CHAPTER Bc
Education

Editor: Claudia Goldin

EDUCATION

Claudia Goldin

The education and training of a population is a critical input to productivity and thus to economic growth. Education directly increases productivity, and thus the incomes of those who receive schooling, by providing individuals with useful skills and knowledge. Schooling also stimulates invention and innovation and enables the more rapid diffusion of technological advances. The role of education changes with technological progress; some technologies have placed heavy demands on the cognitive skills of workers, whereas others have enabled the substitution of machinery for human skill. Formal education, especially basic literacy, is essential for a well-functioning democracy and enhances responsible citizenship and a sense of community. Religious beliefs have also been important in fostering both public and private education, even in the United States with its long history of separation of church and state. Schooling is also a pure consumption good, enabling people to better understand and enjoy their surroundings. Education can thus play a multitude of roles in the economy, polity, community, and religious and personal lives of a people.

It is perhaps no wonder that educational systems diffused rapidly among the free residents of the world's greatest nineteenth-century democracy. According to some estimates, by the 1840s, primary school enrollment per capita in the United States had exceeded that in Germany, and by this standard Americans had become the best-educated people among those in the world's richer nations (Easterlin 1981). U.S. literacy rates were also extremely high, among, once again, the free population. America borrowed many educational concepts and institutions from Europe but tailored them in particularly American ways. U.S. schools, at almost all levels, were more practical and applied than those in Europe, yet they were not industrial and were rarely vocational.[1] They became, early on, free and publicly funded and were generally permissive in allowing youths to enter each level independent of age, social status (but not race in certain parts of the United States), previous school record, and sex. After the establishment of publicly funded primary schools, girls and boys were educated for about the same number of years, and during the early to mid-twentieth century, a greater proportion of girls than boys attended and graduated from secondary schools (Table Bc258–264).

Although it would be useful to present school enrollment, attendance, and literacy rates for the early to mid-nineteenth century, the data are still fragmentary and subject to many potential biases. They were not included in the previous edition of *Historical Statistics of the United States* (1975), and although there has been considerable research on the subject since then, the data remain imperfect. Part of the problem is that data are incomplete for some geographical areas (for example, see Fishlow 1966) and the amount of detail varies. Massachusetts and New York, for example, have been studied in great depth for 1790 to 1850 (see Kaestle and Vinovskis 1980). But even in those states, enrollment rates that have been estimated for youths 5–19 years old are too high to be consistent with independent evidence on the occupations of youths. Perhaps some youths enrolled in school but did not attend, or perhaps school districts inflated enrollments. Even though precise estimates are beyond the task here, there is general agreement among scholars that by the middle of the nineteenth century U.S. schooling rates were exceptionally high, schooling was widespread among the free population, and literacy was virtually universal, again, among the free population (for illiteracy rates since 1870, see Table Bc793–797).

How the new nation of the United States managed in the short span of a half-century to attain the status of the best-educated country in the world is an involved tale. Until the mid-nineteenth century most education was offered in "common schools" that were publicly operated but often not fully publicly funded. In some districts, parents received a "rate bill" for their children's education. Elsewhere, part of the term was publicly funded and the rate bill supported an extended term. In large cities, such as New York, there were, early on, pauper schools paid for by public funds and private schools for the more fortunate. The details are complicated by the highly local nature of education in the United States. What is perfectly clear, however, is that virtually every state in the nation shifted to publicly funded education at the elementary or common school level in the decades following the American Civil War.

The claim that Americans became the best-educated people in the world by the mid-nineteenth century may, however, be somewhat overstated. Some European countries had, until the beginning

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[1] On comparisons among countries, see Ringer (1979).

of the twentieth century, far better institutions of higher education than did the United States. But European educational systems, with few exceptions, were elitist well into the twentieth century. Both secondary and higher education were reserved for those with exceptional abilities, stemming from both family background, with the opportunities it offered, and innate talents. The U.S. system of education, in contrast, was distinctly egalitarian almost from its start. Americans eschewed different systems for different children, and in the early nineteenth century began to embrace the notion that all children should receive a "common," unified, academic education. Despite these claims, however, there were gaping holes in the American educational system. Many, but not all, concern the unequal treatment of African Americans as slaves and then as freed persons.

Slaves received virtually no formal instruction, particularly after Southern states passed laws that prohibited teaching slaves to read (the first was passed in 1830). After emancipation, African-American children attended schools that were both separate from those of whites and unequal in terms of per-student expenditures. But these schools were not nearly as unequal as they were to become, despite the famous dictum of *Plessy v. Ferguson* (1896). The imposition of "Jim Crow" laws and the disenfranchisement of blacks in much of the South in the 1890s led to a decrease in school expenditures per black child relative to that per white child (Margo 1990). Absolute levels also decreased in various states. Southern schools in many states remained de jure segregated throughout the first half of the twentieth century and continued to be segregated even after the famous *Brown v. Board of Education* (1954) case judged such laws to be unconstitutional. Many schools were integrated only after court orders took effect. Even in the North, many blacks attended de jure segregated schools in the early twentieth century. Among the most persistent of the gaping holes in American education has been de facto segregation not just by race, but also by immigrant status and income.[2] Although these deviations from equality of opportunity must not be ignored, they also should not blind us from judging the American experiment with mass education as a grand success story.

The substantial levels of schooling and literacy in the nineteenth-century United States were achieved within a highly decentralized educational system. At present, the federal government still subsidizes only a small fraction (7 percent) of primary and secondary educational expenditures, and even the states do not provide the majority of school revenues (Table Bc902–908). School finance and curriculum decisions are the domain of school districts, and the origin of these districts is yet another detail from the earliest years of the country's educational history.

As the new nation expanded, the township model of school organization, begun in New England, was adopted by many states. But most new states were too rural for township schools, and instead created even smaller jurisdictions. School districts, first counted by the Office of Education in the early 1930s, numbered about 128,000 at that time (series Bc1). Some were not fiscally independent, in the sense of setting their own tax rates, but rather had tax rates set by larger governmental units, such as counties or townships. But many were fiscally independent. Thus, even by the third decade of the twentieth century, the United States had an enormous number of school districts with independent decision-making powers. America's large cities had, by that time, already experienced major school district consolidation, and by the early 1900s schools in virtually all cities with populations exceeding 20,000 had been consolidated into one school district. Consolidation of rural districts occurred slowly until the 1950s. The central point is that most of the decisions regarding elementary and secondary education in America occurred at relatively disaggregated levels – cities, towns, and rural communities.

