: Current Theory, Research, and Action,* Aldine Publishing Company, Chicago, 1968. There is, in addition, a very different benefit to society when facilities for the care and schooling of young children are widely available. This benefit arises from the opportunities mothers then have to continue their own schooling or work outside their homes, thereby enriching their own lives and incomes as well as society's stock of productive resources and output of goods and services. On the other hand, economic theory suggests that average family size will be larger than it would have been in the absence of widely available prekindergarten programs. These effects may be substantial and important; they should certainly be considered in any evaluation of the desirability of various prekindergarten programs. Even for our present purposes they should ideally be taken into account since they affect the size of future population and per-capita GNP. However, limitations of our current research effort have precluded this possibility.

34. Some of these features of future prekindergarten schools, as well as of future elementary schools, considered below, are prominently discussed in the "open classroom" literature. See, for example, *Children and Their Primary Schools* (Plowden Report), A Report of the Central Advisory Council for Education (England), Vol. 1, The Report; and Vol. 2, Research and Surveys, Her Majesty's Stationery Office, London, 1967; and *Open Door,* Center for Urban Education, Washington, D.C., 1971.

35. Although federal prekindergarten programs have induced most of the increased enrollments of recent years and promise to expand in the future, a variety

of delivery modes for prekindergarten instruction may well arise. Programs may be organized, for example, by unions or employers at work sites, by national franchise organizations, by cooperative neighborhood groups, by individuals for profit, or by the public school system. Public funds may subsidize any of these. Features of federal and state legislation in this area will certainly affect these delivery patterns. Even without subsidization, some employers have been turning to instructional day care programs as a way of attracting female workers and reducing absenteeism.

36. Appendix A gives data sources and methodology for the elementary school expenditure estimates.

37. Appendix A gives data sources and methodology for the secondary school expenditure estimates.

38. The Census projections of enrollments at the secondary grades unfortunately do not take account of possible rapid increases in the number of adults who use secondary school facilities, whether for vocational retraining or personal satisfaction.

39. Appendix A gives data sources and methodology for the higher education expenditure estimates.

40. Under the pressure of increasing costs, colleges and universities around the country are now experimenting with shortened degree programs. California's state colleges and the State University of New York, the Nation's largest higher education systems, began pilot three-year programs in Fall 1971. Among others, Harvard and Princeton Universities are seriously studying such possibilities. Moves in this direction have received support from such study teams as the Carnegie Commission on Higher Education (*Less Time, More Options: Education Beyond the High School,* op. cit.) and the HEW task force on higher education headed by Frank Newman (see, for example, *The New York Times,* March 9, 1971, page 45). Moreover, both these study teams have urged the rapid creation of many new two-year community colleges, and the Carnegie Commission predicts that these institutions will be the fastest growing institutions of higher education in the decade of the 1980s, in terms of numbers of students ("New Students and New Places," Carnegie Commission on Higher Education, October 1971).

41. These ideas recur frequently in the writings of leading educators and education critics. Charles Silberman, the Newman Task Force, the Carnegie Commission on Higher Education, the Higher Education Secretariat, Dr. William J. McGill (President of Columbia University), Dr. John I. Goodlad (Dean of the Graduate School of Education, UCLA), and a study panel of the American Association of Arts and Sciences have been among those calling for greater diversity and flexibility in our processes of higher education.

The English Open University is an early model for extended-campus instruction via television. In this country the Chicago City Junior College has offered such a program for 15 years (*TV College—The Fifteenth Year,* the Chicago Educational Television Association, Chicago, Illinois, September 1970), and the TAGER network in Texas is five years old (*Annual Report, 1969-70,* The Association for Graduate Education and Research of North Texas, Southern Methodist University, Dallas, Texas, October 1970). The University of Maine and the new Empire State College

of New York are planning similar programs. For further information, see *Multi-Media Systems, 11 Project Descriptions of Combined Teaching Systems in Eight Countries,* Internationales Zentralinstitut Für Jugend-und Bildungsfernsehen, 8 München 2, Rundfunkplatz 1, 1969 (?), English.

42. June O'Neill estimates that student instruction may currently account for only half of the output of average institutions of higher education. This proportion may have declined over time, and it varies widely among schools. (*Resource Use in Higher Education: Trends in Output and Inputs, 1930 to 1967,* op. cit., page 1.)

43. To the extent that children in prekindergarten schools would otherwise have been schooled at home, expenditures of these schools overstate the true cost of this schooling to society. Some of the resources that would have been required for home schooling can now be allocated to other productive pursuits. The time of mothers is such a resource. Nevertheless, school expenditures, which are the focus of this research, will increase with the growth of prekindergarten enrollment.

44. See Donald J. Bogue, *Principals of Demography,* Wiley, New York, 1969, Figure 7-1, p. 149.

45. See Table 1.

46. The GNP projections used to calculate these percentages were made by the Department of Commerce based on alternative assumptions about population growth and reduction in hours of work. They do not take account of two factors which will raise GNP in a society where schooling is improving at a high rate, as we define it. First, labor force participation of mothers will be higher because the availability of prekindergarten schools frees some of their time for work outside their homes. Second, most college graduates will have two additional years in the labor market during a very productive period of their lives. The resulting additions to GNP cause educational expenditures to be lesser proportions of GNP in the year 2000. The percentages corresponding to the year 2000 in Fig. 2 are, on this account, biased upward.

The magnitude of the part of the bias resulting from neglecting the additional working years of college graduates can be roughly suggested. Assume that one-third of the undergraduates enrolled in any year will graduate in that year, that all graduates are employed in the labor market, that the annual salary foregone at this age by staying in school is $6000 in 1970 prices, and that salaries increase during the 30-year period at the same rate as real per-capita disposable income. Under these conditions, if all schools are of the future type, GNP in the year 2000 will be 3 to 5 percent higher than the Department of Commerce projection.

47. See Fig. 5.

48. See Fig. 1.

49. These projections assume that three-fourths of the instructional personnel in future schools will choose to work for the full 240-day school session while the remainder continue to work 180 days.

50. For reasons discussed in footnote 46, the Department of Commerce projections of the labor force, on which the percentages in Fig. 5 are based, are biased downward if schools improve at the fast rate. This bias should cause all the year-

2000 labor force percentages to be slightly below those given in Fig. 5, but it should not affect the differences implied by varying rates of population growth.

51. Since secondary school teachers employed in future schools will be more highly trained, the total number of teachers demanding a given level of graduate education may not change much, for given population growth, if schools improve at the high rate.

Appendix A

METHODS OF PROJECTING ENROLLMENTS AND ESTIMATING EXPENDITURES PER PUPIL

ENROLLMENT PROJECTIONS

A. Prekindergarten enrollment projections. Full-day equivalent enrollment in prekindergarten institutions of children aged three to six was estimated for 1970 as the sum of full-day enrollment and one-half of part-day enrollment. (Department of Health, Education and Welfare, Office of Education, *School Enrollment,* October 1970, Table 6, page 24.) The sum, 986,000, was 6.3 percent of the population aged three through six in 1970. The high enrollment rate projection assumes that this percentage will be augmented annually by 2.55 percent, reaching 83 percent in the year 2000. At this rate of growth, the prekindergarten enrollment rate in 2000 will reach the low rate of enrollment of children aged five in kindergarten and elementary school projected by the Bureau of the Census for that year. The low prekindergarten enrollment rate projection assumes that the 1970 rate of 6.3 percent will grow annually by 0.79 percent, reaching the arbitrary level of 30 percent in the year 2000.

Each of these two enrollment rate projections was multiplied for each year by the number of children aged three to six in Census population projections B and E. The four resulting projections, designated as high, medium-high, medium-low, and low, are defined and listed in Table C-1.

These figures refer to full-day equivalent enrollment of children in prekindergarten institutions having instruction as an important and integral part of their program. (*Current Population Reports,* Series P-20, No. 222, June 28, 1971, page 8.) One may roughly compare these projections with past trends by noting that the proportion of children aged three to five enrolled part or full time in any preschool program (including purely day care) rose from 25 percent in 1964 to almost 38 percent in 1970 and an estimated 40 percent in 1971 (Bureau of the Census).

B. Elementary and secondary enrollment projections. The projections listed in Tables C-2 and C-3 were made by the Bureau of the Census for the Commis-

sion on Population Growth. Two enrollment rate assumptions were applied to each of the B and E population projections. The high assumption is an extrapolation of the trends in age-sex-specific enrollment rates between 1950-52 and 1967-69. The low assumption was formulated by averaging the high projected rates and the enrollment rates for 1967-69. It was assumed that the distribution by school level would remain constant within age groups.

C. Higher education enrollment projections. Four projections were constructed by the Census Bureau using population Series B and E and two enrollment rate projections formulated as in the elementary and secondary cases. Unlike these two latter cases, however, our conception of higher education in the year 2000 implies a change in the Census enrollment figures. Specifically, students in this future school system will, on the average, earn a Bachelor's degree or its equivalent in two, instead of four, years. Since there are other differences, as well, between current input institutions and future institutions of higher education, we have, for ease of calculation, included all the effects of society's adoption of the future institutions in the rate of change of expenditures per student. Hence, Table C-4 lists the Census projections, but the aggregate expenditure figures for the medium and high trends in school improvement are consistent with enrollments which have been reduced to correspond with our description of future higher education institutions and with the alternative speeds of adoption. In all cases, however, our projections imply the same numbers of people having attended college as do the corresponding Census projections.

ESTIMATES OF EXPENDITURES PER PUPIL

A. Definitions of expenditure categories:

Professional instructional personnel includes all personnel who are licensed to teach except school system administrators. These include counselors, various specialists, and principals.

Paraprofessional instructional personnel includes all persons directly involved in the instructional process who are not licensed teachers. In the future schools described in the text, these people have successfully completed post-high school training programs of six months to two years.

Physical plant expenditures include operation and maintenance of plant, fixed charges, capital outlay minus expenditures on new equipment, and debt service.

Expenditures on *equipment and other instructional resources* include current funds expenditures on books, laboratory supplies and other instructional materials, as well as capital expenditures on new equipment.

Other expenditures include school system administration, and health, attendance, transportation, and food services.

B. Expenditures per prekindergarten pupil. Expenditure per pupil in current prekindergarten schools is given in Table 2 as $830 and is estimated as follows. Expenditure per pupil in Headstart schools for 1969 was for three quarters,

and total Headstart expenditures allocated to pupils was $208.5 million. Alternatively, ESEA Title I preschool programs expended $348 per pupil for three quarters. (*Evaluations of the War on Poverty: Education Programs,* Resource Management Corporation, March 1969, Tables 18 and C-2.) Full-day-equivalent enrollment of children aged three to five was estimated for 1969 by assuming that part-day pupils attend one-half day, on the average. (Full- and part-day enrollments of children aged three to five are given in Department of Health, Education and Welfare, Office of Education, *Preprimary Enrollment Trends of Children Under Six: 1964-1968,* 1969, Table 9, page 18.) This enrollment figure was augmented by 3 percent to account for six year olds in prekindergarten programs. This seems reasonable since 10 percent of those enrolled were aged five to six in 1969. Then, assuming that ESEA Title I expenditure per pupil was the average for all non-Headstart prekindergarten programs gives an estimate for 1969 expenditures on non-Headstart prekindergarten schooling of $237.2 million. The sum of Headstart and non-Headstart expenditures is thus $445.7 million. Dividing by estimated 1969 full-day equivalent enrollment of pupils aged three to six, 573,000, yields an estimate of 1969 expenditure per pupil of $777. This figure was converted to the 1970 estimate of $830 by applying the 1969-70 percentage increase in per-capita disposable income in current dollars (a 7 percent increase).

Because of the great variety among prekindergarten institutions and the lack of detailed cost data, we have estimated the expenditure breakdown for current-input schools by adjusting the percentage distribution for current elementary schools according to generally observed differences between the two levels of schooling. Expenditure on professional personnel, those with the equivalent of a college degree and a teacher's license, is reduced from 52 percent for elementary schools to 17 percent for prekindergarten schools, while expenditure on paraprofessional people is increased from 2 to 32 percent. Expenditure on physical plant is reduced somewhat, and expenditure on other inputs is increased substantially to reflect the nutritional, medical, and dental programs in most federally supported prekindergarten programs.

Expenditure per pupil in future prekindergarten schools is also listed in Table 2 and is estimated in two steps. First, we estimate expenditures on five categories of inputs having 1970 productivity and costs. Second, we increase all these expenditures to the level that would result from an annual cost increase of 2¾ percent. Specifically, professional instructional personnel expenditures assume one professional teacher for every 60 pupils, paid at the 1970 elementary rate of $9025 for a 180-day school year. Expenditures for paraprofessional personnel pay for two paraprofessionals, each paid $5000, for every 20 pupils. Physical plant expenditures are anticipated to be the same as in elementary schools, with facilities in use 240 days of the year. In addition to the $42 per pupil spent on equipment and other instructional resources in current-input schools, future schools spend $25 per pupil for one hour daily of instructional television for each pupil, $1.50 for language laboratory equipment, and $1.50 for art and handicraft materials. (The last two figures each reflect the use of $300 worth of equipment for each two classes of 20 students, with the equipment having an average life of five years. See Appendix B for derivations

of the instructional television expenditure estimate.) Finally, expenditures on other inputs fall to the same percentage as in future elementary schools, reflecting an anticipated shift of expenditures on medical and dental care from school budgets to other public or private accounts.

All expenditure figures are then augmented by a factor corresponding to average yearly cost increases of 2¾ percent.

C. Expenditures per elementary pupil. Since there exist no national expenditure data for elementary and secondary schools separately, we have had to estimate the figures for current-input schools that appear in Tables 3 and 4. First the 1970-71 expenditure per pupil enrolled in regular public and nonpublic elementary and secondary schools, $917 (Department of Health, Education and Welfare, Office of Education, *Digest of Educational Statistics, 1970*, Table 22, page 18), is allocated among the five expenditure categories according to the percentage breakdown of 1967-68, the latest year for which figures are available (calculated from Department of Health, Education and Welfare, Office of Education, *Statistics of Local Public School Systems, 1967-68, Finances*, Table C, page 6; Table F, page 9; and Table G, page 10).

For each category of expenditure, separate estimates for elementary and secondary schools were then obtained by applying the ratio of elementary to secondary expenditures of that type in California schools in 1968-69 (California State Department of Education, *California Public Schools Selected Statistics, 1968-69*, Table IV-6, page 76; Table IV-7, page 77; and Table IV-8, page 78), and by constraining these estimates so that the implied sum of total elementary and secondary expenditures equals the total expenditure of that type obtained by multiplying the original combined per-pupil figure by combined national elementary and secondary enrollment. In algebraic terms, if, for some expenditure category

$E_{t,u.s.}$ = total elementary and secondary expenditures, U.S.
$E/N_{e,cal}$ = expenditures per pupil in California elementary school districts
$E/N_{s,cal}$ = expenditures per pupil in California secondary school districts
$E/N_{e,u.s.}$ = estimated expenditures per pupil in elementary schools, U.S.
$E/N_{s,u.s.}$ = estimated expenditures per pupil in secondary schools, U.S.
$N_{e,u.s.}$ = elementary school enrollment, U.S.
$N_{s,u.s.}$ = secondary school enrollment, U.S.,

then we calculate the numbers of interest, $E/N_{e,u.s.}$ and $E/N_{s,u.s.}$, as follows.

$$K = E_{t,u.s.} \div [(E/N_{e,cal}) \times (N_{e,u.s.}) + (E/N_{s,cal}) \times (N_{s,u.s.})]$$
$$E/N_{e,u.s.} = K \times (E/N_{e,cal})$$
$$E/N_{s,u.s.} = K \times (E/N_{s,cal}).$$

These equations imply that

$$(E/N_{e,u.s.}) \times (N_{e,u.s.}) + (E/N_{s,u.s.}) \times (N_{s,u.s.}) = E_{t,u.s.}$$

These calculations yield estimates of 1970 total expenditures per pupil in elementary and secondary schools of $830 and $1130, respectively. The estimates by expenditure categories are listed in Tables 3 and 4. According to these estimates, expenditure per elementary pupil is 73 percent of expenditure per secondary pupil. We attempted to check this proportion by making use of the identity

$$(E_e/N_e) \times (N_e) + (E_s/N_s) \times (N_s) = E_t$$

where

E_e/N_e	=	state expenditure per pupil in elementary schools
E_s/N_s	=	state expenditure per pupil in secondary schools
E_t	=	state total expenditures on elementary and secondary education
N_e	=	elementary enrollment in the state
N_s	=	secondary enrollment in the state
N_t	=	total elementary and secondary enrollment in the state.

Rearranging terms gives

$$E_t/N_t = E_s/N_s + (E_e/N_e - E_s/N_s) \times (N_e/N_t).$$

This equation was estimated by ordinary least squares regression using 1969 data on total expenditure per pupil, E_t/N_t, and elementary enrollment as a proportion of total elementary and secondary enrollment, N_e/N_t, for the 50 states. The coefficient estimates were unfortunately not statistically significant and so could not be compared to our previous estimates.

Another independent check, however, does give us some confidence in our estimates. In both the elementary and secondary cases, the estimates of expenditures on professional instructional personnel are close to the figures obtained by multiplying the appropriate teacher-pupil ratio by the appropriate average national salary. These figures, $376 and $477, respectively, are somewhat below the professional instructional personnel expenditures listed in Tables 3 and 4, as indeed they should be since counselors, specialists, and principals, who are more highly paid, are included among instructional personnel but were not counted in computing average teacher salaries. In 1970, pupil-teacher ratios in elementary and secondary schools were estimated to be 24:1 and 20:1, respectively, at the national level. (Department of Health, Education and Welfare, Office of Education, *Statistics of Public Schools, Fall 1969,* Table 1, page 8.) Respective salaries were $9025 and $9540. (National Education Association, *Economic Status of the Teaching Profession, 1970-71,* Table 22, page 28.)

Expenditures per pupil in future elementary schools reflect the changes described in the text. Expenditure on professional instructional personnel reflects an anticipated fall in the pupil-teacher ratio to 20:1, while the higher paraprofessional figure is due to the addition of one paraprofessional, paid $5000 for a 180-day school year, for each class of 20 pupils. In addition to the $35 spent on equipment and other instructional resources in current-input schools, the following additions are made:

$80 for one hour daily of individualized computer-assisted instruction. (See Appendix B for the derivation of this estimate.)

$25 for one hour daily of instructional television for each pupil. (See Appendix B for the derivation of this estimate.)

$3 for language laboratory equipment ($300 worth of equipment, having an average life of five years, for each class of 20 pupils).

$5 for microfiche reader-printers (one reader-printer, costing $1000 and lasting an average of 10 years, for each class of 20 pupils).

$3 for laboratory equipment ($120 worth of equipment, lasting an average of two years, for each class).

$2 for typewriters ($200 for three typewriters, lasting an average of five years, for each class).

$2 per pupil for carpentry, mechanics, electronics, and handicraft materials ($400 worth of equipment, lasting an average of five years, for every two classes of 20 pupils each).

Expenditure on physical plant decreases by one-third due to an increase of the same proportion in the number of days plant is in full use. Expenditure on other inputs is assumed to remain the same. Finally, all expenditure figures are augmented by a factor corresponding to average yearly cost increases of 2¾ percent.

D. Expenditures per secondary pupil. The figures for current-input schools, listed in Table 4, were derived by the procedures described in the preceding section of this appendix.

Expenditures per pupil in future secondary schools reflect the changes described in the text. Expenditure on professional instructional personnel is higher due to a rise in teacher salaries consistent with the increased breadth and depth of courses taught. Salaries in future secondary schools are hence commensurate with those of full-time teachers in public junior colleges in 1970—$11,600. (Professional salaries are increased to a level also consistent with the assumption (true in California schools in 1969-70) that secondary teachers are 90 percent of professional secondary instructional personnel.) Expenditures on paraprofessional instructional personnel also increase, in this case because of the addition of one parateacher, paid $5000, for every three professional instructional personnel.

In addition to the $90 spent on equipment and other instructional resources in current-input schools, the following additions are made:

$80 for one hour daily of individualized computer-assisted instruction. (See Appendix B for the derivation of this estimate.)

$25 for one hour daily of instructional television for each pupil. (See Appendix B for the derivation of this estimate.)

$5 for microfiche reader-printers (one reader-printer, costing $1000 and lasting an average of 10 years, for each class of 20 pupils).

