

# Chapter I: General Information on U.S. Education

We begin with a general overview of public and private educational opportunities in the United States. This discussion will provide a background for our subsequent, more detailed examination of mathematics education in the United States in 2016. The final portion of the chapter devotes attention to the new federal education law in the United States, the Every Student Succeeds Act, passed at the end of 2015.

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## Overall Organization of Education in the United States

Figure 1 presents a graphical overview of the structure of education in the United States. The system can be thought of as consisting of four broadly defined levels: elementary school (K–grade 5 or K–grade 6, corresponding to ages 5–10 or 11); middle school or junior high school (grades 6–8 or 7–8, ages 11–13 or 12–13, respectively); senior high school (grades 9–12, ages 14–17); and postsecondary, or tertiary, education (grades 13 and above, ages 18 and older). The ending and beginning points of the each of the levels varies, owing to state and local school system regulations and preferences (Snyder and Dillow 2015).

The numbered scales up the margins of figure 1 indicate, on the left-hand side, the median ages for students enrolled at the varied levels of K–12 education and, on the right-hand side, the corresponding levels from pre-kindergarten through grade 12 of education and the years normally taken for a full-time student to progress through the varied levels of tertiary education. One can loosely interpret the width of the horizontal bars associated with school organizations at different ages as representing the percentage of students enrolled in the varied forms of education at the K–12 levels. Later, additional commentary will amplify the impact of students “dropping out” of education before completion of grade 12 or leaving education to join the workforce after completing grade 12. At the community college level, one must also understand that community and junior colleges may provide vocational and technical education programs for students.

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## Movement of U.S. Students through K–12 Education

K–12 students are legally required to start and maintain enrollment in formal education by state-mandated ages. The minimum compulsory school-starting ages range from 5 to 8 years (age 5 [8 states], age 6 [25 states], age 7 [15 states], and age 8 [2 states]). Standards for the length of compulsory education also vary by state, with minimum allowed school-leaving ages of 16 to 18 (age 16 [23 states], age 17 [9 states], and age 18 [18 states]). Eight states simply require 9 years of formal education, while 4 states require a total of 13 years. However, state standards in nearly half of the 50 states allow for variances in their regulations for school-starting and school-leaving ages for students who are employed; have a physical or mental condition that makes attendance infeasible; have passed eighth grade successfully; or have the permission of their parents, district court, or school board (Bush 2010, Mikulecky 2013). The variance in these regulations across the 50 states is mirrored by the diversity in laws respecting when schooling should begin and what constitutes the minimum amount of schooling acceptable for students in a state. Another example of diversity in education across the states manifests itself in the variability of the NAEP achievement results reported in table 9 in Chapter 4. These two examples reflect differences in state standards, state expectations for students, and the structure of state funding.

