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Broadening Our Perspective Concerning America's Education Attainment: Growth, Progress, and Data Gaps

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ABSTRACT

Our research demonstrates that the current narrative of education stagnancy or decline is misleading. We focus on ages 15–25 and find a pattern of growth and progress in Advanced Placement, dual enrollment (i.e., combining high school and college), four-year colleges/universities growth and completion, apprenticeships, certificates, and credentials. Together, these elements significantly increase the number of years U.S. students spend in education and their attainment. Just as importantly, however, our analysis identifies where current research and data infrastructure fall short. While there are promising developments in sectors such as career and technical education, college transfer, and remedial education, the data gaps in these three sectors do not permit overall conclusions. Some sectors—like on-the-job training, military education, and credentials—lack sufficient data to determine trends. For this reason, our assessment offers not only a longitudinal scan of institutional and programmatic attainment growth, but also a guide to the questions policymakers and researchers must now prioritize and the places where further data must be gathered.

Introduction

For decades, the performance of the American education system has been largely judged by one narrow set of indicators: K–12 standardized test scores that encompass both national and international units of analysis (Hatch, 2021). Proponents of such assessments argue that test scores matter for many things, including national economic prosperity and growth (Hanushek, 2015). The predominant narrative about such data argues that over a long period of time, U.S. scores have either declined or remained stagnant (National Assessment of Educational Progress, n.d.). A resulting sense of alarm about the state of American education has only been intensified by recent test score declines, both before and after the pandemic.

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However, K–12 test benchmarks are insufficient proxies for measuring the long-term educational and economic value generated by American educational institutions and programs. While K–12 schools prepare students for education beyond high school, the prominent tests are limited to outcomes in high school alone (OECD, 2023). As Nicholas Eberstadt (2025) has found, there is a "robust and remarkably stable correspondence between a country's mean years of schooling and its per capita productivity," meaning that test scores "are less powerful predictors of economic performance than … sheer years of schooling for a national population." Simply put, students are in school for far longer than K–12 data alone would suggest, putting pressure on the continued reliance on test scores for assessing the state of national education. In order to obtain a fuller and more accurate picture of education attainment, it is important to look beyond K–12 test scores and, indeed, beyond high school graduation itself.

Public opinion has turned sharply negative concerning colleges and universities in the past decade. The slogan "college for all" that guided the Obama Administration has been attacked as putting too little policy attention on vocational and career education. Moreover, a considerable public focuses on the tiny segment of highly selective postsecondary institutions. Yet those critiques have not included an understanding or trend analysis of the vast array of postsecondary education that already exists, including high schools (AP), job sites, military bases, and prisons. Perhaps if the public better understood the entire array of postsecondary education available to Americans, and its contributions to national educational attainment, their opinion might become more favorable.

Focusing on youth 15 to 25, our goal is to reframe the current conversation around U.S. education attainment and performance by systematically examining how different forms of postsecondary education and training have grown, evolved, and contributed to workforce development over several decades. Based on our review of the literature, we estimate that at least 73% of high school students proceed on to some form of postsecondary education (Irwin et al., 2023).

Our research demonstrates that stagnancy or decline is not the dominant trend if postsecondary and K–12 education are combined. We find a pattern of growth and progress in Advanced Placement, dual enrollment (i.e., combining high school and college), four-year colleges/universities, apprenticeships, certificates, and credentials. Together, these elements significantly increase the number of years U.S. students spend in educational environments.

Just as importantly, however, our analysis identifies where current research and data infrastructure fall short and thus prevent a full accounting of progress or performance. While there are promising developments in sectors such as career and technical education, college transfer, and remedial education, the data gaps in these three sectors do not permit overall conclusions. Some sectors — like on-the-job training, military education, and credentials — lack sufficient data to determine trends. For this reason, our assessment offers not only a longitudinal scan of institutional and programmatic attainment growth, but also a guide to the questions policymakers and researchers must now prioritize and the places where further data must be gathered. This paper thereby contributes to an extensive literature integrating the K–12 perspective with postsecondary education, a literature that argues that this complex array of secondary and postsecondary entities should not be treated as separate domains, and that policies should span the entire spectrum (Hoffman et al., 2007).

Scope of Analysis

This project evaluates 11 distinct categories of educational pathways beyond the traditional higher education framework:

1. Early College Credit (AP)
2. Dual Enrollment in High School and College
3. Career and Technical Education (CTE)
4. Apprenticeships
5. Completion of 4-Year and 2-Year College Degrees
6. Transfers
7. Remedial Education
8. Non-Degree Credentials (NDCs)
9. On-the-Job Training
10. Military Education
11. Correctional Education

For most categories, we analyze historical enrollment data, changes in completion rates, and evidence of long-term outcomes such as employment and earnings. Sources include federal and state datasets, institutional reports, and national surveys.