$30 for libraries and equipment of a type found in 1970 in two-year colleges and for equipment and materials for extensive vocational training. $95 was spent per student by two-year colleges in 1967-68 for equipment and corresponding maintenance and for libraries. (Department of Health, Education and Welfare, Office of Education, *Financial Statistics of Higher Education: Current Funds, Revenues and*

Expenditures, 1967-68, Table 2, page 11, and Table 5, page 127.) Multiplied by the growth in per-capita disposable income, in current dollars, the estimated 1970 figure is $120. Subtracting the equipment expenditures of current-input secondary schools gives an additional $30 per pupil. The same amount is assumed spent on vocational training equipment for pupils enrolled in these programs.

Expenditure on physical plant decreases by one-third because of an increase of the same proportion in the number of days plant is in full use. Expenditure on other inputs is assumed to remain the same. Finally, all expenditure figures are augmented by a factor corresponding to average yearly cost increases of 2¾ percent.

E. Expenditures per student in institutions of higher education. The expenditure estimate for current-input institutions, $3435, is the sum of current funds expenditure per student and additions to plant assets per student, both for all institutions of higher education in 1970. Total expenditures in these two categories were $26.1 billion (*Digest of Educational Statistics*, 1970, Table 22, page 18), and enrollment was 7.7 million.

The expenditure figure for future institutions, $9665, is calculated as follows. The sum of current funds expenditure per student and additions to plant assets per student, both for "other four-year institutions" in 1970, is reduced by one-tenth because of the anticipated enrollment of one-fifth of the students in off-campus programs which cost only half as much. Three-fourths of this amount is then added to one-fourth of an amount calculated in the same way for private universities in 1970. This sum reflects our anticipation that one-fourth of all students in institutions of higher education will be enrolled in post-graduate programs at costs commensurate with those of private universities in 1970. (1968-69 expenditure data for "other four-year institutions" and "private universities" are in *Financial Statistics of Higher Education: Current Funds, Revenues and Expenditures, 1968-69*, Table C, page 8. These figures are adjusted to 1970 by applying the growth rate of per-capita disposable income in current dollars.) Finally, these expenditure figures are augmented by a factor corresponding to average yearly cost increases of 2¾ percent.

Appendix B

ESTIMATES OF EXPENDITURES ON INSTRUCTIONAL TELEVISION AND COMPUTER-ASSISTED INSTRUCTION

Our estimate of per-pupil expenditure on instructional television (ITV) is derived from estimates made by Herbert J. Kiesling ("On the Economic Analysis of Educational Technology," in Sidney G. Tickton (ed.), *To Improve Learning*, Vol. II, 1971, op. cit., pages 981-997). Considering the characteristics and costs of several existing ITV systems and the results of other studies, Kiesling estimates the costs of a system that delivers nationally and locally produced programming to a district of 20,000 pupils, with each pupil receiving about 35 minutes of ITV each school day. Using Kiesling's guides concerning economies of scale, our estimate for a system providing one hour of ITV per day is $25.

The estimate of per-pupil costs of computer-assisted instruction (CAI) is by far the most conjectural expenditure estimate in this research. Existing computer systems currently in active educational use are clearly too expensive to be adopted in any but well-funded experimental programs. Three such systems would cost in 1970 between $480 and $900 per pupil per school year, under the assumptions of our future elementary and secondary schools (Lawrence Parkus, "Computer-Assisted Instruction in Elementary/Secondary Education: The State of the Art," in Tickton (ed.), *To Improve Learning*, 1971, op. cit., pages 333-335). Comparing these numbers with the estimated expenditures on equipment in current-input schools (Tables 3 and 4) is more than sobering.

Expert opinion concerning the future course of these costs is widely varied. (For example, see Dean Jamison, J. Dexter Fletcher, Patrick Suppes, and Richard Atkinson, "Cost and Performance of Computer-Assisted Instruction for Education of Disadvantaged Children," draft paper, June 4, 1971, National Bureau of Economic Research, Inc., New York. Dean Jamison, P. Suppes, and C. Butler, "Estimated Costs of Computer-Assisted Instruction for Compensatory Education in Urban Areas," *Educational Technology*, September 1970. Herbert J. Kiesling, "On the Economic Analysis of Educational Technology," in Tickton (ed.), *To Improve Learning*, op. cit., pages 981-997. Richard E. Speagle, "The Costs of Instructional Technology," in

Tickton (ed.), *To Improve Learning*, op. cit., pages 1061-1074.) However, the existence of several prototype systems capable of delivering instruction in the tutorial and problem-solving modes for less than 50 cents per student contact hour (including terminal equipment, CPU, multiplexing and communication equipment, and curriculum preparation) has nudged us toward optimism. A brief description of two of these systems must suffice here. One of these prototypes, the PLATO IV system at the University of Illinois, is being built to provide a key set, graphical display device, and slide selector at each terminal. Each pupil is assigned approximately 300 words of extended core memory. With a central computer having two million words of extended core memory connected by telephone or coaxial cable system to 4000 student terminals within a 100 mile radius, this system is expected by its designers to produce a yearly total of 10 million student-contact hours at a total cost of 34 cents per hour—or $61 per pupil per year if each pupil uses the system for 180 hours a year. Under these conditions, five-sixths of the computer's capacity is available for other uses at no cost. These specifications imply the system's use for 8 hours daily, 300 days a year. (Donald L. Bitzer and Dominic Skaperdas, "The Design of an Economically Viable Large-Scale Computer-Based Education System," in Tickton (ed.), *To Improve Learning*, op. cit., pages 439-454.) Adjusting the figures to be consistent with our future-schools assumptions—six hours daily, a 180-day school year for each pupil, facilities in use for 240 days—yields an approximate per-pupil expenditure of $80 per year.

The PLATO IV system will be extraordinarily large and achieve its expected low cost largely through economies of scale. The recent development of another CAI system suggests, however, that low cost may not be dependent on such economies. The TICCET system developed by the MITRE Corporation features a computer with only 64,000 words of core memory serving 120 terminals, each having an ordinary television receiver with voice, picture, and text. All 120 pupils who use the system simultaneously can be working on different lessons. (Kenneth J. Stetten, "The Technology of Small, Local Facilities for Instructional Use," in Levien (ed.), *Computers in Instruction*, 1971, op. cit., pages 35-41.) Assuming that each pupil uses the system for one hour daily in a 180-day school year and that all facilities are used for 240 days of the year, the terminal-hour cost of 26 cents implies an annual per-pupil cost of less than $50.

In view of the capabilities and costs claimed for these two prototype systems and of the reservations expressed by other experts, we estimate per-pupil expenditure on CAI in future schools to be $80 per year. This estimate is subject to question, however, both by those who doubt that such systems can eventually be put into operation at such low cost and by those who feel that their instructional effectiveness and political acceptability will be insufficient to warrant widespread adoption, even at the costs we have projected.

Appendix C

BASIC TABLES

Table C-1

PRESCHOOL ENROLLMENT PROJECTIONS, 1970-2000[a]

(in millions of pupils)

Year	High Enrollment Growth[b]	Medium-High Enrollment Growth[c]	Medium-Low Enrollment Growth[d]	Low Enrollment Growth[e]
1970	1.0	1.0	1.0	1.0
1971	1.3	1.0	1.3	1.0
1972	1.6	1.1	1.6	1.1
1973	2.0	1.2	2.0	1.2
1974	2.4	1.4	2.2	1.3
1975	3.0	1.6	2.6	1.4
1976	3.5	1.8	3.0	1.5
1977	4.1	2.0	3.3	1.6
1978	4.7	2.2	3.8	1.8
1979	5.4	2.5	4.2	2.0
1980	6.1	2.7	4.7	2.1
1981	6.8	3.0	5.1	2.2
1982	7.6	3.2	5.6	2.4
1983	8.4	3.5	6.1	2.6
1984	9.2	3.8	6.7	2.7
1985	10.0	4.1	7.1	2.9
1986	10.7	4.3	7.6	3.0
1987	11.4	4.5	8.0	3.2
1988	12.1	4.8	8.5	3.3
1989	12.9	5.0	8.9	3.5
1990	13.6	5.3	9.4	3.6
1991	14.3	5.5	9.8	3.7
1992	15.0	5.7	10.2	3.9
1993	15.6	5.9	10.5	4.0
1994	16.2	6.1	10.9	4.1
1995	16.9	6.3	11.2	4.2
1996	17.7	6.5	11.6	4.3
1997	18.6	6.8	12.0	4.4
1998	19.4	7.1	12.3	4.5
1999	20.3	7.4	12.6	4.6
2000	21.2	7.7	13.0	4.7

[a]Enrollments are in terms of full-day-equivalent pupils.

[b]Population Series B with high enrollment rate growth.

[c]Population Series B with low enrollment rate growth.

[d]Population Series E with high enrollment rate growth.

[e]Population Series E with low enrollment rate growth.

Table C-2

ELEMENTARY ENROLLMENT PROJECTIONS, 1970-2000

(in millions of pupils)

Year	High Enrollment Growth	Medium-High Enrollment Growth	Medium-Low Enrollment Growth	Low Enrollment Growth
1970	36.6	36.5	36.6	36.5
1971	36.2	36.1	36.2	36.1
1972	35.7	35.6	35.7	35.6
1973	35.0	35.0	35.0	35.0
1974	34.5	34.4	34.4	34.3
1975	34.0	33.9	33.6	33.5
1976	33.8	33.7	32.8	32.7
1977	33.8	33.7	32.2	32.0
1978	34.2	34.0	31.7	31.5
1979	34.9	34.6	31.5	31.3
1980	35.9	35.7	31.5	31.3
1981	37.3	37.0	31.7	31.5
1982	38.9	38.6	32.0	31.8
1983	40.6	40.3	32.4	32.2
1984	42.3	41.9	33.0	32.7
1985	43.9	43.5	33.6	33.3
1986	45.5	45.1	34.2	33.9
1987	47.0	46.6	34.8	34.5
1988	48.4	47.9	35.3	35.0
1989	49.6	49.2	35.8	35.4
1990	50.7	50.2	36.2	35.9
1991	51.6	51.1	36.5	36.2
1992	52.8	51.9	36.8	36.4
1993	53.0	52.4	37.0	36.6
1994	53.4	52.9	37.1	36.7
1995	53.8	53.2	37.1	36.7
1996	54.1	53.5	37.1	36.7
1997	54.3	53.7	37.0	36.6
1998	54.6	54.0	36.8	36.4
1999	54.9	54.3	36.7	36.3
2000	55.4	54.7	36.5	36.1

SOURCE: Bureau of the Census.
See notes to Table 1.

Table C-3

SECONDARY ENROLLMENT PROJECTIONS, 1970-2000

(in millions of pupils)

Year	High Enrollment Growth	Medium-High Enrollment Growth	Medium-Low Enrollment Growth	Low Enrollment Growth
1970	15.0	14.9	15.1	14.9
1971	15.4	15.3	15.4	15.3
1972	15.7	15.5	15.7	15.5
1973	15.9	15.8	15.9	15.8
1974	16.2	15.9	16.2	15.9
1975	16.4	16.1	16.4	16.1
1976	16.5	16.2	16.5	16.2
1977	16.5	16.2	16.5	16.2
1978	16.4	16.1	16.4	16.1
1979	16.1	15.8	16.1	15.8
1980	15.7	15.3	15.7	15.3
1981	15.3	14.9	15.3	14.9
1982	14.8	14.4	14.8	14.4
1983	14.6	14.2	14.5	14.1
1984	14.7	14.3	14.3	13.8
1985	15.1	14.7	14.1	13.7
1986	15.8	15.3	14.1	13.7
1987	16.5	16.0	14.2	13.7
1988	17.3	16.7	14.4	13.9
1989	18.1	17.5	14.7	14.2
1990	18.9	18.2	15.0	14.5
1991	19.7	19.0	15.3	14.7
1992	20.1	19.7	15.6	15.0
1993	21.2	20.4	15.9	15.3
1994	21.9	21.1	16.2	15.5
1995	22.6	21.7	16.5	15.8
1996	23.1	22.2	16.7	16.0
1997	23.6	22.7	16.9	16.2
1998	24.1	23.0	17.1	16.3
1999	24.4	23.3	17.2	16.4
2000	24.6	23.6	17.3	16.5

SOURCE: Bureau of the Census.
See notes to Table 1.

Table C-4

HIGHER EDUCATION ENROLLMENT PROJECTIONS, 1970-2000

(in millions of pupils)

Year	High Enrollment Growth	Medium-High Enrollment Growth	Medium-Low Enrollment Growth	Low Enrollment Growth
1970	7.7	[illegible]5	7.7	7.5
1971	8.2	.9	8.2	7.9
1972	8.7	8.3	8.7	8.3
1973	9.3	8.7	9.3	8.7
1974	9.8	9.1	9.8	9.1
1975	10.3	9.5	10.3	9.5
1976	10.7	9.8	10.7	9.8
1977	11.1	10.1	11.1	10.1
1978	11.5	10.3	11.5	10.3
1979	11.9	10.6	11.9	10.6
1980	12.3	10.8	12.3	10.8
1981	12.6	11.0	12.6	11.0
1982	12.7	11.1	12.7	11.1
1983	12.8	11.1	12.8	11.1
1984	12.8	11.0	12.8	11.0
1985	12.8	10.9	12.8	10.9
1986	12.8	10.8	12.8	10.7
1987	12.8	10.7	12.7	10.7
1988	13.0	10.9	12.7	10.6
1989	13.4	11.1	12.7	10.5
1990	13.8	11.4	12.8	10.5
1991	14.4	11.8	13.0	10.6
1992	15.0	12.3	13.2	10.7
1993	15.6	12.7	13.4	10.9
1994	16.3	13.3	13.7	11.0
1995	17.1	13.8	14.0	11.2
1996	17.8	14.3	14.3	11.4
1997	18.6	14.9	14.6	11.6
1998	19.4	15.5	14.9	11.8
1999	20.2	16.0	15.2	12.1
2000	21.0	16.6	15.6	12.3

SOURCE: Bureau of the Census. Also see Appendix A.
See notes to Table 1.

Table C-5

ANNUAL PER-PUPIL EXPENDITURES ON INSTRUCTIONAL PERSONNEL BY SCHOOLING LEVEL AND RATE OF IMPROVEMENT, 1970-2000

(dollars per pupil)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	405	405	405	445	445	445	595	595	595
1971	416	430	453	457	470	492	611	623	643
1972	428	455	501	470	496	538	628	652	690
1973	439	480	549	483	521	585	645	680	737
1974	451	506	596	496	546	630	663	708	784
1975	464	531	643	510	572	676	681	737	830
1976	477	557	690	524	598	721	700	766	875
1977	490	582	736	538	621	765	719	795	920
1978	503	608	782	553	649	809	739	824	964
1979	517	633	827	568	675	853	760	853	1008
1980	531	659	872	584	701	896	780	882	1051
1981	546	685	917	600	727	939	802	911	1093
1982	561	711	961	616	753	981	824	940	1135
1983	576	737	1004	633	779	1022	847	970	1175
1984	592	763	1047	651	805	1063	870	999	1215
1985	608	789	1089	668	831	1103	894	1029	1254
1986	625	815	1131	687	858	1143	918	1059	1292
1987	642	841	1172	706	884	1181	944	1088	1330
1988	660	867	1212	725	911	1219	970	1118	1366
1989	678	893	1252	745	937	1257	996	1148	1401
1990	697	919	1290	766	963	1293	1024	1178	1435
1991	716	946	1329	787	990	1329	1052	1208	1468
1992	736	972	1366	808	1017	1364	1081	1238	1500
1993	756	998	1402	830	1043	1398	1110	1268	1530
1994	777	1025	1438	853	1070	1430	1141	1298	1560
1995	798	1051	1473	877	1096	1462	1172	1328	1587
1996	820	1077	1506	901	1123	1493	1205	1358	1614
1997	842	1104	1539	926	1150	1523	1238	1388	1639
1998	866	1130	1571	951	1176	1551	1272	1418	1662
1999	889	1156	1601	977	1203	1579	1307	1448	1684
2000	914	1183	1631	1004	1229	1605	1343	1478	1705

SOURCE: Tables 2, 3, 4, and text.

Table C-6

ANNUAL PER-PUPIL EXPENDITURES ON PHYSICAL PLANT BY SCHOOLING LEVEL AND RATE OF IMPROVEMENT, 1970-2000

(dollars per pupil)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970.	185.	185.	185.	265.	265.	265.	360.	360.	360.
1971.	190.	192.	196.	272.	274.	276.	370.	372.	374.
1972.	195.	199.	206.	280.	282.	286.	380.	383.	389.
1973.	201.	207.	216.	287.	291.	296.	391.	395.	402.
1974.	206.	214.	226.	295.	299.	306.	401.	407.	416.
1975.	212.	221.	236.	303.	308.	316.	412.	419.	429.
1976.	218.	228.	246.	312.	317.	325.	424.	431.	442.
1977.	224.	236.	256.	320.	326.	334.	435.	443.	455.
1978.	230.	243.	265.	329.	334.	343.	447.	455.	467.
1979.	236.	250.	274.	338.	343.	352.	460.	467.	479.
1980.	243.	258.	283.	348.	352.	360.	472.	479.	490.
1981.	249.	265.	292.	357.	361.	368.	485.	491.	501.
1982.	256.	273.	301.	367.	370.	376.	499.	503.	512.
1983.	263.	280.	309.	377.	379.	383.	512.	516.	522.
1984.	270.	288.	317.	387.	388.	390.	526.	528.	531.
1985.	278.	295.	325.	398.	398.	397.	541.	541.	540.
1986.	286.	303.	332.	409.	407.	403.	556.	553.	549.
1987.	293.	311.	339.	420.	416.	409.	571.	566.	557.
1988.	301.	318.	346.	432.	425.	414.	587.	578.	564.
1989.	310.	326.	353.	444.	434.	419.	603.	591.	571.
1990.	318.	334.	359.	456.	444.	423.	619.	603.	577.
1991.	327.	341.	365.	468.	453.	427.	636.	616.	582.
1992.	336.	349.	371.	481.	462.	431.	654.	629.	587.
1993.	345.	357.	376.	495.	472.	433.	672.	642.	591.
1994.	355.	364.	381.	508.	481.	436.	690.	654.	594.
1995.	365.	372.	385.	522.	490.	437.	709.	667.	596.
1996.	375.	380.	389.	536.	500.	438.	729.	680.	598.
1997.	385.	388.	392.	551.	509.	439.	749.	692.	598.
1998.	395.	395.	395.	566.	518.	438.	769.	705.	598.
1999.	406.	403.	398.	582.	528.	437.	791.	718.	597.
2000.	417.	411.	399.	598.	537.	436.	812.	731.	594.

SOURCE: Tables 2, 3, 4, and text.

Table C-7

ANNUAL PER-PUPIL EXPENDITURES ON EQUIPMENT BY SCHOOLING LEVEL AND RATE OF IMPROVEMENT, 1970-2000

(dollars per pupil)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970.	40.	40.	40.	40.	40.	40.	90.	90.	90.
1971.	41.	42.	44.	41.	44.	50.	92.	97.	104.
1972.	42.	45.	49.	42.	49.	59.	95.	104.	118.
1973.	43.	47.	53.	43.	53.	69.	98.	110.	131.
1974.	45.	49.	57.	45.	57.	78.	100.	117.	145.
1975.	46.	52.	61.	46.	62.	88.	103.	124.	159.
1976.	47.	54.	65.	47.	66.	97.	106.	131.	172.
1977.	48.	56.	69.	48.	70.	107.	109.	138.	186.
1978.	50.	59.	73.	50.	75.	116.	112.	144.	199.
1979.	51.	61.	77.	51.	79.	125.	115.	151.	212.
1980.	52.	63.	81.	52.	83.	134.	118.	158.	225.
1981.	54.	66.	85.	54.	88.	144.	121.	165.	238.
1982.	55.	68.	89.	55.	92.	153.	125.	172.	251.
1983.	57.	70.	93.	57.	96.	162.	128.	179.	264.
1984.	58.	73.	96.	58.	101.	171.	132.	186.	277.
1985.	60.	75.	100.	60.	105.	180.	135.	193.	289.
1986.	62.	77.	104.	62.	109.	189.	139.	200.	302.
1987.	63.	80.	107.	63.	114.	198.	143.	207.	314.
1988.	65.	82.	111.	65.	118.	207.	147.	214.	326.
1989.	67.	85.	114.	67.	123.	215.	151.	221.	338.
1990.	69.	87.	117.	69.	127.	224.	155.	228.	350.
1991.	71.	89.	121.	71.	131.	233.	159.	235.	361.
1992.	73.	92.	124.	73.	136.	241.	163.	242.	373.
1993.	75.	94.	127.	75.	140.	250.	168.	249.	384.
1994.	77.	97.	130.	77.	145.	258.	173.	256.	395.
1995.	79.	99.	133.	79.	149.	266.	177.	263.	406.
1996.	81.	102.	136.	81.	154.	274.	182.	270.	416.
1997.	83.	104.	138.	83.	158.	282.	187.	277.	427.
1998.	85.	106.	141.	85.	162.	290.	192.	284.	437.
1999.	88.	109.	144.	88.	167.	298.	198.	291.	447.
2000.	90.	111.	146.	90.	171.	306.	203.	298.	457.