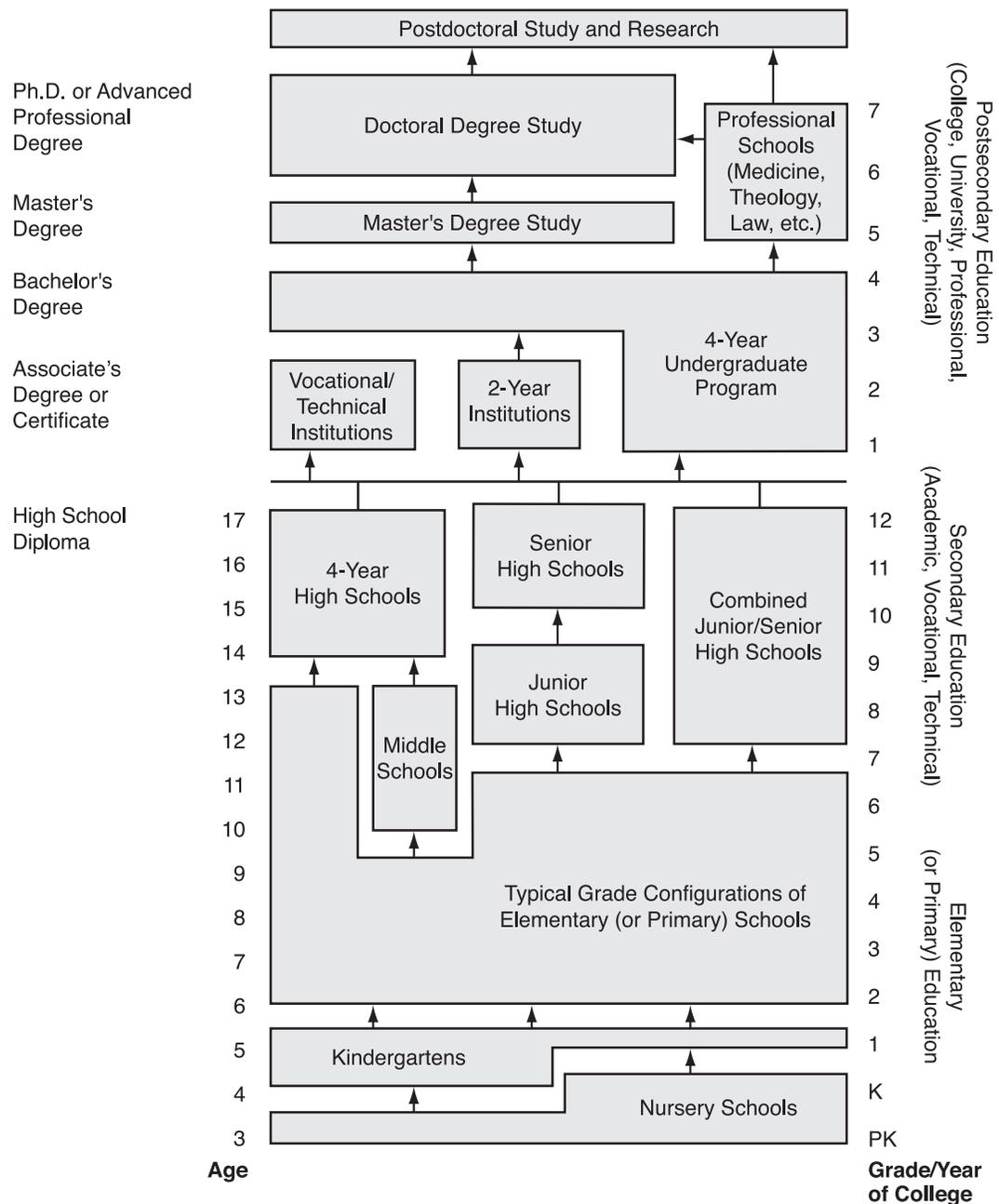


Fig. 1. The structure of education in the United States (Snyder and Dillow 2015)

Not all U.S. students complete secondary education prior to leaving formal education. Although state laws require compulsory education, they also allow for home-schooling of students by their parents. The percentage of students who complete a public school education can be quantified in many ways (Stetser and Stillwell 2014). The *average freshman graduation rate* (AFGR) provides an estimate of the proportion of public high school students who graduate from high school four years after having entered the ninth grade. Using the AFGR and the Common Core of Data compiled by the National Center of Educational Statistics, NCES statisticians have been able to develop a trend line for this measure of student persistence and completion. Of those who

entered high school as ninth graders in the academic year 2008–9, the files suggest that 81% finished during the 2011–12 school year. This was the highest completion rate in a four-year period since the trend line was first developed for *The Condition of Education* in 1990–91, a congressionally mandated annual report to Congress describing the current status of education K–college in the United States. In the inaugural year, the AFGR was 74%. The statistic dropped to 71% in 1995–96 and stayed at that level in 1998–99. It then increased to 75% in 2004–5, dropped again to 73% in 2005–6, and then increased to 80% in 2010–11 before increasing again to the 81% mentioned above for those graduating in 2011–12. Among the 2011–12 graduates, the AFGR rates for various racial/ethnic groups were as follows: Asian/Pacific Islanders (93%), White (85%), Hispanic (76%), and both Black and American Indian/Alaskan Native (68%) (Kena et al. 2015). Students who do not complete high school with their class in four years may continue their enrollment until receiving their diplomas later.

The many students who discontinue their education may achieve the equivalent of a high school diploma through other means. The *status completion rate* (SCR), another completion ratio, provides the percentage of people by age ranges who are not attending a secondary school but have earned a high school diploma or have completed a high school equivalency program. In the 18- to 24-year-old age group, the SCR in 2008 was 89.9%, compared with 87.2% in 2002 and 83.9% in 1980. Gender comparisons for 2008 showed that 90.5% of females and 89.3% of males had achieved a high school diploma or its equivalent, but major differences exist among racial or ethnic subgroups: 94.2% for White non-Hispanics students, 86.9% for Black non-Hispanic students, and 75.5% for Hispanics (Chapman, Laird, and Kewal-Ramani 2010; U.S. Department of Commerce, Census Bureau, American Community Survey 2007, 2012).