Where data is robust — such as with AP or community colleges — trends can be clearly interpreted. But in many domains analysis is hindered by significant gaps: outdated or irregular data collection, lack of standardized definitions, or the near-total absence of national tracking systems. Identifying these weaknesses, while limiting what can be said with confidence, helps to highlight critical blind spots in our understanding of how education and training systems function across the country, and lays a foundation for future research.

Framing Principles

Three premises guide this work:

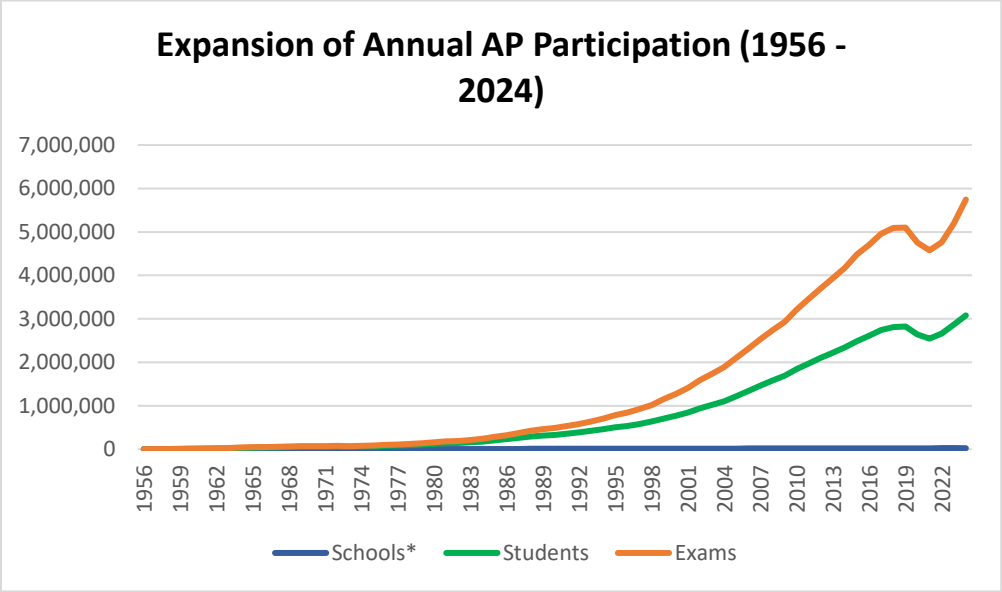
- **The American education system is broader than it appears:** From credentials to military training, a wide array of programs now shapes the education-to- workforce pipeline.

- **Much of the growth in that system is under-recognized:** Many of these postsecondary categories have seen dramatic or significant growth in both participation and educational attainment. These positive sectors include AP, dual enrollment, 4-year degrees, 2-year public degrees, apprenticeships, credentials, and military education.

- **Our data infrastructure does not exist or is not keeping up:** In multiple domains—especially those of career and technical education, on the-job training, correctional education, licenses, and certificates—the lack of consistent longitudinal data obscures whether and how these systems are working.

1. Early College Credit (AP): An Expanding System

Among the clearest examples of scaled educational growth in the last four decades is the rise of the Advanced Placement (AP) program. In 1984, roughly 6,000 schools administered 240,000 exams to fewer than 200,000 students. By 2024, that number had grown such that 23,000 schools were administering 574,000 exams to more than 3 million students. This increase has been systemic, transforming AP into a core feature of the high school-to- college pipeline (College Board, n.d.).



College Board, Central, n.d.

Performance Stability Amid Expansion

While AP usage has expanded dramatically, performance has at least held steady and recently even improved. From 2004 to 2018, passing rates hovered around 60 percent, rising to 64–66 percent between 2019 and 2024. This is especially notable given the broader and more diverse population engaging with AP coursework today (College Board, n.d.).

The distribution of tests taken per student has also remained consistent: around 55 percent of students take one exam, 25 percent take two, 13 percent take three, and only 8 percent take four or more. This suggests that AP growth hasn't been driven by a small group of high-performing students but has been more broadly shared across the high school population. The number of minorities taking and passing AP has expanded greatly.

Along with more students taking the tests, there has been a vast expansion of the subjects tested using AP. Computer Science enrollment grew even faster after AP developed a more conceptual approach in its curriculum design. AP works with teachers in K–12 to provide teacher preparation and a curriculum guidance system, which has further facilitated expansion (Finn & Scanlan, 2019).