SOURCE: Tables 2, 3, 4, and text.

Table C-8

ANNUAL PER-PUPIL EXPENDITURES ON OTHER INPUTS BY SCHOOLING LEVEL AND RATE OF IMPROVEMENT, 1970-2000

(dollars per pupil)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	200	200	200	80	80	80	85	85	85
1971	205	205	205	82	83	85	87	88	90
1972	211	211	209	84	86	90	90	92	95
1973	217	216	214	87	90	94	92	95	100
1974	223	221	218	89	93	99	95	99	105
1975	229	227	223	92	96	103	97	102	110
1976	235	232	226	94	99	108	100	105	114
1977	242	237	230	97	103	112	103	109	119
1978	248	243	234	99	106	117	106	112	124
1979	255	249	237	102	109	121	109	116	128
1980	262	254	240	105	112	125	111	119	132
1981	270	260	243	108	116	129	115	123	137
1982	277	265	246	111	119	133	118	126	141
1983	285	271	248	114	122	137	121	130	145
1984	292	277	250	117	126	140	124	133	149
1985	300	282	252	120	129	144	128	137	153
1986	309	288	254	123	133	148	131	141	156
1987	317	294	255	127	136	151	135	144	160
1988	326	300	256	130	139	154	139	148	163
1989	335	305	256	134	143	157	142	151	166
1990	344	311	257	138	146	160	146	155	170
1991	354	317	256	141	150	163	150	159	173
1992	363	323	256	145	153	166	154	162	175
1993	373	329	255	149	156	168	159	166	178
1994	384	335	253	153	160	170	163	169	180
1995	394	341	251	158	163	173	167	173	182
1996	405	346	249	162	167	174	172	177	185
1997	416	352	246	166	170	176	177	180	186
1998	427	358	243	171	174	178	182	184	188
1999	439	364	239	176	177	179	187	188	189
2000	451	370	234	181	180	180	192	191	190

SOURCE: Tables 2, 3, 4, and text.

Table C-9

ANNUAL TOTAL PER-PUPIL EXPENDITURES BY SCHOOLING LEVEL AND RATE OF IMPROVEMENT, 1970-2000

(dollars per pupil)

nt s	Preschool			Elementary			Secondary			Higher	
	Medium Improve- ment	High Improve- ment	Current Inputs	Medium Improve- ment	High Improve- ment	Current Inputs	Medium Improve- ment	High Improve- ment	Current Inputs	Medium Improve- ment	High Improve- ment
	830.	830.	830.	830.	830.	1130.	1130.	1130.	3435.	3435.	3435.
	870.	898.	853.	871.	902.	1161.	1180.	1211.	3529.	3556.	3601.
	910.	965.	876.	913.	973.	1193.	1230.	1292.	3627.	3678.	3764.
	950.	1032.	900.	954.	1044.	1226.	1280.	1371.	3726.	3801.	3925.
	990.	1098.	925.	996.	1113.	1260.	1331.	1450.	3829.	3924.	4092.
	1030.	1168.	951.	1038.	1182.	1294.	1382.	1528.	3934.	4048.	4237.
	1071.	1228.	977.	1080.	1251.	1330.	1433.	1604.	4042.	4172.	4388.
	1111.	1291.	1004.	1122.	1318.	1366.	1484.	1680.	4153.	4297.	4536.
	1152.	1354.	1031.	1164.	1385.	1404.	1535.	1754.	4268.	4423.	4681.
	1193.	1416.	1060.	1206.	1451.	1442.	1587.	1827.	4385.	4549.	4822.
	1234.	1477.	1089.	1249.	1516.	1482.	1638.	1899.	4505.	4675.	4959.
	1275.	1537.	1119.	1291.	1580.	1523.	1690.	1969.	4629.	4803.	5092.
	1317.	1596.	1149.	1334.	1642.	1565.	1742.	2038.	4757.	4930.	5220.
	1353.	1654.	1181.	1377.	1704.	1608.	1795.	2106.	4887.	5059.	5344.
	1400.	1711.	1213.	1420.	1765.	1652.	1847.	2172.	5022.	5197.	5464.
	1442.	1766.	1247.	1463.	1824.	1697.	1900.	2236.	5160.	5317.	5578.
	1483.	1820.	1281.	1507.	1882.	1744.	1952.	2299.	5302.	5446.	5687.
	1525.	1873.	1316.	1550.	1939.	1792.	2005.	2360.	5448.	5574.	5791.
	1567.	1925.	1353.	1593.	1995.	1841.	2058.	2419.	5597.	5707.	5889.
	1609.	1975.	1390.	1637.	2049.	1892.	2111.	2476.	5751.	5838.	5981.
	1651.	2024.	1428.	1680.	2101.	1944.	2164.	2531.	5910.	5969.	6067.
	1694.	2071.	1467.	1724.	2152.	1997.	2217.	2584.	6072.	6100.	6145.
	1736.	2116.	1508.	1768.	2201.	2052.	2271.	2635.	6239.	6232.	6219.
	1778.	2160.	1549.	1811.	2249.	2109.	2324.	2683.	6411.	6353.	6284.
	1820.	2202.	1592.	1855.	2295.	2167.	2378.	2729.	6587.	6495.	6342.
	1863.	2242.	1635.	1899.	2338.	2226.	2431.	2772.	6768.	6627.	6393.
	1905.	2280.	1680.	1943.	2380.	2288.	2485.	2813.	6954.	6759.	6435.
	1948.	2316.	1727.	1987.	2420.	2351.	2538.	2851.	7145.	6891.	6468.
	1990.	2350.	1774.	2030.	2458.	2415.	2592.	2885.	7342.	7024.	6493.
	2032.	2381.	1823.	2074.	2493.	2482.	2645.	2917.	7544.	7155.	6508.
	2075.	2411.	1873.	2118.	2527.	2550.	2698.	2946.	7751.	7287.	6514.

Tables C-5 through C-8.

Table C-10

EXPENDITURES ON INSTRUCTIONAL PERSONNEL BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvements	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	386	386	386	16270	16270	16270	8921	8921	8921
1971	534	552	582	16549	17018	17601	9392	9574	9877
1972	689	734	808	16757	17673	19201	9847	10212	10922
1973	871	953	1089	16917	18255	20434	10281	10830	11745
1974	1086	1216	1434	17091	18827	21719	10717	11448	12667
1975	1346	1542	1867	17333	19451	22960	11154	12066	13585
1976	1649	1926	2387	17701	20198	24360	11551	12634	14441
1977	1984	2359	2983	18212	21096	25901	11896	13141	15215
1978	2358	2847	3604	18895	22182	27661	12156	13544	15859
1979	2771	3345	4335	19805	23529	29736	12266	13771	16279
1980	3227	4003	5298	20962	25170	32182	12278	13875	16535
1981	3723	4672	6253	22355	27092	34987	12240	13907	16687
1982	4259	5338	7295	23958	29271	38126	12214	13941	16820
1983	4831	6176	8417	25694	31612	41475	12373	14175	17178
1984	5436	7002	9611	27503	34036	44928	12818	14727	17908
1985	6071	7869	10867	29359	36517	48447	13535	15582	18993
1986	6678	8703	12079	31256	39030	51995	14495	16708	20398
1987	7323	9587	13359	33173	41558	55532	15602	17995	21983
1988	8009	10521	14708	35089	44059	59009	16781	19353	23639
1989	8736	11507	16125	36981	46504	62377	18029	20775	25353
1990	9508	12546	17610	38830	48867	65594	19340	22255	27113
1991	10228	13511	18982	40619	51120	68621	20707	23780	28902
1992	10963	14512	20394	42300	53711	72053	22110	25334	30594
1993	11774	15591	21846	44000	55866	74042	23554	26894	32461
1994	12602	16627	23335	45602	57867	76442	25002	28441	34174
1995	13476	17740	24858	47168	59680	78665	26443	29954	35806
1996	14325	18866	26687	48735	60735	80753	27863	31414	37332
1997	15642	20493	28577	50306	62475	82757	29248	32804	38730
1998	16823	21962	30527	51949	64243	84733	30586	34110	39983
1999	18071	23494	32534	53697	66089	86743	31865	35318	41074
2000	19388	25091	34597	55589	68059	88842	33086	36431	42005

SOURCE: Tables C-1 through C-9.

[a]Population Series B with high enrollment rate growth.

Table C-11

EXPENDITURES ON INSTRUCTIONAL PERSONNEL BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970.	386.	386.	386.	16251.	16251.	16251.	8879.	8879.	8879.
1971.	428.	442.	466.	16522.	16991.	17773.	9327.	9508.	9808.
1972.	477.	507.	559.	16722.	17637.	19162.	9757.	10119.	10723.
1973.	541.	592.	677.	16874.	18208.	20432.	10166.	10709.	11614.
1974.	623.	697.	822.	17038.	18768.	21651.	10575.	11297.	12500.
1975.	724.	830.	1005.	17267.	19377.	22893.	10985.	11882.	13378.
1976.	843.	984.	1220.	17621.	20107.	24251.	11353.	12418.	14194.
1977.	972.	1155.	1461.	18116.	20986.	25767.	11670.	12891.	14927.
1978.	1114.	1340.	1732.	18736.	22054.	27509.	11900.	13259.	15526.
1979.	1271.	1557.	2033.	19678.	23379.	29546.	11982.	13453.	15903.
1980.	1441.	1798.	2366.	20819.	24996.	31960.	1.969.	13525.	16119.
1981.	1625.	2039.	2729.	22190.	26893.	34729.	11908.	13530.	16234.
1982.	1821.	2308.	3120.	23772.	29044.	37830.	11862.	13540.	16336.
1983.	2029.	2594.	3535.	25486.	31356.	41140.	12001.	13749.	16662.
1984.	2247.	2894.	3972.	27269.	33750.	44551.	12425.	14275.	17359.
1985.	2473.	3206.	4427.	29104.	36199.	48020.	13113.	15096.	18401.
1986.	2685.	3500.	4857.	30977.	38695.	51531.	14036.	16189.	19753.
1987.	2910.	3818.	5309.	32870.	41177.	55024.	15096.	17412.	21271.
1988.	3148.	4156.	5782.	34760.	43647.	58457.	16224.	18710.	22854.
1989.	3400.	4479.	6276.	36629.	46062.	61784.	17416.	20069.	24491.
1990.	3667.	4839.	6792.	38453.	48393.	64958.	18666.	21481.	26171.
1991.	3912.	5167.	7260.	40219.	50617.	67946.	19972.	22936.	27876.
1992.	4169.	5507.	7739.	41919.	52721.	70724.	21315.	24414.	29580.
1993.	4436.	5859.	8230.	43553.	54704.	73290.	22680.	25896.	31256.
1994.	4716.	6222.	8732.	45130.	56575.	75651.	24052.	27362.	32877.
1995.	5009.	6597.	9244.	46671.	58358.	77836.	25416.	28791.	34416.
1996.	5370.	7056.	9866.	48200.	60081.	79882.	26756.	30166.	35849.
1997.	5751.	7534.	10507.	49751.	61786.	81844.	28058.	31478.	37155.
1998.	6153.	8033.	11166.	51362.	63516.	83774.	29312.	32689.	38318.
1999.	6577.	8552.	11842.	53073.	65321.	85735.	30507.	33814.	39324.
2000.	7025.	9091.	12535.	54927.	67249.	87784.	31640.	34839.	40169.

SOURCE: Tables C-1 through C-9.

[a]Population Series B with low enrollment rate growth.

Table C-12

EXPENDITURES ON INSTRUCTIONAL PERSONNEL BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	386	386	386	16270	16270	16270	8921	8921	8921
1971	534	562	582	16549	17018	17801	9392	9574	9877
1972	669	734	808	16757	17673	19201	9847	10212	10822
1973	843	927	1059	16917	18255	20484	10281	10830	11745
1974	1015	1128	1341	17053	18785	21670	10717	11448	12667
1975	1204	1379	1670	17109	19200	22684	11154	12066	13585
1976	1402	1637	2029	17181	19605	23645	11551	12634	14441
1977	1538	1947	2462	17314	20055	24623	11896	13141	15215
1978	1899	2293	2951	17552	20582	25665	12156	13544	15859
1979	2180	2671	3489	17881	21243	26847	12266	13771	16279
1980	2493	3080	4076	18276	22064	28210	12278	13875	16535
1981	2807	3522	4714	18996	23022	29730	12240	13907	16687
1982	3154	3997	5402	19721	24094	31383	12204	13930	16807
1983	3523	4504	6138	20528	25255	33136	12270	14057	17035
1984	3913	5043	6918	21455	26554	35063	12401	14247	17325
1985	4323	5603	7738	22452	27925	37049	12634	14545	17729
1986	4725	6158	8546	23482	29325	39063	12980	14963	18267
1987	5149	6741	9393	24533	30734	41069	13417	15475	18905
1988	5597	7352	10278	25595	32139	43044	14006	16153	19730
1989	6068	7992	11200	26659	33525	44967	14676	16911	20637
1990	6565	8662	12159	27713	34876	46815	15384	17703	21567
1991	7012	9262	13013	28747	36179	48565	16124	18516	22504
1992	7476	9878	13882	29753	37420	50198	16888	19344	23437
1993	7957	10509	14763	30723	38589	51700	17673	20179	24356
1994	8456	11156	15657	31652	39679	53058	18475	21017	25254
1995	8973	11813	16559	32542	40691	54272	19287	21848	26117
1996	9511	12498	17475	33394	41626	55345	20099	22661	26930
1997	10070	13192	18396	34219	42497	56293	20903	23445	27680
1998	10648	13901	19322	35028	43317	57133	21692	24191	28356
1999	11248	14624	20251	35833	44102	57885	22456	24889	28945
2000	11869	15360	21179	36652	44873	58576	23189	25532	29439

SOURCE: Tables C-1 through C-9.

[a]Population Series B with low enrollment growth rate.

Table C-13

EXPENDITURES ON INSTRUCTIONAL PERSONNEL BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improve-ment	High Improve-ment	Current Inputs	Medium Improve-ment	High Improve-ment	Current Inputs	Medium Improve-ment	High Improve-ment
1970.	386.	386.	386.	16251.	16251.	16251.	8879.	8879.	8879.
1971.	428.	442.	466.	16522.	16991.	17773.	9327.	9508.	9808.
1972.	477.	507.	559.	16722.	17637.	19162.	9757.	10119.	10723.
1973.	527.	576.	658.	16874.	18208.	20432.	10166.	10709.	11614.
1974.	582.	652.	769.	17001.	18727.	21604.	10575.	11297.	12500.
1975.	648.	742.	899.	17049.	19132.	22604.	10985.	11882.	13378.
1976.	716.	857.	1037.	17112.	19526.	23549.	11353.	12418.	14194.
1977.	802.	954.	1206.	17234.	19962.	24510.	11670.	12891.	14927.
1978.	897.	1084.	1365.	17441.	20475.	25531.	11900.	13259.	15526.
1979.	999.	1224.	1599.	17778.	21121.	26693.	11982.	13453.	15903.
1980.	1109.	1375.	1820.	18261.	21926.	28033.	11969.	13525.	16119.
1981.	1225.	1537.	2057.	18863.	22866.	29530.	11908.	13530.	16234.
1982.	1349.	1709.	2310.	19579.	23921.	31157.	11852.	13529.	16322.
1983.	1480.	1892.	2578.	20372.	25064.	32885.	11899.	13632.	16520.
1984.	1617.	2083.	2860.	21285.	26344.	34775.	12009.	13798.	16778.
1985.	1761.	2283.	3152.	22266.	27695.	36742.	12218.	14066.	17146.
1986.	1900.	2476.	3437.	23281.	29073.	38728.	12538.	14453.	17645.
1987.	2046.	2679.	3733.	24315.	30461.	40704.	12949.	14936.	18246.
1988.	2200.	2890.	4040.	25362.	31845.	42651.	13507.	15577.	19027.
1989.	2362.	3111.	4359.	26409.	33211.	44546.	14141.	16295.	19885.
1990.	2532.	3341.	4689.	27448.	34543.	46367.	14811.	17043.	20763.
1991.	2682.	3542.	4977.	28467.	35826.	48092.	15510.	17811.	21647.
1992.	2837.	3749.	5268.	29458.	37049.	49701.	16231.	18591.	22525.
1993.	2998.	3959.	5562.	30412.	38199.	51177.	16973.	19379.	23391.
1994.	3164.	4175.	5859.	31328.	39273.	52514.	17728.	20167.	24232.
1995.	3337.	4395.	6158.	32203.	40266.	53706.	18492.	20948.	25040.
1996.	3516.	4620.	6460.	33040.	41185.	54758.	19255.	21709.	25799.
1997.	3702.	4850.	6764.	33851.	42039.	55687.	20010.	22442.	26497.
1998.	3895.	5085.	7067.	34644.	42843.	56506.	20747.	23137.	27121.
1999.	4094.	5323.	7371.	35432.	43609.	57238.	21457.	23783.	27658.
2000.	4300.	5565.	7674.	36234.	44362.	57909.	22137.	24375.	28104.

SOURCE: Tables C-1 through C-9.

[a]Population Series E with high enrollment rate growth.

Table C-14

EXPENDITURES ON PHYSICAL PLANT BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	176	176	176	9689	9689	9689	5398	5398	5398
1971	244	247	251	9855	9899	9973	5683	5709	5752
1972	315	321	332	9979	10061	10198	5958	6008	6091
1973	398	410	429	10074	10187	10376	6220	6292	6411
1974	496	514	544	10178	10315	10544	6484	6574	6723
1975	615	642	686	10322	10477	10737	6749	6853	7028
1976	753	790	851	10541	10709	10991	6939	7104	7296
1977	906	955	1036	10845	11022	11317	7197	7319	7521
1978	1077	1139	1242	11252	11432	11732	7355	7477	7680
1979	1266	1343	1470	11794	11972	12268	7421	7538	7733
1980	1474	1566	1721	12484	12654	12938	7429	7536	7713
1981	1701	1810	1992	13313	13468	13727	7406	7498	7651
1982	1946	2072	2283	14267	14398	14616	7390	7464	7587
1983	2207	2350	2590	15301	15395	15553	7486	7539	7627
1984	2483	2643	2910	16376	16421	16496	7756	7784	7831
1985	2773	2948	3240	17413	17463	17429	8189	8187	8184
1986	3050	3238	3546	18613	18511	18341	8770	8730	8664
1987	3345	3542	3870	19755	19653	19210	9440	9353	9208
1988	3658	3863	4203	20696	20575	20040	10153	10008	9766
1989	3991	4199	4547	22022	21563	20797	10908	10692	10333
1990	4343	4553	4902	23123	22506	21476	11702	11402	10902
1991	4672	4876	5216	24189	23392	22065	12529	12130	11466
1992	5017	5211	5534	25432	24428	22756	13382	12869	12015
1993	5378	5557	5854	26202	24969	22967	14251	13608	12536
1994	5757	5913	6175	27156	25709	23286	15127	14337	13019
1995	6153	6282	6496	28089	26379	23530	15999	15044	13453
1996	6535	6729	6887	29016	27026	23710	16858	15723	13930
1997	7145	7195	7281	29058	27665	23844	17696	16364	14143
1998	7685	7682	7679	30936	28315	23946	18506	16961	14386
1999	8254	8188	8077	31977	28997	24032	19280	17507	14554
2000	8856	8713	8475	33103	29732	24114	20019	18005	14650

SOURCE: Tables C-1 through C-9.

[a]Population Series B with high enrollment rate growth.