The large number of school districts across the United States, the vast majority of which were fiscally independent, meant that decisions concerning resources devoted to schools, teachers, education generally, and curriculum were made locally. In many European countries, such decisions were made at a much higher level, often nationally. It is possible that the more disaggregated level of educational decision making fostered education for the masses, particularly during the nineteenth and the early twentieth centuries. Even though some districts were considerably poorer than others, the greater homogeneity within the districts could have greatly enhanced school funding. The reasoning is simple. Education, particularly at the secondary level, was primarily a "private good" that was publicly provided. Families could always opt out of the public system, although they would still pay taxes to support it, and send their children to private school. The greater the homogeneity within the community concerning "tastes" for education, the more citizens will vote to spend on education. If the decision-making unit includes families with widely differing incomes and divergent tastes for education, it is possible that both the bottom and the top segment of the distribution will opt out of the public education system, leaving the middle group with a poorly financed or nonexistent school system. Thus, greater local governance could account for the more rapid and more complete spread of secondary schooling in the United States than in Europe in the early to mid-twentieth century.

The greater level of education in the United States than in Europe until late in the twentieth century is, of course, attributable to a host of factors and not just the decentralization of educational decision making. These other factors include higher levels of wealth, lower relative opportunity cost for youths (that is, a lower wage of youth relative to that of adults), competing religions that valued the ability of the laity to read the Bible, and an ideology of the democratic ideal of universal literacy (Goldin and Katz 1999a, 2003).

Educational Institutions and Education Data

The large number of school districts and the highly localized nature of school finance and administration in the United States complicate the compilation of education data for the United States. Rather than having been collected by one national agency or even many state agencies, most of the series are built up first at the state level from the localities and then at the federal level from surveys of the states. The collection procedure differs from series to series, although most come from the states through the federal government. The federal government began to collect data on education from the states just after the establishment of the Office of Education in 1867.

The Office of Education has had a rather complicated history, but one that is of sufficient importance to the data series to deserve a brief synopsis. The Bureau of Education, the forerunner of today's Department of Education, was established in 1867 and became the Office of Education in 1869, an agency of the Department of the

[2] On early twentieth century ethnic differences, see Perlmann (1988).

Interior, where it stayed for seventy years. It was known as the Bureau of Education for those seventy years, but in 1929 it was renamed the Office of Education. In 1939 it became part of the Federal Security Agency and was, in 1953, included in the new agency of Health, Education, and Welfare (HEW). The Department of Education became a separate cabinet-level agency in 1980. Each of the states also eventually appointed a superintendent or commissioner of education and founded an office, bureau, or board of education. The first state board of education was established in Massachusetts in 1837 and was headed by Horace Mann, an individual best known for his tireless crusade for free common schools.

Most of the data in the series begin with the establishment of the federal Bureau (or Office or Department) of Education. Thus the earliest date for education series is approximately 1870 (Table Bc7–18). As noted previously, this is especially unfortunate with regard to the history of the common and elementary schools. The data for secondary school education suffer less from this omission, as the expansion of high schools began in the late nineteenth century. Private academies, functioning much like secondary schools, proliferated in the mid-nineteenth century, but no reliable data can be found on their numbers and impact. Institutions of higher education in the United States date back to the opening of Harvard University in 1638. But at the aggregate level they, too, can be examined quantitatively only for the years after 1870. As is the case for the secondary schools, there is little lost because only a small fraction of American youth could have been attending colleges and universities before that time.

Despite various problems in assembling the education data series, the relative stability and uniformity of U.S. educational institutions has simplified the task. The levels of education in the United States have not varied much across time and space. "Common school" generally includes youths between ages 6 or 7 and 14 or 15 (or older, if the youth had not attended regularly). That is, common school generally means grades 1–8, even if the schools were "ungraded," occupied a single room, and had but one teacher. Common schools were found mainly in the "open country" or rural areas, and continued to be numerous until the mid-twentieth century (series Bc6). Youths in rural areas often went to common school for longer than 8 years, but the additional time was generally for remedial lessons. Only rarely did it mean they were being taught at the secondary school level (see, for example, Goldin and Katz 1999b). Towns, villages, and cities had graded elementary schools.

Secondary or high school generally means grades 9–12, or ages 14 or 15 to 17 or 18. At the start of the "high school movement" in the early 1900s, however, many high schools in small towns covered only grades 9 to 10 or 11. Several curriculum changes have altered the two levels, elementary and high, across the twentieth century. The "junior high school" was introduced in 1909 (in both Columbus, Ohio, and Berkeley, California) and spread rapidly to other districts. It was adopted to keep pupils, who would otherwise leave at age 14, to grade 9, award them a diploma, and give them practical training, for example, in shop and home economics. Since junior highs included grades 7–9, elementary school was shortened to grades 1–6, and high schools became "senior highs," covering grades from 9 to 12. This system is known as "6–3–3," and the previous one as "8–4." At various points in the past century, some districts returned to the previous model whereas others eliminated the junior high school and introduced the middle school, encompassing grades 5–8. Curriculum changes are far more difficult to track, as will be discussed in the section on secondary schooling.

Most of the education series presented use the school year rather than the calendar year. Those on primary and secondary school enrollment, however, switch in 1965 to "opening fall" enrollment (Table Bc19–37) and those for higher education switch in 1946 (Table Bc523–536). The distinction concerns the period within which enrollments are accumulated. "Opening fall" enrollment is believed to be the more accurate method and counts only those students enrolled at the beginning of the school year, whereas the other method accumulates enrollments from the entire year. The difference is trivial for elementary and secondary school students. For college and university enrollments, however, there could be more substantial differences if students transfer from one institution to another.

Each state, today and in the past, determines what constitutes promotion and graduation. With the establishment of the state universities, graduation from high school often implied automatic college admission (although not automatic graduation). Thus states took great interest in the level of proficiency required to graduate from high school. Similarly, promotion from eighth grade in many states meant admission to public high schools, and many states also took an interest in that transition. In the early twentieth century, particularly after World War I, various states pioneered in the testing of students. A version of the well-known Iowa Test of Educational Development began in the 1920s but was not administered statewide for another decade. The New York and California State Regents also produced their own exams. Only scant evidence exists on time trends regarding elementary and secondary school exam scores (Bishop 1989). One aspect of the history of promotion and graduation is clear. There was considerable age-in-grade retention until the mid-twentieth century, when automatic promotion became a more common phenomenon. Retention rates can be computed using Table Bc19–37 on the fraction of pupils continuing from grade 5. Because these data are for public school students only, the transit of private school students (generally Catholic) to public schools after grade 8 complicates the calculation.

