



SCIENCE & TECHNOLOGY POLICY INSTITUTE

The National Defense Education Act of 1958: Selected Outcomes

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Preface

This document was prepared for the Office of Science and Technology Policy, Executive Office of the President, under the “Science and Technology Policy Institute (Omnibus Task)” task.

The authors would like to thank Paul Lagasse for his help in editing the series of original briefing documents that form the basis for this report. The authors would also like to thank Nyema Mitchell (STPI) and Technical Editor John Everett (IDA) for their editorial help in the preparation of this document.

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Executive Summary

In 1958, the U.S. Congress enacted the National Defense Education Act (NDEA) (P.L. 85-864)¹ to ensure the security of the Nation through the “fullest development of the mental resources and technical skills of its young men and women ...” Key features of the legislation included a student loan program to colleges and universities to increase the flow of talent into science, mathematics, and foreign language careers; a “National Defense Fellowship” for graduate study toward a college teaching career; and a wide array of programs to enhance pre-college teacher training and public understanding of science and technology. The immediate catalyst for the legislation was the Soviet Union’s launch of the Sputnik satellite in 1957, which directly challenged the scientific, technological, and military prowess of the United States. However, the momentum for the type of comprehensive Federal education legislation that NDEA represented actually predated Sputnik by at least a decade. President Eisenhower signed the NDEA into law in September 1958.

In 2005, the White House Office of Science and Technology Policy (OSTP) asked the Science and Technology Policy Institute (STPI) to assess the effects of NDEA on increasing the nation’s science and technology (S&T) capabilities, with emphasis on its impact in promoting the growth of the college teaching workforce in those areas. STPI limited the scope of its 4-month analysis to 4 of the 10 major provisions of the NDEA:²

- **Title II.** Loans to Students in Institutions of Higher Education
- **Title III.** Financial Assistance for Strengthening Science, Mathematics, and Modern Foreign Language Instruction
- **Title IV.** National Defense Fellowships
- **Title V.** Guidance, Counseling and Testing; Identification and Encouragement of Able Students.

¹ The Public Law (P.L.) number follows the form **P.L. 85-864**, meaning this law is the 864th law passed by the 85th Congress.

² The other provisions of the NDEA are as follows: Title I: General Provisions; Title VI: Language Development; Title VII: Research and Experimentation in More Effective Utilization of Television, Radio, Motion Pictures, and Related Media for Educational Purposes; Title VIII: Area Vocational Programs; Title IX: Science Information Service; Title X: Miscellaneous Provisions.

STPI began by tracing the legislative and fiscal history of each of the four NDEA Titles, identifying the status of extant programs in Fiscal Year (FY) 2005, and summarizing findings in the form of a Technical Memorandum (TM). Subsequently, STPI conducted an extensive review of the literature, identifying formal evaluations of the pertinent NDEA Titles by contemporary authors and selecting key findings for use in this retrospective analysis. The report that follows presents key highlights of STPI's findings. It begins with a discussion of the historical context within which the NDEA was developed. The report then presents selected administrative and legislative changes over the years, and some effects of each of the four Titles on the education infrastructure in the United States. The report closes with a brief overview of contemporary issues in American education related to those originally addressed by the NDEA.

Section I.
Background and Context for P.L. 85-864,³
The National Defense Education Act (NDEA)

When President Dwight D. Eisenhower signed the National Defense Education Act (NDEA) into law on September 2, 1958, he was responding to a perceived national threat represented by the Soviet Union's launch of the Sputnik I satellite the previous year. In the years following World War II, science and technology (S&T) had become key measures of a nation's military prowess and international strength. The NDEA's funding of science, engineering, and foreign language education would, it was hoped, enable the United States to regain scientific and technological preeminence over its Cold War rival.

However, the launch of Sputnik I was only the immediate catalyst for the legislation in its final form. The momentum for the passage of comprehensive federal education legislation could be traced back at least a decade to the President's Commission on Higher Education of 1947, which proposed a national goal of having one-third of the young men and women in the United States graduate from 4-year colleges. Three years later, an increased focus on national defense because of the Korean Conflict prompted the National Institutes of Health (NIH) to reintroduce training grants, fellowships, and teaching grants. In the early 1950s, the National Science Foundation (NSF) began to fund education and training activities, such as individual fellowships and teacher training institutes. By 1957, this support had expanded to include cooperative graduate fellowships (i.e., institutional training grants).

Originally described by President Eisenhower as "short-term emergency legislation" to address the so-called "Sputnik Crisis," the NDEA was intended to complement and augment more selectively targeted federal educational programs (i.e., those of NIH and NSF) through the Office of Education within the Department of Health, Education,

³ The Public Law (P.L.) number follows the form P.L. 85-864, meaning this law was the 864th law passed by the 85th Congress.

and Welfare (HEW).⁴ The NDEA's emphasis on "general education" was intended to strengthen the U.S. educational infrastructure by steering people into teaching and guidance counseling careers. The provisions of the NDEA also promoted greater access to post-secondary education and broader geographic distribution of federal education funding. In addition to passing the NDEA, Congress also passed P.L. 85-568, the National Aeronautics and Space Act of 1958, which sought "... to recruit specially qualified scientific and engineering talent" that the NDEA would create (U.S. Congress. *National Aeronautics and Space Act of 1958*, P.L. 85-568). P.L. 85-568 was signed into law by President Eisenhower on July 29, 1958.

For the years that the NDEA provisions were in force (roughly 1959–1973), many areas covered by the legislation experienced broad positive trends. For example, observers noted increases in the number of first-time freshman and postsecondary enrollments, in the number of bachelors and doctoral degrees attained, and in the number of degree-granting institutions established. Although the post-war baby boom caused primary and secondary school enrollments to increase dramatically, the influx of new teachers enabled student-to-teacher ratios to decrease.

Long after the sense of urgency created by Sputnik has dissipated, the impact of federal support for student loans and fellowships, infrastructure development, and career counseling continues to be felt. The subsequent sections of this document review how each of these programs was administered and funded as part of the NDEA and explore their long-term effects on S&T education in the United States since 1958.

In 2005, the White House Office of Science and Technology Policy (OSTP) asked the Science and Technology Policy Institute (STPI) to assess the effects of NDEA on increasing the nation's S&T capabilities, with emphasis on its impact in promoting the growth of the college teaching workforce in those areas. STPI limited the scope of its 4-month analysis to 4 of the 10 major provisions of the NDEA:⁵

⁴ The United States Department of Health, Education and Welfare (also known as HEW) was a cabinet-level department of the United States government from 1953 until 1979. In 1979, a separate Department of Education was created from this department, and HEW was renamed the Department of Health and Human Services (HHS).

⁵ The other provisions of the NDEA are as follows: Title I: General Provisions; Title VI: Language Development; Title VII: Research and Experimentation in More Effective Utilization of Television, Radio, Motion Pictures, and Related Media for Educational Purposes; Title VIII: Area Vocational Programs; Title IX: Science Information Service; Title X: Miscellaneous Provisions.

- **Title II.** Loans to Students in Institutions of Higher Education
- **Title III.** Financial Assistance for Strengthening Science, Mathematics, and Modern Foreign Language Instruction
- **Title IV.** National Defense Fellowships
- **Title V.** Guidance, Counseling and Testing; Identification and Encouragement of Able Students.

STPI began by tracing the legislative and fiscal history of each of the four NDEA Titles, identifying the status of extant programs in fiscal year (FY) 2005,⁶ and summarizing findings. Subsequently, STPI conducted an extensive review of the literature, identifying formal evaluations of the pertinent NDEA Titles by contemporary authors and selecting key findings for use in this retrospective analysis.

Sections II–V of this report present the key highlights of STPI’s findings. Each section includes an overview of the Title under discussion, selected administrative and legislative changes over the years, and some effects that the Title had on the education infrastructure in the United States. The report closes with a brief overview of contemporary issues in American education related to those originally addressed by the NDEA (Section VI) and some conclusions (Section VII) based on the findings.

Appendix A provides an Annotated Bibliography of published and unpublished sources used in the development of this report.

Appendix B provides graphs that supplement the information in the main body of this report.

⁶ The fiscal year is the accounting period for the federal government which begins on October 1 and ends on September 30. The fiscal year is designated by the calendar year in which it ends. For example, FY 2007 begins on October 1, 2006, and ends on September 30, 2007. That said, in several places in this document, the reader will encounter a statement that says “fiscal year ending June 30...” Initially, the federal fiscal year coincided with the calendar year. However, in 1842, President John Tyler signed legislation changing the fiscal year to a July 1 to June 30 cycle. Beginning with FY 1977, the Congressional Budget Act of 1974 changed the fiscal year to its current October 1–September 30 cycle.

Section II.

NDEA Title II: Loans to Students in Institutions of Higher Education

A. Overview

Title II of the NDEA established the National Defense Student Loan (NDSL) Program to provide low-interest federal loans to promising yet needy students to enable them to pursue undergraduate and graduate educations. Title II loans were especially targeted toward students who possessed superior capacity in mathematics, engineering, or a modern foreign language or who desired to teach in elementary or secondary schools. A further intention of Title II was “to stimulate and assist in the establishment [of loan programs] at institutions of higher education” through the provision of NDSL loans (U.S. Congress. *National Defense Education Act of 1958*, P.L. 85-864).

Title II spurred the creation of federal- and university-funded college loan programs that still exist today. The program provided study and military deferments and offered loan forgiveness of up to 50 percent at a rate of 10 percent per year for students who chose to serve as full-time teachers in public elementary or secondary schools. However, subsequent analysis of Title II programs found “no evidence ... that the teacher cancellation provisions ... materially contributed to an increase in either the number or quality of teachers” (Jordan, 1982).

B. Administration of Title II

The Commissioner of Education, Office of Education, HEW, administered the Title II loan program. The amount of loan money provided by Title II varied from state to state—in direct proportion to the number of students enrolled in institutions of higher learning within each state. If a state did not request its full allocation during a year, Title II allowed the remainder to be redistributed among other states.

Funds were provided directly to schools, but no school received more than \$250,000 each fiscal year. Every participating school was required to match at least one-ninth of the federal loan funds it received each year. However, for the first 2 years of the program, a set-aside of \$1 million per year was available for disbursement to institutions

that were unable to provide matching funds.⁷ In return, the schools were responsible for administering funds in accordance with the law and with HEW Office of Education guidelines.⁸ Table II-1 lists the authorized appropriations in support of the Title II loan program through 1963.

Table II-1. Total Title II Funds Authorized: 1959–1962
(Source: Carlson, 1959)

School Year Ending	Total Funds Authorized (\$ Millions)
1959	47.5
1960	75
1961	82.5
1962	90
1963	“Such sums as may be necessary for students previously receiving Title II loans to continue their education” ⁹
Total (through 1962)	295

Note for Table II-1: Carlson is referencing funding that was mandated through 1963.

Title II permitted loan funds to be distributed to students who were entering college, to students who were continuing college, and to graduate students¹⁰ (Carlson, 1959). Eligible students received up to \$1,000 per year, with a capped total of \$5,000. To remain eligible for the student loan program, recipients were required to maintain good academic standing in their chosen course of study. The interest on these loans was deferred until 1 year after leaving school or 1 year after graduating, at which time it accrued at a rate of 3 percent per year. Students repaid their loans in full over 10 equal annual installments.

⁷ In 1960, the institutional loan provision of Title II was deemed unnecessary, and its funds were allocated for additional student loans.

⁸ Under the original administrative provisions outlined in Title X of the NDEA, participating institutions were required to administer a loyalty oath to those students receiving loans.

⁹ This included students who had not completed coursework by the end of the 1962 school year.

¹⁰ According to a letter distributed by the Office of Education in the summer of 1959 (reversing a previous determination), doctoral students were eligible to receive federal aid under Title II and Title IV (graduate fellowships) at the same time.

Although Congress appropriated the full amounts authorized by the Act for 1958 through 1963, the funds took longer than expected to reach institutions during the first year of the program. As a result, allocations did not begin until February 1959¹¹ (Hall, 1961). In the school year ending in 1959, 1,188 institutions had loaned \$9.5 million to 24,831 students. By the end of the school year in 1964, approximately 600,000 undergraduate and graduate students had borrowed \$443 million to complete their education¹² (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a). Of that amount, 10 percent represents required institutional contributions (see Table II-2).

Table II-2. NDSL Loans: 1959–1964
 (Source: U.S. Department of Health, Education, and Welfare, 1964; U.S. Department of Health, Education, and Welfare. Office of Education, 1964a)

School Year Ending ¹³	Number of Students Borrowing	Total Federal and Institutional Allocations (\$ Millions)	Number of Institutions Participating
1959	24,831	9,501,676	1,188
1960	115,450	50,151,908	1,363
1961	151,068	70,962,824	1,417
1962	186,465	89,109,307	1,476
1963	216,930	103,727,964	1,536
1964	247,000	119,500,000	1,574
Total	Approx. 600,000	442,953,679	8,554

¹¹ As a result, the appropriated federal funds were not fully spent in the first few years. Therefore, funds were carried over for the following years. However, by fall 1960, total loan requests by schools were greater than the funds available, including carryover from previous years.

¹² The total NDSL allocations reported are \$444.5 million, which differs slightly from the total here. According to the 1964 HEW Annual Report, “the total amount actually borrowed (\$453 million) is in excess of the aggregate NDSL fund of \$444.5 million because repayments on loans are deposited in the various institutional funds and become available for relending” (U.S. Department of Health, Education, and Welfare, 1964).

¹³ The data for 1959–1963 are taken from *Report on the National Defense Education Act, Fiscal Year 1963: A Summary of Programs Administered by the Office of Education Under Public Law 85-864* (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a). The data for 1964 and the data in the **Total** row are taken From *1964 Annual Report U.S. Department of Health Education and Welfare* (U.S. Department of Health, Education, and Welfare, 1964). Rounded numbers are reported.

C. Legislative History of Title II

The NDEA Amendments of 1964 extended and expanded funding for the Act for FY 1964 and FY 1965, increased the annual funding cap for institutions from \$250,000 to \$800,000,¹⁴ and removed special considerations given to students who indicated a desire to teach. At the same time, the amendments added a requirement that students had to enroll at least half time to qualify for Title II loans and introduced a loan-forgiveness mechanism for those students who would go to work in private nonprofit schools, institutions of higher learning, and elementary and secondary schools on overseas military bases. These amendments extended the repayment deferment to students who continued their education in schools outside the United States (Jordan, 1982; U.S. Department of Health, Education, and Welfare, 1964).

The Higher Education Act (HEA) of 1965 (P.L. 89-329) also amended the NDEA. Guided by the principle that “there could be no true excellence ... with the encouragement of the academically gifted and neglect of the majority,” the HEA eliminated superior grades as a factor in making loan awards (Cohen, 1968). The HEA also extended loan-cancellation provisions for recipients who accepted teaching positions in selected schools that had high concentrations of low-income families. The annual maximum individual loan amount was increased from \$1,000 to \$2,500 for graduate students, and the maximum lifetime loan amount for combined undergraduate and graduate study was increased to \$10,000. In addition, the HEA implemented a new loan program called the Guaranteed Student Loan (GSL) Program, which was not limited to needy families. In fact, it contained no income requirements for eligibility. The GSL Program, which was aimed at middle-income families, established a system of loans—some of them subsidized¹⁵—for which anyone could apply through his or her college and that were guaranteed by either state or private nonprofit organizations (U.S. Department of Health, Education, and Welfare. Office of Education, 1967).

In 1970, Title II was amended further to expand loan forgiveness for students who went on to teach in underprivileged areas (Harden, 1981). In 1972, the NDSL (National Defense Student Loan Program) was renamed the National Direct Student Loan Program

¹⁴ Congress increased the institutional cap because in 1963, eligible students at 87 institutions whose requests had exceeded the \$250,000 cap were either denied NDSLs or were awarded loans below the amount for which they were qualified.

¹⁵ For families who had an annual income of \$15,000 or below, the federal government would subsidize the loan (i.e., pay the interest while the student was in school).

(retaining NSDL as the abbreviation). The 1986 reauthorization of the HEA renamed NDSL loans Federal Perkins Loans and, at the same time, created several additional loan programs, including the Supplemental Loan for Students (SLS) and the Federal Family Education Loan (FFEL).¹⁶

D. Intended and Actual Effects of Title II

As noted previously, Title II was intended to improve access to higher education by providing loans to needy students and to address particularly acute national “manpower shortages” in teaching and the educational fields of science, mathematics, engineering, and modern foreign languages.¹⁷ The NDSL Program established by Title II is credited with creating a broad acceptance of student loans as a method of financing post-secondary schooling by improving the accessibility of higher education for needy students, increasing the popularity of financial aid “packages” among colleges and universities, and providing a precedent for subsequent federal student loan and aid programs (Ihrke, 1962; U.S. Congress. Senate. Committee on Appropriations, 1960).

Before passage of the NDEA, many students—even those who worked full time in the summer and part time during the school year—could not afford to attend or complete college. Many students were also unable to obtain loans from private sources. Meanwhile, figures showed that only half of the top quarter of each graduating high school class attended college, possibly, in part, because the students were unable to afford the associated expense of college. Of those who did attend, half dropped out before completing their degrees, often because of the financial burden. Accordingly, the Act recognized the need for “assurance that no student of ability will be denied an opportunity for higher education because of financial need.” Furthermore, because many of the neediest students were unable to obtain loans from private sources, the NDSL Program was intended to provide a source from which these students could obtain loans for a college education. For this same reason, the NDSL Program was also intended to “stimulate and assist” federal college and graduate institutional loan programs at colleges

¹⁶ In 1987, the GSL program was renamed the Stafford Loan Program. Federal Perkins Loans remain as a legacy of Title II today.