The government examined the SCR again in 2012 and found that it had increased to 91.3% with gender-based status completion rate comparisons of male (90.3%) and female (92.3%). The corresponding 2012 SCR figures for cultural ethnic/racial groups are as follows: White non-Hispanics, 94.6%; Black non-Hispanics, 90.0%; and Hispanics, 87.2% (Stark and Noel 2015). The upward trend in overall SCR improvement that began in 1980 continued into 2012. In other 2012 comparisons, females ages 18–24 had a higher SCR than males, and White non-Hispanic students had a higher SCR than Black-non-Hispanic students, who in turn had a higher SCR than Hispanic students. Although the overall SCR for 18- to 24-year-olds is encouraging, the large gaps in percentages of completers by racial or ethnic groups provide a challenge to those involved in U.S. secondary education and literacy programs (Stark and Noel 2015). These data reflect the fact that the United States is a nation of immigrants, bringing their languages to urban, suburban, small town, and rural settings. Often they are met with cultural and economic challenges that impede their opportunities to progress through the U.S. education system. The analysis of completion data is one way of seeing whether all students are finally enjoying opportunities to succeed in securing the equivalent of a high school diploma.

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## **Movement of U.S. Students through Postsecondary Education**

Students who graduate from high school may enter the workforce, attend a non-university tertiary institution focusing on technical or vocational education, attend a two-year community college, or attend a four-year college or university. At this level, the bars in figure 1 represent the flow of students still in the educational stream. Two-year and community colleges usually offer diverse selections of courses and programs, including those that overlap with the first two years of the curriculum at a four-year college, along

with a number of courses that overlap with those found in the technical colleges and high schools. Many community colleges also have vocational streams of students who earn certification for a particular career, sometimes with and sometimes without a two-year degree.

In two-year or community colleges, an associate of arts (AA), an associate of sciences (AS), or an associate of applied sciences (AAS) degree can usually be earned through the equivalent of two years of full-time study. One-year certificate programs are also offered in various technical fields. In addition, a number of vocational or trade schools offer programs in which students can focus on the knowledge and skills needed to perform a particular job. Vocational schools may be integrated with public schools as part of programs that facilitate the transition from school to work. In other instances, these schools are private schools, nonprofit or proprietary, operated outside the public school system. The foci of these schools range from apprenticeship programs for trades to culinary institutes.

U.S. four-year colleges and universities offer bachelor of science (BS) and bachelor of arts (BA) degrees that can typically be completed in four years of full-time study. In addition, many universities offer graduate programs leading to master's (MS, MA, or MEd) degrees and doctoral (PhD and EdD) degrees. Programs leading to professional degrees (law, medicine, business, etc.) exist both in universities and in institutions that offer no other degree programs. The time needed to complete post-bachelor degrees varies with the field and institution.

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## **The U.S. Education Enterprise**

In 2013–14, 98,271 public schools or agencies were in operation in the 50 states and the District of Columbia. These schools were providing a variety of educational services to the estimated 50 million K–12 students enrolled in them. Most of the schools (89,183) were focused on delivering the broad standard curriculum to their students. Another 1,380 provided targeted vocational or technical education, while 2,010 offered special education services. Another 5,986 offered some form of alternative education. Included in this number were 2,779 independent charter agencies (not including those already counted because they are imbedded directly in the curriculum of a public school program). These operational schools were part of one of 18,184 operational public school districts in the United States, ranging from 1,252 districts in Texas to 19 districts in Delaware and excluding Hawaii, which is a single-district state. In 2012–13, these districts employed the equivalent of 3.1 million full-time teachers (Glander 2015).

In addition to the public schools that are created by local communities and provide education to that community's youth in accordance with state regulations, other types of public, private, and home schools operate at the K–12 levels in the United States. Charter schools are public schools that are funded through public and state support but are allowed to operate with freedom from many of the regulations that apply to traditional public schools. Magnet schools are public schools whose curricula address the standard requirements and regulations but provide targeted and advanced instruction in such areas as mathematics, science, or the arts. The provisions governing magnet schools also usually include a requirement that specific percentages of students come from particular cultural, ethnic, or racial groups in a school's or district's student body.