Higher education, at least since the mid-nineteenth century, has been a four-year program, although there are various exceptions and some important changes. One exception is that until the twentieth century, many professional degrees (for example, law, medicine) did not require a baccalaureate degree and thus the first professional degree often included a B.A. Because of this practice, the series on undergraduate enrollment and degrees includes first professional degrees until the mid-twentieth century. Junior (or community) colleges have been two-year institutions ever since the beginning of the twentieth century. Normal (or teacher-training) schools often provided two-year programs, but these grew to four years in some states starting in the 1920s and in most others in the 1940s and 1950s. Teacher-training institutions complicate the higher education data to a considerable degree as the number of women enrolled in them was substantial and program length was not always specified. For that reason, some researchers exclude them in the older data but include them for years after the 1940s (for example, Goldin and Katz 1999b).

Schools at all levels can be under public or private control. At the elementary and secondary levels, the type of control is generally unambiguous in the data series. This is especially true with regard to denominational institutions. The vast majority of private kindergarten to twelfth grade (K–12) schools are denominational. (It is likely that control will be a more ambiguous concept in the future if school vouchers can be used in denominational schools,

as they have been in a recent policy experiment involving Catholic schools.) Control of higher education has been a somewhat less transparent concept. In the first place, some institutions of higher education that were under private control received the initial Morrill Land Grant (1862) funds from the state (examples include Cornell University, MIT, Yale, and Rutgers). More important, the federal government supports research at private institutions and allocates student aid on the basis of need, not the control of the institution. All the GI Bills, for example, paid private and public tuitions, and Pell Grants subsidize students at a range of institutions (see Table Bc-A for some details on these programs). Thus, the control of the institution is not necessarily coterminous with the source of

TABLE Bc-A Important state and federal legislation, judicial decisions, and historical events in U.S. education: 1635–1997

1635	Boston Latin School, the first "grammar" or secondary school in the colonies, is opened. Boston Latin was funded, in part, by income from a public land sale, making it the first public school in America.
1638	Harvard University, the first university in America, founded in 1636, is opened to students.
1647	The Old Deluder Satan Act of the General Court of the Colony of Massachusetts Bay is passed. Towns of 50 families or more must establish a public elementary school and towns of 100 families or more must establish a public "grammar" school "with a master capable of preparing young people for university level study."
1785	The first state university is chartered in Georgia.
1785	The Land Ordinance of 1785, "an Ordinance for ascertaining the mode of disposing of Lands in the Western Territory" (north of the Ohio River and east of the Mississippi), passed by the Continental Congress under the Articles of Confederation, reserved section 16 of each congressional township (36-square-mile sections) for the support of public schools within the township.
1787	The Northwest Ordinance, "an Ordinance for the government of the Territory of the United States northwest of the River Ohio," passed by the Continental Congress, noted that because "religion, morality, and knowledge" are essential to good government, "schools and the means of education shall forever be encouraged."
1789	State constitutions provide for the establishment of statewide school systems and, for states entering the union after 1862, contain allotments of federal lands to support state institutions of higher education.
1789	The Tenth Amendment to the U.S. Constitution provides a legal basis for making education a state function. The First Amendment and the Fourteenth Amendment (the latter adopted in 1868) together ensure separation of church and state in the provision of education at the local level.
1819	In *Dartmouth College v. Woodward* the charter of Dartmouth College is determined to be a contract and thus the state legislature of New Hampshire could not abrogate it and set up a state college instead.
1821	The English Classical School, the first high school founded in the United States, is established in Boston, Massachusetts.
1826	Free public schools are required in Massachusetts townships for all children. Although this is mandated in other states later (New York, for example, required the same in 1867), many cities pass their own "free school" legislation ahead of the states.
1827	The Massachusetts Act is passed, requiring towns with 500 families or more to support a public high school (enforcement was incomplete).
1830	The first law prohibiting the teaching of slaves to read is passed in Louisiana; Georgia and Virginia follow in 1831, Alabama in 1832, South Carolina in 1834, and North Carolina in 1835.
1833	Oberlin College (previously Oberlin Collegiate Institute) in Ohio is founded as the first coeducational college in the United States.
1837	Horace Mann is appointed as secretary of the Massachusetts Board of Education to head the first state board of education.
1838	The Central High School in Philadelphia is established.
1850	An amendment to the Land Ordinance of 1785 increased educational allotment to two sections, 16 and 36, for states entering after 1850.
1852	Massachusetts passes the first compulsory school-attendance act in the United States.
1862	Through the Morrill Land Grant Act, Congress grants funds (scrip in federal land) to states to found colleges of mechanical arts (engineering), military science, and agriculture.
1867	The U.S. Bureau of Education is established.
1874	Through the Kalamazoo Decision, the Michigan Supreme Court validates the use of local funds for secondary school education as being similar to their use for elementary (common) school education. The decision influenced later challenges to public high schools in other states.
1887	The Hatch Act provides government support of state agricultural experiment stations, as joint research projects of state agricultural colleges and the U.S. Department of Agriculture.
1890	Through the Second Morrill Land Grant Act, Congress institutes regular appropriations for the land-grant colleges; the "historically black" institutions are set up in response to the demand of this act that nonwhite students be provided facilities.
1896	In *Plessy v. Ferguson* the Supreme Court validates the separation of black and white pupils and establishes the "separate but equal" doctrine.
1909	The first junior high schools are established in Columbus, Ohio, and Berkeley, California.
1914	The Smith-Lever Agriculture Extension Act sets up an agricultural extension.
1917	The Smith-Hughes Vocational Act gave funds to support agriculture, industry, and home economics education and created the Federal Board for Vocational Education.
1918	All states had compulsory school-attendance laws by 1918, although the maximum age of compulsion often exceeded the age at which a work permit could be granted.