¹⁷ The explanation of congressional objectives for Title II presented in the “Guide to the National Defense Act of 1958” (Carlson, 1959), from which this statement is derived, mostly cites previous Office of Education studies referred to in supporting congressional testimony leading up to the passage of the Act.

and universities around the country. To this end, the NDSL Program complemented rather than competed with existing private loan programs (Jordan, 1982; Carlson, 1959).

By 1963, participating schools enrolled approximately 90 percent of full-time college students in the United States, of which approximately 5 percent were NDSL borrowers¹⁸ (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a). Statistics for 1960 and 1963 indicate that between 8 and 10 percent of loans were made to graduate and professional students. The rest were provided to undergraduates. Although the maximum loan per student was \$1,000 per year, the average annual loan per student was between \$400 and \$500 per year from 1958 through 1964. These amounts reflected inadequate federal funding to meet total student need at some institutions and, to a greater extent, students' and families' desires to limit their debt to more manageable levels (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a; U.S. Congress. Senate. Committee on Appropriations, 1960).

Studies showed that, as anticipated, needy students from lower income groups participated heavily in the NDSL Program. According to a survey of 1961 NDSL borrowers, 9 out of 10 borrowers depended on these loans to start and/or continue college. Two out of 5 borrowers were from families who had an annual income of \$4,000 or less, and 5 out of 7 borrowers were from families who had an annual income of \$6,000 or less (U.S. Department of Health, Education and Welfare, 1962). At \$1,500 per year (public) and \$2,000 per year (private), school costs comprised at least 25 to 50 percent of the annual income of families who fell into these categories (Carlson, 1959). Eight of 10 NDSL borrowers financed 50 percent or more of their college costs from sources outside their families, and 3 of 10 financed 100 percent of their college costs from these sources. In 1960, the number of college freshmen receiving NDSL loans was 50 percent more than the numbers of NDSL sophomores, juniors, or seniors. Analysts argued in Congress that this was an indication that NDSLs were opening the door for needy students who could not otherwise afford to go to college (U.S. Congress. Senate. Committee on Appropriations, 1960).

Although it appears that NDSLs made higher education more accessible for those relatively few low-income borrowers who were able to participate, the NDSL Program's direct financial effect on a national scale is less certain. An FY 1963 report on the NDEA pointed out that "the proportion of high school graduates who [went] on to college on a

¹⁸ Of the 1,536 participating institutions in 1963, 577 were public and 959 were private.

full-time basis [remained] 43 percent, roughly the same proportion that prevailed in 1958” (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a). Still, anecdotal evidence suggests that some students were able to enroll in and finish school because of the NDEA. The Act also enabled other students to attend school full time instead of part time by reducing—and, in many cases, eliminating—their non-school-related workload. As a result, it provided support for the idea that federal loans could improve student accessibility to higher education (U.S. Congress. Senate. Committee on Appropriations, 1960).

Overall, Title II loans sparked a significant increase in student loan availability and in the amount available to each student. In 1955–1956, before the passage of the NDEA, 83,000 students borrowed a total of \$13.5 million from all institutional sources. Three years later, immediately following the passage of the NDEA, over 115,000 students borrowed four times that amount through the NDSL Program alone. By 1962, roughly half of the 1,400 institutions participating in the NDSL Program had never offered long-term loans, while those that had previously offered long-term loans now offered more of them (Ihrke, 1962). As part of the implementation of Title II, HEW’s Office of Education worked closely with universities to develop, for the first time, standards for measuring student need. Meanwhile, the Office of Education provided guidance for institutions on loan implementation and counseling (Hall, 1961). As early as 1960, universities were beginning to liberalize the terms of their loan agreements to match those of the NDEA, and the states were increasing the size and number of their loan programs. In an effort to make education more affordable, colleges began to offer aid packages that included loans, scholarships, and employment opportunities. Between 1960 and 1964, the average student loan increased from \$162 to over \$400 per student per year. By 1962, long-term student loan programs were established at 75 percent of American colleges and universities. Statistics such as these support the claim made by Commissioner of Education L. G. Derthick in 1960 that, as a result of the NDEA Title II, “borrowing in order to help meet educational costs has apparently been accepted by students everywhere” (U.S. Congress. Senate. Committee on Appropriations, 1960).

In terms of “ensuring trained manpower of sufficient quality and quantity to meet the national defense needs of the United States” and “correcting as rapidly as possible the existing imbalances in our educational programs which have led to an insufficient proportion of our population educated in science, mathematics, and modern foreign languages and trained in technology,” the effects of Title II are not certain. The number of bachelor’s degrees awarded in education rose more sharply than in other fields following

the implementation of Title II (see Figure II-1). Although the student-to-teacher ratio improved consistently between 1955 and 1980 (see Figure II-2), no substantial evidence correlates the effectiveness of the loan forgiveness provisions with the number of students going on to teach in elementary and secondary schools (Jordan, 1982; Hall, 1961). In the 1958–1959 school year, 55 percent of NDSL borrowers were potential elementary and secondary teachers, and another 20 percent were identified as having shown superior preparation in science, engineering, mathematics, and/or foreign languages. By 1963, those numbers were 46 percent and 21 percent, respectively (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a).

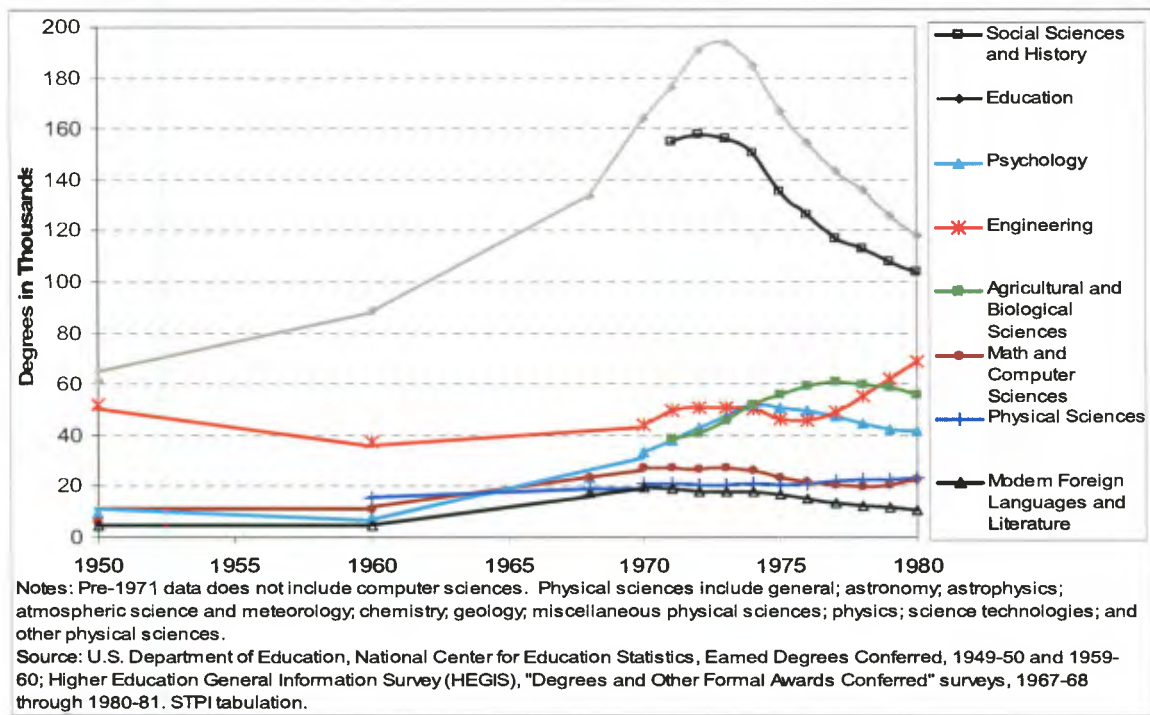


Figure II-1. Bachelor's Degrees Earned by Field: 1950–1980

Note for Figure II-1: See Appendix B (Figure B-1) for data through 2002.

For Title II, the effect of those original loan forgiveness and special consideration provisions, which were intended to encourage more college graduates to become elementary and secondary school teachers, is unclear. In 1958–1959, 13,689 “prospective teachers” received special consideration and loans totaling \$4 million under the NDSL Program. They comprised 55 percent of NDSL borrowers in that year. By 1962–1963, the NDSL Program provided loans to 101,103 “prospective teachers,” comprising 46 percent of the program’s borrowers and totaling \$47 million in loans. By June 1963,

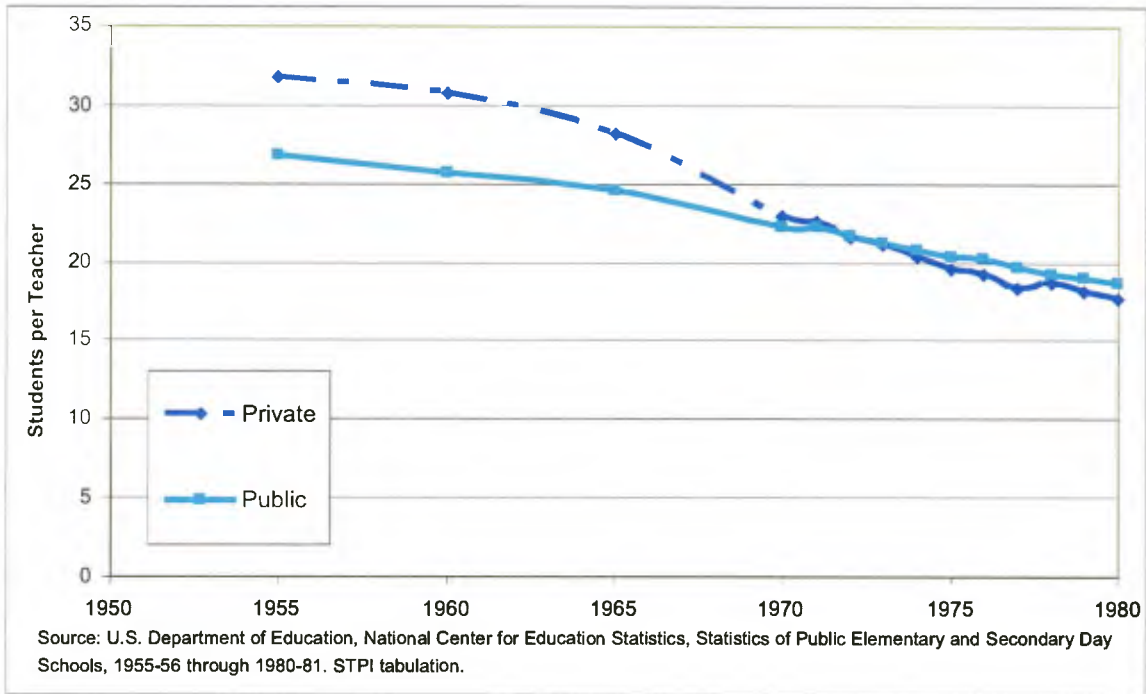


Figure II-2. Student-to-Teacher Ratio: 1955–1980

Note for Figure II-2: See Appendix B (Figure B-2) for data through 2010.

a total of 35,000 teachers had applied for \$3.6 million in NDSL loan cancellations (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a). Meanwhile, despite the growing baby boomer population, the student-to-teacher ratio fell substantially in the years following passage of the NDEA (see Figure II-2), and the percentage of elementary and secondary school teachers with bachelor’s and master’s degrees increased substantially (see Figure II-3). However, the correlation with NDSLs is unknown. Although the number of bachelor’s degrees awarded in education rose more sharply than bachelor’s degrees in some other fields following the implementation of Title II (see Figure II-1), no substantial evidence exists from which to conclude how many of these degree recipients were influenced by NDSLs or how many eventually became elementary or secondary school teachers. Meanwhile, considerable political criticism was directed toward the loan-forgiveness provisions because these provisions were limited to teachers in elementary and secondary public schools—to the exclusion of teachers in colleges, universities, and nonpublic institutions (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a). Amid this political debate, concerns were raised about the effectiveness of these provisions and about the quality of teachers who chose

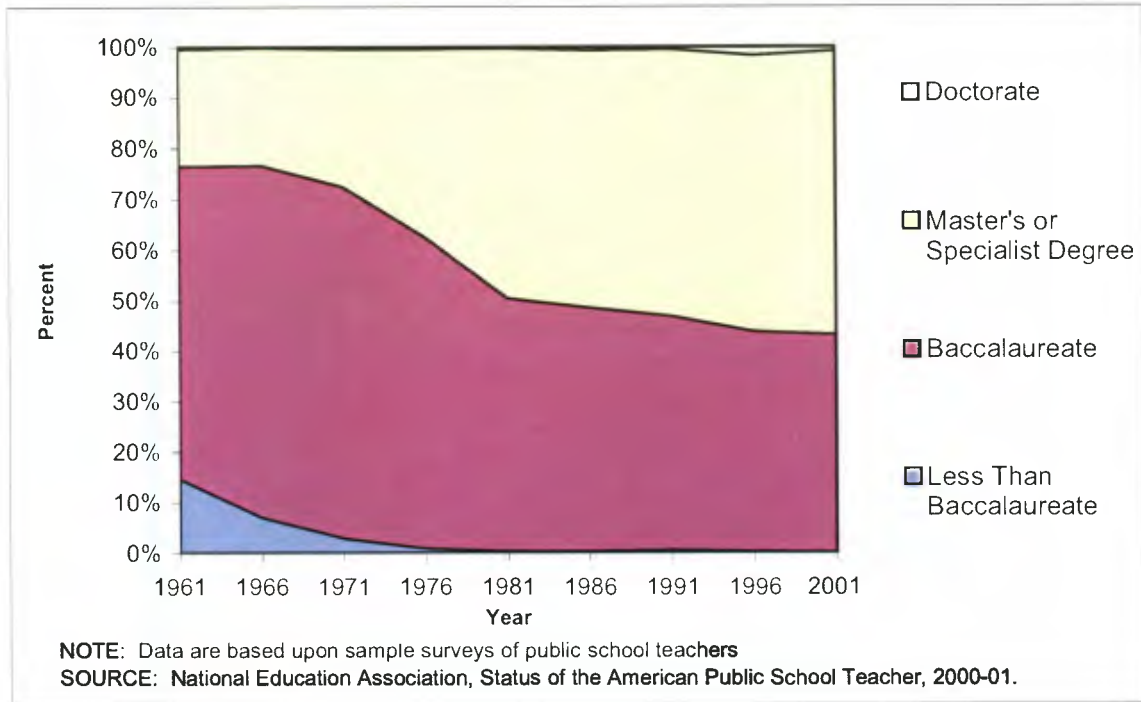


Figure II-3. Highest Degree Earned by Elementary/Secondary School Teachers (Selected Years)

careers on the basis of loan forgiveness. In the end, analysts were unable to find evidence that the loan-forgiveness provisions led to a substantive increase in the number or the quality of teachers (Jordan, 1982; Hall, 1961).

Directly assessing the effect of Title II on people trained in the fields of science, mathematics, technology, and foreign languages is also difficult. Institutions were not required to keep records of NDSL recipients' courses of study, so the only data available are the number of students given special preference under NDSL for superior preparation in science, mathematics, engineering, or modern foreign languages. In 1958–1959, 5,056 students (comprising 20 percent of NDSL borrowers) were loaned \$1.6 million under this provision. In 1962–1963, 45,757 such students (comprising 21 percent of borrowers) were loaned \$22.7 million. Although the number of degrees awarded in many of these key fields increased, attributing this increase directly to the NDSL Program is difficult because of the relatively small fraction of students receiving these loans.

Section III.

NDEA Title III: Financial Assistance for Strengthening Science, Mathematics, and Modern Foreign Language Instruction

A. Overview

The purpose of Title III was to provide matching grants to public schools and loans to nonprofit private schools to enable them to acquire “laboratory and other special equipment, including audio-visual materials and equipment and printed materials (other than textbooks), suitable for use in providing education in science, mathematics, or modern foreign languages” (U.S. Congress. *National Defense Education Act of 1958*, P.L. 85-864). Funds could also be used for “minor remodeling of laboratory or other space used for such materials or equipment” and “improvement of supervisory or related services in public elementary and secondary schools in the fields of science, mathematics, and modern foreign languages” (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a; U.S. Congress. *National Defense Education Act of 1958*, P.L. 85-864).

B. Administration of Title III

Congress funded Title III at \$70 million over a 4-year period, with an additional \$5 million to be provided for supervisory and related services. This included the salaries of subject specialists and managers in local education agencies and provided for in-service workshops to train teachers on the new equipment (U.S. Congress. *National Defense Education Act of 1958*, P.L. 85-864).

After the first year of grants, states reported that high school enrollment in Title III subjects had increased and that college students were better prepared (Ihrke, 1962). Title III grant-funded activities reached 85 percent of all public school children. Subsequent amendments to Title III extended the list of subjects funded to include history, civics, geography, English, reading, economics, and the industrial arts (U. S. Congress. Senate. Committee on Labor and Public Welfare. Subcommittee on Education, 1967d).

To be considered for eligibility to receive Title III funds, state educational agencies were required to submit a state-wide plan to the national Commissioner of

Education. The state-wide plan specified the method for ranking proposed programs within the state for funding priority, established equipment standards, and guaranteed any applicant within a state a hearing before the state agency. The plan was evaluated by the Commissioner of Education, and money was distributed to the states based on a formula that was directly proportional to number of school-age children in each state and inversely proportional to total personal income for each state. States distributed the federal money to local agencies based on the metrics laid out in the state plan. States were also allowed to give loans to nonprofit private schools. Local agencies were required to cover at least half the program costs and to match 50 percent of the federal funds, except in 1959, the first year of the program (U.S. Department of Health, Education, and Welfare. Office of Education, 1964a; U.S. Congress. *National Defense Education Act of 1958*, P.L. 85-864).