Table C-15

EXPENDITURES ON PHYSICAL PLANT BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970.	176.	176.	176.	9678.	9678.	9678.	5372.	5372.	5372.
1971.	196.	198.	201.	9839.	9883.	9957.	5543.	5669.	5712.
1972.	218.	222.	230.	9958.	10040.	10177.	5903.	5953.	6036.
1973.	247.	255.	267.	10049.	10161.	10349.	6151.	6221.	6339.
1974.	284.	295.	312.	10146.	10283.	10511.	6398.	6487.	6634.
1975.	331.	345.	369.	10282.	10438.	10696.	6646.	6749.	6921.
1976.	385.	404.	435.	10493.	10661.	10941.	6869.	6982.	7171.
1977.	444.	468.	507.	10789.	10965.	11258.	7061.	7180.	7378.
1978.	504.	538.	587.	11187.	11366.	11664.	7200.	7319.	7518.
1979.	580.	616.	674.	11718.	11895.	12190.	7250.	7364.	7554.
1980.	658.	699.	768.	12398.	12567.	12849.	7242.	7346.	7519.
1981.	742.	790.	869.	13215.	13369.	13625.	7205.	7294.	7444.
1982.	832.	886.	976.	14156.	14286.	14502.	7177.	7249.	7368.
1983.	927.	987.	1088.	15177.	15271.	15428.	7261.	7312.	7398.
1984.	1026.	1093.	1203.	16239.	16283.	16357.	7518.	7545.	7591.
1985.	1130.	1201.	1320.	17331.	17311.	17276.	7934.	7932.	7929.
1986.	1227.	1302.	1427.	18447.	18346.	18177.	8493.	8454.	8391.
1987.	1327.	1408.	1538.	19574.	19374.	19040.	9134.	9050.	8909.
1988.	1438.	1518.	1652.	20700.	20382.	19853.	9816.	9676.	9442.
1989.	1553.	1635.	1770.	21813.	21358.	20600.	10538.	10329.	9982.
1990.	1675.	1756.	1890.	22899.	22287.	21268.	11295.	11005.	10523.
1991.	1787.	1865.	1995.	23951.	23162.	21848.	12084.	11700.	11059.
1992.	1904.	1977.	2100.	24963.	23978.	22336.	12896.	12402.	11579.
1993.	2026.	2093.	2205.	25936.	24735.	22734.	13723.	13103.	12071.
1994.	2154.	2213.	2311.	26875.	25439.	23045.	14553.	13792.	12525.
1995.	2288.	2336.	2416.	27793.	26101.	23282.	15378.	14460.	12931.
1996.	2453.	2488.	2546.	28703.	26735.	23456.	16188.	15098.	13281.
1997.	2627.	2646.	2677.	29627.	27360.	23581.	16977.	15698.	13566.
1998.	2811.	2810.	2809.	30586.	27994.	23675.	17735.	16254.	13786.
1999.	3005.	2980.	2940.	31605.	28661.	23753.	18458.	16762.	13934.
2000.	3209.	3157.	3071.	32709.	29379.	23827.	19144.	17218.	14009.

SOURCE: Tables C-1 through C-9.

[a]Population Series B with low enrollment rate growth.

Table C-16

EXPENDITURES ON PHYSICAL PLANT BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	176	176	176	9689	9689	9689	5398	5398	5398
1971	244	247	251	9855	9899	9973	5683	5709	5752
1972	315	321	332	9979	10061	10198	5958	6008	6091
1973	387	398	417	10074	10187	10376	6220	6292	6411
1974	464	481	509	10155	10292	10521	6484	6574	6723
1975	560	574	613	10189	10342	10598	6749	6853	7028
1976	640	672	724	10231	10395	10668	6989	7104	7296
1977	748	788	855	10310	10476	10758	7197	7319	7521
1978	867	917	1000	10440	10607	10885	7355	7477	7680
1979	995	1056	1156	10648	10809	11077	7421	7538	7733
1980	1134	1205	1324	10943	11092	11341	7429	7536	7713
1981	1282	1365	1502	11312	11444	11664	7406	7498	7651
1982	1441	1535	1691	11744	11852	12031	7384	7458	7581
1983	1609	1714	1889	12224	12300	12426	7424	7476	7563
1984	1788	1903	2099	12777	12812	12970	7503	7530	7576
1985	1975	2097	2307	13370	13355	13329	7644	7642	7640
1986	2158	2291	2511	13984	13907	13779	7854	7818	7759
1987	2352	2491	2721	14610	14460	14212	8118	8043	7919
1988	2556	2699	2937	15242	15008	14618	8474	8353	8151
1989	2772	2917	3158	15876	15545	14993	8879	8704	8411
1990	2999	3143	3384	16503	16062	15327	9308	9070	8672
1991	3203	3343	3576	17119	16555	15616	9756	9445	8928
1992	3415	3547	3767	17718	17019	15854	10218	9827	9174
1993	3605	3755	3956	18296	17449	16037	10693	10211	9406
1994	3862	3968	4142	18849	17842	16163	11178	10594	9621
1995	4099	4184	4327	19379	18199	16233	11670	10973	9813
1996	4345	4406	4509	19887	18525	16250	12161	11342	9977
1997	4600	4633	4687	20378	18818	16219	12647	11695	10108
1998	4864	4863	4860	20859	19092	16146	13124	12029	10202
1999	5138	5097	5028	21339	19351	16037	13587	12338	10256
2000	5422	5334	5188	21826	19634	15899	14030	12619	10267

SOURCE: Tables C-1 through C-9.

[a]Population Series E with high enrollment rate growth.

Table C-17

EXPENDITURES ON PHYSICAL PLANT BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	176	176	176	9678	9678	9678	5372	5372	5372
1971	196	198	201	9839	9883	9957	5643	5669	5712
1972	218	222	230	9958	10040	10177	5903	5953	6036
1973	241	248	259	10049	10161	10349	6151	6221	6339
1974	266	276	292	10124	10261	10488	6398	6487	6634
1975	296	309	330	10153	10306	10561	6646	6749	6921
1976	327	343	370	10190	10353	10625	6869	6982	7171
1977	366	386	419	10263	10430	10709	7061	7180	7378
1978	410	434	473	10386	10552	10829	7200	7319	7518
1979	457	484	530	10587	10747	11013	7250	7364	7554
1980	506	538	591	10874	11023	11270	7242	7346	7519
1981	560	595	655	11236	11367	11585	7205	7294	7444
1982	616	656	723	11659	11766	11945	7171	7243	7362
1983	676	720	793	12132	12207	12332	7199	7250	7335
1984	739	786	866	12675	12710	12768	7266	7293	7337
1985	804	855	940	13259	13244	13218	7392	7391	7388
1986	868	921	1010	13864	13768	13661	7586	7552	7495
1987	935	990	1081	14480	14332	14085	7835	7763	7642
1988	1005	1061	1155	15103	14871	14485	8172	8055	7861
1989	1079	1135	1229	15727	15399	14852	8556	8386	8104
1990	1157	1212	1305	16345	15909	15181	8961	8732	8349
1991	1225	1278	1366	16952	16394	15464	9384	9085	8568
1992	1295	1346	1429	17542	16850	15697	9820	9444	8817
1993	1369	1415	1490	18111	17272	15875	10269	9806	9033
1994	1445	1485	1550	18656	17659	15997	10726	10166	9231
1995	1524	1556	1609	19177	18009	16064	11189	10521	9408
1996	1606	1629	1667	19676	18327	16078	11650	10865	9557
1997	1691	1703	1723	20158	18616	16045	12107	11195	9676
1998	1779	1779	1778	20631	18882	15969	12553	11505	9758
1999	1870	1855	1830	21100	19134	15858	12983	11789	9800
2000	1964	1933	1880	21577	19380	15718	13394	12047	9802

SOURCE: Tables C-1 through C-9.

[a]Population Series E with low enrollment rate growth.

Table C-18

EXPENDITURES ON EQUIPMENT BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improve-ment	High Improve-ment	Current Inputs	Medium Improve-ment	High Improve-ment	Current Inputs	Medium Improve-ment	High Improve-ment
1970	38	38	38	1462	1462	1462	1349	1349	1349
1971	53	54	57	1488	1505	1795	1421	1486	1596
1972	68	72	78	1506	1733	2111	1489	1623	1845
1973	86	93	105	1521	1854	2408	1555	1757	2093
1974	107	118	137	1536	1971	2696	1621	1892	2344
1975	130	150	177	1558	2092	2983	1687	2028	2597
1976	163	186	225	1591	2226	3283	1747	2157	2840
1977	196	226	280	1637	2375	3606	1799	2275	3068
1978	233	274	343	1698	2547	3961	1839	2376	3271
1979	274	326	414	1780	2750	4365	1855	2444	3425
1980	319	384	493	1884	2989	4830	1857	2490	3544
1981	368	447	590	2009	3265	5356	1851	2521	3637
1982	421	516	675	2154	3579	5943	1847	2551	3723
1983	477	590	777	2310	3908	6573	1872	2616	3857
1984	537	667	885	2472	4256	7250	1939	2740	4076
1985	600	749	998	2639	4615	7984	2047	2921	4378
1986	660	828	1107	2809	4981	8601	2192	3155	4759
1987	723	910	1222	2982	5352	9301	2360	3420	5188
1988	791	998	1343	3154	5722	10002	2538	3701	5640
1989	863	1091	1470	3324	6087	10693	2727	3997	6113
1990	939	1188	1603	3490	6444	11367	2925	4305	6605
1991	1020	1291	1725	3651	6788	12017	3132	4624	7111
1992	1085	1372	1850	3830	7179	12746	3346	4951	7626
1993	1162	1469	1978	3965	7432	13227	3563	5280	8143
1994	1245	1569	2110	4089	7733	13788	3782	5609	8654
1995	1335	1679	2244	4240	8022	14325	4000	5932	9153
1996	1435	1799	2405	4430	8303	14843	4215	6246	9632
1997	1545	1930	2572	4522	8593	15353	4424	6547	10086
1998	1662	2067	2743	4670	8868	15865	4627	6833	10510
1999	1785	2210	2918	4827	9163	16391	4820	7100	10899
2000	1915	2359	3098	4997	9476	16943	5005	7348	11252

SOURCE: Tables C-1 through C-9.

[a]Population Series B with high enrollment rate growth.

Table C-19

EXPENDITURES ON EQUIPMENT BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	38	38	38	1461	1461	1461	1343	1343	1343
1971	42	43	46	1485	1600	1792	1411	1476	1585
1972	47	50	54	1503	1729	2106	1476	1608	1828
1973	53	58	65	1517	1849	2402	1538	1737	2070
1974	61	68	78	1532	1965	2687	1600	1867	2313
1975	72	80	95	1552	2084	2971	1662	1998	2558
1976	83	95	115	1584	2216	3269	1717	2120	2792
1977	96	112	137	1629	2363	3587	1765	2232	3010
1978	110	130	162	1689	2532	3938	1800	2326	3202
1979	125	150	190	1769	2732	4337	1812	2388	3346
1980	142	171	220	1871	2968	4796	1810	2427	3454
1981	160	195	253	1995	3240	5317	1801	2452	3538
1982	180	221	289	2137	3547	5897	1794	2477	3616
1983	200	248	326	2291	3877	6520	1815	2538	3741
1984	222	276	366	2451	4220	7169	1879	2656	3951
1985	244	305	407	2618	4575	7839	1983	2830	4242
1986	265	333	445	2784	4937	8524	2123	3055	4608
1987	287	362	486	2955	5303	9216	2283	3309	5020
1988	311	392	528	3125	5668	9908	2454	3579	5453
1989	336	424	572	3292	6030	10591	2634	3861	5906
1990	362	458	618	3456	6382	11257	2824	4156	6375
1991	386	499	666	3615	6721	11898	3021	4460	6859
1992	412	521	702	3768	7047	12511	3224	4771	7349
1993	438	553	745	3915	7357	13093	3431	5084	7841
1994	466	587	790	4057	7653	13646	3638	5396	8325
1995	495	622	834	4195	7937	14174	3844	5702	8797
1996	530	665	889	4333	8214	14683	4047	5998	9249
1997	568	710	945	4472	8489	15183	4244	6281	9676
1998	608	756	1003	4617	8767	15685	4434	6548	10072
1999	650	804	1062	4771	9057	16200	4615	6797	10435
2000	694	855	1123	4937	9364	16741	4786	7026	10761

SOURCE: Tables C-1 through C-9.

[a]Population Series B with low enrollment rate growth.

Table C-20

EXPENDITURES ON EQUIPMENT BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	38	38	38	1462	1462	1462	1349	1349	1349
1971	53	54	57	1488	1603	1795	1421	1486	1596
1972	68	72	78	1506	1733	2111	1489	1623	1845
1973	84	90	102	1521	1854	2408	1555	1757	2093
1974	100	111	128	1533	1967	2690	1621	1892	2344
1975	119	134	158	1538	2065	2944	1687	2028	2597
1976	138	158	192	1544	2160	3187	1747	2157	2840
1977	162	185	231	1556	2258	3428	1799	2275	3068
1978	188	221	276	1576	2363	3675	1839	2376	3271
1979	215	257	326	1607	2482	3941	1855	2444	3425
1980	245	295	379	1652	2620	4234	1857	2490	3544
1981	277	337	437	1708	2774	4552	1851	2521	3637
1982	312	382	500	1773	2942	4892	1846	2549	3720
1983	348	430	566	1845	3123	5252	1856	2594	3825
1984	386	480	637	1929	3321	5641	1876	2651	3943
1985	427	533	711	2018	3529	6047	1911	2727	4087
1986	467	585	784	2111	3742	6461	1963	2825	4262
1987	509	640	859	2205	3958	6879	2030	2941	4461
1988	553	697	939	2301	4174	7296	2119	3089	4707
1989	599	757	1021	2396	4388	7708	2220	3253	4976
1990	648	820	1107	2491	4599	8113	2327	3425	5254
1991	693	876	1182	2584	4804	8504	2439	3601	5537
1992	738	934	1259	2674	5001	8880	2555	3780	5823
1993	786	993	1337	2762	5190	9236	2673	3962	6110
1994	835	1053	1416	2846	5367	9570	2795	4145	6395
1995	886	1114	1495	2925	5534	9883	2917	4327	6676
1996	939	1178	1575	3002	5691	10173	3040	4506	6948
1997	995	1242	1655	3076	5839	10443	3162	4679	7209
1998	1052	1308	1736	3149	5979	10697	3281	4846	7454
1999	1111	1376	1817	3221	6115	10938	3397	5003	7681
2000	1172	1444	1897	3295	6248	11171	3508	5150	7886

SOURCE: Tables C-1 through C-9.

[a]Population Series E with high enrollment rate growth.

Table C-21

EXPENDITURES ON EQUIPMENT BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970.	38.	38.	38.	1461.	1461.	1461.	1343.	1343.	1343.
1971.	42.	43.	46.	1485.	1600.	1792.	1411.	1476.	1585.
1972.	47.	50.	54.	1503.	1729.	2106.	1476.	1608.	1828.
1973.	52.	56.	63.	1517.	1849.	2402.	1538.	1737.	2070.
1974.	58.	63.	73.	1528.	1961.	2681.	1600.	1867.	2313.
1975.	64.	72.	85.	1533.	2058.	2934.	1662.	1998.	2558.
1976.	71.	81.	98.	1538.	2152.	3174.	1717.	2120.	2792.
1977.	79.	92.	113.	1549.	2248.	3412.	1765.	2232.	3010.
1978.	89.	104.	131.	1568.	2351.	3656.	1800.	2326.	3202.
1979.	99.	118.	149.	1598.	2468.	3918.	1812.	2388.	3346.
1980.	109.	132.	169.	1641.	2604.	4207.	1810.	2427.	3454.
1981.	121.	147.	191.	1696.	2755.	4521.	1801.	2452.	3538.
1982.	133.	163.	214.	1760.	2921.	4857.	1793.	2475.	3613.
1983.	146.	181.	238.	1831.	3099.	5212.	1800.	2516.	3710.
1984.	160.	199.	263.	1913.	3294.	5596.	1817.	2567.	3819.
1985.	174.	217.	290.	2001.	3500.	5997.	1848.	2637.	3952.
1986.	188.	235.	315.	2093.	3710.	6406.	1897.	2729.	4117.
1987.	202.	254.	342.	2186.	3923.	6818.	1959.	2839.	4306.
1988.	217.	274.	369.	2280.	4136.	7229.	2043.	2979.	4540.
1989.	233.	295.	397.	2374.	4347.	7636.	2139.	3135.	4795.
1990.	250.	316.	427.	2467.	4555.	8035.	2240.	3297.	5058.
1991.	265.	335.	452.	2559.	4757.	8422.	2346.	3464.	5326.
1992.	280.	354.	478.	2648.	4952.	8792.	2455.	3633.	5597.
1993.	296.	374.	504.	2734.	5137.	9143.	2567.	3805.	5868.
1994.	313.	394.	530.	2816.	5312.	9472.	2682.	3977.	6136.
1995.	330.	414.	556.	2895.	5476.	9780.	2797.	4148.	6401.
1996.	347.	435.	582.	2970.	5631.	10065.	2913.	4316.	6656.
1997.	366.	457.	609.	3043.	5776.	10331.	3027.	4479.	6900.
1998.	385.	479.	635.	3114.	5914.	10580.	3138.	4635.	7129.
1999.	404.	501.	661.	3185.	6046.	10816.	3246.	4781.	7339.
2000.	425.	523.	687.	3257.	6177.	11044.	3348.	4916.	7529.

SOURCE: Tables C-1 through C-9.

[a]Population Series E with low enrollment rate growth.

Table C-22

EXPENDITURES ON OTHER INPUTS BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	190	190	190	2925	2925	2925	1274	1274	1274
1971	264	264	263	2975	3010	3069	1342	1358	1384
1972	340	339	338	3012	3081	3194	1407	1438	1490
1973	430	428	424	3041	3139	3303	1469	1515	1593
1974	536	532	525	3073	3198	3406	1531	1593	1695
1975	665	658	646	3116	3266	3517	1593	1669	1796
1976	814	803	784	3182	3356	3646	1650	1739	1888
1977	980	962	932	3274	3471	3800	1699	1800	1969
1978	1164	1139	1096	3397	3617	3985	1737	1848	2033
1979	1369	1332	1272	3560	3805	4212	1752	1871	2068
1980	1593	1543	1460	3769	4038	4488	1754	1878	2083
1981	1839	1772	1660	4019	4315	4808	1749	1875	2086
1982	2103	2015	1868	4307	4630	5168	1745	1873	2088
1983	2386	2272	2082	4619	4968	5550	1768	1899	2117
1984	2685	2540	2299	4944	5317	5939	1831	1967	2193
1985	2998	2818	2517	5278	5672	6329	1934	2075	2311
1986	3298	3078	2711	5619	6031	6716	2071	2219	2467
1987	3617	3351	2907	5964	6388	7096	2229	2384	2643
1988	3955	3636	3105	6308	6740	7461	2397	2558	2825
1989	4314	3935	3302	6648	7083	7806	2576	2739	3013
1990	4695	4247	3501	6981	7410	8127	2763	2928	3204
1991	5051	4530	3663	7302	7721	8418	2958	3123	3396
1992	5424	4822	3819	7677	8081	8753	3160	3320	3587
1993	5814	5122	3968	7910	8284	8908	3365	3518	3773
1994	6223	5431	4110	8198	8539	9108	3572	3714	3950
1995	6652	5748	4243	8480	8781	9282	3778	3905	4116
1996	7173	6137	4411	8760	9013	9436	3980	4088	4268
1997	7725	6541	4569	9044	9243	9576	4178	4262	4403
1998	8308	6961	4717	9339	9477	9707	4369	4426	4519
1999	8924	7396	4851	9653	9722	9836	4552	4576	4615
2000	9574	7848	4970	9994	9985	9970	4727	4713	4691

SOURCE: Tables C-1 through C-9.

[a]Population Series B with high enrollment rate growth.

Table C-23

EXPENDITURES ON OTHER INPUTS BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970.	190.	190.	190.	2922.	2922.	2922.	1268.	1268.	1268.
1971.	211.	211.	211.	2970.	3006.	3065.	1332.	1348.	1374.
1972.	235.	235.	233.	3006.	3074.	3188.	1394.	1425.	1477.
1973.	267.	266.	264.	3034.	3131.	3294.	1452.	1498.	1575.
1974.	307.	305.	301.	3063.	3188.	3396.	1511.	1571	1673.
1975.	358.	354.	348.	3104.	3254.	3503.	1569.	164-	1768.
1976.	416.	410.	401.	3168.	3341.	3630.	1622.	170-	1855.
1977.	480.	471.	457.	3257.	3453.	3781.	1667.	1766.	1931.
1978.	550.	538.	518.	3377.	3596.	3962.	1700.	1809.	1990.
1979.	627.	611.	583.	3538.	3780.	4185.	1712.	1827.	2020.
1980.	712.	689.	652.	3743.	4010.	4457.	1710.	1830.	2031.
1981.	802.	773.	724.	3989.	4283.	4773.	1701.	1824.	2030.
1982.	899.	862.	799.	4274.	4594.	5128.	1695.	1819.	2028.
1983.	1002.	954.	874.	4582.	4928.	5505.	1714.	1842.	2054.
1984.	1110.	1050.	950.	4902.	5272.	5889.	1775.	1906.	2126.
1985.	1221.	1148.	1025.	5242.	5623.	6274.	1873.	2010.	2239.
1986.	1326.	1238.	1090.	5569.	5977.	6656.	2005.	2149.	2389.
1987.	1437.	1331.	1155.	5909.	6330.	7031.	2157.	2307.	2557.
1988.	1555.	1429.	1221.	6249.	6677.	7391.	2318.	2473.	2731.
1989.	1679.	1532.	1286.	6585.	7015.	7732.	2488.	2646.	2910.
1990.	1811.	1639.	1350.	6913.	7339.	8048.	2667.	2826.	3093.
1991.	1932.	1733.	1401.	7230.	7645.	8335.	2853.	3012.	3276.
1992.	2058.	1830.	1449.	7536.	7932.	8592.	3045.	3199.	3457.
1993.	2191.	1930.	1495.	7830.	8200.	8817.	3240.	3387.	3633.
1994.	2329.	2032.	1538.	8113.	8451.	9013.	3436.	3573.	3800.
1995.	2474.	2138.	1578.	8390.	8688.	9184.	3631.	3753.	3956.
1996.	2652.	2269.	1631.	8665.	8916.	9334.	3822.	3926.	4098.
1997.	2840.	2405.	1680.	8944.	9141.	9470.	4008.	4089.	4224.
1998.	3039.	2546.	1725.	9234.	9370.	9597.	4187.	4241.	4331.
1999.	3248.	2692.	1766.	9541.	9609.	9722.	4358.	4381.	4418.
2000.	3469.	2843.	1801.	9875.	9866.	9852.	4520.	4507.	4486.