In addition to these public- and state-funded schools, many communities also have private schools that are funded by parents of the students enrolled, religious denominations, community foundations, or other donors. These schools are independent,

nongovernmental, or non-state, schools. The school's administration is typically responsible to a council or board, often established by the parents of the students attending. Public and magnet schools' administrators are commonly responsible to a governing board elected by the public of the geographical area that the school serves. Charter schools' administrators are typically responsible to a board elected by the parents of the students, and they also are accountable to varied local and state regulations, depending on the laws of the state in which they are located.

Private schools are funded primarily by tuition charged annually to students' parents. Some scholarship aid may be available through a school foundation or established by past graduates. Annual tuition for private schools ranges from nothing at schools whose tuition is covered by an endowment or a special program to nearly \$50,000 a year at some of the most exclusive college preparatory schools in the United States.

Another subclass of private schools consists of those that are supported by a particular religious group or denomination. These schools add instruction in religion to the curriculum and modify instruction in the regular content to highlight particular aspects of the religious group's or denomination's history or beliefs. These schools include parochial schools, which are established to educate the children of Roman Catholic families living in a given parish. Other religious bodies and denominations also sponsor private schools in addition to the Roman Catholic private schools.

A final form of schooling is the home school, in which parents assume direct responsibility for the education of their children, with very few strictures placed on them by the state in which the home school exists. In some cases, parents who are homeschooling their children have banded together to achieve the economy of scale and resources gained by having a critical mass of students.

In the 2013–14 school year, approximately 33,366 private schools were in operation, adding to the numbers of public schools and enrollment data shared above. The organizing structure was Catholic for 21% of these schools, other religious bodies for 47%, and nonsectarian for 32% (Snyder and Dillow 2015).

The academic year 2011–12 is the latest year for which we have complete data on student enrollment in the entire educational enterprise in the United States, since census data lag school-year data by 3–4 years. In 2011–12, U.S. K–12 public schools accounted for more than 49,000,000 students. Private elementary and secondary schools contributed another 5,250,000 students, and homeschooling accounted for approximately 1,700,000 additional students (Snyder and Dillow 2015). Thus, these estimates give us slightly more than 55,950,000 students who were involved in K–12 educational programs in the United States in the 2011–12 school year. Projections for the 2015–16 school year suggest that the number of students involved in K–12 public and private education may have been around 55,957,000 students, composed of 50,773,000 public school students and 5,183,000 students in private schools (Hussar and Bailey 2013). This number does not include estimates of the homeschooled youth in K–12, who could add more than 2,000,000 students to the total for the 2015–16 school year (Ray 2015). (Note that because federal education data in the United State usually lag two to three years behind the date of their release, it is sometimes necessary in this report to speak of data from time that is past as estimates.)

At the postsecondary level, at the beginning of the 2011–12 academic year, 15,110,196 students were enrolled in public degree-granting institutions, and 5,883,917 were enrolled in private degree-granting institutions. Analyzing these data more closely, we find that the students enrolled in public institutions were divided, with 8,047,729 at

four-year colleges or universities and another 7,062,467 at two-year colleges. A different distribution existed at private institutions, where the students were also divided, with 5,446,402 in four-year colleges and universities and another 437,515 studying in two-year colleges. Breaking down this latter number of students in private two-year colleges, we see that 29,864 of them were enrolled in nonprofit two-year programs, whereas 367,651 were enrolled at profit-making two-year institutions. The much larger number enrolled at these institutions is most likely a reflection of vocational programs offered at the two-year profit making institutions (Snyder and Dillow 2015).

As table 1 suggests, the number of students in public U.S. K–12 and postsecondary education has risen steadily since 1985 (Snyder and Dillow 2015). Projections through 2022 show the total number of students in K–12 public schools continuing to increase.

Table 1

*School and postsecondary enrollments and projections over time (in millions)*

Type	Year								
	1985**	1990**	1995**	2000**	2005**	2010**	2015***	2020***	2022***
K–12 public	39.4	41.2	44.8	47.2	49.1	49.5	50.3	52.1	53.0
K–12 private*	5.6	5.6	5.9	6.2	6.1	5.4	5.0	4.9	5.0
Postsecondary	12.2	13.8	14.3	15.3	17.5	21.0	21.3	22.8	23.5

\*Nongovernmental, including parochial schools (governed by religious bodies).

\*\* (Snyder and Dillow 2015).

\*\*\* (Hussar and Bailey 2014).