Between 1959 and 1964, under Title III, HEW's Office of Education approved over 300,000 projects, valued at \$560 million. During those same years, federal support for equipment purchases and minor remodeling totaled \$240 million, while federal expenditures for state supervisory and related services totaled \$27 million. The required matching funds came largely from the local level (97 percent), with state funds mostly covering equipment at state-sponsored schools and supervisory programs (U.S. Department of Health, Education, and Welfare. Office of Education, 1969). Very little funding went to nonprofit private schools as loans. In 1960, for example, the Office of Education only disbursed an estimated \$2 million out of the \$7.2 million reserved for private school loans (U.S. Congress. Senate. Committee on Appropriations, 1960).

In the first 6 fiscal years of the Title III program, science-related improvements accounted for 58 percent of the projects and 74 percent of the expenditures, mathematics accounted for 25 percent of the projects and 9 percent of the expenditures, and modern foreign languages accounted for the remaining 15 percent of the projects and 17 percent of the expenditures. When the list of eligible subjects was expanded in 1965, the share of total approved projects and expenditures for science-related improvements declined, although it remained the largest single subject area (U.S. Department of Health, Education, and Welfare. Office of Education, 1969).

A 1966 survey of 54 states and territories revealed that the most commonly reported problem with Title III was a lack of matching funds at the state level for specialist supervisors and teacher training (Gaarder, 1966). On average, however, state and local agencies overmatched federal contributions. Between 1960 and 1964, state and

local agencies spent a combined total of \$11 million more than necessary for equipment and renovations and nearly \$1 million more than necessary for supervisory and related services to match federal expenditures (see Table III-1).

**Table III-1. Expenditures for Supervisory and Related Services
Under NDEA Title III: FY 1959–FY 1964
(Source: Gaarder, 1966)**

Fiscal Year	Expenditures (\$ Thousands)			Overmatched Contributions (1960–1964)	
	Federal	State	Total	Funds (\$ Thousands)	Percent
1959	795	72	867	Matching not required	
1960	1,842	1,907	3,749	65	4
1961	2,387	2,621	5,008	234	10
1962	2,531	2,718	5,249	187	7
1963	2,678	2,897	5,575	219	8
1964	3,106	3,314	6,421	208	7
Total	13,339	13,529	26,869	913	7

Note for Table III-1: *The dollar/percentage figures in this table are STPI tabulations.*

C. Legislative History of Title III

Title III has not been funded since 1978, although it was never formally repealed. While a full analysis of all the amendments to NDEA¹⁹ is beyond the scope of this report, the major amendments to Title III included the NDEA Amendments of 1964, the HEA of 1965, and the HEA Amendments of 1966 and 1968. These amendments expanded the types of equipment and subjects covered and extended the amount and duration of funding (U.S. Department of Health, Education, and Welfare. Office of Education, 1969). Appropriations for supervisory and related services were merged with Title V of the Elementary and Secondary Education Act (ESEA) sometime between 1965 and 1968. In 1970, the equipment and remodeling portion of Title III was combined with Section 12 of the National Foundation on the Arts and Humanities Act of 1965, P.L. 89-209 (Harden, 1981).

¹⁹ A full list of amendments to each title can be found in U.S.C. Title 20 Chapter 17.

A more general parallel program began in 1965 as part of Title II of ESEA (U.S. Congress. *Elementary and Secondary Education Act of 1965*, P.L. 89-10). States received money from both programs in the 1960s and 1970s. The main differences between the two federal funding programs were that ESEA Title II covered more subjects and material types and had no matching requirement. A 1968 House bill attempted to combine the programs and eliminate the matching requirement from NDEA Title III, but this effort was apparently unsuccessful (U.S. Department of Health, Education, and Welfare. Office of Education, 1969). Federal records pertaining to ESEA suggest that the general equipment and facility improvement grants from ESEA Title II no longer exist (U.S. Department of Health, Education, and Welfare. Office of Education, 1969; U.S. Congress. *Elementary and Secondary Education Act of 1965*, P.L. 89-10).

D. Intended and Actual Effects of Title III

Title III programs reached nearly every state and local agency in the country. By 1964, every state except Arizona had participated. In 1964 alone, 54 percent of eligible local educational agencies, representing 86 percent of the national public school enrollment, received federal funds through Title III. Nearly 3,400 elementary classrooms and 7,700 secondary classrooms and laboratories received equipment or minor remodeling funds in the first 6 years of the program (Gaarder, 1966).

Funding for state and local supervisory services greatly expanded the number of specialists working for educational agencies. Before 1959, only 33 state education agency subject-matter supervisors worked in the fields of science, mathematics, and modern foreign languages. By 1965, that number had risen to 350 full-time-equivalent supervisors. The responsibilities of these supervisors included curriculum development, in-service education, and Title III project review (U.S. Department of Health, Education, and Welfare. Office of Education, 1969).

State surveys conducted in the 1960s suggest that better equipment and teacher training contributed to students' increased interest in Title III subjects. In the fall of 1959, the first year of Title III, one-half million more high school students elected to take a foreign language than in 1958, and some states reported increases in language enrollments by as much as 95 percent. Enrollment in high school science and mathematics classes increased by as much as 50 percent in some states (see Figure III-1 and Figure III-2), and, in 1960, colleges and universities reported that freshmen were arriving better prepared

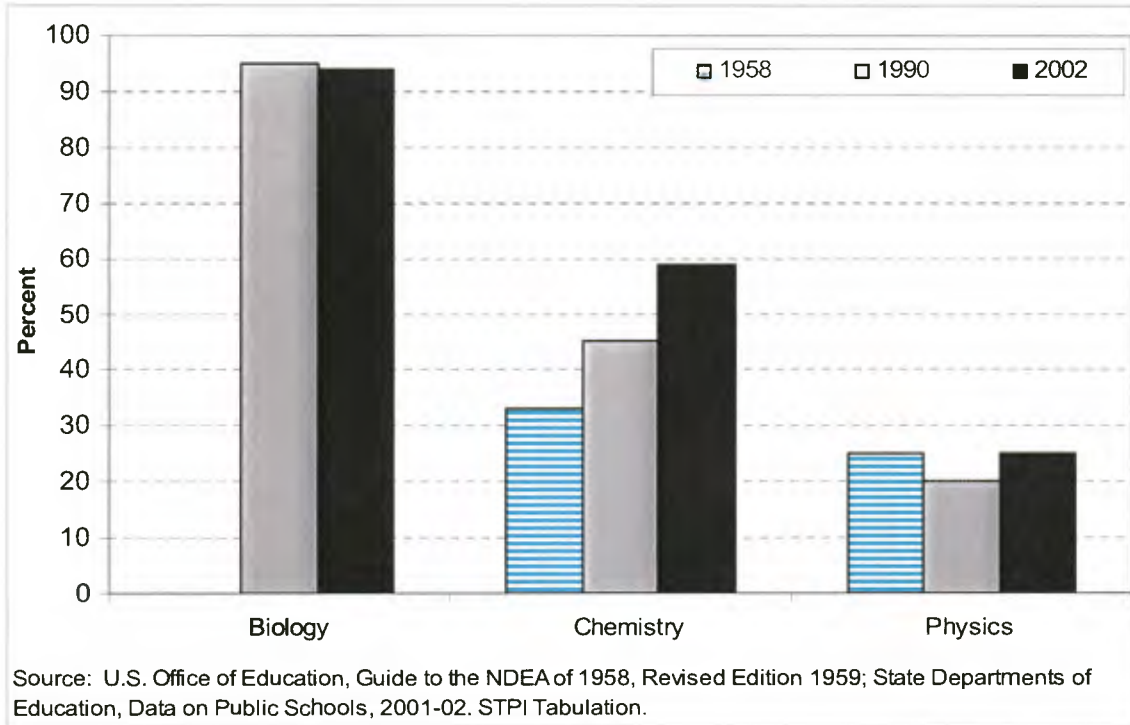


Figure III-1. Percentage of High School Graduates Who Earned Credit in Selected Science Courses (Selected Years)

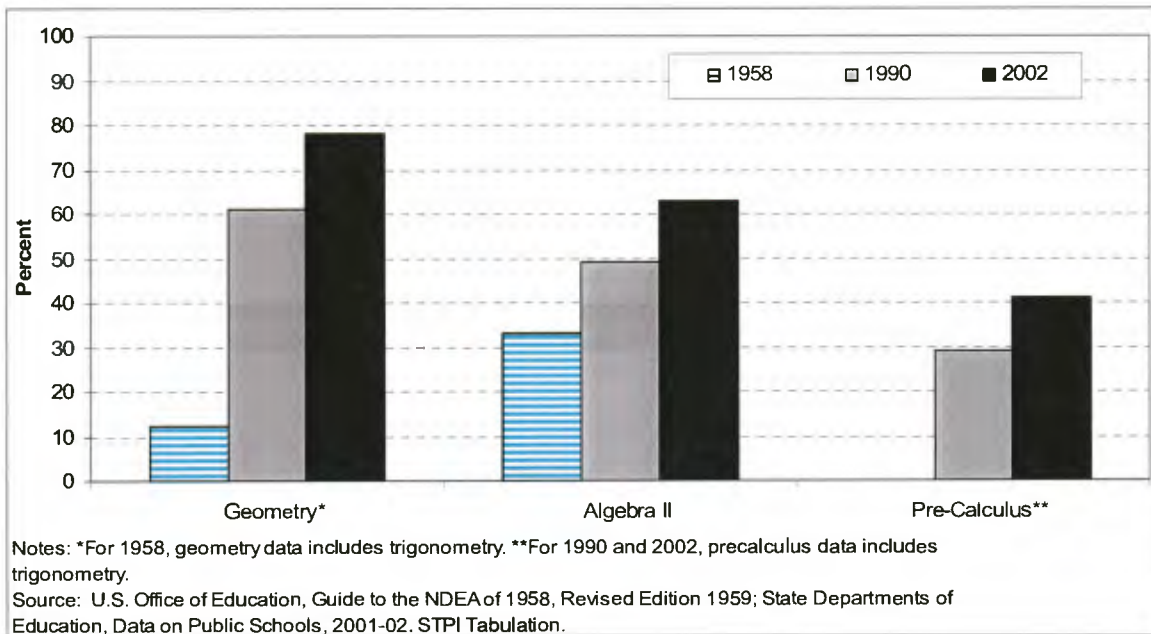


Figure III-2. Percentage of High School Graduates Who Earned Credit in Selected Mathematics Courses (Selected Years)

for higher education (Ihrke, 1962). However, these same surveys also indicated that states did **not** have a satisfactory way to evaluate their Title III programs (Gaarder, 1966). States considered the scope of Title III too large to allow them to make an exact inventory of purchases by individual local agency and found it impossible to identify direct causal links among the myriad of variables influencing public education (U.S. Department of Health, Education, and Welfare. Office of Education, 1969).

Section IV.

NDEA Title IV: National Defense Fellowships

A. Overview

Title IV was designed with three goals in mind:

1. To increase the number of quality college teachers
2. To expand the number and geographical distribution of Ph.D. programs in the United States
3. To enable more students to pursue doctoral programs by providing financial support.

Title IV established fellowships for graduate study in a “new program or [as part of the] expansion of an existing program ... [thereby] increasing the facilities available in the nation for the graduate training of college or university level teachers and ... promoting a wider geographical distribution of such facilities throughout the nation,” with “preference ... given to persons interested in teaching in institutions of higher education” (U.S. Congress. *National Defense Education Act of 1958*, P.L. 85-864).

Title IV funded a total of 5,500 graduate study fellowships. One thousand fellowships were awarded the first year (1959), and 1,500 were awarded each year for the next 3 years. Each fellowship award totaled \$6,600. Awardees received up to \$2,000 for the first year, \$2,200 for the second year, and \$2,400 for the third year. The Title authorized “such sums as may be necessary” to fund these fellowships—additional awards of \$400 per year per dependent and up to \$2,500 for the participating institution to cover the costs of establishing or expanding the fellowship program of graduate study. Subsequent analysis showed that the Title IV program was “one of the most successful titles of NDEA” (Lindquist, 1971).

B. Administration of Title IV

To qualify for Title IV funds, an institution had to submit its proposed program(s) of study to the Commissioner of Education. A Title IV Advisory Committee consisting of faculty from a range of academic fields reviewed the applications and made funding

recommendations. In addition to the requirement that the applying institution's programs had to be "new or expanded" to qualify, the institution also needed to show that its programs would increase "the facilities available in the nation for the graduate training of college or university level teachers" and promote "a wider geographical distribution of such facilities throughout the nation" (U.S. Congress. *National Defense Education Act of 1958*, P.L. 85-864). Title IV placed no restrictions on the fields of study that could qualify for funding, and it did not require institutional matching funds. While institutions were allowed to charge their Title IV fellows tuition, they were required to subtract the Federal contribution to the institution in such cases.

Although approved institutions were required to give admissions preference to individuals who expressed an interest in becoming college teachers, Title IV placed no binding requirement on fellowship recipients to teach. Fellows were required to state an interest in college teaching, maintain "satisfactory proficiency" in their graduate study, and devote "essentially full time" to their work. Gainful employment was restricted to part-time teaching and instruction at his or her institution, as approved by the Commissioner of Education.

In the first year (1959), the law was interpreted to restrict Title IV fellows from receiving any other federal assistance, including NDEA loans under Title II. However, by the second year, fellows were notified that they could apply for Title II loans but could not receive any other form of direct federal educational aid. Subsequent amendments permitted re-awards of unused fellowship funds, meaning that advanced students who qualified became eligible for Title IV awards. Under an NDEA provision that applied to all Titles, all Title IV fellows were required to take a loyalty oath.²⁰

C. Legislative History of Title IV

Unlike most federal programs, Title IV did not have an authorized spending limit. Instead, funds were authorized as necessary to pay for a specified maximum of new fellowship awards each year.

²⁰ NDEA Loyalty Oath: "I do not believe in, and am not a member of, and do not support, any organization that believes in or teaches the overthrow of the United States Government, by force, or violence, or by any illegal or unconstitutional methods." After failed attempts in 1959, 1960, and 1961 to remove the loyalty oath provision of NDEA, it was successfully removed in 1962 for Title IV fellowship recipients. It was replaced with a requirement that applicants provide a full statement regarding criminal charges brought against them.

The NDEA originally specified that Title IV was to be in effect between 1961 and 1964. However, because of the National Education Act (NEA) of 1963, HEA Amendments of 1968, and other amendments to the NDEA in 1961 and 1964, Title IV was in effect for 15 years, from the school year ending in 1959 to the school year ending in 1973. Table IV-1 lists the federal expenditures and the institutes and programs that received Title IV funds during the first 10 years of the program.

Table IV-1. Title IV Federal Expenditures and Institutes and Programs: 1959–1969
(Source: Lindquist, 1971)

School Year Ending	Federal Title IV Expenditures (\$ Thousands)	New Institutes Applying	New Institutes	Active Institutes	Programs Applying	Programs Awarded
1959	4,620.4	172	123	123	1,040	272
1960	11,451.3	157	137	139	918	404
1961	17,312.8	161	145	149	948	521
1962	19,603.5	170	153	161	1,120	565
1963	19,680.4	172	155	166	1,175	618
1964	20,695.3	180	156	168	1,243	690
1965	29,779.8	173	152	169	2,283	905
1967	53,640.2	187	170	178	2,916	2,059
1968	—	201	193	195	3,114	2,690
1969	—	206	199	199	3,337	2,993

Over the life of the Title IV program (1959–1973), most of the 45,829 fellows were supported for the full 3 years provided for under the program (see Table IV-2).²¹

In addition to authorizing additional fellowships, the NEA of 1963 modified the law to allow re-awarding of unused funds from resigned fellowships²² and a flat payment of \$2,500 annual per-fellow to each participating institution.²³

²¹ This total number of fellows exceeds the sum total of new fellowships authorized by Congress for the years 1959 to 1973 because beginning in 1963, re-awards of resigned fellowships were authorized and began taking place.

²² Re-awards were made to new fellows who were further along in their graduate study. For example, a fellowship that was resigned after 1 year of study (and therefore still had 2 years' worth of funding left) would generally be re-awarded to a doctoral student who had already completed his or her first year of study.

²³ Up until that time, only a maximum of \$2,500 per fellow per year was allowed and only for costs that could be attributed to each student.

Table IV-2: Title IV Fellowships: 1959–1969
(Source: Lindquist, 1971)

School Year Ending	New Fellowships Authorized	New Fellowships Awarded	Re-awards of Resigned Fellowships	Active Fellows
1959	1,000	1,000	–	1,000
1960	1,500	1,500	–	2,404
1961	1,500	1,500	–	3,712
1962	1,500	1,500	–	4,041
1963	1,500	1,500	–	4,118
1964	1,500	1,500	29	4,200
1965	3,000	3,000	267	6,000
1967	6,000	6,000	564	10,500
1968	7,500	7,500	1,247	15,000
1969	7,500	3,328	3,833	15,328

The 1964 NDEA amendments extended the program of authorized new fellowships—expanding these fellowships in number and authorizing additional payments to fellows for summer study. These amendments also formalized the fellowship requirement for interest in teaching in an institution of higher learning, limited fellowships to Ph.D. students or those intending to pursue a doctoral or equivalent degree, and forbade the use of fellowships for study at a Divinity School or in a Department of Divinity.

Furthermore, the 1964 amendments removed the requirement that all new fellowships be awarded to students in new or expanded programs and removed the clause that required programs to promote “a wider geographical distribution” of graduate education facilities. In the first few years of the NDEA, the Title IV Advisory Committee focused on new programs and then on expanded programs. After the 1964 amendment, only one-third of the new fellowships had to be awarded to new or expanded programs. This enabled the Commissioner of Education to provide continuing support for previously qualified programs and assign support to programs based on their strength and reputation. Altogether, these changes recognized the success of Title IV in establishing new and expanded programs for doctoral study and represented a critical shift in the focus of the Title awards away from further expansion and toward strengthening the quality of existing programs.

In 1964, the Office of Education also instituted a major administrative policy change. It began to award fellowships directly to institutions instead of to doctoral programs. The institutions were permitted to distribute funds among their programs as they saw fit.