TABLE Bc-A Important state and federal legislation, judicial decisions, and historical events in U.S. education: 1635–1997 *Continued*

1942	The General Educational Development (GED) Program is initiated to provide World War II veterans lacking a high school diploma with an opportunity to earn a secondary school credential; civilians were first able to take the test in 1952.
1943	In *West Virginia Board of Education v. Barnette* the Supreme Court ruled that students who are Jehovah's Witnesses were not obliged to participate in saluting the flag.
1944	Through the GI Bill of Rights the 78th Congress provides subsistence allowances, tuition fees, and supplies for the education and training of veterans of World War II in a wide variety of settings including colleges, high schools, and vocational training institutions.
1950	The National Science Foundation is established to "promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes."
1952	The Korean War GI Bill of Rights extends educational benefits of the 1944 Bill to Korean War veterans and others who served in the armed forces during the war period.
1954	In *Brown v. Board of Education* the Supreme Court holds unconstitutional the deliberate segregation of schools by law on account of race.
1954	The Cooperative Research Program authorizes the U.S. Commissioner of Education to contract with institutions of higher education and state education agencies for educational research.
1958	The National Defense Education Act provides extensive aid to schools and students.
1962	In *Engel v. Vitale* the Supreme Court rules that the state could not enforce prayer in public schools.
1963	The Vocational Education Act further expands agricultural extension.
1964	The Civil Rights Act, Section 1983, outlaws discrimination by sex.
1965	Head Start is established in the Office of Economic Opportunity as a way to serve children of low-income families; it would later be administered by the Administration for Children and Families.
1972	Title IX of the Education Amendments Act protects students from receiving different resources or other disparate treatment on account of sex.
1973	The Federal Pell Grant Program is authorized under the Higher Education Act of 1965, and provides for undergraduate student aid based on need.
1975	The Education for All Handicapped Children Act (EAHCA) requires better access to schools for disabled students.
1975	The Individuals with Disabilities Education Act (IDEA) replaces EAHCA and addresses the failure of many states to comply with EAHCA.
1978	In *University of California Regents v. Bakke* the Supreme Court rules against reverse discrimination; fixed quotas cannot be set.
1980	The Department of Education is established as a separate cabinet-level agency.
1994	The School-to-Work Opportunities Act provides seed money to states and local partnerships of business, labor, government, education, and community organizations to develop school-to-work systems.
1997	The Taxpayer Relief Act sets up Hope Tax Credits, Tax Credits for Lifelong Learning, Education IRAs, and tax deductibility of interest on student loans.

funding. It never was. Harvard University, for example, received funds from the Massachusetts colonial government and afterwards from the state until the early nineteenth century.

This essay ends with a note on the data sources, but there are some details that must be addressed first. As previously mentioned, most of the sources are the administrative records of localities and states. That is why the existence of the U.S. Bureau of Education, which compiled these data, is important to the construction of the series and why the earliest date for the series is about 1870. These administrative sources provide "flow" data rather than "stock" data. That is, they give contemporaneous information on students, teachers, schools, finances, and so on, rather than the number of years of schooling of the population or the number of individuals who ever taught, to provide two examples. They reveal little about student characteristics in terms of age, sex, race, ethnicity, and family background, although some are occasionally indicated. Racial segregation of public schools in the South, for example, allows the calculation of high school graduation by race after 1930 (Table Bc468–479). Some administrative data are given by sex (Table Bc258–264). Because the administrative data are rarely given by age, the contemporaneous "flow" numbers have to be divided by the relevant population group to obtain rates.

Other potential sources of education data are the U.S. decennial population census, the Current Population Survey (CPS), and state censuses. Since 1850 the U.S. census has asked whether an individual had attended (almost any kind of) school (for at least one day) during the preceding year. But not until 1940 did the U.S. population census, and later the CPS, ask about the "stock" of education, that is, school attainment or the "highest grade completed." For the years before 1940, only two states (Iowa and South Dakota) asked questions on educational attainment, and research on the subject has been done using the Iowa State Census of 1915 (Goldin and Katz 1999b).

The relationship between education and income, at the individual level, can be presented for the entire United States beginning only with 1940 (tables Bc814–901). But even the 1940 data are subject to considerable bias. Although the 1940 federal population census was the first to inquire of income and education, both variables contain omissions and biases. Wage and salary income information was requested in 1940, but that from self-employment was first asked for in 1950. The education and income series use comparable income measures for the decennial census years 1940, 1950, and 1960 (wage and salary income) and then switch, by necessity, to a more inclusive measure of income when using the Current Population Survey (Tables Bc814–901). Caution should

be exercised in using these data to make inferences about the role of education in enhancing income. One reason is that the aggregate population is used (men 25 years of age or older) and there were large compositional changes between census years. From 1940 to 1950, for example, the fraction of young men with high school diplomas increased substantially. Because these persons had little job market experience, their average earnings were lower than those of older high school graduates and not much higher than those of older individuals without a high school diploma. The compositional change means that, in times of rapid educational advance, the role of more education (here a high school diploma) will not be as apparent than if the series had been divided by age.

"Highest grade completed" was asked in 1940, but many older Americans had not attended graded schools and some went to school for more years than grades. There is considerable evidence that the 1940 Census overstates the high school graduation rate of older Americans to a considerable degree (Goldin 1998). The graduation data are often inconsistent with those from administrative data, although those for lower grades are not. Educational data from the census (and also those from the Current Population Surveys) are also important because they allow tabulation of education by individual and family characteristics (Table Bc38–79).

Even though the U.S. population census asked whether an individual had attended school during the previous year, the answers overstate the number of youths who were actually attending formal day school for at least several months during the year. (They are, however, given for 5- to 19-year-olds in Table Bc438–446 and graphed in Figure Bc-B.) The length of time attended, as previously noted, was "for at least one day" and the type of school was virtually any, including night and commercial schools. Thus, for most of the period under consideration, the administrative data must be relied on for virtually all the series. It should be noted that the terms "enrollment" and "attendance" are used interchangeably in these series. Although the census question concerned attendance of school for at least one day, the convention is to use the term enrollment in this case.

Schools took various forms over the period under discussion. The rural common school of the open country was a simple one-room structure, often situated on someone's quarter section or farm. The town school in almost any era would be recognizable to those reading this essay, although there would be various differences across time. One difference is that elementary and high schools, early on, were often in the same building. Thus, it is impossible to produce separate series on these schools until the 1930s (Table Bc1–6). Some states listed virtually all elementary schools as high schools, whereas others had state laws requiring secondary schools to be separate structures. Similar ambiguities plague issues regarding instructional staff. Each state had regulations concerning who could teach and what the prerequisites were. But these varied enormously across space and time. The series presented here accept the definitions in the administrative records. Someone who taught secondary school students was a secondary school teacher. But there are times when even this distinction is ambiguous.