Implications for Postsecondary Outcomes

AP has become a core part of the national college readiness infrastructure. For many students—particularly those in under-resourced schools—it offers one of the few opportunities to engage with college-level material in high school. But while enrollment and

attainment have grown, outcome data have failed to keep up. We still know little about how AP participation translates into college-level benefits. Whether students actually attain college credit, how that credit affects time to degree or cost of attendance, and how it ties to graduation or labor market outcomes remains largely untracked (Finn & Scanlan, 2019).

Our understanding of outcomes has been hindered by data collection practices, or lack thereof. Institutions may publicize their AP credit policies, but there's no comprehensive dataset tracking credit award or utilization across colleges. Practices across colleges are also not standardized, with individual colleges using different cut points on the AP score band from 1 to 5. Most colleges award credit using a score of 3, but others require a 4 or 5.

To understand AP's true impact, future research should track credit conversion across institution types and disciplines, and analyze how AP credits influence degree timelines, borrowing, and persistence. There's also a need to study whether increasing AP participation is reshaping high school curricula or student experience, especially in schools with limited resources. These pressures are often noted anecdotally, but they deserve more systematic attention.

2. Dual Enrollment in High School and College: Huge Growth and Uncertainty in Outcomes

Dual enrollment enables students in high school to simultaneously take college courses and earn college credit. A large majority of these courses are taken at the college level, but some are offered in high schools. Dual enrollment (DE) has become one of the most rapidly expanding channels for early college credit in the United States.

Although national-level data is limited prior to the early 2000s, participation has grown dramatically over the past two decades. Dual enrollment rose from 1.1 million in 2000 to over 2.5 million in 2023 (Irwin et al., 2023). In the past 3 years alone, dual enrollment has increased by 20 percent. There is a major shift going on in how college-level coursework is accessed while students are still in high school. Seventy-six percent of dual enrollment students were seniors in high schools, and the majority want to use dual enrollment to reduce college costs. According to the Community College Research Center (2024), other DE trends are:

- Nationally, 82 percent of high schools offer DE courses.
- About one third of high school students have taken at least one DE course by graduation.
- More than 1.5 million students annually enroll in DE courses, more than a million of them at community colleges. From 2011 to 2021, the number of students taking DE nearly doubled, and it continues to grow.
- About 70 percent of DE courses are offered through community colleges.
- High school students account for one in five community college enrollments.

Regional Variance and Institutional Strategy

Growth in dual enrollment has followed distinct geographic patterns (NCES, 2013). States across the South and Midwest led the country in enrolling high school students in 2023. Historically, the DE landscape has been shaped by its local strongholds that are majority-white, skewing national demographic statistics. However, this profile is beginning to shift. As DE expands in more racially diverse states, state-level data increasingly reflects significant participation from non-White student populations, both in absolute numbers and relative

proportions. These trends suggest an ongoing diversification of the DE student base and highlight how demographic representation in dual enrollment is beginning to mirror the broader U.S. high school population.

Gaps in Tracking and Impact

Dual enrollment is now an integral feature of the U.S. secondary-postsecondary interface, particularly within the community college system. Participation is expanding rapidly, backed by institutional investment and growing state-level support. However, many states continue to face structural challenges in embedding DE into the center of their undergraduate systems. Meanwhile, critical gaps in longitudinal tracking limit our ability to assess impact and guide strategic improvements.

Despite its broad reach, dual enrollment remains poorly understood at the national level. Participation data exists, but key outcome measures—such as college course credit, time to degree, and cost savings—are inconsistently tracked or not tracked at all. It's still unclear whether students who take DE courses consistently earn usable college credit, how that credit affects progression through higher education, or whether these programs result in improved postsecondary outcomes for low-income students. Another critical question is whether dual enrollment on college campuses is more effective than on high school campuses.

Looking ahead, research should focus on connecting DE participation with student persistence, degree completion, credit transferability, and workforce outcomes. Comparative analysis across states—examining delivery models, funding structures, and institutional partnerships—will be essential to identifying scalable best practices and advancing the DE model nationwide. Some DE may not be very rigorous, such as courses offered in high schools, but the scale of DE's expansion in bringing high school students into college-level education must be adding to student education attainment.

3. Career and Technical Education (CTE)

Career and Technical Education (CTE) has historically played a key role in preparing students for occupational pathways, especially in applied fields. Enrollments in CTE from 1990 to 2013 were stable. This lack of student CTE growth was caused in part by student shifts to four-year college preparation courses. But, in the period since 2013 enrollments have risen, creating new specified pathways between K–12 and postsecondary education (Advance CTE, 2025).

Federal Investment and Changing Emphasis

This shift in student participation occurred alongside a long-term reduction in federal investment. From 1985 to 2014, federal appropriations for CTE programs declined by approximately 32 percent, with a particularly sharp downturn after 2001. Over that same period, CTE's share of discretionary federal education spending dropped from 5.8 to 1.7 percent. Funding declines tracked a reduction in CTE offerings driven by competition in schools for limited instructional time and resources. In many schools, the expansion of test preparation, advanced academic pathways, and college preparation courses constrained space left for CTE. In this context, the contraction in participation was less a signal of declining relevance and more a byproduct of competing curricular demands.