SOURCE: Tables C-1 through C-9.

[a]Population Series B with low enrollment rate growth.

Table C-24

EXPENDITURES ON OTHER INPUTS BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	190	190	190	2925	2925	2925	1274	1274	1274
1971	264	264	263	2975	3010	3069	1342	1358	1384
1972	340	339	338	3012	3081	3194	1407	1438	1490
1973	419	416	413	3041	3139	3303	1469	1515	1593
1974	501	498	491	3066	3191	3399	1531	1593	1695
1975	595	588	578	3076	3224	3471	1593	1669	1796
1976	692	682	666	3089	3258	3539	1650	1739	1888
1977	809	794	770	3113	3300	3613	1699	1800	1969
1978	938	917	883	3152	3356	3697	1737	1848	2033
1979	1076	1048	1000	3215	3435	3803	1752	1871	2068
1980	1226	1187	1123	3304	3540	3934	1754	1878	2083
1981	1386	1335	1251	3415	3667	4086	1749	1875	2086
1982	1558	1492	1383	3545	3811	4254	1743	1872	2086
1983	1740	1657	1518	3670	3969	4434	1753	1883	2100
1984	1932	1828	1655	3857	4148	4633	1772	1903	2121
1985	2135	2006	1792	4036	4338	4840	1805	1937	2157
1986	2333	2178	1918	4221	4531	5046	1854	1987	2209
1987	2543	2356	2044	4411	4724	5248	1917	2050	2273
1988	2764	2541	2170	4601	4917	5442	2001	2135	2358
1989	2997	2733	2294	4793	5106	5628	2097	2230	2452
1990	3242	2933	2417	4982	5289	5800	2198	2329	2549
1991	3463	3106	2511	5158	5464	5958	2303	2431	2645
1992	3692	3282	2599	5349	5630	6098	2413	2535	2739
1993	3929	3461	2682	5523	5784	6220	2525	2640	2831
1994	4176	3644	2753	5690	5927	6322	2639	2744	2919
1995	4431	3829	2826	5850	6058	6404	2755	2848	3002
1996	4697	4019	2888	6003	6177	6467	2871	2949	3079
1997	4973	4211	2941	6152	6287	6513	2986	3046	3147
1998	5258	4406	2985	6297	6390	6545	3099	3139	3205
1999	5554	4604	3019	6442	6488	6564	3208	3225	3252
2000	5861	4804	3042	6589	6583	6574	3313	3303	3288

SOURCE: Tables C-1 through C-9.

[a]Population Series E with high enrollment rate growth.

Table C-25

EXPENDITURES ON OTHER INPUTS BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	190	190	190	2922	2922	2922	1268	1268	1268
1971	211	211	211	2970	3006	3065	1332	1348	1374
1972	235	235	233	3006	3074	3188	1394	1425	1477
1973	260	259	257	3034	3131	3294	1452	1498	1575
1974	288	285	282	3055	3181	3388	1511	1571	1673
1975	320	317	311	3065	3213	3459	1569	1644	1768
1976	354	349	340	3076	3245	3525	1622	1709	1855
1977	396	389	377	3098	3285	3596	1667	1766	1931
1978	443	433	417	3135	3339	3678	1700	1809	1990
1979	494	480	459	3196	3415	3761	1712	1827	2020
1980	547	530	502	3283	3518	3909	1710	1830	2031
1981	605	583	546	3392	3642	4058	1701	1824	2030
1982	666	638	592	3520	3784	4224	1693	1818	2026
1983	731	696	638	3662	3939	4400	1700	1826	2036
1984	799	756	684	3826	4115	4597	1716	1843	2054
1985	870	817	730	4003	4302	4800	1745	1873	2086
1986	938	876	771	4185	4492	5003	1791	1920	2134
1987	1010	936	812	4371	4682	5201	1850	1979	2193
1988	1086	999	853	4559	4872	5393	1930	2059	2274
1989	1166	1064	893	4748	5058	5575	2020	2149	2363
1990	1250	1131	932	4934	5238	5745	2116	2242	2454
1991	1324	1188	960	5118	5411	5900	2216	2339	2544
1992	1401	1245	986	5296	5574	6038	2319	2436	2633
1993	1480	1304	1010	5467	5726	6157	2425	2535	2719
1994	1563	1364	1032	5632	5866	6257	2533	2633	2801
1995	1648	1424	1051	5789	5995	6337	2642	2731	2879
1996	1736	1486	1068	5940	6112	6399	2751	2825	2949
1997	1828	1548	1081	6086	6220	6443	2859	2916	3012
1998	1923	1612	1092	6226	6320	6473	2964	3002	3065
1999	2022	1676	1099	6370	6415	6491	3065	3081	3108
2000	2124	1741	1102	6514	6508	6499	3162	3154	3139

SOURCE: Tables C-1 through C-9.

[a]Population Series E with low enrollment rate growth.

Table C-26

TOTAL EXPENDITURES BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary			Higher		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970.	790.	790.	790.	30346.	30346.	30346.	16943.	16943.	16943.	26577.	26577.	26577.
1971.	1095.	1117.	1153.	30866.	31531.	32639.	17838.	18127.	18609.	29055.	29275.	29642.
1972.	1413.	1467.	1556.	31254.	32546.	34704.	18700.	19281.	20249.	31663.	32113.	32864.
1973.	1786.	1883.	2046.	31554.	33435.	36571.	19525.	20394.	21843.	34471.	35159.	36306.
1974.	2225.	2381.	2641.	31878.	34311.	38365.	20352.	21507.	23430.	37441.	38370.	39920.
1975.	2759.	2991.	3376.	32329.	35287.	40217.	21184.	22617.	25005.	40520.	41690.	43639.
1976.	3379.	3705.	4247.	33015.	36480.	42281.	21937.	23634.	26464.	43429.	44823.	47147.
1977.	4066.	4504.	5232.	33969.	37964.	44624.	22592.	24535.	27773.	46255.	47855.	50521.
1978.	4832.	5399.	6345.	35243.	39779.	47338.	23085.	25244.	28842.	49170.	50956.	53933.
1979.	5680.	6396.	7591.	36939.	42055.	50582.	23295.	25624.	29506.	52263.	54216.	57470.
1980.	6613.	7497.	8972	39100.	44852.	54437.	23319.	25777.	29875.	55291.	57377.	60853.
1981.	7631.	8701.	104	41697.	48140.	58879.	23246.	25801.	30061.	58163.	60341.	63970.
1982.	8729.	10001.	12120.	44686.	51873.	63853.	23196.	25829.	30218.	60643.	62858.	66551.
1983.	9901.	11388.	13865.	47923.	55884.	69152.	23498.	26229.	30780.	62750.	64949.	68614.
1984.	11141.	12852.	15705.	51292.	60030.	74593.	24344.	27218.	32008.	64491.	66618.	70163.
1985.	12441.	14384.	17622.	54759.	64267.	80114.	25704.	28765.	33867.	66063.	68070.	71415.
1986.	13806.	15986.	19447.	58297.	68555.	85652.	27528.	30813.	36288.	67646.	69490.	7250[illegible]
1987.	15009.	17390.	21360.	61873.	72850.	91145.	29630.	33152.	39021.	69784.	71433.	74182.
1988.	16414.	19018.	23360.	65447.	77098.	96512.	31870.	35620.	41870.	72828.	74251.	76623.
1989.	17904.	20732.	25446.	68975.	81237.	101674.	34240.	38204.	44812.	76792.	77943.	79861.
1990.	19485.	22534.	27615.	72424.	85227.	106564.	36731.	40891.	47825.	81634.	82450.	83811.
1991.	20962.	24205.	29585.	75751.	89021.	111121.	39327.	43658.	50876.	87200.	87601.	88270.
1992.	22509.	25917.	31596.	79653.	93399.	116307.	42005.	46474.	53922.	93379.	93267.	93081.
1993.	24130.	27698.	33646.	82067.	95971.	119144.	44733.	49300.	56912.	100152.	99414.	98182.
1994.	25827.	29540.	35729.	85056.	99144.	122624.	47482.	52101.	59798.	107497.	106002.	103509.
1995.	27605.	31[illegible].	37841.	87977.	102161.	125802.	50220.	54835.	62529.	115401.	113001.	109001.
1996.	29768.	33791.	40389.	90880.	105976.	128742.	52916.	57471.	65062.	123819.	120350.	114570.
1997.	32057.	36160.	42998.	93830.	107967.	131530.	55546.	59977.	67362.	132796.	128077.	120213.
1998.	34477.	38672.	45664.	96894.	110903.	134251.	58088.	62329.	69398.	142262.	136094.	125815.
1999.	37033.	41289.	48381.	100153.	113971.	137002.	60517.	64501.	71141.	152126.	144297.	131249.
2000.	39734.	44011.	51140.	103683.	117253.	139869.	62836.	66497.	72598.	162363.	152647.	136454.

SOURCE: Tables C-1, C-9, C-10, C-14, C-18, C-22.

[a]Population Series B with high enrollment rate growth.

Table C-27

TOTAL EXPENDITURES BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary			Higher		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970	790.	7[illegible]	790.	30312.	30312.	30312.	16863.	16863.	16863.	25907.	25907.	25907.
1971	877.	89[illegible]	924.	30817.	31481.	32587.	17713.	18001.	18480.	27992.	28204.	28558.
1972	977.	10[illegible]	1076.	31189.	32480.	34632.	18530.	19105.	20064.	30162.	30591.	31305.
1973	1110.	1171.	1272.	31473.	33350.	36478.	19306.	20166.	21599.	32482.	33130.	34210.
1974	1276.	1365.	1514.	31779.	34204.	38246.	20083.	21222.	23120.	34918.	35795.	37[illegible]
1975	1485.	1609.	1817.	32206.	35153.	40[illegible]	20862.	22273.	24625.	37416.	38496.	40[illegible]
1976	1727.	1894.	2171.	32866.	36325.	42091.	21562.	23230.	26012.	39722.	40998.	4[illegible]
1977	1942.	2205.	2563.	33793.	37768.	44393.	22163.	24069.	27246.	41915.	43365.	4[illegible]
1978	2284.	2592.	[illegible]99.	35039.	39548.	47064.	22600.	24713.	28236.	44165.	45769.	48[illegible]
1979	2604.	2932.	[illegible].	36703.	41786.	50258.	22757.	25032.	28824.	46545.	48284.	51182.
1980	2953.	3244.	4006.	38830.	44542.	54061.	22732.	25129.	29124.	48821.	50663.	53732.
1981	3330.	3797.	4576.	41389.	47785.	58444.	22615.	25101.	29245.	50937.	52844.	56022.
1982	3733.	4277.	5183.	44339.	51471.	63357.	22528.	25085.	29348.	52689.	54615.	57823.
1983	4159.	4783.	5824.	47536.	55432.	68593.	22792.	25441.	29855.	54085.	55980.	59139.
1984	4605.	5312.	6491.	50961.	59526.	73967.	23597.	26383.	31026.	55155.	56974.	60006.
1985	5068.	5861.	7179.	54283.	63708.	79417.	24903.	27869.	32811.	56073.	57777.	60615.
1986	5503.	6372.	7820.	57777.	67944.	[illegible]4886.	26657.	29838.	35140.	57021.	58575.	61166.
1987	5954.	6911.	8488.	61307.	72184.	90311.	28670.	32077.	37756.	58464.	59846.	62149.
1988	6452.	7476.	9183.	64634.	76374.	95609.	30812.	34437.	40479.	60687.	61873.	63849.
1989	6969.	8070.	9904.	68319.	80465.	100707.	33076.	36906.	43289.	63679.	64633.	66224.
1990	7515.	8691.	10651.	71722.	84400.	105530.	35453.	39469.	46162.	67386.	68060.	69183.
1991	8017.	9254.	11315.	75016.	88145.	110028.	37930.	42108.	49069.	71668.	71998.	72547.
1992	8542.	9835.	11990.	78185.	91577.	114163.	40480.	44787.	51965.	76428.	76336.	76183.
1993	9091.	10435.	12676.	81224.	94996.	117934.	43074.	47471.	54801.	81639.	81036.	80033.
1994	9665.	11055.	13371.	84176.	98118.	121355.	45679.	50122.	57527.	87276.	86061.	84038.
1995	10266.	11693.	14072.	87050.	101084.	124476.	48269.	52705.	60100.	93217.	91376.	88142.
1996	11005.	12478.	14932.	89901.	103946.	127354.	50814.	55187.	62477.	99736.	96942.	92287.
1997	11786.	13295.	15809.	92794.	106775.	130078.	53288.	57538.	64622.	106537.	102751.	96442.
1998	12610.	14145.	16702.	95798.	109648.	132732.	55668.	59733.	66507.	113666.	108738.	100524.
1999	13480.	15029.	17610.	98990.	112548.	135411.	57939.	61753.	68110.	121054.	114824.	104441.
2000	14396.	15946.	18529.	102448.	115857.	138204.	60090.	63591.	69425.	128654.	120955.	108123.

SOURCE: Tables C-2, C-9, C-11, C-15, C-19, C-23.

[a]Population Series B with low enrollment rate growth.

Table C-28

TOTAL EXPENDITURES BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary			Higher		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970.	790.	790.	790.	30346.	30346.	30346.	16943.	16943.	16943.	26577.	26577.	26577.
1971.	1095.	1117.	1153.	30866.	31531.	32639.	17838.	18127.	18609.	29055.	29275.	29642.
1972.	1413.	1467.	1556.	31254.	32548.	34704.	18700.	19281.	20249.	31663.	32113.	32864.
1973.	1737.	1832.	1991.	31554.	33435.	36571.	19525.	20394.	21843.	34471.	35159.	36306.
1974.	2081.	2227.	2470.	31[illegible]7.	34234.	38279.	20352.	21507.	23430.	37441.	38370.	39920.
1975.	2468.	2675.	3020.	31912.	34831.	39697.	21164.	22617.	25005.	40520.	41690.	43639.
1976.	2873.	3149.	3611.	32045.	35418.	41039.	21937.	23634.	26464.	43429.	44823.	47147.
1977.	3356.	3717.	4318.	32293.	36091.	42422.	22592.	24535.	27773.	46255.	47855.	50521.
1978.	3891.	4348.	5110.	32700.	36909.	43923.	23085.	25244.	28842.	49170.	50956.	53933.
1979.	4467.	5031.	5971.	33350.	37970.	45608.	23295.	25624.	29506.	52263.	54216.	57470.
1980.	5088.	5768.	6903.	34274.	39316.	47718.	23319.	25777.	29875.	55291.	57377.	60853.
1981.	5752.	6559.	7904.	35431.	40907.	50032.	23246.	25801.	30061.	58163.	60341.	63970.
1982.	6464.	7406.	8976.	36783.	42699.	52560.	23178.	25808.	30194.	60643.	62858.	66551.
1983.	7220.	8305.	10111.	38288.	44648.	55248.	23302.	26010.	30523.	62750.	64949.	68614.
1984.	8020.	9252.	11305.	40018.	46835.	58197.	23551.	26331.	30965.	64491.	66618.	70163.
1985.	8859.	10242.	12549.	41876.	49147.	61265.	23993.	26851.	31612.	66058.	68064.	71409.
1986.	9683.	11212.	13759.	43798.	51505.	64349.	24652.	27593.	32496.	67604.	69446.	72517.
1987.	10553.	12227.	15018.	45759.	53877.	67407.	25482.	28510.	33558.	69354.	70993.	73725.
1988.	11469.	13290.	16323.	47740.	56237.	70400.	26600.	29730.	34946.	71155.	72545.	74862.
1989.	12436.	14400.	17674.	49724.	58563.	73296.	27871.	31098.	36477.	73261.	74359.	76189.
1990.	13454.	15559.	19067.	51689.	60826.	76055.	29217.	32526.	38042.	75790.	76548.	77811.
1991.	14370.	16587.	20282.	53618.	63003.	78643.	30622.	33994.	39614.	78730.	79092.	79695.
1992.	15321.	17640.	21506.	55494.	65070.	81030.	32073.	35486.	41173.	82118.	82019.	81855.
1993.	16307.	18718.	22738.	57303.	67012.	83192.	33565.	36992.	42703.	85914.	85281.	84225.
1994.	17329.	19820.	23973.	59037.	68815.	85112.	35088.	38501.	44189.	90009.	88757.	86670.
1995.	18389.	20946.	25207.	60696.	70482.	86792.	36629.	39996.	45607.	94440.	92476.	89203.
1996.	19493.	22101.	26447.	62286.	72017.	88235.	38172.	41458.	46934.	99124.	96347.	91720.
1997.	20637.	23278.	27681.	63825.	73441.	89469.	39699.	42865.	48143.	104107.	100408.	94243.
1998.	21823.	24478.	28904.	65333.	74779.	90521.	41196.	44204.	49217.	109364.	104622.	96720.
1999.	23051.	25700.	30114.	66834.	76056.	91424.	42647.	45454.	50134.	114868.	109956.	99104.
2000.	24324.	26942.	31307.	68361.	77308.	92220.	44039.	46604.	50980.	120701.	113478.	101440.

SOURCE: Tables C-3, C-9, C-12, C-16, C-20, C-24.

[a]Population Series E with high enrollment rate growth.

Table C-29

TOTAL EXPENDITURES BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING LOW ENROLLMENT GROWTH, 1970-2000[a]

(in millions of 1970 dollars)

	Preschool			Elementary			Secondary			Higher		
Year	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement	Current Inputs	Medium Improvement	High Improvement
1970.	790.	790.	790.	30312.	30312.	30312.	16863.	16863.	16863.	25907.	25907.	25907.
1971.	877.	995.	924.	30817.	31481.	32587.	17713.	18001.	18480.	27992.	28204.	28558.
1972.	77.	1014.	1076.	31189.	32480.	34632.	18530.	19105.	20064.	30162.	30591.	31305.
1973.	1080.	1139.	1237.	31473.	33350.	36478.	19306.	20166.	21599.	32482.	33130.	34210.
1974.	1193.	1277.	1416.	31710.	34129.	38162.	20083.	21222.	23120.	34918.	35785.	37229.
1975.	1328.	1439.	1625.	31799.	34709.	39558.	20862.	22273.	24625.	37416.	39496.	40296.
1976.	1468.	1610.	1845.	31916.	35275.	40674.	21562.	23230.	26012.	39722.	40998.	43123.
1977.	1644.	1821.	2115.	32144.	35925.	42227.	22163.	24069.	27246.	41915.	43365.	45780.
1978.	1839.	2055.	2415.	32530.	36717.	43694.	22600.	24713.	28236.	44145.	45769.	48442.
1979.	2048.	2307.	2737.	33159.	37751.	45405.	22757.	25032.	28824.	46545.	48284.	51182.
1980.	2272.	2579.	3082.	34060.	39070.	47420.	22732.	25129.	29124.	48821.	50663.	53732.
1981.	2510.	2863.	3449.	35192.	40630.	49694.	22615.	25101.	29245.	50937.	52844.	56022.
1982.	2764.	3167.	3839.	36518.	42392.	52183.	22509.	25064.	29323.	52689.	54615.	57823.
1983.	3033.	3488.	4247.	37997.	44309.	54829.	22598.	25224.	29600.	54085.	55980.	59139.
1984.	3315.	3824.	4673.	39700.	46463.	57735.	22808.	25500.	29988.	55155.	56974.	60005.
1985.	3609.	4173.	5112.	41530.	48740.	60758.	23204.	25967.	30573.	56073.	57777.	60615.
1986.	3894.	4509.	5533.	43422.	51063.	63798.	23813.	26654.	31391.	56979.	58532.	61120.
1987.	4193.	4859.	5968.	45352.	53398.	66808.	24593.	27516.	32387.	58072.	59444.	61732.
1988.	4509.	5224.	6417.	47304.	55724.	69758.	25652.	28670.	33701.	59187.	60344.	62271.
1989.	4840.	5605.	6879.	49258.	58015.	72610.	26855.	29965.	35147.	60585.	61493.	63005.
1990.	5189.	6001.	7354.	51195.	60245.	75328.	28128.	31314.	36624.	62340.	62963.	64002.
1991.	5496.	6344.	7757.	52986.	62389.	77877.	29455.	32699.	38105.	64436.	64733.	65227.
1992.	5814.	6694.	8161.	54944.	64425.	80227.	30825.	34105.	39571.	66901.	66821.	66687.
1993.	6144.	7052.	8566.	56724.	66334.	82351.	32234.	35525.	41010.	69683.	69169.	68312.
1994.	6485.	7417.	8971.	58432.	68110.	84241.	33669.	36943.	42401.	72693.	71681.	69995.
1995.	6838.	7789.	9374.	60063.	69747.	85887.	35120.	38348.	43729.	75957.	74377.	71745.
1996.	7206.	8171.	9778.	61626.	71254.	87300.	36568.	39716.	44968.	79409.	77185.	73478.
1997.	7587.	8559.	10177.	63137.	72650.	88505.	38002.	41033.	46195.	83079.	80127.	75207.
1998.	7982.	8953.	10572.	64616.	73958.	89528.	39402.	42279.	47073.	86934.	83165.	76884.
1999.	8390.	9354.	10961.	66087.	75205.	90402.	40751.	43434.	47905.	90955.	86274.	78472.
2000.	8813.	9762.	11343.	67582.	76427.	91169.	42042.	44491.	48573.	95200.	89503.	80008.