One last important data issue must be mentioned. Education is "life-long learning." Much of it does not take place in formal settings and is thus difficult to track. The series presented here will, by necessity, omit on-the-job training and also proprietary training institutions. It is possible to study the latter for much of the twentieth century because the Office of Education often collected information on them. Commercial schools proliferated in the 1910s and 1920s, but there is, at present, no readily available, comprehensive, and reliable series on them.

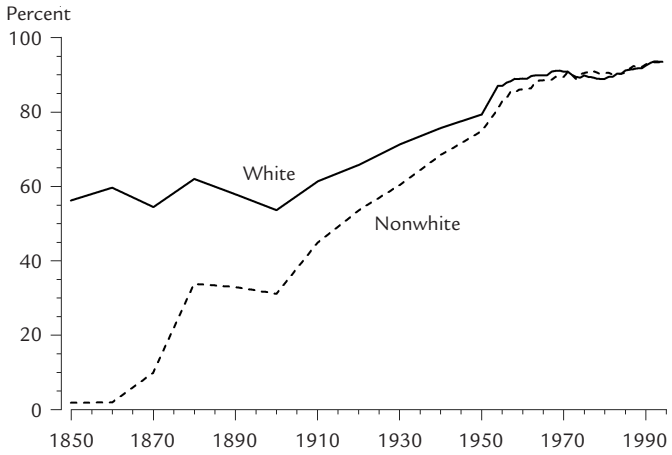

FIGURE Bc-B School enrollment rates, by race: 1850–1994

Sources
Series Bc439–440.

Documentation
Persons ages 5–19.

The Three Transformations of American Education

The United States underwent three transformations of education – primary, secondary, and tertiary. The periodization of the three transformations dates the completion of each schooling level by the majority of youth. The completion of each can be thought of as the moment when an education level was available and taken up by the "masses" or, put another way, when "mass education" reached that level. The first transformation brought most of the youth through common or elementary school (eighth grade) and occurred during the nineteenth century. The second transformation brought the majority of youth through secondary or high school and occurred in the first half of the twentieth century. The third, still ongoing, transformation is bringing the majority of young adults through four-year higher education.

Education is intrinsically a hierarchical process, however. Any state or nation that has elementary schools must also employ teachers with knowledge exceeding that necessary to teach the elementary grades. Thus, although the United States underwent three transformations of education, all three levels had to be in place simultaneously. At times this necessitated borrowing from Europe. In the late nineteenth century, America imported instructional staff for colleges and universities and also exported college students (many of whom returned as trained academics). But the fact that many American institutions of higher learning were founded far in advance of the third transformation is an indication of the importance of the highest levels of education for training at the most elementary levels.

Primary or Common School, and Elementary Education

The first educational transformation occurred over an extended period but moved rapidly during the middle of the nineteenth century when fully free, publicly funded common schools diffused

throughout the nation (Kaestle 1983). Although compulsory education laws also began to be passed during the period of the common school transformation, it is believed that they lagged rather than led it. That is, the state laws were passed only after the majority of youths had already gone beyond the compulsory legal age. As noted previously, the most interesting period of common school diffusion predates the era of readily accessible data.

Almost all of the data series concerning K–12 education begin with 1870. The exception is that for school attendance (for 5- to 19-year olds) from the U.S. federal population census (see Table Bc438–446, as well as Figures Bc-B and Bc-C). Beginning with the collection of the administrative information by the Office of Education in 1870, data exist on public and private enrollments by level or grade, where common school students are classified in the K–8 group (Table Bc7–18). More detailed data on students by grade can be computed for the years after 1910 for public school students (Table Bc19–37). But it was not until the late 1910s, with the publication of the *Biennial Survey of Education in the United States*, that data became available to calculate student–teacher ratios (series Bc12). Because the age of students was not collected in most administrative data, rates of attendance have to be computed by assuming an age group (for example, 14–17 for secondary school) and using data on population by age.

According to the data in Tables Bc7–18 and Bc438–446, the transformation to "mass" primary school education (among the free population) was completed by the mid-nineteenth century. The transition, moreover, was similar for boys and girls (Figure Bc-C). Although none of these series reveals the precise fraction of boys and girls at different ages attending school, considerable work by educational historians has shown that, at least in the elementary and secondary grades, girls attended school for more months than did boys for much of the period. Even though a large fraction of youths were enrolled in school, the attendance of those who were enrolled was, on average, between 60 and 70 percent of the school year from the 1850s to the 1910s, or between 80 and 110 days per year (series Bc96). Regrettably, none of the data, as previously reported, says anything about the pre-1850 period.

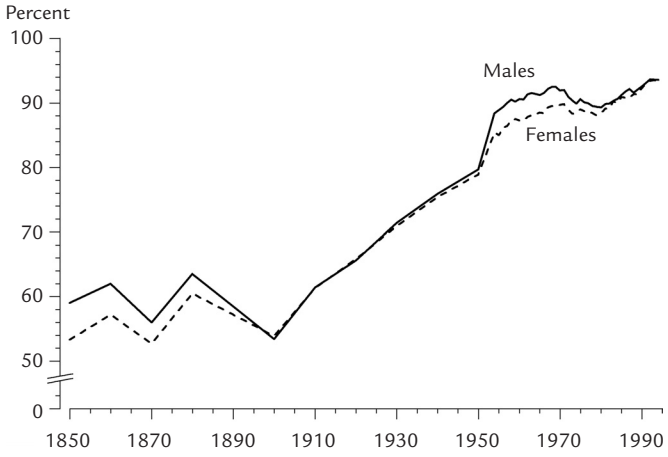

FIGURE Bc-C School enrollment rates for whites, by sex: 1850–1994

Sources
Series Bc442 and Bc445.

Documentation
Persons ages 5–19.

Among the more important changes in elementary public school education since 1970 has been the increase in the fraction of public school youths in "special education programs" (Table Bc80–93), the unionization of teachers (Table Bc447–453), the decrease in classroom size (Table Bc7–18), and the increase in real expenditures per child (Table Bc909–925). The increase in real expenditures per child should not be too surprising because the real cost of teachers (nominal amounts in Table Bc97–106 must be deflated by a price index series) rises with general levels of productivity. But simple decompositions show that the increase in expenditures per pupil cannot be fully explained by the increase in the real wage of teachers, the decrease in classroom size, and the increase in more costly special education students. Administrative costs per pupil, it appears, have greatly increased. Another important recent change is the increase in preschool education (Table Bc429–437).