Newer trend analysis demonstrates that the quality and depth of current CTE education is growing compared to the few scattered student CTE courses of the past. State accountability and program integration have expanded rapidly (Advance CTE, 2025). By 2019, 85 percent of high school graduates had completed a CTE course. The highest participation was in IT, human services, and business. Asian students participated in CTE the least, and male and rural students the most (National Center for Education Statistics, 2024).

There is evidence that CTE can reinforce academic success under certain conditions. Public high school students who complete 4 or more CTE credits and also complete a college preparation core curriculum tend to demonstrate stronger academic outcomes than peers who do not. This suggests that CTE can function best when programs are intentionally integrated with defined specific course career pathways in high schools that are linked to a college career pathway (Advance CTE, 2025). Students who enroll in CTE are more likely to earn associate degrees, but less likely to earn 4-year degrees, than non-CTE high school graduates.

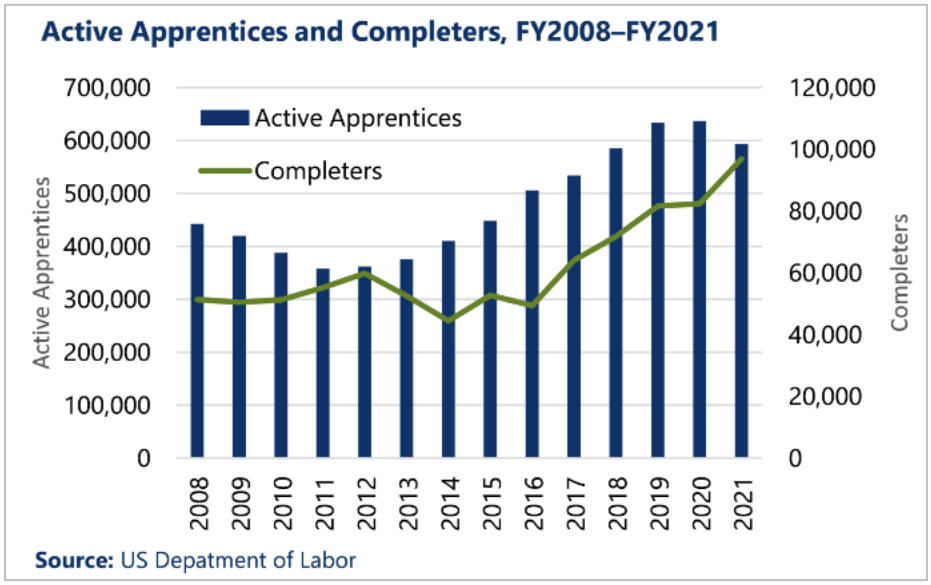
Missing Data and Necessary Tracking

CTE remains a meaningful option for students pursuing applied education, but the last national enrollment and career concentration data was gathered in 2021 by NCES. There is data in several states, but no aggregation. Moreover, many key questions remain unanswered. National tracking systems do not consistently follow CTE concentrators beyond high school, and comparative evaluations of program models are limited.

Future work should explore the links between specific CTE pathways and postsecondary degrees, credentials, certifications, and long-term employment. Additional attention should also be paid to how different implementation models influence equity, scalability, and overall effectiveness across districts and states (Advance CTE, 2018).

4. Apprenticeships

Apprenticeships have long contributed to U.S. workforce development, particularly in skilled trades. While the model has existed for decades, detailed national data prior to the early 2000s on enrollment and outcomes is relatively sparse. Most consistent tracking begins in the last 15 years, during which time the system has undergone a notable resurgence. Although between 2001 and 2011 the number of active apprenticeships marginally declined, since 2011 the landscape has made a clear shift toward expansion. Indeed, between 2010 and 2020, the number of active apprenticeships grew by 73 percent, marking one of the most sustained periods of growth in the history of the registered apprenticeship system.