Total public and private elementary and secondary school enrollment reached 55 million in 2005, representing a 22% increase since fall 1985. Between fall 2005 and fall 2015, a further increase of 1.4% was expected, indicating a slower rate of growth. When the data become available, increases in public school enrollment are expected in the proportions of Hispanics, Asians/Pacific Islanders, and American Indians/Alaska Natives, and decreases are expected to be found in the proportions of Whites and Blacks. Increases in public school enrollment are expected in the South and West, whereas decreases are expected in the Northeast and Midwest (Aud et al. 2011, Hussar and Bailey 2011, 2013).

## Admission to Postsecondary Institutions

Graduates of public or private senior high schools may matriculate to the nation’s colleges, but they must apply to the individual schools to be considered for admission. Most state-supported, two-year colleges will accept any secondary school graduate from the geographic area that they serve. Other two-year colleges and most four-year colleges require applicants for admission to have completed a specified number of courses in English, mathematics, science, social studies, and foreign language and to have a high school diploma. Many state-supported institutions have formulas for admission that may take into consideration the intended field of study, secondary school course grades, percentile rank in class, scores on college entrance examinations, letters of recommendation, participation in sports and other extracurricular activities, and other information supplied by a students’ high school. Private colleges use some of the same criteria as public institutions but may consider factors such as whether members of the applicant’s family have

graduated from the institution. Very selective schools may consider the level of difficulty of courses taken in high school and the scores that applicants have earned on recognized Advanced Placement examinations, possibly using them to award acceptance with advanced standing on entrance. The mean costs of college undergraduate attendance, including tuition, fees, room, and food for in-state students at four-year public and private nonprofit colleges in 2005–6 (in current dollars) were \$13,828 and \$30,725, respectively (College Board 2015h; Glinder, Kelly-Reid, and Mann 2015). These totals increased by the 2010–11 year to \$16,527 and \$34,764, respectively. Adding another five years of growth to the costs, the four-year public and nonprofit private college costs for tuition, fees, room, and board in 2015–16 were \$18,198 and \$37,392, respectively.

Although many undergraduate students receive scholarships and other types of financial aid from various sources, including the college that they attend, government programs, or private foundations, the costs of attending a college and university are increasingly beyond the reach of many students and their families (College Board 2015h). The College Board estimates that full-time undergraduate students at private nonprofit schools received an average of about \$18,870 in grant aid and federal tax benefits in 2014–15 to help pay their way through a year at their school. Full-time in-state students at public universities received an average \$6,110 to assist in meeting their costs in the same academic year. The cost of attending two-year colleges varies widely, depending on the program selected by a student. In some cases, almost all expenses are borne by the local taxing district; in other cases, the costs are equivalent to those of a public four-year college or university.

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## **The Every Student Succeeds Act of 2015**

Because the Constitution of the United States does not claim education as a responsibility of the federal government, individual states have considerable leeway in structuring the education of their students. State laws define the boundaries for the compulsory education of students; outline the general framework for required studies in reading, writing, mathematics, science, social science, physical education, and other subjects; define the minimum number of days of school attendance per year; and define the standards for teacher certification and professional development. These laws, however, stipulate little or no regulation or monitoring for homeschooling. State laws also provide the mechanisms by which local schools are recognized by the state government and provide statutes for the founding and accreditation of private schools. In like manner, states have considerable leeway in waiving regulations for charter schools. These schools thus receive public funds but are not responsible for meeting all the regulations binding other public schools in the state or district.

The United States Department of Education sets standards and provides federal funding for special programs, such as school lunch programs for students in poverty and compensatory programs for students needing special educational assistance. The role of the federal government in education has increased markedly since the establishment of the No Child Left Behind Act (NCLB), passed by Congress in 2001. NCLB authorized the U.S. Department of Education to manage a program that provided financial incentives for schools with good performance profiles and penalties for schools with poor performance records. The program was unprecedented in the nation's history (U.S. Department of Education 2008).

Three days after taking office in January 2001, President George W. Bush announced No Child Left Behind, his framework for education reform that he described as “the

cornerstone of my administration” (Bush 2009). Less than a year later, the United States Congress passed the No Child Left Behind Act of 2001. NCLB had four main thrusts: increased data-driven accountability for states, school districts, and schools; greater choice for parents and students, particularly those attending low-performing schools; more flexibility for states and local educational agencies (LEAs) in the use of federal education dollars; and a stronger emphasis on reading, especially for the youngest children. The disaggregation of state and local data required by NCLB mandated that all students, and in particular, special education students of various types, receive a high-quality mathematics education. In short, the law embodied the idea that the success of all students does truly mean a focus on *all*. In particular, the focus was on making every student proficient, according to the state equivalents of National Assessment of Educational Progress (NAEP) proficiency levels, described in Chapter 4.