SOURCE: Tables C-4, C-9, C-13, C-17, C-21, C-25.

[a]Population Series E with low enrollment rate growth.

Table C-30

TOTAL EXPENDITURES BY RATE OF IMPROVEMENT AND ENROLLMENT GROWTH, ALL LEVELS, 1970-2000[a]

(in millions of 1970 dollars)

Enrollment Growth	Current Inputs			Medium Improvement				High Improvement				
Year	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low
1970	74656	73872	74656	73872	74656	73872	74656	73872	74656	73872	74656	73872
1971	78853	77399	78853	77399	80050	78580	80050	78580	82044	80548	82044	80548
1972	83030	80857	83030	80857	85409	83190	85409	83190	89373	87077	89373	87077
1973	87335	84371	87286	84341	90872	87816	90820	87785	96766	93559	96710	93524
1974	91897	89056	91881	87904	96569	92576	96338	92413	104355	100109	104098	99927
1975	96792	91969	96883	91405	102584	97531	101813	96917	112237	106802	111361	106104
1976	101760	95878	100285	94668	108652	102447	107025	101113	120139	113396	119260	111854
1977	106882	99663	104496	97866	114858	107408	112198	105180	128150	119982	125034	117369
1978	112330	104087	108847	101134	121378	112582	117458	109254	136458	126741	131808	122787
1979	118177	108609	113376	104509	128291	118035	122840	113374	145148	133745	139614	128149
1980	124322	113336	117971	107884	135503	123681	128238	117437	154137	140923	145349	133357
1981	130736	118271	122592	111254	142983	129527	133608	121458	163394	148287	151967	138411
1982	137453	123269	127067	114482	150562	135447	138772	125239	172743	155711	158281	143168
1983	144372	128571	131560	117712	158449	141636	143911	129001	182411	163411	164497	147815
1984	151267	134213	136079	120977	166718	148195	149036	132762	192469	171490	170831	152602
1985	158968	140328	140786	124416	175485	155214	154305	136657	203018	180023	176830	157059
1986	167156	146959	145736	128108	184704	162730	159756	140758	213950	189014	183122	161842
1987	176297	154405	151147	132210	194826	171018	165607	145217	225709	198704	189708	166895
1988	186559	162785	156964	136652	205986	180161	171802	149963	238365	209120	196532	172145
1989	197911	172043	163291	141538	218117	190073	178420	155077	251792	220124	203635	177642
1990	210274	182076	170149	146852	231102	200620	185459	160523	265815	231526	210974	183308
1991	223250	192631	177340	152483	244475	211564	192675	166164	279851	242959	218245	188965
1992	237546	203635	185605	158484	259056	222635	200215	172045	294907	254302	225564	194645
1993	251032	215047	193089	164784	272383	233939	208002	176080	307885	265444	232858	200240
1994	265863	226796	201462	171278	286787	245357	215893	184152	321660	276291	239943	205608
1995	281202	239902	210154	177978	301441	256860	223900	190261	335172	286790	246809	210733
1996	297382	251455	219074	184809	316650	268553	231923	196325	348763	297049	253337	215517
1997	314229	264404	228268	191805	332182	280359	239993	202368	362103	306951	259535	219974
1998	331721	277743	237716	198935	347999	292263	248083	208356	375128	316465	265362	224057
1999	349830	291462	247400	206183	364058	304253	256166	214267	387772	325572	270776	227740
2000	368616	305588	257425	213637	380408	316348	264333	220183	400071	334281	275846	231093

SOURCE: Tables C-26 through C-29.

[a]High Enrollment Growth is Population Series B with high enrollment rate growth. Medium-High Enrollment Growth is Population Series B with low enrollment rate growth. Medium-Low Enrollment Growth is Population Series E with high enrollment rate growth. Low Enrollment Growth is Population Series E with low enrollment rate growth.

Table C-31

REQUIREMENTS FOR TEACHERS AND PARATEACHERS BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in thousands)

Year	Preschool						Elementary						Secondary					
	Current Inputs		Medium Improvement		High Improvement		Current Inputs		Medium Improvement		High Improvement		Current Inputs		Medium Improvement		High Improvement	
	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH
1970	47.6	15.9	47.6	15.9	47.6	15.9	0.0	1523.4	0.0	1523.4	0.0	1523.4	0.0	749.7	0.0	749.7	0.0	749.7
1971	64.2	21.4	64.6	21.4	65.3	21.3	0.0	1508.1	14.7	1507.7	39.2	1507.0	0.0	768.1	2.1	766.7	5.5	764.3
1972	80.6	26.9	81.6	26.8	83.3	26.6	0.0	1486.1	29.0	1485.4	77.3	1484.2	0.0	783.7	4.2	780.8	11.3	775.9
1973	99.2	33.1	101.0	32.9	104.1	32.6	0.0	1460.2	42.7	1459.1	113.9	1457.3	0.0	796.4	6.5	791.9	17.3	784.5
1974	120.3	40.1	123.3	39.8	128.3	39.3	0.0	1435.8	56.0	1434.3	149.3	1431.9	0.0	807.9	8.8	801.9	23.3	791.8
1975	145.1	48.4	149.7	47.9	157.2	47.2	0.0	1417.1	69.1	1415.3	184.2	1412.4	0.0	818.4	11.1	810.8	29.6	798.3
1976	173.0	57.7	179.5	57.0	190.3	55.9	0.0	1408.4	82.4	1406.3	219.7	1402.8	0.0	824.8	13.4	815.6	35.7	800.1
1977	202.6	67.5	211.5	66.6	226.2	65.2	0.0	1410.3	96.3	1407.9	256.7	1403.8	0.0	826.7	15.7	815.9	41.8	797.8
1978	234.3	78.1	246.0	76.9	265.5	75.0	0.0	1424.1	111.1	1421.2	296.2	1416.5	0.0	822.2	17.8	809.9	47.5	789.3
1979	268.0	89.3	283.1	87.8	309.2	85.3	0.0	1452.7	127.5	1449.4	339.9	1444.0	0.0	807.4	19.7	793.8	52.5	771.1
1980	303.7	101.2	322.7	99.3	354.3	96.2	0.0	1496.5	145.9	1492.8	389.1	1486.5	0.0	786.6	21.3	771.9	56.8	747.3
1981	341.1	113.7	364.5	111.3	403.6	107.4	0.0	1553.2	166.6	1548.9	444.2	1541.8	0.0	763.2	22.7	747.5	60.6	721.2
1982	379.7	126.6	408.2	123.7	455.7	119.0	0.0	1620.0	189.5	1615.1	505.4	1607.0	0.0	741.2	24.1	724.5	64.2	696.7
1983	419.2	139.7	453.3	136.3	510.0	130.6	0.0	1690.8	214.3	1685.3	571.5	1676.2	0.0	730.7	25.7	712.9	68.6	683.3
1984	459.1	153.0	499.2	149.0	566.2	142.3	0.0	1761.3	240.4	1755.1	641.1	1744.8	0.0	736.8	27.9	717.5	74.5	685.2
1985	498.9	166.3	545.7	161.6	623.6	153.8	0.0	1830.0	267.6	1823.1	713.7	1811.7	0.0	757.1	30.8	735.9	82.0	700.4
1986	534.1	178.0	587.6	172.7	676.6	163.8	0.0	1896.1	295.8	1888.5	788.8	1875.9	0.0	789.1	34.2	765.5	91.2	726.0
1987	570.1	190.0	630.7	184.0	731.6	173.9	0.0	1958.6	324.6	1950.2	865.7	1936.4	0.0	826.7	38.1	800.3	101.5	756.4
1988	606.8	202.3	675.0	195.4	788.9	184.1	0.0	2016.2	353.8	2007.1	943.6	1992.0	0.0	865.4	42.2	836.2	112.5	787.5
1989	644.2	214.7	720.7	207.1	848.2	194.3	0.0	2068.1	383.1	2058.2	1021.6	2041.9	0.0	904.8	46.6	872.5	124.2	818.9
1990	682.3	227.4	767.6	218.9	909.7	204.7	0.0	2113.3	412.1	2102.8	1098.9	2085.2	0.0	944.7	51.2	909.3	136.5	850.2
1991	714.3	238.1	808.1	228.7	964.4	213.1	0.0	2151.6	440.5	2140.3	1174.7	2121.4	0.0	984.4	56.0	945.6	149.3	881.0
1992	746.5	248.8	849.2	238.6	1020.3	221.5	0.0	2201.6	472.2	2189.4	1259.3	2169.3	0.0	1023.3	61.0	981.1	162.6	910.7
1993	778.9	259.6	889.8	248.4	1077.5	230.8	0.0	2207.6	495.0	2194.9	1320.1	2173.7	0.0	1060.6	66.1	1014.9	176.2	938.6
1994	811.4	270.5	933.1	258.3	1135.9	238.0	0.0	2226.7	521.0	2213.4	1389.5	2191.1	0.0	1095.6	71.2	1046.3	189.9	964.2
1995	844.0	281.3	975.9	268.1	1195.7	246.2	0.0	2241.6	546.4	2227.5	1457.0	2204.2	0.0	1127.8	76.4	1074.9	203.6	986.8
1996	885.8	295.3	1023.7	280.9	1269.6	256.9	0.0	2253.6	571.3	2238.9	1523.4	2214.5	0.0	1156.5	81.4	1100.2	217.2	1006.2
1997	928.4	309.5	1085.0	293.8	1346.1	267.7	0.0	2264.4	596.1	2249.1	1589.6	2223.7	0.0	1181.5	86.4	1121.7	230.4	1022.0
1998	971.7	323.9	1141.3	306.9	1425.2	278.6	0.0	2275.8	621.3	2259.9	1656.8	2233.3	0.0	1202.5	91.2	1139.4	243.2	1034.2
1999	1015.8	338.6	1200.0	320.2	1506.8	289.5	0.0	2286.4	647.3	2272.8	1726.2	2245.1	0.0	1219.3	95.8	1153.0	255.4	1042.5
2000	1060.7	353.6	1259.6	333.7	1591.1	300.6	0.0	2306.6	674.7	2289.3	1799.2	2260.5	0.0	1232.1	100.1	1162.8	267.0	1047.3

SOURCE: Appendix A and Tables C-1 through C-4.

[a]Population Series B with high enrollment rate growth.

Table C-32

REQUIREMENTS FOR TEACHERS AND PARATEACHERS BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-HIGH ENROLLMENT GROWTH, 1970-2000[a]

(in thousands)

Year	Preschool						Elementary						Secondary					
	Current Inputs		Medium Improvement		High Improvement		Current Inputs		Medium Improvement		High Improvement		Current Inputs		Medium Improvement		High Improvement	
	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH
1970	47.6	15.9	47.6	15.9	47.6	15.9	0.0	1521.7	0.0	1521.7	0.0	1521.7	0.0	746.1	0.0	746.1	0.0	746.1
1971	51.4	17.1	51.8	17.1	52.3	17.1	0.0	1505.6	14.7	1505.3	39.1	1504.6	0.0	762.8	2.1	761.4	5.5	759.0
1972	55.7	18.6	56.4	18.5	57.6	18.4	0.0	1483.1	28.9	1482.3	77.1	1481.1	0.0	776.6	4.2	773.7	11.2	768.8
1973	61.6	20.5	62.8	20.4	64.7	20.2	0.0	1456.5	42.6	1455.4	113.6	1453.6	0.0	787.5	6.4	783.1	17.1	775.7
1974	68.9	23.0	70.7	22.8	73.5	22.5	0.0	1431.3	55.8	1429.9	148.9	1427.5	0.0	797.2	8.6	791.3	23.0	781.3
1975	78.1	26.0	80.5	25.8	84.6	25.4	0.0	1411.7	68.8	1410.0	183.5	1407.0	0.0	806.0	10.9	798.4	29.1	785.8
1976	88.4	29.5	91.7	29.1	97.3	28.6	0.0	1402.1	82.0	1400.0	218.7	1396.5	0.0	810.7	13.2	801.6	35.1	786.4
1977	99.2	33.1	103.6	32.6	110.8	31.9	0.0	1403.1	95.8	1400.6	255.4	1396.5	0.0	811.0	15.4	800.4	41.0	782.7
1978	110.7	36.9	116.3	36.4	125.5	35.4	0.0	1415.8	110.4	1413.0	294.5	1408.3	0.0	804.9	17.4	792.8	46.5	772.7
1979	122.9	41.0	129.8	40.3	141.3	39.1	0.0	1443.4	126.7	1440.1	337.7	1434.7	0.0	788.8	19.2	775.5	51.3	753.3
1980	135.6	45.2	144.1	44.4	158.2	42.9	0.0	1486.2	144.9	1482.5	386.4	1476.3	0.0	766.9	20.8	752.5	55.4	728.5
1981	148.8	49.6	159.1	48.6	176.1	46.9	0.0	1541.7	165.3	1537.5	440.9	1530.4	0.0	742.5	22.1	727.2	59.3	701.7
1982	162.4	54.1	174.6	53.9	194.9	50.9	0.0	1607.4	188.1	1602.6	501.5	1594.5	0.0	719.8	23.4	703.7	62.4	676.7
1983	176.1	58.7	190.4	58.3	214.2	54.9	0.0	1677.2	212.6	1671.7	566.9	1662.6	0.0	708.8	25.0	691.5	66.5	652.7
1984	189.7	63.2	206.3	61.6	234.0	58.8	0.0	1746.5	238.4	1740.4	635.7	1730.2	0.0	714.2	27.1	695.5	72.2	654.2
1985	203.3	67.8	222.3	66.8	254.1	62.7	0.0	1814.1	265.5	1807.3	707.5	1796.0	0.0	733.5	29.8	712.9	79.5	678.5
1986	214.8	71.6	236.3	69.5	272.1	65.9	0.0	1879.2	293.7	1871.7	781.7	1859.1	0.0	764.2	33.1	741.3	88.3	703.1
1987	226.5	75.5	250.6	73.1	290.7	69.1	0.0	1940.6	321.7	1932.4	857.8	1918.6	0.0	799.9	36.8	774.4	98.2	731.9
1988	238.5	79.5	265.4	76.8	310.1	72.4	0.0	1997.3	350.5	1988.4	934.8	1973.4	0.0	836.6	40.8	808.4	108.8	761.4
1989	250.7	83.6	280.5	80.6	330.1	75.6	0.0	2048.4	379.5	2038.7	1011.9	2022.4	0.0	874.1	45.0	843.0	119.9	791.1
1990	263.2	87.7	296.0	84.4	350.9	78.9	0.0	2092.8	408.1	2082.4	1088.3	2064.9	0.0	911.8	49.4	877.7	131.7	820.7
1991	273.2	91.1	309.1	87.5	368.8	81.5	0.0	2130.4	436.2	2119.2	1163.2	2100.6	0.0	949.4	54.0	912.1	144.0	849.8
1992	283.3	94.4	322.3	90.5	387.2	84.0	0.0	2161.3	463.5	2149.1	1236.1	2129.3	0.0	986.1	58.8	945.5	156.7	877.7
1993	293.4	97.8	335.6	93.6	405.9	86.6	0.0	2185.1	490.0	2172.6	1306.7	2151.6	0.0	1021.2	63.6	977.2	169.6	903.8
1994	303.6	101.2	349.2	96.7	425.1	89.1	0.0	2203.7	515.7	2190.5	1375.1	2168.4	0.0	1054.0	68.5	1006.6	182.7	927.6
1995	313.9	104.6	362.9	99.7	444.6	91.5	0.0	2217.9	540.6	2204.1	1441.6	2181.0	0.0	1084.0	73.4	1033.2	195.7	948.5
1996	327.5	109.2	380.7	103.8	468.4	95.0	0.0	2229.3	565.1	2214.8	1507.0	2190.6	0.0	1110.6	78.3	1056.5	208.5	956.2
1997	341.3	113.8	398.9	108.0	494.9	98.4	0.0	2239.4	589.5	2224.3	1572.1	2199.1	0.0	1133.5	82.9	1076.1	221.0	980.5
1998	355.4	118.5	417.6	112.7	521.3	101.9	0.0	2250.1	614.3	2234.3	1638.0	2208.0	0.0	1152.4	87.4	1091.9	233.1	991.1
1999	369.8	123.3	436.8	116.6	548.5	105.4	0.0	2262.8	639.8	2246.4	1706.1	2219.0	0.0	1167.3	91.7	1103.9	244.5	998.1
2000	384.3	128.1	456.4	120.9	576.5	108.9	0.0	2279.2	666.7	2262.1	1777.7	2233.6	0.0	1178.3	95.7	1112.0	255.3	1001.6

SOURCE: Appendix A and Tables C-1 through C-4.

[a]Population Series B with low enrollment rate growth.