U.S. Department of Labor, 2021

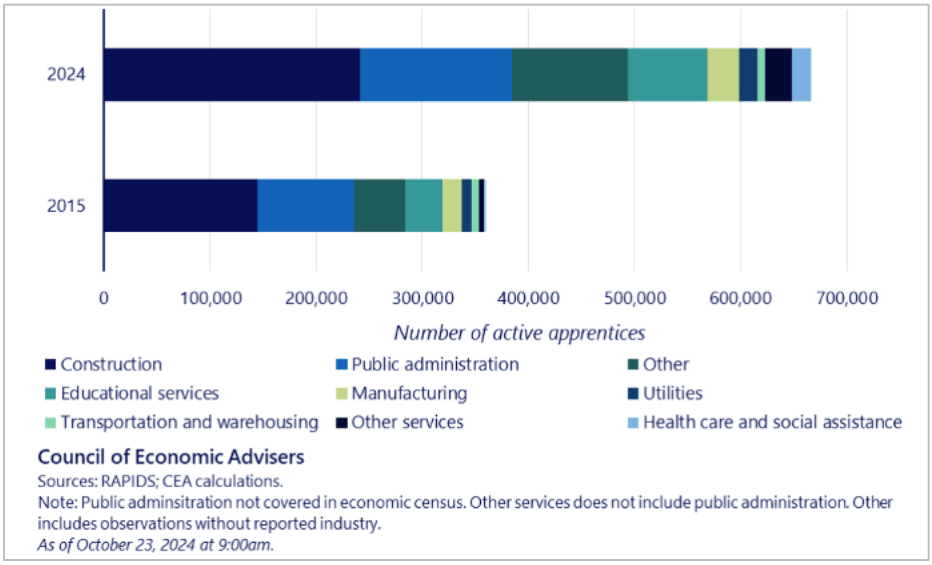
However, despite recent growth, the incidence of apprenticeship in the United States remains far below its potential scale. Just 0.3 percent of the U.S. labor force are active registered apprentices, compared to 2–3 percent in countries with more developed apprenticeship systems (Leech, 2025).

Sectoral and Demographic Diversification

Traditionally concentrated in fields like construction, public administration, and manufacturing, apprenticeships have begun to expand into sectors such as healthcare and utilities—areas that historically lacked structured training pipelines. This broadening of the model reflects efforts to address workforce shortages in high-demand sectors and create new on-ramps for learners outside the conventional trades.

Demographic participation has also begun to shift. The share of women in apprenticeship programs has increased, likely driven by growth in female-majority sectors such as healthcare and administrative services. Additionally, the expansion of apprenticeships into new industries is reflected in the growing size of the "Other" category in Department of Labor enrollment data—an indicator of activity in areas not captured under legacy reporting categories. In regional terms, much of the expansion has occurred in established hubs, particularly across the Midwest.

As participation has grown, there has also been investment in newer apprenticeship formats. Beginning in 2011, the Department of Labor began moving from aggregate headcounts to more detailed analysis of program origin and structure. This shift suggests a maturing policy environment more attentive to the design and intent of apprenticeship pathways.



In program terms, in 2010 the federal government began the Youth Apprentice Program for ages 16 to 34 with a design based on best practices. This program expanded rapidly, from 18,000 in 2010 to 40,000 in 2020 during the pandemic. The number of youth registered apprentices surged by 113 percent between 2010 and 2020 (Jobs for the Future, 2020). The average exit wage was $30 an hour, much higher than the median wage for all young people. Youth apprenticeships are part of an ecosystem that includes employers, high schools, providers of postsecondary educators and intermediaries that coordinate activities and liaisons for all partners (Jobs for the Future, 2020).

Track Outcomes and Measure Performance

The registered apprenticeship system is entering a broad-based resurgence supported by both political parties. Participation has grown, completion has recently increased, and diversification across sectors and demographics is underway. Yet important questions and fundamental data gaps remain. A 2025 report by Apprenticeships for America concluded that the absence of key data, issues with data validation in RAPIDS, and concerns about data quality have a number of consequences. Policymakers, agency leaders, and philanthropic funders have limited insights into how to most effectively deploy resources; advocates lack data to make the case for apprenticeship expansion—both to individual employers and to policymakers; and sponsors and intermediaries don't have the feedback loops they need for continuous improvement (Apprenticeships for America, 2019).

As apprenticeship models expand into white-collar, service, and technology sectors, future research should prioritize longitudinal tracking of employment and earnings outcomes. Data disaggregated by gender, race, geography, and industry will be essential to assessing program equity and impact. Additionally, clearer definitions and performance standards will be critical to maintaining program integrity and enabling comparability across models.

5. Completion of 4-Year and 2-Year College Degrees

At every 4-year institution, the overall U.S. graduation rate in 2024 was higher than it has been in recent years. In fact, graduation rates increased an average of 6.4 percentage points between the 2007 and 2018 entry classes. At public four-year universities, the 2022 entering

graduation rate increased 5.8 percentage points since 2007's entry class. This completion increase was aided by an increased focus on completion by national and state advocacy organizations like Complete College America and Education Trust.