The HEA of 1968²⁴ significantly expanded the Title IV program, authorizing 7,500 new fellowships per year to be awarded for 5 more years through the school year ending in 1973.²⁵ The 1968 amendments enabled selective additional funding to fellows for a fourth year of study and permitted the Commissioner of Education to increase annual institutional payments to \$3,500 per fellow.²⁶ These amendments also increased fellowship stipends and dependency allowances to the level of other federal fellowship programs, allowed fellows to receive Veteran's Administration benefits for graduate study concurrent with Title IV funds, and established an Advisory Council on Graduate Education to replace the Title IV Advisory Committee.

According to the United States Code (U.S.C.), "fellowships under this subchapter have not been authorized since the fiscal year ending June 30, 1973" (U.S. Code. 20 U.S.C. Chapter 17). Although a variety of federal fellowship programs for graduate education exist currently, an interest in college teaching is not a primary prerequisite for most existing programs, and none of these programs are directly linked to the NDEA Title IV graduate fellowships.

D. Intended and Actual Effects of Title IV

In 1959, Elliot L. Richardson, Assistant Secretary for Legislation at HEW, described Title IV as "a significant milestone in federal assistance to graduate education ... [that] marked a major step away from a purchase-of-services approach to graduate education and toward acknowledgement of the vital dependency of our nation's future on the development of its best brains in every field of advanced study" (Lindquist, 1971).

²⁴ The Higher Education Act of 1965 was reauthorized in 1968, 1972, 1976, 1980, 1986, 1992, and 1998. Current authorization for the programs in the Higher Education Act expires at the end of December 2006. Before each reauthorization, Congress amends additional programs, changes the language and policies of existing programs, or makes other changes.

²⁵ The actual number of new fellowships awarded annually remained approximately 3,000 for the school years ending in 1969 through 1973.

²⁶ This increase was declined by the Commissioner because of diminishing funds for the program.

The intention of Title IV was to increase the number of quality college teachers,²⁷ expand the number and geographical distribution of Ph.D. programs, and enable more students to attend doctoral programs by providing financial support. Subsequent analyses over the next decade supported Richardson's claim and demonstrated the effectiveness of Title IV in achieving and exceeding each of its objectives.

Title IV, in its first few years of operation, had a "considerable influence on the growth of graduate education in a number of states which had produced no doctoral graduates or very few up to that time" (U.S. Department of Health, Education, and Welfare. Office of Education, 1961). A subsequent study (Lindquist, 1971) demonstrated the effectiveness of Title IV in

- Increasing graduate programs for the training of college teachers
- Motivating young people to enter training for teaching careers
- Increasing, through fellowship support, the number of persons who earn a doctorate and reducing the time necessary to achieve that degree
- Encouraging fellows to actually enter higher education employment after they leave graduate school.

These claims are supported by the increase in doctoral degrees across a variety of fields for which data are available (see Figure IV-1).

Title IV was effective in reaching these goals, in part, because it lowered the time-to-completion for participants and encouraged an earlier identification of career goals. Title IV recipients from lower income brackets—who presumably would have otherwise been unable to finance their graduate education—had higher rates of degree completion (Lindquist, 1971).

In 1973, 64 percent of NDEA Fellows who had earned doctorates in science and engineering fields were employed in educational institutions. By 1975, the number was 59 percent. Following the implementation of Title IV, the number of college faculty rose significantly (see Figure IV-2). Title IV outcomes are perhaps the best documented

²⁷ "The prospect that in the coming years a large majority who enter college teaching may have only a year or so of advanced preparation is deeply disturbing. If this happens, the quality of college education will certainly undergo an insidious erosion, which, though not dramatically apparent to the public, could have disastrous long-run effects upon our society. It is doubtful that any individual college or university, however strong its position, could hope to escape the impact of a quality shortage of this magnitude." *A Guide to the National Defense Act of 1958* (Carlson, 1959).

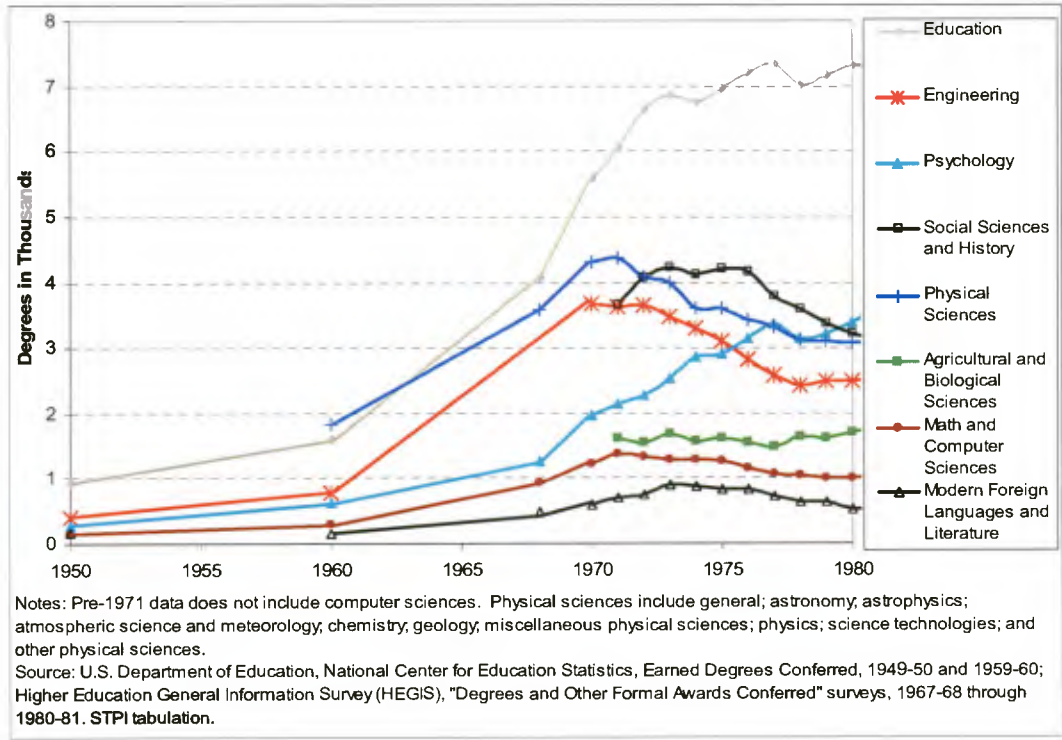


Figure IV-1. Doctoral Degrees Earned by Field: 1950–1980

Note for Figure IV-1: See Appendix B (Figure B-3) for data through 2002.

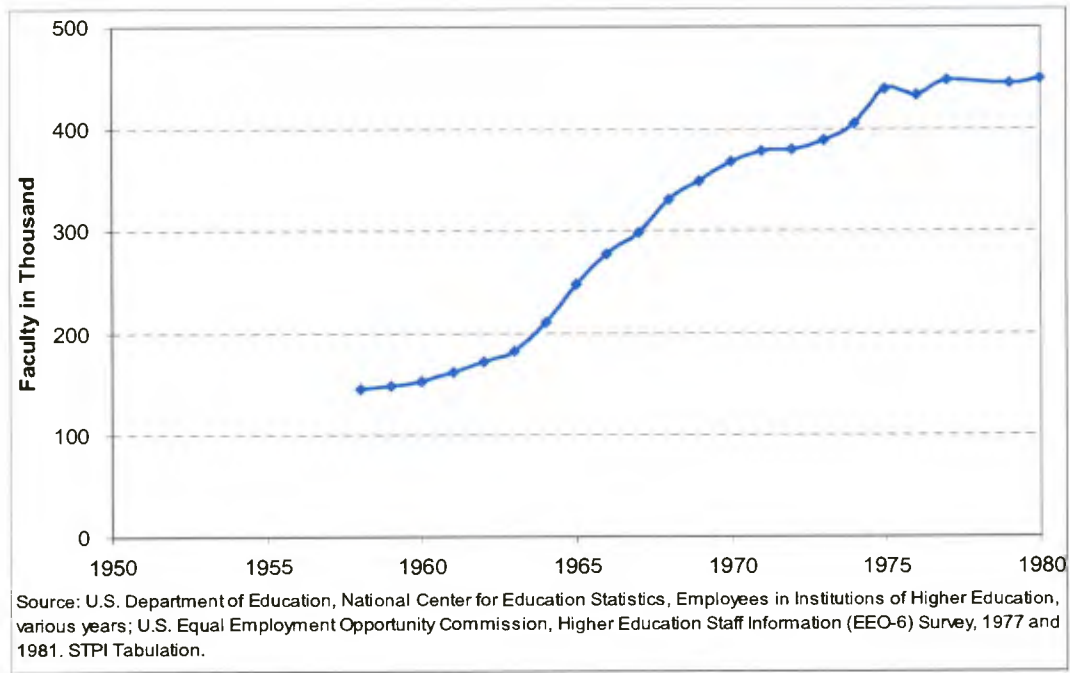


Figure IV-2. Full-time Faculty: 1958–1980

Note for Figure IV-2: See Appendix B (Figure B-4) for data through 2001.

among programs administered under the NDEA, in large part because the Office of Education sponsored and conducted several studies during the life cycle of the program. Using these data, Harmon (1977) found that 49 percent of all male and 24 percent of all female fellowship recipients had obtained their doctorates by 1974. These doctorate recipients represented 26 percent (male) and 14 percent (female) of faculty at U.S. colleges and universities. Harmon's study found that NDEA fellows had an average "time-to-doctorate"—7 years for men and 8.4 years for women—that was 20 percent lower than non-NDEA fellows. In addition, over half of those NDEA fellows who had obtained their doctorates had published in scientific literature by 1972.

Section V.
**NDEA Title V: Guidance, Counseling, and Testing;
Identification, and Encouragement of Able Students**

A. Overview

Title V of the NDEA provided funding for aptitude testing and educational and career counseling to public secondary school students and for the establishment of guidance counselor training institutes. The testing programs were intended to “identify students with outstanding aptitudes and ability.” Guidance counseling programs were intended to “advise students of courses of study best suited to their ability” and to assist qualified students to prepare for college education. The training institutes were intended to “improve the qualifications of personnel engaged in counseling and guidance of students in secondary schools” (U.S. Congress. *National Defense Education Act of 1958*, P.L. 85-864).

The NDEA originally authorized the testing and counseling programs at \$15 million per year for 4 years. Counseling and guidance training institutes were funded at \$6.25 million for the fiscal year ending June 30, 1959, and \$7.25 million for each of the 3 succeeding fiscal years.

The Office of Education disbursed Title V funds to state educational agencies in proportion to the number of school-age children in each state, but no state received less than \$20,000. Except for the first year of Title V (1959), states were required to cover at least half the program costs and to match 50 percent of the federal funds.

B. Administration of Title V

States requesting funds under Title V were required to submit plans outlining their testing procedure and counseling program to the Commissioner of Education through their state educational agency. The full program cost, up to the state’s allotment, was covered in the first year of the Title. In all other years, state and local agencies were required to match federal funds. To establish a qualifying guidance counselor training

institute, each institution of higher learning signed a contract directly with the Commissioner of Education.

In the first 6 years of the program, federal Title V funding for Title V-A programs (testing and guidance) totaled \$77 million. State and local education agencies, however, provided far more than the required 50 percent matching funds. Between 1959 and 1964, local agencies contributed \$575 million to Title V-A programs, and state agencies contributed an additional \$30 million (see Table V-1). This represented a 640 percent overmatching of funds for 1960 to 1964.²⁸ Even this level of funding, however, did not keep pace with increasing enrollments. By FYs 1965–1966, an additional \$172 million was needed to hire enough secondary school counselors to bring the nationwide counselor-to-student ratio to the ideal 1:300, assuming that trained counselors were available to fill the positions (U.S. Congress. Senate. Committee on Labor and Public Welfare. Subcommittee on Education, 1967c).

Table V-1. Federal, State, and Local Contributions Under NDEA Title V-A: 1959–1964
(Source: U.S. Department of Health, Education, and Welfare. Office of Education. Bureau of Elementary and Secondary Education, 1969)

FY	Federal		State		Local	
	Cost (\$ Millions)	Percent	Cost (\$ Millions)	Percent	Cost (\$ Millions)	Percent
1959	4	44.5	0.420	3.9	5	51.6
1960	13	16.2	3	4.1	66	79.7
1961	14	13.6	4	4.2	88	82.3
1962	14	11.2	5	4.2	111	84.6
1963	14	9.9	7	5.3	127	84.8
1964	14	8.8	8	4.8	146	86.4
Total	73	11.9	29	4.6	545	83.6

Between 1959 and 1964, Title V-B programs (training institutes) provided \$37 million for short-term and regular-session institutes. Approximately 57 percent of this federal support was used to pay enrollee stipends. The remaining 43 percent was used to operate the institutes. Initially, most of the funding went to short-term summer institutes. In 1961, the Office of Education focused the Title V-B program on improving

²⁸ Matching funds were not required in 1959.

the level of training for school counselors rather than on increasing the number of personnel.

Beginning in the summer of 1962, the summer institutes were used to provide refresher training to professionals who already had some graduate training, and semester or year-long regular session institutes were used to train working school personnel who had little or no experience in counseling and guidance. This shift in policy diverted a larger share of Title V-B program funds to full-year institutes. Each full-academic-year institute cost approximately five times as much as a short-term summer institute.

C. Legislative History of Title V

According to the U.S.C, Title III of the ESEA of 1965 superseded Title V of the NDEA. Other legislation affecting Title V included the NDEA Amendments of 1964 and the HEA Amendments of 1968, which added elementary schools and junior colleges and technical institutes to Title V-A programs (testing and guidance) and Title V-B programs (training institutes), respectively. Funding for NDEA Title V was authorized through the fiscal year ending on June 30, 1971 (U.S. Department of Health, Education, and Welfare. Office of Education. Bureau of Elementary and Secondary Education, 1969). Original ESEA Title III funding was eliminated in 1978 (20 U.S.C. 17 § V) (see U.S. Code. 20 U.S.C. Chapter 17).

D. Intended and Actual Effects of Title V

Title V succeeded in greatly increasing the scope and size of guidance programs in the nation's schools. In the 1958–1959 school year, 90 to 95 percent of secondary students attended schools with negligible or nonexistent guidance programs. By the 1965–1966 school year, 83 percent of secondary students attended schools with guidance programs that met a state-written quality standard (U.S. Congress. Senate. Committee on Labor and Public Welfare. Subcommittee on Education, 1967e). The number of full-time-equivalent counselors available in public and private secondary schools more than tripled between 1958 and 1966—from 13,000 to over 43,000 (U.S. Department of Health, Education, and Welfare. Office of Education. Bureau of Elementary and Secondary Education, 1969). Of this 1966 total, 19,000 of these counselors attended an NDEA-funded institute (U.S. Congress. Senate. Committee on Labor and Public Welfare. Subcommittee on Education, 1967e). The increase reduced the nationwide counselor-to-student ratio from 1:960 to 1:450.

While it is not known whether counselors who attended institutes were individually more effective, they did tend to stay in education fields longer than the general pool of high school counselors. Eighty-three percent of regular-session attendees remained employed as high school guidance personnel 3 years after graduation. Of those not still employed as high school counselors, many were still working in the education field in elementary schools, colleges, or education agencies (U.S. Department of Health, Education, and Welfare. Office of Education, 1969).

The number of standardized aptitude tests given to high school students also dramatically increased—from approximately one-third of K–12 students in 1958 to nearly all students by 1966. During those years, the number of standardized aptitude tests administered to elementary and secondary students increased from 10 million (2 million of which were paid for under the NDEA) to 45 million (9 million of which were paid for under the NDEA) (U.S. Department of Health, Education, and Welfare. Office of Education. Bureau of Elementary and Secondary Education, 1969). By way of context, between 1955 and 1965, elementary and secondary school enrollment in the United States increased from 35 million to 48 million students (U.S. Department of Education. National Center for Education Statistics, 2003a).

While no evidence exists to demonstrate conclusively that testing and guidance programs led to an increase in the number of students who finished high school and entered college, drop-out rates declined and college enrollment increased overall while Title V was in effect. Between 1958 and 1967, the national high school retention rate increased 24 percent. Out of every 1,000 students who had been fifth graders in 1950–1951, 582 graduated from high school in 1957–1958, of which 308 enrolled directly in college. Nine years later, those numbers had increased: 720 graduated from high school and 400 enrolled directly in college. A related measure, the number of high-school graduates as a percentage of the 17-year old population, also increased significantly in the same time period (see Figure V-1). Total first-time enrollment in college more than doubled between 1958 and 1967 (see Figure V-2) (U.S. Department of Health, Education, and Welfare. Office of Education. Bureau of Elementary and Secondary Education, 1969).