Table C-33

REQUIREMENTS FOR TEACHERS AND PARATEACHERS BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING MEDIUM-LOW ENROLLMENT GROWTH, 1970-2000[a]

(in thousands)

Year	Preschool						Elementary						Secondary					
	Current Inputs		Medium Improvement		High Improvement		Current Inputs		Medium Improvement		High Improvement		Current Inputs		Medium Improvement		High Improvement	
	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH
970	47.6	15.9	47.6	15.9	47.6	15.9	0.0	1523.4	0.0	1523.4	0.0	1523.4	0.0	749.7	0.0	749.7	0.0	749.7
971	64.2	21.4	64.6	21.4	65.3	21.3	0.0	1508.1	14.7	1507.7	39.2	1507.0	0.0	768.1	2.1	766.7	5.5	764.3
972	80.6	26.9	81.6	26.8	83.3	26.6	0.0	1486.1	29.0	1485.4	77.3	1484.2	0.0	783.7	4.2	780.8	11.3	775.9
973	96.5	32.2	98.3	32.0	101.3	31.7	0.0	1460.2	42.7	14	113.9	1457.3	0.0	796.4	6.5	791.9	17.3	784.5
974	112.5	37.5	115.3	37.2	120.0	36.7	0.0	1432.6	55.9	14	149.0	1428.7	0.0	807.9	8.8	801.9	23.3	791.8
975	129.8	43.3	133.9	42.9	140.6	42.2	0.0	1398.8	68.2	13	181.8	1394.1	0.0	818.4	11.1	810.8	29.6	798.0
976	147.1	49.0	152.6	48.5	161.8	47.5	0.0	1367.1	80.0	1356.0	213.3	1361.6	0.0	824.8	13.4	815.5	35.7	800.1
977	167.2	55.7	174.5	55.0	186.7	53.8	0.0	1340.8	91.5	1338.4	244.0	1334.5	0.0	836.7	15.7	815.9	41.8	797.8
978	188.7	62.9	198.1	62.0	213.8	60.4	0.0	1321.3	103.1	1318.7	274.8	1314	0.0	822.2	17.8	809.9	47.5	789.3
980	233.7	77.9	244.3	76.4	272.6	74.0	0.0	1311.6	115.1	1308.6	306.9	1303.7	0.0	807.4	19.7	793.8	52.5	771.1
981	257.1	85.7	270.8	83.9	304.3	81.0	0.0	1311.8	127.9	1308.5	341.1	1303.1	0.0	786.6	21.3	771.9	56.8	747.3
982	281.2	93.7	302.3	91.6	337.5	88.1	0.0	1319.8	141.5	1316.2	377.5	1310.1	0.0	763.2	22.7	747.5	60.6	721.2
983	305.7	101.9	330.5	99.4	371.9	95.3	0.0	1333.5	156.0	1329.5	416.0	1322.8	0.0	740.6	24.1	723.9	64.2	696.2
984	330.5	110.2	359.4	107.3	407.6	102.4	0.0	1350	171.2	1346.5	456.6	1339.2	0.0	724.6	25.5	707.0	68.0	677.5
985	355.3	118.4	388.6	115.1	444.1	109.5	0.0	1374	187.6	1369.3	500.2	1361.3	0.0	712.8	27.0	694.1	72.1	662.9
986	377.9	126.0	415.7	122.2	478.7	115.9	0.0	1399.5	204.7	1394.2	545.8	1385.5	0.0	706.7	28.7	686.9	76.5	653.7
987	400.8	133.6	443.4	129.4	514.4	122.3	0.0	1424.5	222.2	1418.8	592.6	1409.3	0.0	706.7	30.6	685.5	81.7	650.2
988	424.0	141.3	471.7	136.6	551.2	128.6	0.0	1448.5	240.1	1442.3	640.2	1432.0	0.0	710.9	32.7	688.3	87.3	650.5
989	447.4	149.1	500.6	143.8	589.1	135.0	0.0	1470.7	258.1	1464.1	688.3	1453.1	0.0	722.3	35.2	697.9	93.9	657.3
990	471.1	157.0	530.0	151.1	628.1	141.3	0.0	1490.8	276.2	1483.8	736.5	1472.0	0.0	736.5	37.9	710.3	101.1	665.6
991	489.7	155.2	554.0	150.8	661.1	146.1	0.0	1508.3	294.1	1500.8	784.3	1488.2	0.0	751.4	40.7	723.3	108.5	676.3
992	508.1	169.4	578.0	162.4	694.5	150.7	0.0	1522.7	311.8	1514.7	831.4	1501.4	0.0	766.5	43.6	736.3	116.3	686.0
993	526.4	175.5	602.0	167.9	728.1	155.3	0.0	1533.8	329.0	1525.4	877.3	1511.3	0.0	781.3	46.6	749.1	124.1	695.4
994	544.4	181.5	626.1	173.3	762.2	159.7	0.0	1541.4	345.7	1532.6	921.8	1517.8	0.0	795.8	49.6	761.5	132.2	704.3
995	562.2	187.4	650.1	178.6	796.5	164.0	0.0	1545.6	361.7	1536.3	964.4	1520.9	0.0	809.6	52.6	773.2	140.3	712.5
996	580.0	193.3	674.3	183.9	831.4	168.2	0.0	1546.5	376.9	1536.8	1005.2	1520.7	0.0	822.6	55.7	784.0	148.5	719.8
997	597.6	199.2	698.5	189.1	866.6	172.3	0.0	1546.3	391.5	1534.5	1044.1	1517.7	0.0	834.3	58.7	793.6	156.7	725.8
998	615.1	205.0	722.7	194.3	902.1	176.3	0.0	1545.5	405.5	1529.9	1081.3	1512.6	0.0	844.4	61.8	801.7	164.7	730.4
999	632.3	210.8	746.3	199.3	937.9	180.2	0.0	1527.8	418.9	1523.8	1117.1	1505.9	0.0	852.8	64.7	808.1	172.5	733.5
2000	649.4	216.5	771.1	204.3	974.0	184.0	0.0	1520.8	432.0	1516.7	1151.9	1498.2	0.0	859.2	67.5	812.5	180.0	734.7
							0.0		444.8	1509.4	1186.2	1490.4	0.0	863.5	70.2	815.0	187.1	734.0

SOURCE: Appendix A and Tables C-1 through C-4.

[a]Population Series E with high enrollment rate growth.

Table C-34

REQUIREMENTS FOR TEACHERS AND PARATEACHERS BY SCHOOL LEVEL AND RATE OF IMPROVEMENT, ASSUMING LOW ENROLLMENT GROWTH, 1970-2000[a]

(in thousands)

	Preschool						Elementary						Secondary					
	Current Inputs		Medium Improvement		High Improvement		Current Inputs		Medium Improvement		High Improvement		Current Inputs		Medium Improvement		High Improvement	
	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH	PARA	TEACH
70	47.6	15.9	47.6	15.9	47.6	15.9	0.0	1521.7	0.0	1521.7	0.0	1521.7	0.0	746.1	0.0	746.1	0.0	746.1
71	51.4	[illegible]	51.8	17.1	52.3	17.1	0.0	1505.6	14.7	1505.3	39.1	1504.6	0.0	762.8	2.1	761.4	5.5	759.0
72	55.7	[illegible]6	56.4	18.5	57.6	18.4	0.0	1483.1	28.9	1482.3	77.1	1481.1	0.0	776.6	4.2	773.7	11.2	758.8
73	59.9	20.0	61.1	19.9	62.9	19.7	0.0	1456.5	42.6	1455.4	113.6	1453.6	0.0	787.5	6.4	783.1	17.1	775.7
74	64.5	21.5	66.1	21.3	[illegible]8.3	21.1	0.0	1428.2	55.7	1426.7	148.5	1424.4	0.0	797.2	8.6	791.3	23.0	781.3
75	69.8	23.3	72.0	23.1	75.7	22.7	0.0	1393.9	68.0	1392.1	181.2	1389.2	0.0	806.0	10.9	798.4	29.1	785.8
76	75.2	25.1	78.0	24.8	82.7	24.3	0.0	1361.6	79.7	1359.5	212.4	1356.1	0.0	810.7	13.2	801.6	35.1	786.4
77	81.9	27.3	85.5	26.9	91.5	26.3	0.0	1334.6	91.1	1332.3	242.9	1328.4	0.0	811.0	15.4	800.4	41.0	782.7
78	89.2	29.7	93.6	29.3	101.1	28.5	0.0	1314.5	102.5	1311.8	273.4	1307.5	0.0	804.9	17.4	792.8	46.5	772.7
79	96.7	32.2	102.1	31.7	111.2	30.8	0.0	1304.0	114.4	1301.1	305.1	1296.2	0.0	788.8	19.2	775.5	51.3	753.3
80	104.3	34.8	110.9	34.1	121.7	33.0	0.0	1303.6	127.1	1300.3	338.9	1294.9	0.0	766.8	20.8	752.5	55.4	728.5
81	112.2	37.4	119.9	36.6	132.8	35.3	0.0	1310.9	140.6	1307.3	374.9	1301.3	0.0	742.5	22.1	727.2	59.0	701.7
82	120.3	40.1	129.3	39.2	144.3	37.7	0.0	1323.9	154.9	1319.9	413.0	1313.3	0.0	719.2	23.4	703.1	62.3	675.1
83	128.4	42.8	138.8	41.8	156.2	40.0	0.0	1340.6	169.9	1336.3	453.1	1329.0	0.0	702.7	24.7	685.6	66.0	657.1
84	136.6	45.5	148.5	44.3	168.5	42.3	0.0	1363.2	186.1	1358.4	496.2	1350.5	0.0	690.3	26.2	672.2	69.8	642.0
85	144.7	48.2	158.3	46.9	180.9	44.6	0.0	1387.9	203.0	1382.7	541.3	1374.0	0.0	683.5	27.8	664.3	74.0	632.2
86	152.0	50.7	167.2	49.1	192.5	46.6	0.0	1412.3	220.3	1406.7	587.5	1397.2	0.0	682.6	29.6	662.2	78.9	628.0
87	159.3	53.1	176.2	51.4	204.4	48.6	0.0	1435.6	237.9	1429.5	634.5	1419.3	0.0	686.1	31.6	664.3	84.2	627.8
88	166.7	55.6	185.4	53.7	216.7	50.6	0.0	1457.3	255.8	1450.7	682.0	1439.8	0.0	696.5	34.0	673.0	90.5	633.9
89	174.1	58.0	194.8	56.0	229.3	52.5	0.0	1476.9	273.6	1469.9	729.6	1458.2	0.0	709.7	36.5	684.4	97.4	642.3
90	181.7	60.6	204.4	58.3	242.3	54.5	0.0	1493.9	291.3	1486.4	776.8	1474.9	0.0	723.4	39.2	696.3	104.5	651.1
91	187.	62.4	211.9	60.0	252.8	55.9	0.0	1507.9	308.7	1500.0	823.3	1486.8	0.0	737.3	41.9	709.3	111.8	659.9
92	192.0	64.3	219.3	[illegible]6	263.5	57.2	0.0	1518.6	325.7	1510.2	868.6	1496.3	0.0	750.9	44.7	720.0	119.3	668.3
93	198.3	66.1	226.8	63.3	274.3	58.5	0.0	1525.8	342.2	1517.1	912.4	1502.4	0.0	764.2	47.6	731.3	127.0	676.4
94	203.7	67.9	234.3	64.9	285.2	59.8	0.0	1529.7	358.0	1520.5	954.5	1505.2	0.0	776.9	50.5	741.9	134.7	[illegible]3.7
95	209.1	69.7	241.7	66.4	296.2	61.0	0.0	1530.3	373.0	1520.8	994.7	150[illegible].8	0.0	788.7	53.4	751.7	142.4	[illegible]0.1
96	214.4	71.5	249.3	68.0	307.4	62.2	0.0	1528.1	387.4	1518.2	1033.0	1501.6	0.0	799.2	56.3	760.3	150.1	695.3
97	219.7	73.2	256.8	69.5	316.6	63.4	0.0	1523.7	401.1	1513.4	1069.6	1496.3	0.0	808.3	59.1	767.4	157.6	689.2
98	225.0	75.0	264.3	71.1	330.0	64.5	0.0	1517.7	414.3	1507.1	1104.9	1489.3	0.0	815.7	61.9	772.9	165.0	701.5
99	230.1	76.7	271.9	72.5	341.4	65.6	0.0	1510.7	427.1	1499.7	1139.0	1481.5	0.0	821.0	64.5	776.4	172.0	702.0
00	235.3	78.4	279.4	74.0	352.9	66.7	0.0	150[illegible].5	439.8	1492.2	1172.7	1473.4	0.0	824.4	67.0	778.0	178.6	700.7

SOURCE: Appendix A and Tables C-1 through C-4.

[a]Population Series E with low enrollment rate growth.

Table C-35

REQUIREMENTS FOR PRESCHOOL INSTRUCTIONAL PERSONNEL, TEACHERS AND PARATEACHERS COMBINED, BY RATE OF IMPROVEMENT AND ENROLLMENT GROWTH, 1970-2000[a]

(in thousands)

Enrollment Growth	Current Inputs			Medium Improvement				High Improvement				
Year	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low
1970	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5
1971	85.6	68.6	85.6	68.6	86.0	68.9	86.0	68.9	86.6	69.3	86.6	69.3
1972	107.5	74.3	107.5	74.3	108.4	74.9	108.4	74.9	109.9	76.0	109.9	76.0
1973	132.2	82.2	128.6	79.9	133.9	83.2	130.2	80.9	136.7	84.9	132.9	82.6
1974	160.3	91.9	150.9	86.0	163.1	93.5	152.5	87.4	167.6	96.1	156.7	89.8
1975	193.5	104.1	173.1	93.1	197.6	106.3	176.7	95.1	204.4	110.0	182.8	98.4
1976	230.7	117.9	196.1	100.2	236.5	120.9	201.0	102.8	246.2	125.9	209.3	107.0
1977	270.1	132.3	222.9	109.2	278.1	136.2	229.5	112.4	291.4	142.7	240.5	117.8
1978	312.4	147.6	251.6	118.9	322.9	152.6	260.1	122.9	340.5	160.9	274.2	129.6
1979	357.4	163.8	281.1	128.9	370.9	170.1	291.8	133.8	393.6	180.4	309.6	141.9
1980	404.9	180.8	311.6	139.1	422.0	188.4	324.7	145.0	450.5	201.2	346.6	154.8
1981	454.8	198.5	342.8	149.6	475.9	207.7	358.7	156.6	511.1	223.0	385.3	168.1
1982	506.3	216.5	375.0	160.3	531.9	227.5	393.9	168.5	574.6	245.7	425.6	182.0
1983	558.9	234.8	407.6	171.2	589.6	247.6	430.0	180.6	640.7	269.1	467.2	196.2
1984	612.1	253.0	440.6	182.1	648.2	267.9	466.6	192.9	708.5	292.8	510.0	210.8
1985	665.2	271.9	473.7	193.0	707.3	288.2	503.7	205.2	777.5	316.7	553.6	225.5
1986	712.2	286.4	503.9	202.6	760.3	305.7	537.9	216.3	840.4	337.9	594.6	239.1
1987	760.1	302.1	534.5	212.4	814.6	323.7	572.8	227.6	905.5	359.8	636.7	253.0
1988	809.0	318.0	565.3	222.2	870.5	342.2	608.3	239.1	972.9	382.4	679.8	267.2
1989	858.9	334.3	596.6	232.2	927.7	361.1	644.4	250.8	1042.5	405.8	724.1	281.8
1990	909.7	350.9	628.1	242.3	986.5	380.5	681.1	262.7	1114.4	429.8	769.4	296.8
1991	952.5	364.3	653.0	249.7	1036.8	396.6	710.8	271.9	1177.5	450.3	807.2	308.7
1992	995.4	377.7	677.5	257.1	1087.8	412.8	740.4	281.0	1241.8	471.2	846.2	320.7
1993	1038.5	391.3	701.8	264.4	1139.3	429.2	769.9	290.1	1307.2	492.5	883.4	332.8
1994	1081.8	404.8	725.9	271.6	1191.4	445.8	799.4	299.1	1373.9	514.2	921.8	345.9
1995	1125.3	418.5	749.6	278.8	1244.0	462.6	828.7	308.2	1441.8	536.2	960.5	357.2
1996	1181.1	436.6	773.4	285.9	1310.6	484.5	858.2	317.3	1526.5	564.3	999.6	369.5
1997	1237.8	455.1	796.9	293.0	1378.8	506.9	887.6	326.3	1613.8	593.3	1038.9	382.0
1998	1295.6	473.9	820.1	300.0	1448.7	529.9	917.0	335.4	1703.7	623.2	1078.4	394.4
1999	1354.5	493.0	843.1	306.9	1520.2	553.3	946.2	344.4	1796.4	653.9	1118.1	407.0
2000	1414.3	512.4	865.8	313.7	1593.3	577.3	975.4	353.4	1891.7	685.4	1158.0	419.6

SOURCE: Tables C-31 through C-34.

[a]High Enrollment Growth is Population Series B with high enrollment rate growth. Medium-High Enrollment Growth is Population Series B with with low enrollment rate growth. Medium-Low Enrollment Growth is Population Series E with high enrollment rate growth. Low Enrollment Growth is Population Series E with low enrollment rate growth.

Table C-36

REQUIREMENTS FOR ELEMENTARY INSTRUCTIONAL PERSONNEL, TEACHERS AND PARATEACHERS COMBINED, BY RATE OF IMPROVEMENT AND ENROLLMENT GROWTH, 1970-2000[a]

(in thousands)

Enrollment Growth	Current Inputs				Medium Improvement				High Improvement			
Year	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low
1970.	1523.4	1521.7	1523.4	1521.7	1523.4	1521.7	1523.4	1521.7	1523.4	1521.7	1523.4	1521.7
1971.	1508.1	1505.6	1508.1	1505.6	1522.4	1519.9	1522.4	1519.9	1546.3	1543.8	1546.3	1543.8
1972.	1486.1	1483.1	1486.1	1483.1	1514.4	1511.2	1514.4	1511.2	1561.4	1559.2	1561.4	1558.2
1973.	1460.2	1456.5	1460.2	1456.5	1501.8	1498.0	1501.8	1498.0	1571.2	1567.2	1571.2	1567.2
1974.	1435.8	1431.3	1432.6	1428.2	1490.3	1485.7	1487.0	1482.4	1581.2	1576.3	1577.7	1572.9
1975.	1417.1	1411.7	1398.8	1393.9	1484.4	1476.8	1465.2	1460.1	1596.6	1590.5	1576.0	1570.4
1976.	1408.4	1402.1	1367.1	1361.6	1468.7	1482.0	1445.0	1439.2	1622.5	1615.2	1574.8	1568.5
1977.	1410.3	1403.1	1340.8	1334.6	1504.1	1496.4	1429.9	1423.3	1660.4	1651.9	1578.5	1571.3
1978.	1424.1	1415.8	1321.3	1314.5	1532.3	1523.4	1421.8	1414.4	1712.7	1702.8	1589.1	1580.9
1979.	1452.7	1443.4	1311.6	1304.0	1576.9	1566.8	1423.7	1415.5	1783.9	1772.5	1610.6	1601.3
1980.	1496.5	1486.2	1311.8	1303.6	1638.7	1627.4	1436.4	1427.4	1875.6	1862.7	1644.1	1633.8
1981.	1553.2	1541.7	1319.8	1310.9	1715.5	1702.8	1457.7	1447.9	1986.0	1971.3	1687.6	1676.2
1982.	1620.0	1607.4	1333.5	1323.9	1804.6	1790.6	1485.5	1474.8	2112.4	2096.0	1738.8	1726.3
1983.	1690.8	1677.2	1350.9	1340.6	1899.7	1884.3	1517.7	1506.2	2247.7	2229.5	1795.8	1782.1
1984.	1761.3	1746.5	1374.1	1363.2	1995.5	1978.7	1556.9	1544.5	2385.9	2365.9	1861.5	1846.7
1985.	1830.0	1814.1	1399.5	1387.9	2090.8	2072.6	1598.9	1585.7	2525.4	2503.4	1931.3	1915.3
1986.	1896.1	1879.2	1424.5	1412.3	2184.3	2164.8	1641.0	1627.0	2664.6	2640.9	2001.9	1984.7
1987.	1958.6	1940.6	1448.5	1435.6	2274.9	2254.0	1682.4	1667.4	2802.0	2776.4	2072.3	2053.8
1988.	2016.2	1997.3	1470.7	1457.3	2361.0	2338.9	1722.2	1706.5	2935.6	2909.1	2141.4	2121.8
1989.	2063.1	2043.4	1490.8	1476.9	2441.3	2418.1	1759.9	1743.5	3063.5	3034.3	2208.4	2187.7
1990.	2113.3	2092.8	1508.3	1493.9	2514.9	2490.5	1794.9	1777.7	3184.1	3153.2	2272.5	2250.8
1991.	2151.6	2130.4	1522.7	1507.9	2580.8	2555.4	1826.5	1808.7	3296.2	3263.7	2332.8	2310.1
1992.	2201.6	2181.0	1533.8	1518.6	2661.7	2612.6	1854.4	1836.0	3428.5	3365.3	2388.6	2364.9
1993.	2207.6	2185.1	1541.4	1525.8	2689.9	2662.6	1878.2	1859.2	3493.8	3458.3	2439.6	2414.9
1994.	2226.7	2203.7	1545.6	1529.7	2734.4	2706.1	1897.9	1878.5	3580.6	3543.5	2485.2	2459.8
1995.	2241.5	2217.9	1546.5	1530.3	2773.9	2744.7	1913.8	1893.8	3661.2	3622.6	2525.9	2499.5
1996.	2253.6	2229.3	1544.5	1528.1	2810.2	2779.9	1926.0	1905.6	3737.9	3697.6	2561.8	2534.7
1997.	2264.4	2239.4	1540.3	1523.7	2845.3	2813.8	1935.4	1914.5	3813.3	3771.2	2593.9	2565.9
1998.	2275.8	2250.1	1534.5	1517.7	2881.2	2848.6	1942.7	1921.4	3890.1	3846.1	2623.0	2594.2
1999.	2289.4	2262.8	1527.8	1510.7	2920.1	2886.2	1948.7	1926.9	3971.3	3925.2	2650.1	2620.5
2000.	2306.6	2279.2	1520.8	1503.5	2964.0	2928.7	1954.3	1932.0	4059.7	4011.3	2676.7	2646.2

SOURCE: Tables C-31 through C-34.

[a]High Enrollment Growth is Population Series B with high enrollment rate growth. Medium-High Enrollment Growth is Population Series B with low enrollment rate growth. Medium-Low Enrollment Growth is Population Series E with high enrollment rate growth. Low Enrollment Growth is Population Series E with low enrollment rate growth.