In 2024, 43 percent of the U.S. population ages 24 to 29 held a bachelor's degree or higher, compared to 35 percent of those aged 55 and older. In fall 2025, the total enrollment for 4- and 2-year degrees is expected to be about 19.5 million students, with 11.9 million full-time and 7.7 million part-time. The highest total degree enrollment in U.S. history was 21 million in 2010, or about six times the 3.6 million enrollment figure from 1960 (NSC, 2025). Recent enrollment and completion declines appear to focus losses on the pandemic, and on low-quality institutions with high student loan balances and poor completion percentages (Eberstadt, 2025).

Universities Focus on Student Completion

Increased attention concerning college completion began about 2007 with the annual National Student Clearinghouse Research Center. Since then, many state leaders began to push postsecondary institutions to create new incentives and student support systems for completion. For example, California incorporated completion in its finance formula for community colleges. California State University evaluated college Presidents on how much completion increased. Remedial education was fundamentally changed through different placement assessments, and corequisite classes that supplemented revamped remedial courses (Legislative Analyst's Office, 2025).

NSC conducts its survey annually and incremental graduation progress continues. The 2024 data compared students who began college in 2017 to students who began in 2018. The 2024 results update 2023 and report an overall rate increase of 1.2 percent. Completion rates increased the most at 2-year public community colleges (1.1 percent). The overall rate is depressed by the recent decline in 4-year for-profit institutions, which dropped 2.4 percent in 2024.

There are also stark differences between highest and lowest income neighborhoods. Just 48.2 percent graduated from lowest income neighborhoods compared to 75.8 percent who did so from highest income neighborhoods (NSC, 2024).

Two-Year Associate Degrees

Since the 1980s, associate's degrees—primarily conferred by community colleges—have played an important role in expanding access to postsecondary education, as community colleges have historically offered a low-cost alternative to four-year institutions. During the 1984 to 2006 period, the two-year sector experienced substantial growth, with the number of community colleges increasing by 28 percent. By 2006, community colleges awarded roughly 70 percent of all associate's degrees in the U.S., while the private sector—both nonprofit and for-profit institutions—accounted for 22 percent, up from 16 percent in 1994 (Brock et al., 2025).

Post-Recession Shocks and Enrollment Declines

The Great Recession (2008–2010) produced a short-term spike in two-year college enrollments, as displaced workers sought retraining opportunities. That was followed by a gradual enrollment decline beginning in the mid-2010s, which was further accelerated by the COVID-19 pandemic. In contrast, four-year college enrollment rose during this same period. As

of the early 2020s, enrollment in associate's degree programs remains below pre- recession levels, even though strong labor market demand persists in key fields like healthcare, IT, and skilled trades. This divergence raises questions about how students perceive the long-term value of a two-year degree—particularly as economic returns can vary widely by institution type, program of study, and geography.

For cohort year 2020, the graduation rate within 150 percent of normal time at 2-year postsecondary institutions was 39.4 percent (Irwin et al., 2023). It is noteworthy that recent completion rates increased at public community colleges. Between 2012 and 2022, enrollment in associate's degree programs declined because of the pandemic, yet degree conferrals dropped by only 1 percent. This suggests that while fewer students were enrolling, those who do may be more likely to complete their programs. This positive trend is potentially due to improved advising, streamlined curricula, or changing student intent.

However, there are 2.6 million individuals in the U.S. who have completed 2 years of college credits but have no 2-year degree or credential (Brock et al., 2025). Many students do not complete the AA degree because of personal life challenges or financial barriers. Others are eligible to transfer to 4-year institutions through course completion, and thus see no value in completing the AA. Higher rates of part-time enrollment and more limited institutional resources further challenge community college degree or credential completion.

In response to these barriers, a few states have offered an AA degree or credential on request for former students who have completed 2 years of courses. Such students would not need to re-enroll to get their degree or certificate.

Increased Earnings and Institutional Practices

Associate's degrees play a significant role in the U.S. higher education system, particularly in terms of access and affordability. Yet that role appears to be shifting (Brock et al., 2025). While recent completion gains are encouraging, overall enrollment has declined, and persistent structural limitations continue to affect student outcomes. At the same time, the associate's degree offers a clear return on effort and investment, as median earnings of 2 year college completers resulted in 18 percent more earnings than a high school degree (National Center for Education Statistics, 2024). This suggests that completing an associate's degree can make a significant difference in students' futures.

Further research is needed to clarify what is driving improved completion of public associate's degrees amid lower enrollment. Additional study of institutional practices—such as guided pathways, developmental education reform, and proactive advising—could yield insight into which models are most effective at supporting student success in the two-year sector.

6. Transfer Between Degree-granting Institutions

Transfer pathways between institutions remain a defining feature of the American postsecondary system. The pandemic caused more students to stop out and transfer. In fall 2024, transfers comprised 13.4 % of all continuing and returning undergraduates, up from 11.9 percent in fall 2020. Two- to four-year transfers accounted for 41.7%. Black and Hispanic transfer rates went up and white transfers went down (National Student Cleargimhhouse,2025).