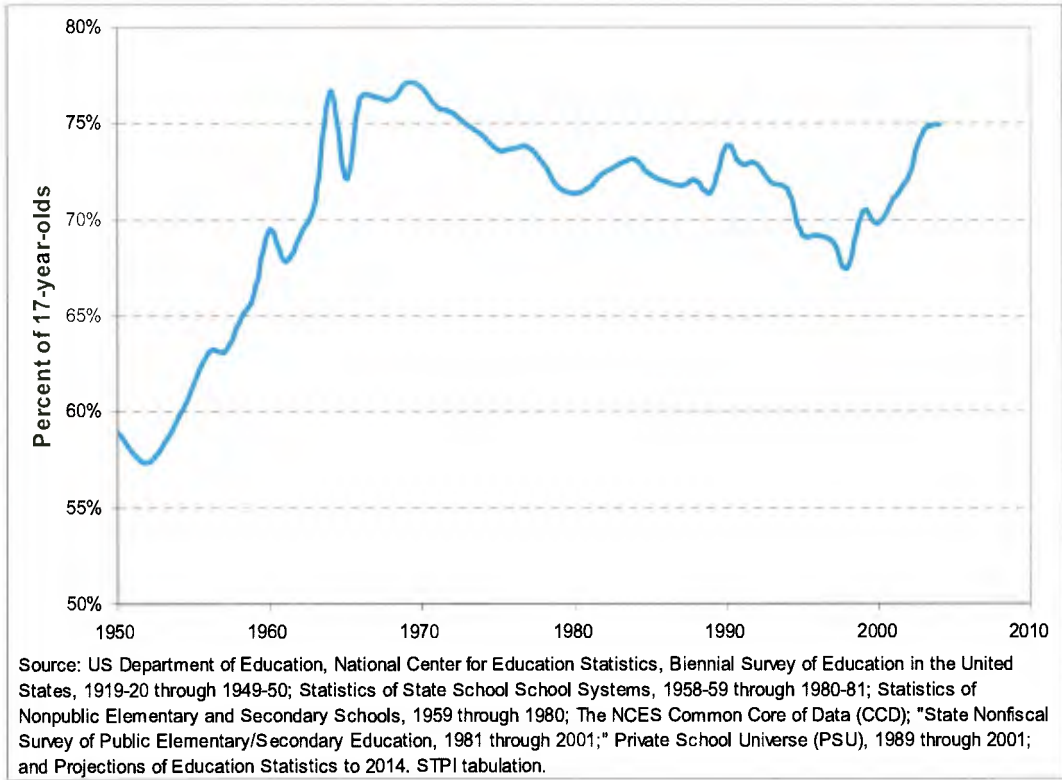


Figure V-1. High School Graduates as a Percentage of the 17-year-old Population: 1950–2004

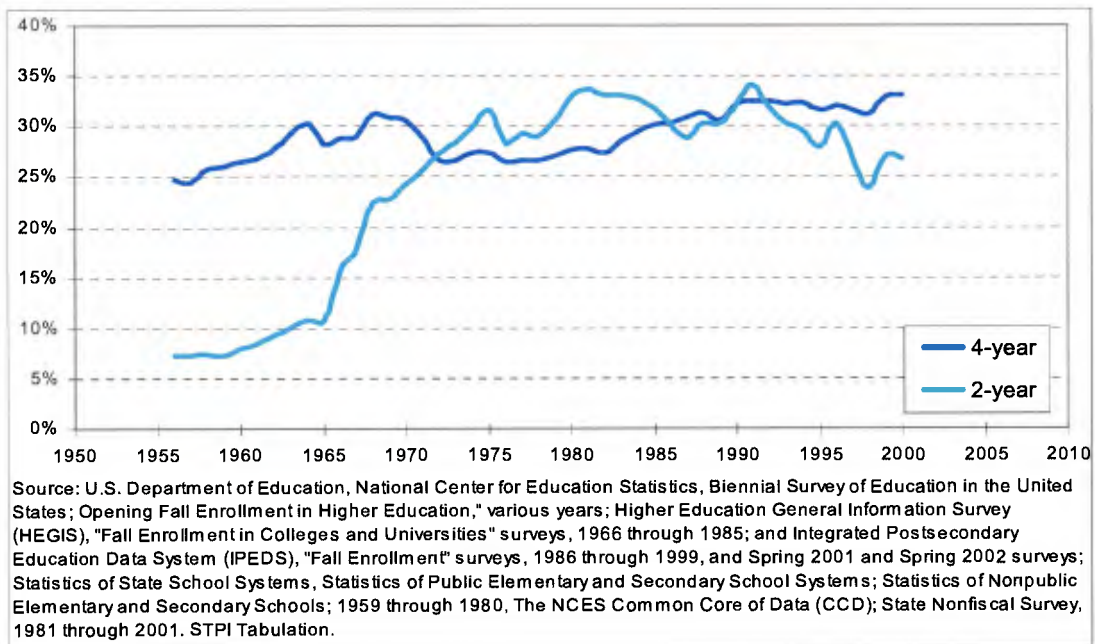


Figure V-2. First-time Freshman Enrollment as a Percentage of the 18-Year-Old Population: 1956–2000

VI. Current Initiatives for U.S. Educational System

A. Overview

Recent initiatives have attempted to address growing concerns over the current state of the educational system in the United States. Research has indicated a correlation between poor student performance at the pre-college level—as reflected in low readiness for post-secondary education and high drop-out rates at the high school level—and the competitiveness of the United States in the global economy.

For example, the National Governors Association (NGA) convened an Education Summit in February 2005. The NGA's report, *An Action Agenda for Improving America's High Schools*, claimed that "America's high schools are failing to prepare too many of our students for work and higher education." The report cites statistics showing that for every 100 ninth-graders enrolled today, 68 will graduate from high school on time and only 18 will graduate from college on time (National Governors Association, 2005).

Statistics such as these are fueling calls for a comprehensive overhaul of the American educational system at the local, state, and national levels. The No Child Left Behind (NCLB) Act (P.L. 107-110), which President Bush signed into law on January 8, 2002, is a broad-based educational reform initiative. It calls for greater teacher accountability, grants states and school districts more flexibility in spending federal money, identifies best practices and encourages the adoption of these practices, and allows parents to select from a broader range of educational options (e.g., tutoring and charter schools). NCLB also seeks improvements in pre-college equipment and teaching materials, more and broader access to guidance counseling, and improved testing and metrics.

B. Contemporary Issues

During this study, STPI identified and tracked three contemporary issues:

1. Postsecondary enrollment
2. Student financial support
3. Pre-college instructional equipment.

1. Postsecondary Enrollment

During the 1960s, enrollment in postsecondary educational institutions rose by 120 percent (see Figure VI-1). In 1969, college enrollment represented 35 percent of the 18- to 24-year-old population. From 1970 to 1979, postsecondary enrollment grew by 34 percent—from 9.6 million to 12.9 million.

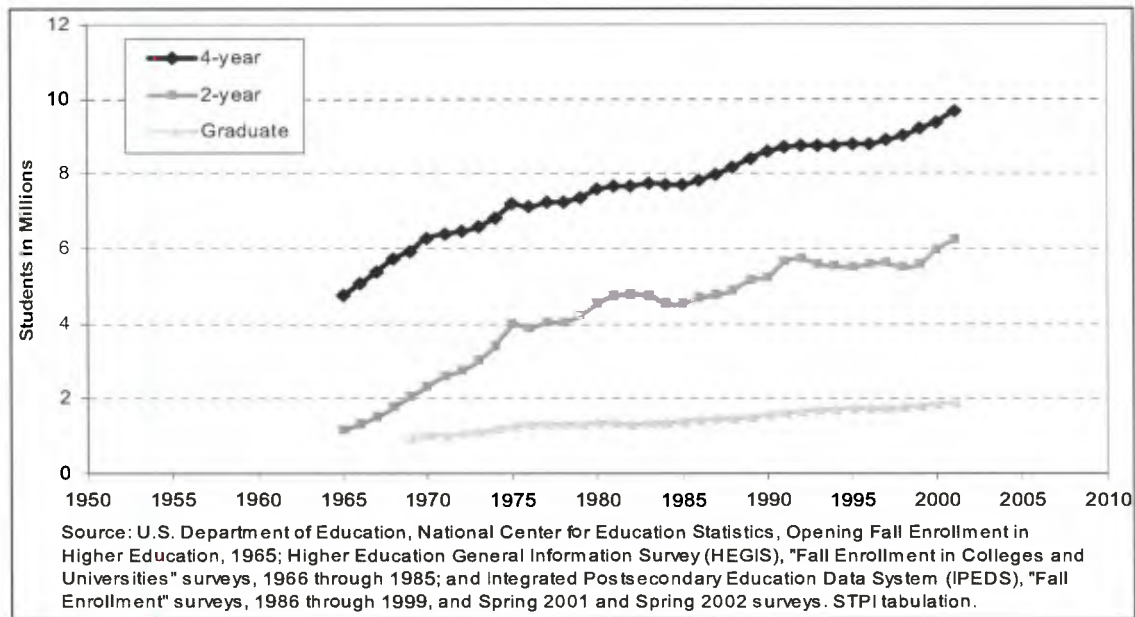


Figure VI-1. Postsecondary Enrollment: 1965–2001

Although postsecondary enrollment growth slowed substantially during the 1980s, with only a 12 percent increase between 1979 and 1989, incremental increases resumed in the 1990s. The primary drivers for that increase were students who were born into the top quartile of family income (above about \$95,000 per year). Students from that group increased their bachelor's degrees attainment rates by 30 percent between the late 1970s and the early 2000s. In contrast, bachelor's degree attainment for students in the third family income quartile increased by 9 percent, in the second quartile by 3 percent, and in the bottom quartile by 0.03 percent (Mortenson, 2005). Figure VI-2 shows Bachelor Degree attainment by age 24 by family income quartile from 1971–2002.

2. Student Financial Support

Since the 1970s, federal aid has come in a variety of new forms—including grants, work-study, and tax breaks, in addition to loans. Nonetheless, in the face of

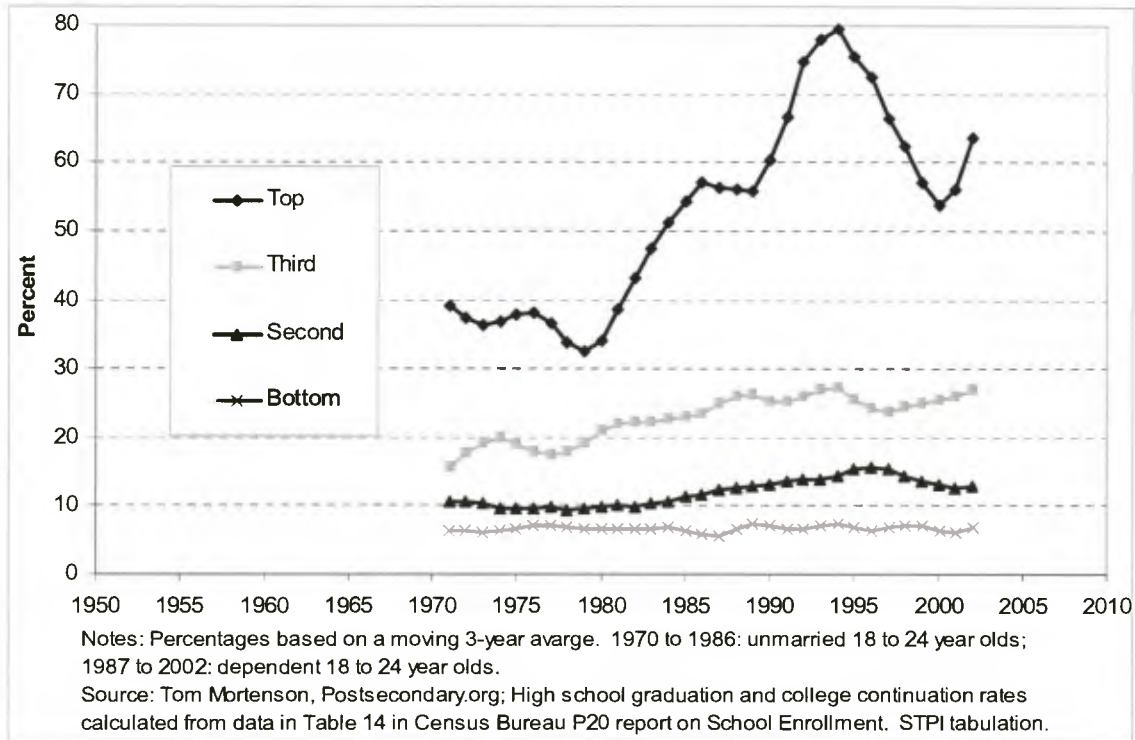


Figure VI-2. Bachelor Degree Attainment by Age 24 by Family Income Quartile: 1971–2002

soaring costs for higher education, the management of debt burden—particularly for the most needy families—remains a critical concern (Baum and O’Malley, 2003). According to the College Board (2005b), a mean debt of \$24,600 was incurred by undergraduate students who received a bachelor’s degree at a private, for-profit school during the 2003–2004 school year. Of those students, 88 percent graduated with debt (see Table VI-1).

Table VI-1. Undergraduate Degree Recipient Debt by Degree and Institution: 2003–2004
 (Source: College Board, 2005b)

Degree	Institution	Median Debt per Borrower (\$ Thousands)	Percent Graduating With Debt
Bachelor’s	Private, For-Profit	24,600	88
Bachelor’s	Private, Nonprofit	19,400	73
Bachelor’s	Public	15,500	62
Associate’s	For-Profit	16,100	90
Associate’s	Public	6,100	35

Contemporary federal education and training strategies include low interest student loans—including the Federal Perkins and Stafford Loans—for undergraduate and graduate students who need financial assistance. Perkins Loans consist of government and school funds but are made by individual schools rather than the government. Stafford, the largest federal loan program, has two separate programs: Direct Loans and FFELs. Direct Loan funds are distributed directly from the federal government. FFEL funds come from a bank, credit union, or other private lender. The federal government, including the Department of Defense (DoD) and the Department of Homeland Security (DHS), also offers a wide range of graduate fellowships for advanced study in most academic fields.

Recent amendments (2005 and 2006) to the Stafford Loan Program introduced increases in interest rates, a switch from floating to fixed interest rates, restrictions on loan consolidation, and increases in maximum allowable loan amounts. The federal Parent Loan for Undergraduate Student (PLUS) Program, which provides loans directly to parents, will also experience an interest rate increase. While rising interest rates intensify existing concerns about debt burden, analysts argue that many students will still need to borrow from private loan sources at much higher rates under the new maximum loan amounts (Dratch, 2006). Meanwhile, the federal Pell Grant Program, which is aimed at students in the lowest income brackets, will introduce two new components:

1. Pell-qualified students who carry a B average and graduate from an academically challenging high school program will become eligible for an additional \$750 in their first year of college and \$1,300 in their second year of college.
2. The national Science and Mathematics Access to Retain Talent (SMART) program will provide an additional \$4,000 per year to Pell-qualified juniors and seniors who maintain a B average in mathematics, science, or key foreign languages.

However, Pell grants have not been increased to keep up with rising college and living costs. Analysts argue that these new changes to the Pell Grant Program, which has been the most direct and effective form of aid for needy students (College Board, 2005b), are least likely to benefit the neediest students (Dratch 2006).

3. Pre-college Instructional Equipment

The issue of “rusting secondary school laboratories” dates back to the advent of NDEA in 1958. Despite efforts at all levels, the specter has never been completely abolished. For example, a 2000 survey of the heads of science departments found that

(1) while 85 percent of the classes used computers, 21 percent reported that their facilities “posed a serious problem for science instruction” and (2) 11 percent said their facilities lacked adequate fume hoods or air hoses. A small percentage reported inadequate electricity, water, and gas in their lab facilities (Smith et al., 2002).

In the United States, no comprehensive assessment of the science, mathematics, or foreign language training instructional resources in the nation’s high schools has been conducted since the General Accounting Office’s (GAO)²⁹ 1995 report, *School Facilities: America’s Schools Not Designed or Equipped for 21st Century* (General Accounting Office, 1995). This report found that roughly 40 percent of high schools could not meet the functional requirements for laboratory science or large-group instruction. The National Research Council’s (NRC) 2005 study, *America’s Lab Report: Investigations in High School Science*, found that “most people in this country lack the basic understanding of science they need to make informed decisions about the many scientific issues affecting their lives” (National Research Council, Committee on High School Science Laboratories: Role and Vision, 2005). The NRC study reached this conclusion from a thorough analysis of the contributions that laboratory experience make to U.S. high school science curricula. The NRC report found a startling disconnect between science curricula and laboratory experience throughout U.S. high schools.

²⁹ Effective July 7, 2004, the GAO’s legal name became the Government Accountability Office.

VII. Conclusions

The four NDEA Titles featured in this report contributed to general upward trends (e.g., in the rate of high school, college, and graduate completion; in the level of student preparedness in science, mathematics, and modern languages; in the number of teachers and degree-granting institutions; in the number of bachelors and doctoral degrees awarded; and in the number of scholarly publications by doctoral recipients) during the years that they were in force. Their provisions also contributed to broad socioeconomic changes in the United States because they enabled students from a wider range of income levels to attend and finish college.

Because the HEW Office of Education sponsored and conducted several detailed studies of Title IV over its lifetime, its effects have been well documented. However, it has proven difficult to separate the effects of all Title II, III, and V provisions from other drivers in the observed historical trends or to assign particular causal relationships. Some provisions can be linked strongly to results, while, for others, the evidence of a connection is largely anecdotal.

Contemporary concerns about patterns of postsecondary enrollment, student debt, and increasingly inadequate instructional equipment and the collective effect of these three concerns on national competitiveness echo the concerns of nearly 50 years ago—concerns that led to the establishment of the NDEA. Experience with the NDEA suggests that comprehensive educational legislation can have a strong, positive effect; however, without the means to track and analyze outcomes, its effects cannot be quantitatively and qualitatively established with certainty.