Table C-37

REQUIREMENTS FOR SECONDARY INSTRUCTIONAL PERSONNEL, TEACHERS AND PARATEACHERS COMBINED, BY RATE OF IMPROVEMENT AND ENROLLMENT GROWTH, 1970-2000[a]

(in thousands)

Enrollment Growth	Current Inputs				Medium Improvement				High Improvement			
Year	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low
1970.	749.7	746.1	749.7	746.1	749.7	746.1	749.7	746.1	749.7	746.1	749.7	746.1
1971.	766.1	762.8	768.1	762.8	768.8	763.4	768.8	763.4	769.9	764.5	769.9	764.5
1972.	783.7	779.6	783.7	779.6	785.1	777.9	785.1	777.9	787.2	780.1	787.2	780.1
1973.	796.4	787.5	796.4	787.5	798.4	789.5	798.4	789.5	801.7	792.7	801.7	792.7
1974.	807.9	797.2	807.9	797.2	810.6	799.9	810.6	799.9	815.1	804.3	815.1	804.3
1975.	818.4	806.0	818.4	806.0	821.9	809.4	821.9	809.4	827.5	815.0	827.5	815.0
1976.	824.8	810.7	824.8	810.7	829.0	814.8	829.0	814.8	835.8	821.6	835.8	821.6
1977.	826.7	811.0	826.7	811.0	831.6	815.8	831.6	815.8	839.6	823.7	839.6	823.7
1978.	822.2	804.9	822.2	804.9	827.7	810.3	827.7	810.3	836.8	819.2	836.8	819.2
1979.	807.4	788.8	807.4	788.8	813.5	794.7	813.5	794.7	823.6	804.6	823.6	804.6
1980.	786.6	766.8	786.6	766.8	793.2	773.2	793.2	773.2	804.1	783.9	804.1	783.9
1981.	763.2	742.5	763.2	742.5	770.2	749.3	770.2	749.3	781.9	760.6	781.9	760.6
1982.	741.2	719.8	740.6	719.2	748.6	727.0	748.0	726.4	761.0	739.0	760.3	738.4
1983.	730.7	708.8	724.6	702.7	738.7	716.5	732.5	710.4	751.9	729.3	745.6	723.1
1984.	736.8	714.2	712.8	690.3	745.4	722.5	721.1	698.4	759.7	736.4	735.0	711.8
1985.	757.1	733.5	706.7	683.5	756.8	742.7	715.6	692.0	782.4	758.0	730.3	706.3
1986.	789.1	764.2	706.7	682.6	779.7	774.4	716.1	691.8	817.2	791.4	731.8	705.9
1987.	826.7	799.9	710.5	686.1	808.4	811.2	721.0	695.9	857.9	830.1	737.8	712.1
1988.	865.4	826.6	722.3	696.5	838.4	849.2	733.1	707.0	900.0	870.1	751.2	724.4
1989.	904.8	874.1	736.5	709.7	867.9	887.9	748.2	720.9	943.1	911.0	767.6	739.7
1990.	944.7	911.8	751.4	723.4	898.4	927.0	764.0	735.5	986.7	952.4	784.8	755.6
1991.	984.4	949.4	766.5	737.3	928.6	966.1	779.9	750.2	1030.2	993.8	802.3	771.7
1992.	1023.3	986.1	781.3	750.9	1042.1	1004.2	795.7	764.7	1073.3	1034.4	819.5	787.7
1993.	1060.6	1021.2	795.8	764.2	1080.9	1040.8	811.1	778.9	1114.8	1073.4	836.5	803.3
1994.	1095.6	1054.0	809.6	776.9	1117.6	1075.1	825.8	792.4	1154.1	1110.3	852.8	818.3
1995.	1127.8	1084.0	822.6	788.7	1151.3	1106.6	839.7	805.1	1190.5	1144.2	868.3	832.5
1996.	1156.5	1110.6	834.3	799.2	1181.6	1134.7	852.4	816.6	1223.4	1174.8	882.5	845.4
1997.	1181.5	1133.5	844.4	808.3	1208.1	1159.0	863.4	826.5	1252.4	1201.5	895.1	856.9
1998.	1202.5	1152.4	852.8	815.7	1230.6	1179.3	872.7	834.7	1277.4	1224.2	905.9	866.5
1999.	1219.3	1167.3	859.2	821.0	1248.8	1195.6	880.0	840.9	1297.9	1242.6	914.6	874.0
2000.	1232.1	1178.3	863.5	824.4	1263.0	1207.8	885.1	845.0	1314.3	1256.9	921.1	879.4

SOURCE: Tables C-31 through C-34.

[a]High Enrollment Growth is Population Series B with high enrollment rate growth. Medium-High Enrollment Growth is Population Series B with low enrollment rate growth. Medium-Low Enrollment Growth is Population Series E with high enrollment rate growth. Low Enrollment Growth is Population Series E with low enrollment rate growth.

Table C-38

REQUIREMENTS FOR PARATEACHERS BY RATE OF IMPROVEMENT AND ENROLLMENT GROWTH--
PRESCHOOL ELEMENTARY AND SECONDARY COMBINED, 1970-2000[a]

(in thousands)

Enrollment Growth	Current Inputs				Medium Improvement				High Improvement			
Year	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low
1970.	47.6	47.6	47.6	47.6	47.6	47.6	47.6	47.6	47.6	47.6	47.6	47.5
1971.	64.2	51.4	64.2	51.4	81.4	68.5	81.4	68.5	110.0	96.9	110.0	96.9
1972.	80.6	55.7	80.6	55.7	114.9	89.5	114.9	89.5	171.9	145.9	171.9	145.9
1973.	99.2	61.6	96.5	59.9	150.2	111.8	147.4	110.1	235.3	195.4	232.4	193.6
1974.	120.3	68.9	112.5	64.5	188.0	135.1	179.9	130.4	300.9	245.4	292.3	240.3
1975.	145.1	78.1	129.8	69.8	229.8	160.3	213.1	150.9	371.0	297.2	352.0	286.0
1976.	173.0	88.4	147.1	75.2	275.2	186.9	245.9	170.8	445.8	351.1	410.8	330.2
1977.	202.6	99.2	167.2	81.9	323.4	214.7	281.7	191.9	524.7	407.2	472.5	375.4
1978.	234.3	110.7	188.7	89.2	374.9	244.1	319.0	213.6	609.2	466.5	536.2	421.0
1979.	268.0	122.9	210.8	96.7	430.3	275.7	357.4	235.7	700.6	530.3	601.8	467.6
1980.	303.7	135.6	233.7	104.3	489.9	309.8	397.5	258.7	800.2	600.0	670.5	516.0
1981.	341.1	148.8	257.1	112.2	553.8	346.5	439.1	282.6	908.4	676.0	742.4	566.7
1982.	379.7	162.4	281.2	120.3	621.8	386.0	482.4	307.5	1025.3	758.7	817.7	619.7
1983.	419.2	176.1	305.7	128.4	693.3	427.9	527.3	333.5	1150.1	847.7	896.6	675.3
1984.	459.1	189.7	330.5	136.6	767.6	471.8	574.0	360.8	1281.8	941.9	979.8	734.5
1985.	498.9	203.3	355.3	144.7	844.1	517.4	622.0	389.0	1419.4	1041.0	1066.4	796.2
1986.	534.1	214.8	377.9	152.0	917.5	562.5	668.6	417.1	1556.5	1142.1	1153.0	858.9
1987.	570.1	226.5	400.8	159.3	993.4	609.1	716.2	445.7	1698.8	1246.7	1241.9	923.2
1988.	606.8	238.5	424.0	166.7	1071.1	656.7	765.0	475.1	1844.9	1353.6	1333.4	989.2
1989.	644.2	250.7	447.4	174.1	1150.3	704.9	814.6	504.9	1993.9	1462.0	1426.6	1056.3
1990.	682.3	263.2	471.1	181.7	1230.9	753.5	864.8	534.9	2145.1	1570.9	1521.0	1123.6
1991.	714.3	273.2	489.7	187.3	1304.	799.3	909.4	562.5	2288.4	1676.0	1608.8	1188.9
1992.	746.5	283.3	508.1	192.8	1382.4	844.5	953.6	589.8	2442.1	1779.9	1695.9	1251.5
1993.	778.9	293.4	526.4	198.3	1452.0	889.3	997.3	616.6	2573.7	1882.3	1782.1	1313.7
1994.	811.4	303.6	544.4	203.7	1525.3	933.4	1040.3	642.7	2715.3	1982.9	1866.9	1374.4
1995.	844.0	313.9	562.2	209.1	1598.6	976.9	1082.7	668.2	2856.3	2082.0	1950.2	1433.3
1996.	885.8	327.5	590.0	214.4	1682.4	1024.0	1124.6	692.9	3010.2	2184.9	2032.1	1490.5
1997.	928.4	341.3	597.6	219.7	1767.5	1071.3	1165.7	[illegible]0	3166.2	2283.0	2112.5	1545.9
1998.	971.7	355.4	615.1	225.0	1854.2	1119.3	1206.3	[illegible].5	3325.1	2392.4	2191.7	1599.8
1999.	1015.8	369.8	632.3	230.1	1943.1	1168.3	1246.4	763.5	3488.4	2499.1	2269.8	1652.4
2000.	1060.7	384.3	649.4	235.3	2034.4	1218.8	1286.1	786.1	3657.3	2609.5	2347.4	1704.3

SOURCE: Tables C-31 through C-34.

[a]High Enrollment Growth is Population Series B with high enrollment rate growth. Medium-High Enrollment Growth is Population Series B with low enrollment rate growth. Medium-Low Enrollment Growth is Population Series E with high enrollment rate growth. Low Enrollment Growth is Population Series E with low enrollment rate growth.

REQUIREMENTS FOR TEACHERS BY RATE OF IMPROVEMENT AND ENROLLMENT GROWTH--
PRESCHOOL ELEMENTARY, AND SECONDARY COMBINED, 1970-2000[a]

(in thousands)

Enrollment Growth	Current Inputs					Medium Improvement				High Improvement			
Year	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low
1970	2289.0	2283.7	2289.0	2283.7	2289.0		2289.0	2283.7	2289.0	2283.7	2289.0	2283.7
1971	2297.6	2285.6	2297.6	2285.6	2295.7		2295.7	2283.7	2292.6	2280.7	2292.6	2280.7
1972	2296.8	2278.2	2296.8	2278.2	2293.0		2293.0	2274.5	2286.7	2268.3	2286.7	2268.3
1973	2289.7	2264.6	2288.8	2264.0	2283.9	2258.9	2283.0	2258.4	2274.3	2249.5	2273.4	2249.0
1974	2283.5	2251.5	2278.0	2246.9	2276.0		2270.2	2239.4	2263.0	2231.3	2257.3	2226.7
1975	2278.9	2243.8	2260.5	2223.2	2274.0		2250.7	2213.6	2257.5	2218.2	2234.3	2197.8
1976	2290.9	2242.3	2240.9	2197.4	2278.9	2233.8	2229.0	2185.9	2258.8	2211.5	2209.2	2166.8
1977	2304.6	2247.2	2223.2	2172.9	2290.4		2209.3	2159.6	2266.7	2211.1	2186.1	2137.4
1978	2324.4	2257.7	2206.4	2149.1	2308.0		2190.5	2133.9	2280.8	2216.4	2164.0	2108.7
1979	2349.5	2273.1	2189.3	2125.0	2331.1		2171.5	2109.2	2300.4	2227.1	2141.9	2080.3
1980	2384.4	2298.2	2176.3	2105.2	2364.0		2156.8	2086.9	2330.0	2247.7	2124.4	2056.4
1981	2430.1	2333.8	2168.7	2090.8	2407.7		2147.6	2071.1	2370.4	2279.0	2112.3	2038.3
1982	2487.7	2381.4	2167.8	2083.2	2463.4	2359.1	2145.0	2062.2	2422.7	2322.1	2107.1	2027.1
1983	2551.3	2444.7	2177.4	2086.2	2534.6	2429.5	2152.9	2063.7	2490.1	2380.2	2112.0	2026.1
1984	2651.1	2533.9	2197.1	2099.0	2621.6	2506.1	2170.7	2075.0	2572.4	2453.2	2126.7	2034.8
1985	2753.5	2615.4	2224.6	2119.6	2720.6	2586.1	2196.2	2093.8	2665.9	2537.2	2148.8	2050.9
1986	2853.3	2715.0	2257.2	2145.6	2826.7	2682.4	2226.5	2118.0	2765.7	2628.1	2175.4	2071.9
1987	2975.3	2816.1	2293.0	2174.8	2934.6	2780.6	2260.0	2145.2	2866.7	2719.6	2204.8	2095.7
1988	3083.9	2913.5	2334.4	2209.4	3038.8	2873.6	2298.6	2177.5	2963.6	2807.1	2239.0	2124.2
1989	3187.6	3006.1	2376.5	2244.6	3137.9	2964.1	2337.9	2210.3	3055.1	2889.1	2273.5	2153.9
1990	3285.5	3092.4	2416.8	2277.5	3231.0	3051.1	2375.2	2241.0	3140.1	2964.5	2305.8	2179.6
1991	3374.1	3170.9	2452.5	2307.6	3314.6	3118.8	2407.9	2268.2	3215.6	3031.8	2333.5	2202.5
1992	3473.7	3241.6	2484.5	2333.8	3409.1	3205.1	2436.9	2291.8	3301.5	3091.0	2357.5	2221.9
1993	3527.8	3304.2	2512.7	2356.2	3468.2	3264.2	2461.9	2311.6	3342.1	3142.0	2377.3	2237.3
1994	3592.8	3353.9	2536.7	2374.5	3518.0	3311.7	2482.8	2327.3	3393.2	3185.0	2393.0	2248.7
1995	3650.7	3406.6	2556.1	2388.7	3570.6	3361.0	2499.5	2338.9	3437.2	3221.0	2404.4	2255.9
1996	3705.4	3449.0	2572.2	2398.9	3619.9	3397.1	2512.0	2346.5	3477.6	3251.8	2411.8	2259.2
1997	3755.4	3486.7	2584.0	2405.3	3664.7	3408.4	2520.7	2350.4	3513.4	3278.0	2415.3	2258.9
1998	3802.3	3521.0	2592.4	2408.4	3706.2	3439.1	2526.1	2351.0	3546.1	3301.0	2415.6	2255.3
1999	3847.3	3553.4	2597.8	2409.4	3746.0		2528.5	2348.7	3577.1	3322.5	2413.1	2249.1
2000	3892.4	3585.6	2600.8	2406.3	3785.9	3495.1	2528.7	2344.3	3608.4	3344.0	2408.4	2240.8

SOURCE: Tables C-31 through C-34.

[a]High Enrollment Growth is Population Series B with high enrollment rate growth. Medium-High Enrollment Growth is Population Series B with low enrollment rate growth. Medium-Low Enrollment Growth is Population Series E with high enrollment rate growth. Low Enrollment Growth is Population Series E with low enrollment rate growth.

REQUIREMENTS FOR INSTRUCTIONAL PERSONNEL, TEACHERS AND PARATEACHERS COMBINED, BY RATE OF IMPROVEMENT AND ENROLLMENT GROWTH--PRESCHOOL, ELEMENTARY AND SECONDARY COMBINED, 1970-2000[a]

(in thousands)

Enrollment Growth	Current Inputs				Medium Improvement				High Improvement			
Year	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low	High	Medium High	Medium Low	Low
1970.	2336.6	2331.3	2336.6	2331.3	2336.6	2331.3	2336.6	2331.3	2336.6	2331.3	2336.6	2331.3
1971.	2361.8	2337.0	2361.8	2337.0	2377.1	2352.2	2377.1	2352.2	2402.7	2377.6	2402.7	2377.6
1972.	2377.4	2334.0	2377.4	2334.0	2407.8	2364.1	2407.8	2364.1	2458.6	2414.2	2458.6	2414.2
1973.	2388.8	2326.2	2385.2	2323.9	2434.1	2370.7	2430.5	2368.4	2509.6	2444.9	2505.9	2442.6
1974.	2404.1	2320.5	2390.9	2311.4	2464.0	2379.1	2450.1	2369.8	2563.9	2476.7	2549.6	2467.1
1975.	2429.1	2321.8	2390.2	2293.0	2503.9	2394.5	2463.8	2364.5	2628.5	2515.5	2596.3	2493.8
1976.	2463.9	2330.7	2388.0	2272.5	2554.2	2417.7	2475.0	2356.7	2704.6	2562.6	2620.0	2497.0
1977.	2507.2	2346.4	2390.4	2254.9	2613.8	2448.4	2491.0	2351.6	2791.5	2618.3	2658.6	2512.7
1978.	2558.7	2368.4	2395.1	2238.3	2682.9	2486.3	2509.5	2347.6	2890.0	2682.9	2700.2	2529.7
1979.	2617.5	2396.0	2400.1	2221.7	2761.3	2531.6	2529.0	2344.0	3001.0	2757.5	2743.7	2547.8
1980.	2688.1	2433.8	2410.0	2209.6	2853.9	2589.1	2554.3	2345.7	3130.2	2847.7	2794.9	2572.5
1981.	2771.2	2482.7	2425.8	2203.0	2961.6	2659.8	2586.7	2353.7	3278.9	2955.0	2854.7	2605.0
1982.	2867.5	2543.8	2449.0	2203.5	3085.2	2745.1	2627.4	2369.7	3448.0	3080.8	2924.8	2646.8
1983.	2980.5	2620.7	2483.1	2214.6	3227.9	2848.4	2680.2	2397.2	3640.2	3227.9	3008.6	2701.4
1984.	3110.1	2715.7	2537.5	2235.6	3 [illegible] 9.1	2969.2	2744.6	2435.8	3854.1	3395.1	3106.5	2769.3
1985.	3252.4	2818.7	2579.9	2264.4	3564.7	3103.5	2818.1	2482.9	4085.3	3578.2	3215.2	2847.1
1986.	3397.4	2929.8	2635.1	2297.6	3744.2	3244.9	2895.1	2535.0	4322.2	3770.2	3328.3	2930.8
1987.	3545.4	3042.6	2693.9	2334.1	3927.9	3389.0	2976.2	2590.9	4565.5	3966.4	3446.7	3018.9
1988.	3690.7	3152.0	2758.4	2376.1	4109.8	3530.3	3063.6	2652.6	4808.5	4160.7	3572.4	3112.5
1989.	3831.3	3256.8	2824.0	2418.8	4288.3	3667.2	3152.5	2715.2	5049.0	4351.1	3700.1	3209.2
1990.	3967.3	3355.6	2887.9	2459.6	4461.8	3798.2	3240.9	2775.9	5285.2	4536.4	3826.8	3303.1
1991.	4088.4	3444.1	2942.2	2494.9	4619.3	3911	3317.2	2830.8	5504.0	4707.8	3942.3	3390.5
1992.	4220.3	3524.9	2992.7	2526.7	4771.5	[illegible]	3390.4	2881.7	5743.6	4870.9	4053.4	3473.4
1993.	4336.7	3597.7	3039.0	2554.5	4910.1	4132.6	3451.2	2928.2	5915.8	5024.3	4159.4	3551.0
1994.	4404.2	3662.6	3081.1	2578.3	5043.3	4227.1	3523.1	2970.1	6108.6	5167.9	4259.9	3623.1
1995.	4494.7	3720.4	3118.7	2597.8	5159.2	4313.9	3582.2	3007.1	6293.5	5303.0	4354.6	3689.2
1996.	4591.2	3776.5	3152.2	2613.3	5302.4	4399.1	3636.6	3039.4	6487.8	5436.7	4443.9	3749.6
1997.	4683.8	3828.0	3181.6	2625.0	5432.2	4479.8	3686.5	3067.4	6679.5	5566.0	4527.9	3804.7
1998.	4774.0	3876.4	3207.4	2633.3	5560.4	4557.8	3732.4	3091.5	6871.2	5693.4	4607.3	3855.1
1999.	4863.2	3923.2	3230.1	2638.6	5689.0	4635.1	3774.9	3112.2	7065.5	5821.6	4682.9	3901.4
2000.	4953.1	3969.9	3250.2	2641.6	5820.3	4713.8	3814.8	3130.4	7265.6	5953.6	4755.8	3945.1

SOURCE: Tables C-38, C-39.

[a]High Enrollment Growth is Population Series B with high enrollment rate growth. Medium-High Enrollment Growth is Population Series B with low enrollment rate growth. Medium-Low Enrollment Growth is Population Series E with high enrollment rate growth. Low Enrollment Growth is Population Series E with low enrollment rate growth.