For community colleges, transfer has long been framed as a central mission, but it can be a challenging prospect for students (Brock et al., 2025). Almost a third of first time ever in college students who began at a community college in fall 2017 transferred to a four-year institution within six years. Half of these students subsequently received a bachelors degree.

Transfer often competes with other four-year institutional objectives. Many four-year institutions have shown uneven incentives, insufficient financial aid, or lack of coordination for supporting transfer students. Some transfer students face inconsistent articulation of courses causing frequent credit loss and bureaucratic delays that extend time to degree or lead some to leave college altogether (Irwin et al., 2023).

One of the more overlooked aspects of the transfer landscape is the growing prevalence of reverse and lateral transfers. NSC's longitudinal research from the 2015 and 2018 entering classes further highlights these challenges (NSC, 2025). As of 2015, over half (51.3%) of students transferring from four-year public institutions moved to two-year public colleges. Even among students who began at a two-year public college, 38% transferred laterally to another two-year institution. These patterns suggest a mobile student population operating within a system that lacks the institutional clarity and flexibility to support students effectively. The concept of a linear pipeline for describing transition from secondary school to completion of postsecondary education is therefore not accurate.

Policymakers should focus on improving credit articulation, data tracking, and financial aid continuity to better serve this large and growing segment of the student population. Institutions need to improve counseling, and remove roadblocks that inhibit degree attainment.

7. Remedial Education

Remedial education—also referred to as developmental education—has long been used by colleges to support students who arrive underprepared in core academic areas such as math, reading, or writing. While remediation is widely implemented across both two- year and four-year institutions, its overall effectiveness remains contested, and relatively few national longitudinal studies have examined its long-term academic or labor market impact. Recent research has shown, however, that remediated students attempt fewer credits than their non-remediated peers and are consistently less likely to complete degrees. Moreover, these findings have held across both two- and four-year institutions and informed much of the recent policy discussion (Community College Research Center, n.d.).

The policies, options, and requirements of remedial education have undergone a major overhaul in the last 15 years (Wren, 2025). Placement tests are more precise, math course options are more inclusive, including statistics and data science, and first semester students are enrolled in "co-requisite courses" that provide more academic support.

Challenges remain, however, both nationally and systemically. Remediation disproportionately hinders academic progress for students of color, low-income students, males, and those attending institutions with high remediation placement rates. There is no unified standard for placement; colleges use different approaches, making it difficult to compare outcomes or track trends across institutions. The lack of centralized oversight contributes to fragmentation in program design, curricular expectations, and data collection, thereby further complicating efforts to evaluate effectiveness on a broad scale.

Robust Standards and National Tracking

More research is needed to evaluate both traditional and emerging remediation models—particularly co-requisite structures that allow students to take developmental and credit-bearing courses simultaneously. In the absence of consistent placement standards and robust national tracking systems, it remains difficult to assess how these reforms are working at scale (Community College Research Center, n.d.).

Future research should focus on long-term outcomes for students enrolled in various remediation models, with attention to credit accumulation, persistence, degree attainment, and earnings. Standardized placement criteria, integrated data infrastructure, and clearly defined outcome metrics will be essential to advancing the field and ensuring that remediation serves its intended purpose.

8. Non-Degree Credentials (NDCs)

A certificate is a document demonstrating completion of a specific educational or training program, while a credential is a broader term encompassing various forms of validation of an individual's knowledge, skills, or abilities, including certificates and licenses. Essentially, licenses or certificates are a type of credential. However, the broader concept is labeled a "Non-Degree Credential" (NDC). Once confined to specific fields like healthcare, law, and education, these forms of occupational recognition expanded significantly between the 1960s and 2025. By 2008, roughly one in four American workers held an NDC, the same share as a generation earlier. In 2025 that had risen to 34 percent (Levine, 2025). The United States has 1,850,034 unique credentials offered by more than 134,000 providers, a 2025 report found.

Count of Types of Credentials Offered to U.S. Workforce, 2025

- **Certificates**: 486,352 certificates of completion, academic certificates and apprenticeships
- **Certifications**: 6,892 certifications
- **Micro-credentials**: 3,384 micro-credentials
- **Licenses**: 14,331 occupational licenses
- **Badges**: 1,022,028 badges

Credential Engine, 2025b

Two main forces have driven this growth. First, changes in workforce composition—particularly the rise of service-sector employment—have expanded the number of occupations requiring formal licensing. Second, states and professional associations have broadened the scope of licensing requirements across a range of jobs. According to data from the U.S. Bureau of Labor Statistics, licensed workers are more likely to be employed full-time and have a stronger employed-to-unemployed ratio than their unlicensed peers: approximately 2:1 compared to 0.85 (U.S. Bureau of Labor Statistics, 2019). Half of vocational credential holders already have a degree (U.S. Census, n.d.).