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Glossary

ACFSA	Advisory Committee on Student Financial Assistance
BSSR	Bureau of Social Science Research
CCD	Common Core of Data
CPIR	Consolidated Program Information Report
CRS	Congressional Research Service
CSHE	Center for Studies in Higher Education
DHS	Department of Homeland Security
DL	Direct Loan
DoD	Department of Defense
EEO	Equal Employment Opportunity
ESEA	Elementary and Secondary Education Act
FAQ	frequently asked question
FFEL	Federal Family Education Loan
FRSS	Fast Response Survey System
FY	fiscal year
GAO	Government Accountability Office General Accounting Office
GPO	U.S. Government Printing Office
GSL	Guaranteed Student Loan
H.R.	House of Representatives
HEA	Higher Education Act
HEGIS	Higher Education General Information Survey
HEHS	Health, Education, and Human Services Division
HEW	Department of Health, Education, and Welfare
HHS	Department of Health and Human Services
HS&B	High School and Beyond
IDA	Institute for Defense Analyses
IOM	Institute of Medicine

IPEDS	Integrated Postsecondary Education Data System
JHU	Johns Hopkins University
NAE	National Academy of Engineering
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NCES	National Center for Education Statistics
NCLB	No Child Left Behind
NDEA	National Defense Education Act
NDSL	National Defense Student Loan National Direct Student Loan
NEA	National Education Act
NGA	National Governors Association
NIH	National Institutes of Health
NRC	National Research Council
NSF	National Science Foundation
OSTP	Office of Science and Technology Policy
P.L.	Public Law
PLUS	Parent Loan for Undergraduate Student
PSU	Private School Universe
R&D	research and development
RL	Congressional Research Service Long Version of a Report (e.g., CRS RL32854) ³⁰
S&E	science and engineering
S&T	science and technology
S.	Senate
SED	Survey of Earned Doctorates
SLS	Supplemental Loan for Students

³⁰ The Congressional Research Service (CRS) produces a number of document types although the most commonly requested are the reports (almost 4,000 reports are currently in existence). The purpose of a report is to clearly define the issue in the legislative context. The reports may take many forms including policy analysis, economic studies, statistical reviews, and legal analyses, and can be either Short Reports (RS), which are typically under 7 pages in length, or Long Reports (RL), which can include major studies on a particular topic.

SMART	Science and Mathematics Access to Retain Talent
STEM	scientific, technical, engineering, and mathematics
STPI	Science and Technology Policy Institute
TM	Technical Memorandum
U.S.	United States
U.S.C.	United States Code

Appendix A.
Annotated Bibliography

Appendix A. Annotated Bibliography

This bibliography includes published and unpublished materials reviewed as part of the process of carrying out the OSTP task order.

Advisory Committee on Student Financial Assistance (ACFSA). 2001. *Access Denied: Restoring the Nation's Commitment to Equal Educational Opportunity*. Washington, DC: The Committee.
http://www.ed.gov/about/bdscomm/list/acsfa/access_denied.pdf.

In this report, the Advisory Committee, which was created by Congress to advise the Secretary of Education and Congress on higher education and student-aid policy, “finds that low-income students’ access to college, especially four-year colleges and universities, is limited by high levels of unmet need and that increasing numbers of low-income students arriving on the nation’s campuses over [the next] decade will exacerbate this problem.” Factors such as a rise in college attendance costs only for low-income families, recent shifts in policy priorities away from access at all levels, and resulting increases in unmet need for low-income students are considered. This report concludes that these factors contribute to significant disparities in college participation rates of qualified students by family income level. The role of part-time work, academic preparation, and the timing and delivery of financial aid information to families are also assessed. Policy recommendations for addressing this situation are outlined.

Baum, Sandy and Marie O’Malley. 2003. *College on Credit: How Borrowers Perceive Their Education Debt. Results of the 2002 National Student Loan Survey*. Washington, DC: Nellie Mae Corporation.
http://www.nelliemae.com/library/research_10.html.

This report summarizes the findings of the 2002 National Student Loan Survey sponsored by Nellie Mae to examine the effect of student loan debt burden on borrowers in repayment. It provides data on debt levels for undergraduate and graduate students and captures borrowers’ perceptions about the value of their education in relation to their student loan debt. Results are compared with those of previous surveys conducted in 1987, 1991, and 1997, with 15-year analyses of certain trends in debt levels and borrower behavior. The report concludes that rising college costs, decreasing purchasing power of federal and state financial aid, and tough economic times have contributed to increased dependence on loans for financing education and, consequently, greater indebtedness among students and their families. Strong evidence is presented suggesting that the increase in borrowing over the 1997–2002 period has placed by far the largest burden on

low-income families (i.e., those who qualified for Pell Grants), who struggle with debt levels that are manageable for higher income families. Data are also presented by racial/ethnic groups and school type. The study also suggests that 27 percent of students rely on credit card debt to finance part of their education.

Butz, William P , Terrence K. Kelly, David Adamson, Gabrielle Bloom, Donna Fossum, and Mihal Gross. 2004. *Will the Scientific and Technology Workforce Meet the Requirements of the Federal Government?* Santa Monica, CA: RAND Corporation. http://192.5.14.110/pubs/monographs/2004/RAND_MG118.pdf.

This report presents the results of a RAND study that examined the current federal scientific, technical, engineering, and mathematics (STEM) workforce. It assesses whether personnel shortages or other deficiencies in the federal STEM workforce may be imminent, examines past legislation and programs implemented to identify measures that might be instituted now, and explores the data that the federal government needs to collect to monitor this issue adequately.

Carlson, Theodora E, 1959. *Guide to the National Defense Education Act of 1958*. Washington, DC: U.S. Department of Health, Education, and Welfare, Office of Education.

This guide, produced by the Office of Education, provides a description of the programs established in each Title of the National Defense Education Act (NDEA). It addresses frequently asked questions (FAQs) about the Act's provisions, including descriptions of the national context and objectives that each Title was intended to address eligibility criteria, application processes, and legislative authorizations and projections. Some key statistics and studies that identified national problems and led to the passage of the Act are also cited.

Cartter, Allan M. 1976. *Ph.D. 's and the Academic Labor Market: A Report Prepared for the Carnegie Commission on Higher Education*. New York: McGraw-Hill.

Cartter's influential study reviewed the growth of enrollment in higher education and predicted that by the 1980s, a glut of specialized talent would depress the market for academic labor. This surplus, he predicted, would negatively affect the U.S. economy. Subsequent studies have largely borne out Cartter's predictions.

Clowse, Barbara B. 1981. *Brainpower for the Cold War: The Sputnik Crisis and National Defense Education Act of 1958*. Westport, CT: Greenwood Press.

This book traces the legislative history of the NDEA, from inception to implementation. It focuses on the personalities, institutions, and politics that shaped the final legislation. Clowse argues that domestic politics, rather than the Cold War, were the primary motivation for passing the NDEA.

Cohen, Wilbur J. September 1968. "NDEA: An Idea That Grew." *American Education*, Vol. 4, No 4, p. 3.

This article discusses on the history and effects of the NDEA.

College Board. 2005a. *Trends in College Pricing 2004*. Washington, DC: The Board.
http://www.collegeboard.com/prod_downloads/press/cost04/041264TrendsPricing2004_FINAL.pdf.

This report, based on the College Board's Annual Survey of Colleges, provides information on tuition and other expenses associated with attending public and private nonprofit institutions of postsecondary education in the United States. Changes in tuition and enrollment (by region) are discussed, accompanied by additional data. The report also describes considerable variation in costs across postsecondary institutions and makes the point that most students pay less than the published cost as a result of financial aid.

College Board. 2005b. *Trends in Student Aid 2004*. Washington, DC: The Board.
http://www.collegeboard.com/prod_downloads/press/cost04/TrendsinStudentAid2004.pdf.

This publication presents annual data on the amount of financial assistance (in the form of grants, loans, work-study, and education tax benefits) distributed to students to help them pay for postsecondary education. The College Board began this data series in 1983 to track the value of student financial aid over time from federal, state, and institutional sources. This report tracks the increasing complexity of student financing and documents the shifts in the nature of federal student aid. For instance, according to the report, "in the 1970s and 1980s, most aid programs were designed to increase access to college for students who would otherwise be unable to afford to enroll. In recent years, student aid programs have been focused increasingly on affecting students' choice of institutions, on rewarding academic achievement, and on reducing strain on middle-income families."

Douglass, John A. 1999. *The Cold War, Technology and the American University*. University of California, Berkeley Center for Studies in Higher Education Paper CSHE2-99. Berkeley, CA: The Center. <http://repositories.cdlib.org/cshe/CSHE2-99>.

This paper discusses the short- and long-term significance of Sputnik to federal science and technology (S&T) policy, the role of the American research university, and the American economy. It notes the role of Sputnik in elevating the American research university as a pivotal tool for winning the Cold War by significantly expanding the training of scientists and engineers and catalyzing large-scale federal funding for higher education. As a result, the federal government became the nation's primary source of research and development (R&D) investment. Douglass argues that scientific research increasingly shifted toward a multidisciplinary model that led to the creation of new knowledge that forms the foundation for today's technological innovations.

Dratch, Dana. 2006. *Pell Grants—Less Money for the Needy*.
<http://www.bankrate.com/comB/news/advice/college/20060228c1.asp>

This article discusses the federal Pell Grant and the effects of a new merit-based program that offers additional funds for academic achievement and participation

in science, mathematics, or certain language programs. While the program is intended to increase funding to help keep pace with rising college costs, it has been criticized for excluding many of the neediest students.

Fitzgerald, Brian. 2002. *Effects of Unmet Need on College-Qualified High School Graduates*. Washington, DC: Advisory Committee on Student Financial Assistance. <http://www.ed.gov/about/bdscomm/list/acsfa/fitzgerald.ppt>.

This presentation presents a variety of charts documenting (lower) access to post-secondary education among qualified students from lower income families. It borrows on data from ACFSA's 2001 "Access Denied." ACFSA was created by Congress to advise the Secretary of Education and Congress on higher education and student-aid policy.

Fowler, William J. (Ed.) 2003. *Developments in School Finance: 2001–02. Fiscal Proceedings From the Annual State Data Conferences of July 2001 and July 2002*. Washington, DC: U.S. Department of Education. National Center for Education Statistics. http://nces.ed.gov/pubs2003/2003403_1.pdf.

These proceedings contain papers presented at the 2001 and 2002 annual National Center for Education Statistics (NCES) Summer Data Conferences. These conferences attracted policymakers from several state departments of education, fiscal analysts, and fiscal data providers from each state. The attendees were offered fiscal training sessions and updates on developments in the field of education finance. At the 2001 NCES Summer Data Conference, scholars in the field of education finance addressed the theme "Making Data Work." Discussions and presentations dealt with several topics (e.g., the effective display of finance data, assessing the financial condition of school districts, and the economic efficiency and funding adequacy of school districts.) The theme for the 2002 Summer Data Conference was "Common Data, Common Goals," and the topics of education finance addressed included teacher pay, vouchers, measuring the cost of education, and the school district bond rating process.

Gaarder, Alfred B. 1966. *Improving Instruction in the Public Schools Through Title III of the NDEA*. Washington, DC: U.S. Department of Health, Education, and Welfare, Office of Education.

This is a nationwide report of joint federal-state-local activities conducted through Title III of the NDEA. It provides a summary of this Title III objectives, an evaluation with anecdotes (by state), and extensive state-by-state data on costs of projects administered (instructional equipment, materials, minor remodeling of classrooms/laboratories, state supervisory services, and so forth) using Title III funds. These costs are further broken down by type of project, general subject (science, mathematics, or modern foreign languages), and school level (elementary or secondary).

General Accounting Office. 1995. *School Facilities: America's Schools Not Designed or Equipped for 21st Century*. Letter Report, GAO/HEHS-95-95. Washington, DC: The Office.

<http://frwebgate.access.gpo.gov/cgi-bin/useftp.cgi?IPaddress=162.140.64.88&filename=he95095.txt&directory=/diskb/wais/data/gao>.

This study examined whether America's schools met key facilities requirements and environmental conditions for education reform and improvement, had appropriate technologies and infrastructures, and had adequate physical capacity to support future requirements. The study found, among other things, that most schools were unprepared for the 21st century, that one-third of schools that had sufficient computer technology were not networked, and that about 40 percent of schools could not adequately meet the functional requirements for laboratory science or large-group instruction.

Hall, Robert C. 1961. *The National Defense Student Loan Program: A Two-Year Report*. Washington, DC: U.S. Government Printing Office (GPO).

This report provides an extensive accounting of NDEA Title II funds through 1960, including the number of student and institutional applicants/beneficiaries by state, institutional type, and other criteria. It also includes a description of the administrative process used for the National Defense Student Loan (NDSL) program and a brief assessment of the success of the program during this limited period.

Hammond, James T. 2005. "Colleges Facing Faculty Shortage." *The [South Carolina] State*, August 2.

This article states that "schools' leaders anticipate expensive efforts to replace thousands of South Carolina professors who are nearing retirement age." It links the state-wide trend with national data and cites the retirement of Sputnik-era U.S. scientists as part of the cause for concern.

Hanushek, Eric A. and Steven G. Rivkin. 2003. *How to Improve the Supply of High-Quality Teachers*. Brookings Papers on Education Policy. Washington, DC: Brookings Institute.

This paper reviews the various strands of research related to teacher quality, including the role of aggregate salaries, the supply of teachers with different characteristics, the relationship between teacher characteristics and student achievement, and direct estimates of the value added of teachers. It then proceeds to relate this evidence to current policy initiatives as generally bounded by recommendations to tighten up on teacher qualifications and by recommendations to loosen up on entry.

Harden, Thomas K. 1981. *The National Defense Education Act: A Turning Point in Federal Aid*. Washington, DC: U.S. Department of Education.

This report evaluates the changes in federal aid policies marked by the passage of NDEA in 1958 and by subsequent amendments to the Act. It describes how the Soviet Union's launch of Sputnik in 1957 "allowed supporters to link educational aid to national defense," thereby leading to the passage of NDEA, the first federal funding program for general education, in 1958. Although the NDEA Titles were originally focused on gifted students and the areas of science, mathematics, and foreign languages, subsequent legislation broadened NDEA's scope to include the arts and humanities and nearly all students.

Harmon, Lindsey R. 1977. *Career Achievements of NDEA (Title IV) Fellows of 1959–1973: Report to the U.S. Office of Education*. Washington, DC: The National Academies, National Research Council, Commission on Human Resources.³¹

This is an extensive study of the career outcomes of the individuals receiving fellowships through Title IV of the NDEA. It was requested by the Office of Education, through the National Science Foundation (NSF), to expand the analysis of the two-phase study of the Title IV fellowship program completed by the Bureau of Social Science Research (BSSR, Inc.) in 1968. It evaluates career achievements of fellows by assessing rates of doctorate attainment, percentage of fellows reaching faculty status, percentage of fellows reaching dissertation adviser status, institutional migration, geographic migration, winning of research grants, employment after doctorate, and publications and citations in scientific literature. The results of the study support the conclusions of the BSSR report: that Title IV increased the accessibility of graduate education, reduced time-to-degree completion, and motivated fellows to teach in colleges following graduation.

Harris, Mary M. and James R. Miller. 2005. "Needed: Reincarnation of National Defense Education Act of 1958." *Journal of Science Education and Technology*, Vol. 14, No. 2, pp. 157–171.

This article provides an evaluation of mathematics, science, and engineering education in the United States and provides policy recommendations based on the authors' findings.

Heller, Donald E. (Ed.) 2001. *States and Public Higher Education Policy: Affordability, Access, and Accountability*. Baltimore, MD: Johns Hopkins University (JHU) Press.

This book addresses the three major concerns in higher education today: affordability, access, and accountability. It briefly outlines the historical foundations of postsecondary public education in America and the role of states in providing

³¹ The National Academies bring together committees of experts in all areas of scientific and technological endeavor. These experts serve *pro bono* to address critical national issues and give advice to the federal government and the public. Four organizations comprise the Academies: the National Academy of Sciences (NAS), the National Academy of Engineering (NAE), the Institute of Medicine (IOM), and the National Research Council (NRC).

higher education services. It also evaluates the major changes to the system and how these changes have brought the three major issues together.

Holmstrom, Engin I. and Laure M. Sharp. 1970. *Study of NDEA Title IV Fellowship Program, Phase I & II*. Washington, DC: Bureau of Social Science Research, Inc.

These two reports correspond to two phases of an extensive study of NDEA Title IV fellowship recipients sponsored by the Office of Education. The Phase II report concludes that the graduate fellowships administered under this Title were successful in fulfilling their objectives because (1) the doctorate completion rate among NDEA fellows was significantly higher, (2) most fellows had entered full-time employment as college or university teachers, (3) time-to-degree completion was lower for NDEA fellows because a large proportion were able to forego work to spend full time on their studies, (5) positive program reviews were received by program deans, (6) encouragement to state career teaching goals at the beginning of doctoral education resulted in higher proportions of fellows who became teachers, (7) the structure of the NDEA program (though need-blind) reached a large number of low-income students who otherwise would not have had the opportunity to pursue doctorates, and (8) the low-income students were slightly more likely to complete their degrees than students of more privileged backgrounds. Extensive evaluations of Title IV and supporting data are also provided.

Ihrke, Donald F. 1962. *Evaluation of the Effectiveness of the National Defense Education Act*. Master's thesis. Northern State Teachers College.

This dissertation summarizes a variety of statistics, commentary, and other historical documents pertaining to NDEA.

Jessee, Ronald N. 1975. *Title II of the Elementary and Secondary Education Act and Title III of the National Defense Education Act: Consolidated Program Information Report*. Washington, DC: U.S. Department of Health, Education, and Welfare. NCES.

This brief report summarizes expenditures and participation in programs funded by Title III of NDEA and the related Title II of the Elementary and Secondary Education Act (ESEA) of 1965, which provides direct federal assistance for the acquisition of school library resources, textbooks, and other instructional materials for both public and nonpublic school children. It presents statistics for the 1971–1972 period, drawn from the Consolidated Program Information Report (CPIR) and other historical sources.

Jordan, K. Forbis. 1982. *Precollege Science and Mathematics Education: Experiences With the National Defense Education Act and the Teacher Institutes Conducted By the National Science Foundation*. Congressional Research Service (CRS) 82-214 S. Washington, DC: Library of Congress.