Most education data measure the quantity of schooling received, in years or grades. The quality of education is an equally important, yet less transparent, aspect. Quality can be proxied by the student–teacher ratio (Table Bc7–18) and the length of the term (series Bc95), to mention two measures that can be used over the long term. Current concern with K–12 educational quality has focused on another measure, that of test scores. Among the most widely used is the National Assessment of Educational Progress (NAEP) (Table Bc273–428). Although the United States has done poorly in international test comparisons, NAEP scores have generally risen since the 1970s. A reconciliation of these two observations is yet to be accomplished.

Secondary or High School

The second transformation of American education was the "high school movement," and it was the most rapid of the three. In 1910, fewer than 10 percent of all U.S. youth graduated high school, but by 1940 the median youth was a high school graduate (Table Bc258–264). In certain parts of the nation (notably, the Pacific, West North Central, and New England states), the "high school movement" was even more rapid (see Table Bc468–479 and Figure Bc-D). In those states, graduation and enrollment rates were as high in the 1930s as they would be until the 1960s (Tables Bc468–479 and Bc492–500). Because the "high school movement" began in the early part of the twentieth century and secondary school attendance was relatively meager before, little is lost from the late starting date for the series.

There was one potentially important predecessor of the public high school in America. "Academies," private institutions that taught material beyond eighth grade and often prepared students for college admission, appeared in the late eighteenth century, particularly in the Northeast, and underwent a growth spurt in the early nineteenth century in both the Northeast and the Midwest. Some of these institutions have survived until today (for example, Andover, Exeter), but most disappeared with the increase in publicly funded secondary schools and a greater demand by parents for a less classically oriented and more practical program of instruction. There are, regrettably, no compilations of their enrollment.[3]

The secondary school graduation rates in Figure Bc-D (and Table Bc468–479) are computed by dividing the administrative data on high school graduates by the number of 17-year-olds in

[3] On the "high school movement" and its origins, see Goldin (1998), Krug (1963), and Reese (1995).

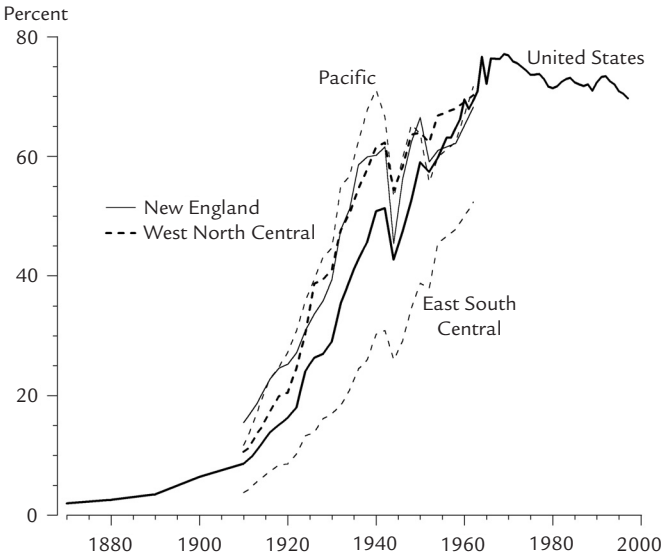

FIGURE Bc-D Public and private secondary school graduation rates – United States and four census divisions: 1870–1997

Sources

Series Bc264, Bc468, Bc472, Bc477, and Bc479.

Documentation

The graduation rate is the number of secondary school graduates in a given year divided by the number of 17-year-olds in that year.

the census division (aggregated up from the states). The secondary school enrollment rates are similarly computed, but the denominator is the number of 14- to 17-year-olds. The fact that some students were older than 17 or younger than 14 may trivially affect the calculation. More important is that the state population data are available only for decennial census years and must be interpolated between them.

It may appear odd that the contemporaneous high school graduation rate in Figure Bc-D is higher in 1970 than it is after. Those data, it will be recalled, were obtained from administrative sources. Data from the major household survey of population – the Current Population Survey – show, to the contrary, that the fraction of 25- to 29-year-olds, for example, claiming to have graduated from high school does not decline from 1975 to 1985 (corresponding to the approximate year of high school graduation of 1966 and 1976). Instead, the fraction graduating high school increases and attains a level that is about 7 percentage points higher than in the administrative records for the same birth cohorts. That is, the contemporaneous public and private high school graduation rate in 1985 is about 73 percent, but it is 86 percent for the same cohorts in the household survey. Most of the difference in the two numbers is accounted for by the General Educational Development (GED) credential (discussed later). The administrative records on high school graduation capture only those who receive diplomas from regular secondary schools, whereas the GED is an examination that can be passed later in life by those who dropped out of high school.

The series in Tables Bc468–479 and Bc492–500 include public and private secondary school students. Also included are college preparatory students in institutions of higher education. Before high schools spread across the nation, many public and private universities and colleges had their own preparatory programs. Youths often entered these programs directly from elementary school or after several years at their local high school. The fraction of secondary school graduates coming from all private programs, including an estimate of those from the preparatory departments of colleges and universities regardless of control, is given in Table Bc501–509.

Secondary schooling spread rapidly in the early twentieth century because schools were built and students in districts already having high schools were enticed to enter and remain. The increased demand for white-collar workers and for trained blue-collar workers spurred an interest in and demand for schooling beyond eighth grade. But in the nineteenth century secondary schools were institutions that generally trained youths to attend university. They often prepped pupils to pass the entrance examination of the local private college or the state university, if it had such an exam. High schools were reinvented beginning in the late nineteenth century to be places of practical and applied learning. They also, of course, retained courses of study to train youth to enter institutions of higher education.

Curriculum is difficult to track because of changes in subject matter, among other details. The Office or Department of Education requested information from secondary schools from 1889–1890 to 1981–1982 on the number of pupils taking various subjects. These data are measured in "pupil courses" and are expressed in Table Bc115–145 as the percentage of pupils taking a course. A course that occupied one hour per week is, by necessity, given equal weight to one that occupied five hours per week. Thus the total can exceed 400 percentage points, even if each student took an average of four full-time courses. The data were systematized in several ways beginning in 1982. Courses were measured in "Carnegie units," in which each Carnegie unit is a one-year course, generally equal to five 45-minute periods per week for the entire year (Table Bc146–257). The course of study for the entire high school program (at graduation) is given in Table Bc146–257, rather than an average for those currently in school (as often the case in Table Bc115–145). Whatever the defects of the historical data, they clearly show that the secondary school curriculum became more practically based and also broader in academic subject matter sometime in the 1920s.