The No Child Left Behind Act was set to expire on Sept. 30, 2007, inasmuch as the U.S. Congress passes laws with the intent that they will expire after a fixed period of time—most often, five years. This scheduled expiration is supposed to force Congress to update or amend a law, with some history of implementation to back up changes. However, if Congress somehow doesn’t get around to taking a new look at a law, the law’s authority doesn’t go away; it remains intact until a new law is passed.

The No Child Left Behind Act had not been reauthorized prior to the beginning of Barack Obama’s first term as president of the United States. In March 2010, the Obama administration released a blueprint for reform of the Elementary and Secondary Education Act, using the name by which the law has been formally known since its first passage in 1965, instead of No Child Left Behind, as the 2001 reauthorization under the Bush administration had been called (Duncan 2010). This blueprint recommended that states implement a broader range of assessments to evaluate advanced academic skills, develop and implement plans for the use of technology across the curriculum and in assessment, and foster students’ capabilities to communicate effectively in writing and speaking. Other goals included engaging students in conducting research, using technology, engaging in scientific investigation, and solving problems effectively.

At the same time, President Obama proposed that the stringent accountability penalties, based on what NCLB called annual yearly progress (AYP), determined by the percentage of students at or above the proficient level in the NCLB legislation, be relaxed in favor of focusing more efforts on student improvement. Such improvement measures would involve modifying assessments appropriately for English language learners, minorities, and special needs students. In addition, school programs were to be revised to consider measures beyond reading and math tests. The blueprint suggested that the enactment of Obama’s changes would retain students in school through graduation. Obama’s plan also focused on closing the achievement gap between Black and White students.

Attempts to revise the bill foundered during Obama’s first term as president and on into his second term but regained traction in the fall of 2014, and in the spring of 2015 separate bills were approved for reauthorization by the U.S. Senate and U.S. House of Representatives. The draft bills went into committee to be merged into a compromise bill that might pass both houses and be forwarded to the president. The resulting proposed bill, the Every Student Succeeds Act (ESSA), came out of committee on November 30, 2015, and was passed by both houses of Congress with strong bipartisan support. With President Obama’s signature on December 10, 2015, the bill became the law of the land, replacing the No Child Left Behind Act of 2001, eight years after its scheduled reauthorization.

ESSA differs from NCLB in several significant ways. First and foremost, the new law shrinks the federal footprint, limiting the intervention of the U.S. Department of Education, and specifically the secretary of education, into most aspects of standard setting, assessments, and improvements based on standards. The bill retains the annual testing of students from grades 3 through 8 and at grade 11 in reading and mathematics. However, states will set their own standards and performance goals. They will still have to report the results of student performance assessments relative to state definitions of performance, provide data on student performance as measured by state achievement levels, and submit breakdowns in performance by gender, racial/ethnic cultural group, and disabilities, as required by federal law.

Furthermore, states will be freed of the pressures of the AYP strictures of NCLB but will still be required to provide interventions for the lowest 5% of school performers, for schools with high dropout rates, and for schools with persistent achievement gaps. The shift away from the AYP requirements removes the need for states to seek waivers to avoid federal penalties or interventions when they fail to meet federal performance standards. All states will now be charged with refocusing their efforts on helping students truly succeed in school rather than simply pass an examination. The law also separates accountability for test results from teacher merit evaluations—a key point that opponents fought to maintain. One other key point lost by the minority in the final form of Every Student Succeeds Act was the portability of Title I funding for students with disabilities. The minority argued that such funds should be tied to the students, to enable them to move to other schools of their choosing with the funds moving with them.

The prospect of maintaining a testing program without the federal strictures on performance and accountability to the federal government, as set out in the new act, causes some educators to decry the loss of a single, uniform federal standard for judging achievement. One educator has noted that students who do not come from a privileged family should recognize that they are on their own if they live in a state that does not believe in providing an excellent education.

The Every Student Succeeds Act puts targets in place for the appropriation of funds for the various parts of the law and promises to bring some stability to K–12 education policy until the bill comes up for reauthorization in 2020.