This report draws on a variety of reports and analyses to conduct the first comprehensive review of all NDEA programs completed after most or all of the Act's programs had expired. Jordan points out that NDEA "might be viewed as the first major federal program to provide general aid to all school districts in contrast to

its stated purpose of updating and reforming the nation's educational system in response to Soviet launch of the Sputnik satellite." He also states that "evaluation of individual programs varied in terms of quantity and quality" perhaps because NDEA "was not a comprehensive and integrated piece of legislation but resembled a group of categorical programs whose common goal was to upgrade science instruction at all levels of education." According to Jordan, "For NDEA Title II, National Defense Student Loans, the findings raised questions as to whether the loans actually influenced decisions to become teachers. Most local school districts participated in NDEA Title III (laboratory equipment and instructional materials). Matching fund requirements were identified as a problem, and school programs reportedly failed to keep pace with developments in educational technology. Evaluations were favorable concerning NDEA Title IV graduate fellowships for college teaching. Program completion rates were high, and a high percentage of the participants became college teachers. NDEA Title V encouraged the development of guidance and counseling programs in schools, but the need for this program may not be as great today. Funding for foreign language institutes has been continued through other programs, but the issue may be whether specific efforts should be made to encourage language programs in elementary and secondary schools. NDEA and NSF teacher institutes were perceived positively by the participants. They increased their knowledge of subject matter; and interaction was increased between collegiate subject matter specialists and secondary teachers."

Kuenzi, Jeffrey J. 2005. *Teacher Recruitment and Retention: Federal State, and Local Programs*. Washington, DC: The Library of Congress CRS.

This report reviews a variety of federal, state, local, and private programs designed to increase the supply of teachers, create incentives for their professional development, and improve teachers' job experience and satisfaction. Because Title II and Sections of Title IV of the Higher Education Act (HEA) currently provide the bulk of Federal effort to recruit and retain teachers, this report seeks to provide a context for the discussion of such programs that may arise during Congressional reauthorization of the HEA.

Lindquist, Clarence B. 1971. *NDEA Fellowships for College Teaching, 1958-68: Title IV, National Defense Education Act of 1958*. Washington, DC: U.S. Office of Education.³²

This is a thorough but easily navigable year-by-year report on the first 10 years of the fellowship program established by the NDEA Title IV. It includes a relevant legislative history of the Act before its passage, descriptions and motivations for subsequent amendments, specifics of program administration, extensive statistics on the number of student and institutional applicants and beneficiaries, and a preliminary evaluation of the program's success. Altogether, it presents a strong

³² This work was originally published as Lindquist, Clarence B. (Undated). *NDEA Title IV Fellowships for College Teaching, 1958-68*. Washington, DC: U.S. Department of Health, Education, and Welfare.

though preliminary case for the success of the fellowship program, including evidence that Title IV led to an increase in graduate programs for the training of college teachers, motivated young people to enter training for college teaching careers, increased (through fellowship support) the number of persons earning doctorates while reducing time-to-degree for these individuals, and encouraged fellows to enter higher education employment after leaving graduate school.

Mortenson, Thomas G. 2005. *The Growing Gap Between Policy and Reality in Higher Education Opportunity in the United States: 1980–2005*. Paper presented at The European Access Network, July 7, Vienna, Austria.

<http://www.postsecondary.org/archives/Reports/070705EAN.pdf>.

This report presents compelling data on the low accessibility of postsecondary education for lower income students, highlighting, for instance, great income discrepancies in the rate of bachelor's degree attainment by age 24 and the change in this rate between 1977 and 2003. In 2003, bachelor's degree attainment rates by age 24 were 75 percent for the top family income quartile, 28 percent for the third quartile, 13 percent for the second quartile, and 9 percent for the bottom quartile. Between 1977–1979 and 2001–2003, these rates increased by 30 percent for the top family income quartile, 9 percent for the third, 3 percent for the second, and 0.03 percent for the bottom family income quartile.

Mortenson, Thomas G. 2000. *Postsecondary Participation of Students from Low Income Families: Challenges to Maintaining Access in the 21st Century*. Paper presented at a Roundtable Meeting of the Advisory Committee on Student Financial Assistance, April 12, at Boston University, Boston MA.

<http://www.cbo.gov/ftpdocs/49xx/doc4958/doc16.pdf>.

This presentation provides a series of charts (using mostly 1998 data from the NCES) that document (1) significant family-income, gender, and racial discrepancies in high school graduation rates, (2) college participation rates of high school graduates, (3) college completion rates of college participants, and (4) composite college completion rates. Overall, the data show that family income is positively correlated with each of these four rates. The data also show that female students consistently outperform male students in each of these categories.

National Governors Association. 2005. *An Action Agenda for Improving America's High Schools*. 2005 National Education Summit on High Schools.

<http://www.nga.org/cda/files/0502actionagenda.pdf>.

This document is a plan of action developed by the National Governors Association (NGA) to ensure that America's high school population will be prepared to enter institutes of higher learning and will be ready to participate fully in the U.S. and world economies.

National Research Council, Committee on High School Science Laboratories: Role and Vision. 2005. *America's Lab Report: Investigations in High School Science*. Susan R. Singer, Margaret L. Hilton, and Heidi A. Schweingruber (Eds.). Washington, DC: National Research Council.

This book is a rare examination of the role and state of high school science laboratories in the United States. It attempts to address the following (example) questions: (1) What comprises effective laboratory teaching? (2) What does research tell about learning in high school science labs? (3) How should laboratory learning be assessed? (4) Do all students have access to laboratory experiences? (5) What changes need to be made to improve laboratory experiences? (6) How can school organization contribute to effective laboratory teaching? Altogether, it describes disagreement among experts about the effect of laboratory experiences on student understanding and even about the format and goals of laboratory instruction.

National Science Foundation. 2003. *Survey of Earned Doctorates*. Washington, DC: The Foundation. <http://www.nsf.gov/statistics/srvydoctorates/>.

The Survey of Earned Doctorates (SED) began in 1958 to collect data continuously on the number and characteristics of individuals receiving research doctoral degrees from all accredited U.S. institutions. The results of this annual survey are used to assess characteristics and trends in doctorate education and degrees. This information is vital for educational and labor force planners in the federal government and academia.

National Science Foundation. National Science Board. 2005. *Science and Engineering Indicators, 2004*. Washington, DC: The Board. <http://www.nsf.gov/statistics/seind04/>.

Many decades of investment in R&D have helped lay the basis for a science and engineering (S&E) system that generates about one-third of the world's research articles, a multitude of technological innovations, and numerous high-technology industries that exploit innovations to their profit and to the nation's economic benefit. The United States has maintained its scientific and technological edge in the world even as new centers of scientific and technical know-how and innovation have emerged. It attracts many of the world's best scientists and engineers, remains the world's leading producer of high-technology products, and benefits from the rapid growth of knowledge-intensive service industries. Its policies and practices are studied around the world as models that might be applied by other countries in their efforts to boost their competitive standing in a world that is moving toward more knowledge-intensive industries. However, although the United States remains the world's S&T leader, a collection of trends in indicators of U.S. S&T competitiveness paints a more differentiated picture. Activating the Web site give the reader an interesting overview of the S&E indicators as of 2004.

Pierson, George A. 1965. *An Evaluation [of] Counselor Education in Regular Session Institutes: The NDEA Counseling and Guidance Institutes Program*. Washington, DC: GPO.

This evaluation was prepared upon request by the Office of Education for an independent study of regular session institutes for counselor education. It provides a variety of data on these institutions, including their annual number and enrollment and an extensive selected bibliography of studies related to NDEA Counseling and Guidance Institutes. It also describes the role these institutes were intended to play and evaluates their curricula and effectiveness. For an evaluation of short-term institutes for counselors and teachers, the report refers the reader to *A Report on the First 50 Institutes* by Leona E. Tyler, published by the Office of Education in 1960.

Samuelson, Robert J. 2005. "Sputnik Scare, Updated." *The Washington Post*, May 26, p. A27.

This *Washington Post* editorial argues that the deficit in the American S&E workforce is exaggerated and that the threat to the American economy presented by China and India is misunderstood—if not overstated.

Skinner, Rebecca R. and Richard N. Apling. 2005. *Vocational Education Reauthorization: Comparison and Analysis of Selected Provisions in H.R. 366 and S. 250*. CRS RL32962. The Library of Congress Congressional Research Service.

According to this CRS report, "the Federal government currently provides support for vocational and technical education through the Carl D. Perkins Vocational and Technical Education Act of 1998 (P.L. 105-332). (For more information about these acts, see CRS Report RL31747, *The Carl D. Perkins Vocational and Technical Education Act of 1998: Background and Implementation*.) The Perkins Act authorized funding for vocational and technical education through FY 2003, although the Congress continues to provide funding under the Act. The 109th Congress has acted to reauthorize the Perkins Act. Both the House and the Senate have passed their respective bills—H.R. 366 and S. 250. While both bills would retain much of current law, either would make substantial changes to current legislation, which are outlined in this report.

Smith, P.S., E.R. Banilower, K.C. McMahon, and I.R. Weiss. 2002. *The National Survey of Science and Mathematics Education: Trends From 1977 to 2000*. Chapel Hill, NC: Horizon Research, Inc.

<http://www.horizonresearch.com/reports/2002/2000survey/trends.php>.

This report is the fourth in a series of national surveys of science and mathematics education sponsored by NSF through a grant to Horizon Research, Inc. Building on three previous studies conducted in 1977, 1985–1986, and 1993, the report includes an extensive literature review, a case study of 11 districts throughout the country, and a national survey of teachers, principals, and district/state personnel. Its primary purpose is to provide current information and uncover trends regarding teacher background, curriculums, instruction, and the availability of

instructional resources. The survey focuses primarily on the years between 1993 and 2000, but some instances refer back to 1977 or 1985–1986.

Smole, David P. 2005. *Federal Perkins Loans and FFEL/DL Stafford Loans: A Brief Comparison*. CRS RL32854. Washington, DC: The Library of Congress Congressional Research Service.

This report provides a brief introduction to and comparison of key aspects of Perkins and Stafford Loans, especially in the context of expected Congressional consideration of reauthorization of the HEA.

Stoll, Adam. 2005. *The Higher Education Act: Reauthorization Status and Issues*. Washington, DC: The Library of Congress Congressional Research Service.

<http://hutchison.senate.gov/IB10097.pdf>.

This CRS report assesses the expiring HEA and considerations for its reauthorization, which is expected to be a topic of discussion during the 109th Congress. It describes the four main categories into which HEA programs primarily fall: (1) student financial aid, (2) services to help students complete high school and enter and succeed in college, (3) aid to institutions, and (4) aid to improve K–12 teacher training at postsecondary institutions. The report also outlines some of the issues considered by Congress to date during the reauthorization process. These include the changes in college prices and the appropriate federal role in addressing increased prices, the effectiveness of the HEA programs in increasing postsecondary access, measures to hold institutions accountable for educational outcomes, the process used to determine students' need for financial aid, and the significance of the growth in postsecondary distance education.

Suffrin, Sidney C. 1963. *Administering the National Defense Education Act*. Syracuse, NY: Syracuse University Press.

This book provides a history of the conditions that led to the passage of NDEA and shaped its administration.

Thompson, Theodore Albert. 1964. *The National Defense Education Act of 1958*. Master's thesis. Cornell University. Inter-University Project One Publication Series.

This dissertation outlines the historical circumstances and motivations that led to the passage of NDEA in 1958, including a description and evaluation of the Act's legislative history.

U.S. Code. 20 U.S.C. Chapter 17. "National Defense Education Program" and "Subchapter I – General Provisions." 2004 edition.

This is a complete record of all changes and amendments made to NDEA. See <http://www.access.gpo.gov/uscode/uscmmain.html>.

U.S. Congress. *Elementary and Secondary Education Act of 1965*, P.L. 89-10. 89th Congress, April 11, 1965.

The Elementary and Secondary Education Act is a comprehensive federal education law intended to designate substantial financial support for K–12 education.

Most of the funds are allocated for teacher professional development, instructional materials, resources to support educational programs, and parental involvement promotion.

U.S. Congress. *National Aeronautics and Space Act of 1958*, P.L. 85-568. 85th Congress, July 29, 1958. http://www.nasa.gov/offices/ogc/about/space_act1.html#POLICY.

The amended text of the act that created the National Aeronautics and Space Administration (NASA).

U.S. Congress. *National Defense Education Act of 1958*, P.L. 85-864. 85th Congress, September 2, 1958. Washington, DC: GPO.

The text of the NDEA as signed by President Dwight Eisenhower.

U.S. Congress. Congressional Budget Office. 1988. *Trends in College Tuition and Student Aid Since 1970*. Washington, DC: The Office.
<http://www.cbo.gov/ftpdocs/49xx/doc4958/doc16.pdf>.

This report provides data on trends in college tuition (by sector and type of institution), enrollment, and student aid beginning in 1970. It includes an evaluation of the effect of changes in enrollment and student aid on college prices. It is an excellent companion to the College Board's Trends in College Pricing reports because it presents data compiled before 1983.

U.S. Congress. House. Committee on Education and Labor. 1962. *Amendments to National Defense Education Act of 1958*. 87th Congress, 2nd session, October 2. H. R. 87-2157.

Amending the National Defense Education Act of 1958 to raise the limit on federal payments into student loan funds, to broaden the types of equipment which can be acquired with federal grants and loans under Title III thereof, and for other purposes.

U.S. Congress. House. Committee on Education and the Workforce. Subcommittee on Oversight and Investigations. 1998. *Education at a Crossroads: What Works and What's Wasted in Education Today*. Washington, DC: The Committee.
<http://edworkforce.house.gov/publications/xroads/crreport.pdf>.

This report summarizes the findings and recommendations of the subcommittee following an intensive review of the federal role in education, including extensive interviews with students, parents, teachers, and administrators during visits to schools across the country. The report found significant disparities between American schools, some of which were "shining examples of educational excellence," and others that were "mired in failure." The purpose of the Crossroads project was to identify the steps that lead in the direction of either excellence or failure. This report found that successful schools were not the product of federal funding but, instead, were characterized by parental involvement, local control, emphasis on basic academics, and greater percentages of education dollars spent in classrooms. It also characterized the federal role in education in the late 1990s as fraught with failure and bureaucracy—pointing to the complexity and number

of federal education programs, the lack of coordination between these programs, large resulting amounts of paperwork, and significant overhead costs at the federal, state, and local levels.

U.S. Congress. Senate. Committee on Appropriations. 1960. *Review of Activities Under National Defense Education Act*. January 6. Committee Print.

These congressional proceedings contain a statement by the Commissioner of Education, Dr. Lawrence Derthick, and a variety of statistics and anecdotes quoted during discussion of NDEA activities to date.

U.S. Congress. Senate. Committee on Labor and Public Welfare. 1962. 87th Congress, 2nd session, September 28. S. Report 2179.

Amending the National Defense Education Act of 1958 to raise the limit on federal payments into student loan funds, to broaden the types of equipment which may be acquired with federal grants and loans under Title III thereof and for other purposes.

U.S. Congress. Senate. Committee on Labor and Public Welfare. Subcommittee on Education. 1967a. *Notes and Working Papers Concerning the Administration of Programs Authorized Under Student Financial Assistance Programs*. 88th Congress. Washington, DC: GPO. Committee Print.

This document contains “A Study of Federal Student Loan Programs” conducted by the College Entrance Examination Board. This study focuses on six federally assisted student loan programs: (1) the NSDL program, (2) guaranteed loans under the HEA of 1965, (3) guaranteed loans under the Vocational Student Loan Insurance Act of 1965, (4) the health professions’ student loan program, (5) the nursing students’ loan program, and (6) the Cuban refugee students’ loan program. This evaluation covers the administration of the student loan programs, the problem of student loan collections, and other significant areas of student loan operations and provides policy recommendations to the Senate Subcommittee on Education in preparation for hearings on the Higher Education Amendments of 1968.

U.S. Congress. Senate. Committee on Labor and Public Welfare. Subcommittee on Education. 1967b. *Notes and Working Papers Concerning the Administration of Programs Authorized Under Title I of Public Law 89*. 88th Congress. Washington, DC: GPO. Committee Print.

This document is the first in a series of reports requested by the Chairman of the Senate Education Subcommittee, Wayne Morse. It summarizes the administration, funding, and effect of NDEA Title I through the 1965–1966 school year.

U. S. Congress. Senate. Committee on Labor and Public Welfare. Subcommittee on Education. 1967c. *Notes and Working Papers Concerning the Administration of Programs Authorized Under Title II of Public Law 89, 88th Congress*. Washington, DC: GPO. Committee Print.

This document is a Senate report that discusses the outcome of NDEA's Title II and recommends future actions.

- U. S. Congress. Senate. Committee on Labor and Public Welfare. Subcommittee on Education. 1967d. *Notes and Working Papers Concerning the Administration of Programs Authorized Under Title III of the National Defense Education Act, As Amended*. 88th Congress. Washington, DC: GPO. Committee Print.

This document is the third in a series of reports requested by the Chairman of the Senate Education Subcommittee, Wayne Morse. It summarizes the administration, funding, and effect of NDEA Title III through the 1965–1966 school year.

- U.S. Congress. Senate. Committee on Labor and Public Welfare. Subcommittee on Education. 1967c. *Notes and Working Papers Concerning the Administration of Programs Authorized Under Title V of the National Defense Education Act, As Amended, 88th Congress*. Washington, DC: GPO. Committee Print.

This document is the fifth in a series of reports requested by the Chairman of the Senate Education Subcommittee, Wayne Morse. It presents data on Title V funding levels, numbers and sizes of guidance and testing programs, and high school completion rates between 1958 and 1966. Some data are presented for the 1958–1959 and the 1965–1966 school years only. Estimates are made of future spending levels needed to meet counselor-student ratio targets. Lengthy appendixes contain the text of NEDA Title V (as amended) and program management documents.

- U.S. Department of Education. National Center for Education Statistics. 2003a. *Digest of Education Statistics, 2003*. Washington, DC: The Center.
<http://nces.ed.gov/programs/digest/d03/tables/dt064.asp> and
<http://nces.ed.gov/programs/digest/d03/tables/dt186.asp>.