As in the first transformation of American education, one may wonder what the effects of state legislation were in the "high school movement." All states passed compulsory education laws at some point in their history and most were accompanied by related legislation regarding child labor. The laws are complex and, prior to the late 1920s, the maximum compulsory age (often set at age 16) was generally not binding. Rather, youths could be excused if they obtained a work permit and had attained some minimum level of schooling. Although the jury is still out, there is considerable evidence that compulsory education laws did not "cause" much of the high school movement. States did, however, pass other legislation that aided secondary school expansion. One neglected piece of legislation is the "free tuition law." Because school districts were small and numerous in rural areas, not all districts would have had high schools. Families would be responsible to pay tuition to the district with the high school if they lived in a district without one but sent their child to the school. The "free tuition laws" made the sending district responsible for the payment of tuition. Most of these laws were passed in the 1910s and 1920s; Nebraska, for example, passed a "free tuition law" in 1907 and Iowa did in 1913.

A more recent development in secondary schooling is the General Educational Development (GED) credential. The GED was instituted during World War II (in 1942) to give veterans without a high school diploma a chance to earn credit for their informal education outside school. Civilians were allowed to take the examination in 1952. The data on individuals taking (and passing) the exam exist from 1971 and are given in Table Bc265–272.

At the start of this essay, it was noted that, by most accounts, the United States exceeded all other nations in mass elementary school education by the 1840s. It not only retained that lead, but with the "high school movement" it substantially increased it (Goldin and Katz 2003). Although Germany instituted various types of secondary schools in the early twentieth century, neither it nor any other European country was able to put their "masses" through nonvocational full-time secondary school until well after World War II. Thus, when the United States passed the GI Bill of Rights (1944), it could promise to put returning veterans through college because the median 18-year-old was already a high school graduate. No other country could achieve the same objective, nor would any for many years to come.

Tertiary or Higher Education

The third great transformation of American education – that to mass higher education – has been the most prolonged and is still ongoing. Part of the reason for the length of the transition, as noted previously, is that lower levels of education need higher ones to train teachers. All nations require institutions of higher education long before they are to be transformed into nations of highly educated people. Institutions of higher education serve many purposes, of course. Early in American history, for example, these institutions trained ministers, as well as lawyers and military and political leaders.

Institutions of higher education (B.A. granting, four-year) increased steadily in numbers in the United States across the nineteenth century. There was a burst of activity in the 1870s in the public sector and in the 1890s in the private sector.[4] The increase in public universities in the 1870s is attributable to the celebrated Morrill Land Grant Act of 1862, one of many pieces of legislation that had been previously defeated or vetoed but was passed and signed into law during the Civil War's 37th Congress. The Morrill Land Grant Act gave scrip in the form of federal land to each of the states "for the endowment, support and maintenance of at least one college where the leading object shall be – without excluding other scientific and classical studies and including military tactics – to teach branches of learning as are related to agriculture and mechanic arts" (Nevins 1962). The institutions could be publicly controlled, or privately controlled, as they were in states such as New York and New Jersey.

The Morrill Land Grant Act did not, however, set up the first state universities. By 1862 the majority of existing states outside the Northeast (nineteen out of twenty-four) already had a state institution of higher education; some states (for example, Virginia, Ohio) had more than one. States used their Morrill funds in various ways. Some established their first institution of higher education (for example, Nebraska), some gave the money to the existing state institution (for example, Wisconsin), and others established an additional university (for example, Michigan). It should also be noted that the Morrill Land Grant Act of 1862 was but the first of several related acts. An amendment to the original act extended the land grants to states as they entered the union. The second Morrill Act in 1890 set up annual appropriations to the land-grant institutions, and was indirectly responsible for establishing institutions of higher education that are now termed "historically black," by denying funds to states that did not provide facilities to black students (Table Bc719–736).

The series in Table Bc510–522 on the number of institutions of higher education contain several complicated features. One concerns teacher-training institutions, also known as normal schools and teachers' colleges. As mentioned previously, teachers' colleges often began as two-year institutions but later became four-year institutions, able to grant the baccalaureate degree. Many of the state teachers' colleges were later made into the second tier of the state university system (as, for example, in California and Illinois) or the state university system itself (as in New York State). Thus, in the absence of detailed knowledge of the type of degrees awarded in each year, it is impossible to separate the institutions into two-year and four-year schools. Another complication is that state universities often establish separate campuses across the state. Before 1975 these branch campuses were treated as part of the central, or flagship, university, whereas after 1975 they have been treated as separate institutions.

The series on the enrollment of individuals in institutions of higher education (Table Bc523–536) is more complicated than that for elementary and secondary schools. In the first place, until the middle of the twentieth century many students in first-professional-degree programs were simultaneously in an undergraduate program. Undergraduates and first-professional-degree students are, therefore, combined for consistency in the historical series. The computed undergraduate enrollment rates (series Bc524) are therefore more inflated after the 1940s, when almost all professional students had an undergraduate degree, than they are before, when a large fraction of professional students did not have a preprofessional degree. Another difficulty is deciding what age group to use in the denominator. College students more widely disbursed by age than are those in K–12, and the inclusion of the professional and graduate students means that a wider age group is required. The standard is to use 18- to 24-year-olds.

The main gender difference in education in U.S. history has been the greater enrollment of men in colleges and universities, particularly four-year institutions. Ever since the early 1980s, however, women have enrolled in institutions of higher education and received B.A. degrees in greater numbers than have men (see Table Bc568–587 on degrees and Table Bc523–536 on enrollment). As can be seen in Figure Bc-E, the fraction of 20- to 24-year-olds enrolled in school is now greater for women than for men. It should

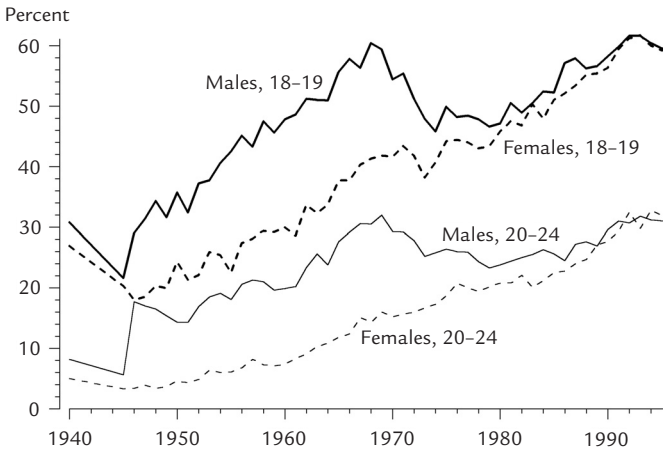

FIGURE Bc-E School enrollment rates, by age and sex: 1940–1995

Sources

Series Bc61, Bc63, Bc75, and Bc77.

[4] Goldin and Katz (1999b) analyze institutions surviving to the 1930s.

also be noted that the fraction of males enrolled in school has only recently exceeded the peak level of the late 1960s. (The same is true for 20- to 24-year-olds.) This anomaly is attributable mainly to the war in Vietnam and draft deferments.

The transition to mass higher education in the United States is the result of several factors. One is the increase in high school graduation early in the twentieth century. Another is the GI Bill for World War II and Korean War veterans. Recent research has estimated the degree to which the GI Bills increased the level of undergraduate education (Stanley 2000). The bills were more than compensatory to returning GIs, as a higher fraction of men in each of the affected cohorts went to college than likely would have occurred had they not served in the wars (for more discussion of the GI Bill, see the essay on veterans in Chapter Ed). The diffusion of the Scholastic Aptitude Test (SAT), particularly in the 1940s, also democratized the admissions procedure for college. Finally, the explosion in the number of public junior colleges (also known as two-year or community colleges) in the 1970s allowed even the financially and scholastically constrained individual to continue in higher education (Table Bc510–522).

Interpretation

This essay has emphasized the leadership of the United States in education – the rapid increase in schooling in the early nineteenth century, the widening lead in the early to mid-twentieth century, and the high levels of tertiary education in the post–World War II period. At the beginning of the twenty-first century, however, many of the world's rich nations, and even some of the "newly industrialized economies," are closing the gap with the United States in educational quantities (for example, years of education, proportion of the population with a bachelor's degree) or, in the case of many European countries, have already closed the gap for young persons. More important, they are rapidly exceeding the United States with respect to educational quality, and even with respect to quantities adjusted by quality, although this concept is difficult to measure.

Many of the virtues of the U.S. educational system, which served Americans so well in the past, are fast becoming disadvantages and drawbacks. The extremely open and permissive system that enabled generations of Americans to continue to secondary school and college now means that there are no rigid standards and no national examinations. In the United States, those who perform in the upper half of the academic standards may be doing well, but those in the bottom half are often left behind. In many European countries, individuals in the bottom half are challenged and sorted by standardized tests or offered technical alternatives to the academic track. In addition, the localized nature of educational finance in the United States is, more and more, coming under attack for its inherent inequities. Affluent districts can afford good schools but poor districts cannot. Attempts at equalization within states, however, often have deleterious and unintended consequences for the school system as a whole, leaving the poor no better off than before and occasionally worse off (Hoxby 2001).

Describing educational change in American history is a much easier task than understanding why change occurred and what its consequences have been. With regard to advances in schooling, it is clear that there is a complicated interrelationship between the demand for educated workers and citizens and the public's response. Compulsory schooling legislation, as pointed out throughout this essay, was *not* the driving force behind "mass education." The public provision and the public funding of education, however, have been strong positive forces in spurring the three great transformations of American education.

But what are the consequences of more education for individuals, the society, and the economy? Many studies demonstrate a positive relationship between education and income and between schooling and productivity (for example, Goldin and Katz 2000). Some critics have claimed that "ability bias" – meaning that the most able continue the longest with their education – imparts an upward bias to these results. But several careful studies using plausibly exogenous variation in years of schooling have found that "ability bias" is a minor factor, and may even have an incorrect sign. Other literature, using cross-country variation in schooling and economic performance, has demonstrated that there are strong correlations between education and income and between schooling and economic growth. But we do not know if the correlations imply causality, for the countries with the highest growth rates could also be ones with institutions and communities that value education and enable human capital formation.

The United States became the richest nation in the world sometime in the late nineteenth century, and it has maintained that position ever since. The extraordinary record of American economic growth would appear to owe something to its achievement of mass education at each of the three levels, but that is a very difficult proposition to prove.

Appendix: A Note on Data Sources

The majority of the series are updated versions of those in *Historical Statistics of the United States* (1975). Many, however, are new to the volume. Most, although not all, of the series are updated annually by the National Center for Education Statistics (NCES) of the U.S. Department of Education and are published in the *Digest of Education Statistics*. Tables from recent editions of the *Digest of Education Statistics* and other NCES publications can be accessed at the NCES Internet site. In the process of updating, the NCES often revises previously published data and thus these series may in the future be altered in small ways by NCES. NCES also published *120 Years of American Education: A Statistical Portrait* (U.S. Department of Education 1993). The series presented here borrow from some of the tables in *120 Years*, which are updated versions of the historical series in the *Digest* and many from *Historical Statistics*.

The primary sources for most of the series begin in 1869–1870 with U.S. Office of Education, *Annual Reports of the Commissioner of Education*. These reports extend to 1916–1917, when they were superseded by the *Biennial Survey of Education in the United States*. The *Biennial*s, published for the even-numbered school years from 1917–1918 to 1957–1958, include general information on the U.S. school systems and reports from the state school systems and those of the cities. The *Biennial*s also include a wealth of data on all levels of education and types of school, including private and commercial.

Much of the detailed data in the early *Biennial*s came from surveys of school districts, and complementary data came from surveys of the states. Sometime in the early 1930s, the Office of Education revised some of the earlier data to take account of obvious underreporting from the school districts. The Office never mentioned the procedure that was used nor commented that the

revisions were being made. It simply published series with different numbers.[5]

The *Digest of Education Statistics*, published since 1962, picks up where the *Biennials* leave off. Recent tables can be accessed through the NCES Internet site. The sources for the *Digest* are surveys and estimates of the Department of Education and other agencies.

Private school data were often collected by the Office or Department of Education but, beginning in the 1950s, data from the National Catholic Welfare Conference have been relied on for the bulk of private students, those in Catholic schools. The pioneering work of Abbott L. Ferriss in rendering consistent many of the historical education series should also be mentioned (Ferriss 1969).

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[5] See Goldin (1994, 1998) for a discussion of the procedure that the Office of Education must have used in the construction of the secondary school data.