The first Internet address is *Table 64. Public and private elementary and secondary teachers, enrollment, and pupil to teacher ratios: Selected years, fall 1955 to fall 2002*. The second Internet address is *Table 186. College enrollment and enrollment rates of recent high school completers, by sex: 1960 to 2002*.

- U.S. Department of Education. National Center for Education Statistics. 2003b. *High School Guidance Counseling*. E.D. Tabs (Author). Washington, DC: The Center.
<http://nces.ed.gov/pubs2003/2003015.pdf>.

The survey, conducted through the NCES Fast Response Survey System (FRSS), provides a description of public high school guidance programs, activities, and staff in 2002. This report summarizes findings for all public high schools in the 2002 FRSS survey and the 1984 supplement to High School and Beyond (HS&B). Findings for schools in the FRSS survey are also presented by the following school characteristics: enrollment size, locale, percentage of college-bound students, and number of vocational courses offered per 100 students.

U.S. Department of Education. National Center for Education Statistics. 2000. *Drop-out Rates in the United States: 2000*. Washington, DC: The Center.
http://nces.ed.gov/pubs2002/droppub_2001/11.asp.

This report is the 13th in a series of NCES reports on high school dropout and completion rates. It presents data on rates in 2000 (the most recent year for which data are available) and includes time series data on high school dropout and completion rates for 1972 through 2000. In addition to extending time series data reported in earlier years, this report examines the characteristics of high school dropouts and high school completers in 2000. It shows that progress was made during the 1970s and 1980s in reducing high school dropout rates and increasing high school completion rates but that these rates remained comparatively stable during the 1990s.

U.S. Department of Health, Education, and Welfare. 1964. *1964 Annual Report of the U.S. Department of Health, Education, and Welfare*. Washington, DC: The Department.

This annual report provides a brief official evaluation of the extent and success of NDEA, by Title, including key statistics on funding and the number of program beneficiaries at the time when the first appropriations made under the Act were set to expire. Annual reports for other years provide similar information.

U.S. Department of Health, Education and Welfare. 1962. *Report on the National Defense Education Act 1961–62*. Washington, DC: The Department.

This report provides an introduction to the NDEA and a Title-by-Title outline of the problems and objectives that each Title is intended to address, the mechanisms for reaching these goals, planned and expended program support, and a detailed accounting of the number of students and institutions applying and benefiting by state, institutional type, and other criteria.

U.S. Department of Health, Education, and Welfare. Office of Education. 1969. *NDEA Title III: A Management View, Fiscal Years 1959–67*. Washington, DC: The Department.

This is a management review report of Title III of the NDEA prepared for Congress by the Office of Education. It was designed to show the intent of the Congress and the states' effectiveness in administering the programs under this Title from 1959 through 1967. It reflects data from before and after Title III was amended to include history, civics, geography, English, reading, economics, and industrial arts, in addition to the original three subjects of science, mathematics, and modern foreign languages. It provides an overview with recommendations for legislative consideration, a case study of state education agency management practices, extensive statistical tables, and descriptions of exemplary Title III projects. Detailed annual data break out expenditures by state, type of project (instructional materials, minor remodeling, state supervisory services, and so forth), subject, and a variety of other categories. Copies of questionnaires used for

collecting data (via interviews) on the administration and effectiveness of Title III funds are also provided.

U.S. Department of Health, Education, and Welfare. Office of Education. 1967. *Education 1967*. Washington, DC: GPO.

This document outlines various programs and services offered by the Office of Education.

U.S. Department of Health, Education, and Welfare. Office of Education. 1965. *Statement by Peter P. Muirhead, Associate Commissioner for Higher Education on the Collection of National Defense Student Loans*. March 9. Washington, DC: The Department.

This statement addresses the reasons for NDSL's existence, the nature and extent of the problem of collecting on NDSLs in the early 1960s, and potential corrective measures. Data on the number of loans awarded, collected, defaulted, and forgiven are provided along with data on the costs of NDSL administration. Lack of proper counseling of applicants for loans, lack of emphasis on loan terms and responsibilities, and incompetent eligibility evaluations are cited among conditions causing defaults of NDSL loans.

U.S. Department of Health, Education, and Welfare. Office of Education. 1964a. *Report on the National Defense Education Act, Fiscal Year 1963: A Summary of Programs Administered by the Office of Education Under Public Law 85-864*. Washington, DC: GPO.

This report provides an introduction to NDEA and a Title-by-Title outline of the problems and objectives each Title is intended to address, the mechanisms for reaching these goals, planned and expended program support to date, and detailed accounting of the number of students and institutions applying and benefiting by state, institutional type, and other criteria. Evaluations of these programs are also offered. Although this report contains current year, cumulative, and some annual data, previous editions of this report provide similar information for other years.

U.S. Department of Health, Education, and Welfare. Office of Education. 1964b. *Statement by Commissioner of Education on Defense Educational Activities*. Washington, DC: The Department.

The commissioner's statement provides a review of accomplishments under the NDEA, including key statistics on funds expended and the number of beneficiaries at the time when the original appropriations under the Act were set to expire and a second set of further appropriations were beginning to take effect.

U.S. Department of Health, Education, and Welfare. Office of Education. 1961. *National Defense Graduate Fellowship Program: A Report on the First Two Years*. Washington, DC: GPO.

This is a thorough report on the first 2 years of the fellowship program administered under NDEA Title IV. It includes a description of the administration of the

program, an evaluation of the effects of Title IV, and key statistics on its funding and number of beneficiaries through 1961.

U.S. Department of Health, Education, and Welfare. Office of Education. Bureau of Elementary and Secondary Education. 1969. *Review of Progress Under Title V-A, National Defense Education Act of 1958, As Amended*. Washington, DC: The Department.

This review of Title V-A seeks to present a comprehensive picture of the program's contribution to guidance, counseling, and testing in the nation's schools. Specifically, this report focuses on the purpose of Title V-A, ways in which its objectives have been met, evidence of the program's effectiveness, efforts to achieve maximum effect, and areas of critical need and changing emphasis. Extensive data pertinent to each of these five topics are presented at the national level, along with a sampling of data and anecdotes from individual states.

U.S. Department of Labor. Bureau of Labor Statistics. *Occupation Outlook Handbook, 2006–07 Edition*. Washington, DC: The Bureau.
<http://www.bls.gov/oco/ocos067.htm>.

This document provides counselors information in the following areas: nature of the work; working conditions; training, other qualifications, and advancement; employment, job outlook, earnings, related occupations; and sources of additional information.

Wickline, Lee E. 1966. *Improvement of Instruction Through NDEA Title III: A Report on the Improvement of Instruction in Science, Mathematics, and Modern Foreign Languages in Public Elementary and Secondary Schools Under Title III of the National Defense Education Act of 1958*. Washington, DC: GPO.

This report highlights some of the major contributions of NDEA Title III. It outlines the types and quantities of equipment and materials purchased and the variety of state supervisory services made available because of this Title. It provides a brief description of the objectives of this Title, data on usage of appropriated funds, and an evaluation of how well they have met the objectives set forth by Congress. Based on a review of annual financial, statistical, and narrative reports submitted by the states to the U.S. Office of Education, it concludes that Title III has been a significant factor in effecting changes that have led to improvement of instruction in science, mathematics, and modern foreign languages.

Wolanin, Thomas R. 2003. "The Federal Role in Higher Education." In *The NEA 2003 Almanac of Higher Education*. Washington, DC: National Education Association.
<http://www2.nea.org/he/healma2k3/a03p39.pdf>.

This report evaluates the federal role in higher education, including tax benefits, other forms of student assistance, and research support. It provides a brief overview of the history of federal involvement and a useful chart comparing a variety of federal tax benefits for higher education. It concludes that the federal government and higher education remain "inextricably linked" and makes other arguments about considerations for such federal funding.

Wolfe, Dael L. 1954. *America's Resources of Specialized Talent*. New York: Harper.

Dael Wolfe conducted the first comprehensive study of the present and future supply of workers whose entry-level employment required at least a bachelor's degree. The fields examined ranged from engineers and scientists to lawyers and teachers. Wolfe found that the academic ability of people who chose careers in mathematics and physics averaged highest, followed by those who chose careers in chemistry and other sciences. The study also predicted explosive and permanent annual growth in the number of college graduates.

Appendix B.
Supplementary Graphs

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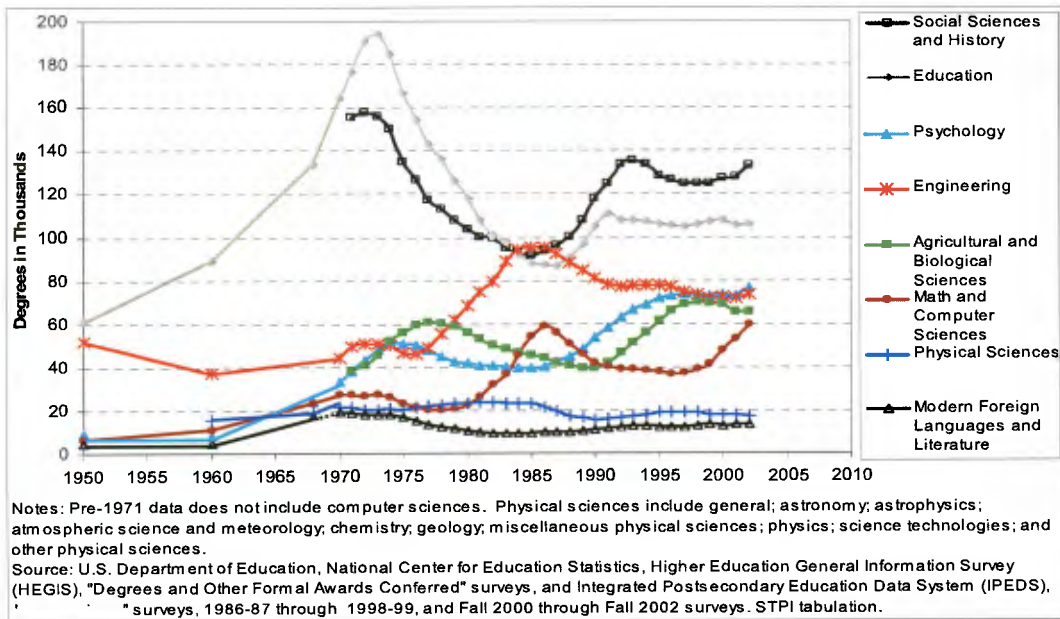


Figure B-1. Bachelor's Degrees Earned by Field: 1950–2002

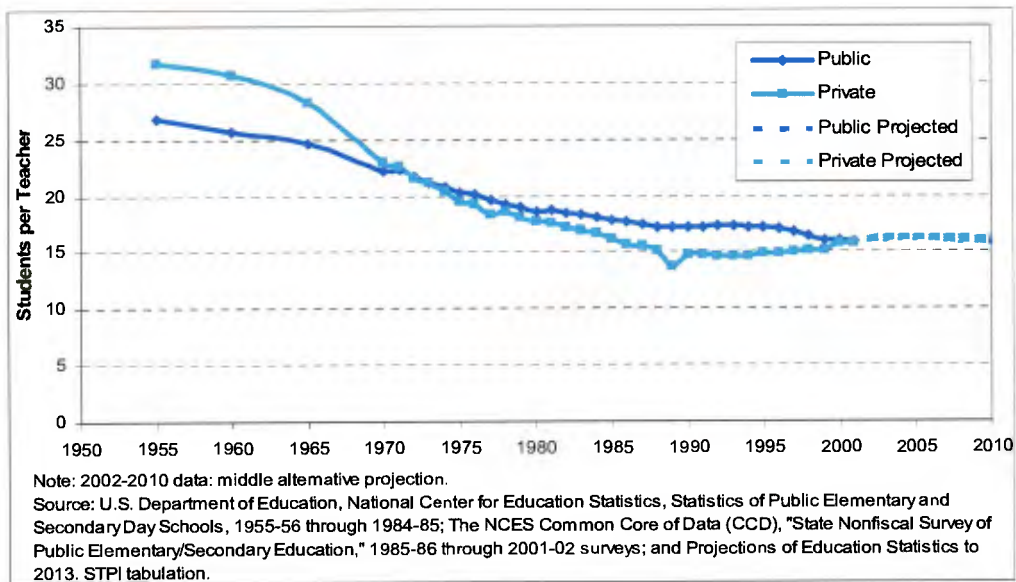


Figure B-2. Student-to-Teacher Ratio: 1955–2010

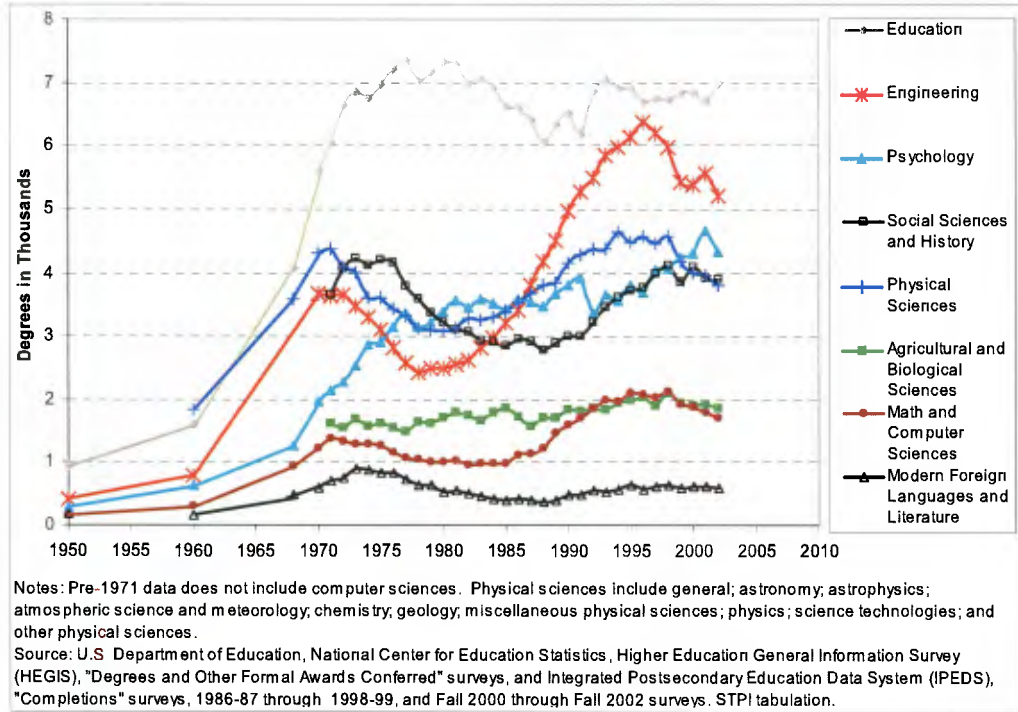


Figure B-3. Doctoral Degree by Field: 1950–2002

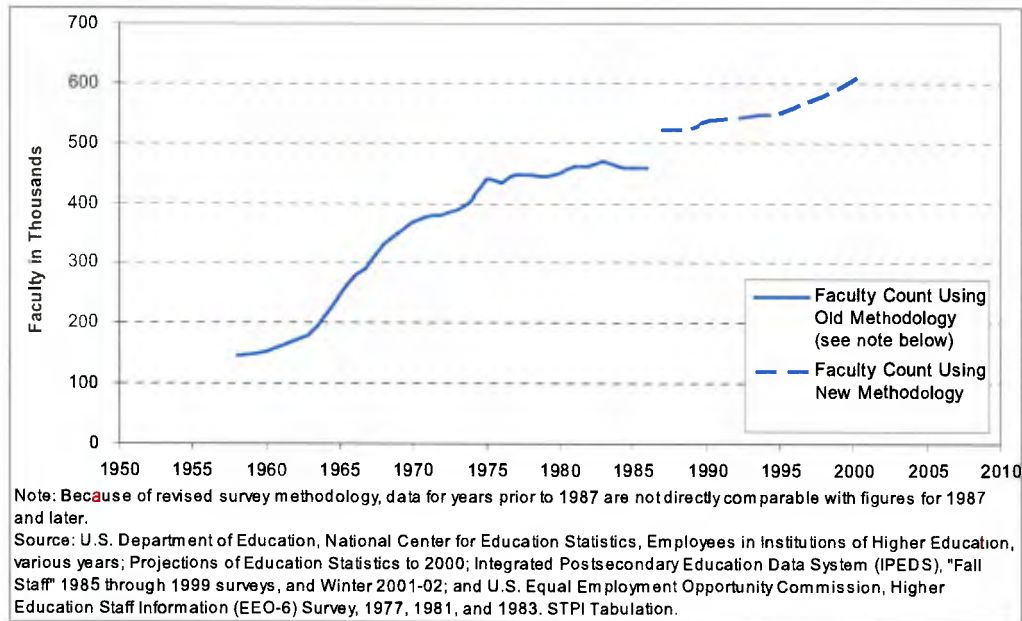


Figure B-4. Full-time Faculty: 1958–2001

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14. ABSTRACT The National Defense Education Act of 1958 (P.L. 85-864) represented an important step in the expansion of educational opportunities for those interested in pursuing careers in the sciences, mathematics, or foreign languages. In 2005, the White House Office of Science and Technology Policy (OSTP) asked the Institute for Defense Analyses (IDA) Science and Technology Policy Institute (STPI) to examine the effects of NDEA on increasing the Nation's science and technology capabilities, with emphasis on its effect in promoting the growth of the teaching workforce. Using available data and historical texts, STPI studied 4 of the 10 major NDEA provisions: Loans to Students in Institutions of Higher Learning (Title II); Financial Assistance for Strengthening Science, Mathematics, and Modern Foreign Language Instruction (Title III); National Defense Fellowships (Title IV); and Guidance, Counseling, and Testing; Identification and Encouragement of Able Students (Title IV). These four NDEA Titles contributed to general upward trends during the years that they were in force. Their provisions also contributed to broad socioeconomic changes in the United States because they enabled students from a wider range of income levels to attend and finish college.						
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