NDCs are usually much shorter in duration than degrees, lasting two weeks or longer than a year. Providers include accredited or nonaccredited schools, businesses, labor unions, associations, governments, academies, and more. Online providers have proliferated, and

while some credentials are related to a vocation, others are not. Unlike degrees, some NDCs can expire. A majority of students pay for NDCs themselves, and some are very expensive (Levine, 2025).

This diversity has made the sector dynamic and responsive to labor market trends, but also highly fragmented and difficult to track. According to Credential Engine's 2022 report, a major challenge lies in "effectively tracking the growth of credentials," in part due to the rise of Massive Open Online Courses (MOOCs) and noncredit-bearing programs offered through platforms like Coursera, edX, and Khan Academy. These programs often operate independently of established regulatory frameworks, limiting their visibility in formal datasets (Credential Engine, 2022).

A 2025 report from AEI and Burning Glass focuses on workforce credentials that signal mastery of a specific career-relevant skill. They report that short-term (one year or less) certificate attainment grew at a rate of 33 percent between 2013 and 2023. This rate compares to 8 percent growth for bachelor's degrees. The study compares outcomes for credential earners across 2,050 providers of short-term credentials to similar workers who did not pursue credentials. Results revealed a wide span of outcomes, but the average credential return is only $1,200 more per year. It therefore might take years for the average worker to recover the costs of getting the credential.

Federal/State Efforts and Emerging Frameworks

Credential issuance continues to grow across all sectors—education, employment, and technology—but outcome data has not kept pace. As Credential Engine (2022) notes, "credentialization" is moving faster than federal and state efforts to standardize definitions, establish reporting norms, or integrate credentials into formal education and employment systems. The result is a visibility gap that limits policymaking, program design, and learner decision-making.

Only recently have states begun to develop infrastructure to monitor credential activity more systematically. A key step in this effort has been the modernization of eligible training provider lists (ETPLs), which track credentials that align with workforce development goals. These registries offer a potential foundation for distinguishing high value credentials—those linked to wage gains or career advancement—from programs that offer limited or uncertain returns. Despite these efforts, there is still no centralized authority to evaluate or compare credentials. Learners are left to navigate a complex marketplace with little guidance, making it difficult to assess which credentials have genuine labor market value and which do not. For example, a significant problem is misalignment, caused by credentials that have little or no direct connection to a specific occupational cluster.

This ambiguity is especially acute in the world of online and noncredit programs, where reporting requirements are minimal or nonexistent. The growing role of employer-issued credentials—ranging from in-house training certifications to proprietary skill badges—adds another layer of complexity. The four-decade expansion of credentials, however, is so large that it has added years of education to the U.S. workforce and to educational attainment overall.

Thus, while there is little doubt that the credential ecosystem has become more central to how Americans acquire, signal, and stack skills (Credentials Matter, n.d.), without standardized

tracking systems, it is difficult to determine which credentials lead to meaningful employment outcomes, upward mobility, or long- term career growth (McClennan et al., 2024).

There are a number of ways that future research could strengthen the effectiveness of credential programs and help students decide where and when to invest their time and money. First, concrete data is needed on which credentials are associated with sustained wage gains or job placement. Tracking outcomes could also help to distinguish between stackable credentials that lead to advanced opportunities and terminal credentials that do not. On the employer side, better data is needed as to whether and how employers take account of credentials in hiring and promotion practices. From the point of view of public funding, Congress expanded Pell Grants in 2025 to include student financial support for short term workforce-aligned programs that include the full gamut of apprenticeships, certificates, and credentials. The hope is that federal student aid will result in faster, more affordable, and more job-relevant outcomes.

9. On-The-Job Training

On-the-job training (OJT) remains one of the most common ways Americans acquire work-related skills, yet it is also one of the least systematically measured. Applied and context-oriented learning can be much more effective than abstraction, thus OJT has strong potential for learning while doing. Despite its central role in workforce development, the federal government maintains no current metrics on how employers invest in or deliver training. As the U.S. Department of Commerce recently acknowledged, the federal statistical infrastructure surrounding OJT is "fragmented and incomplete," limiting policymakers' ability to understand how workers are being prepared for increasingly complex job demands (U.S. Department of Commerce, 2022).

The last major attempt to study OJT nationally occurred in the 1990s and continues to be cited today as a baseline reference despite being nearly three decades out of date. Since then, federal-level data collection efforts have been sporadic and narrow in scope, failing to capture participation rates, investment levels, or long-term outcomes.

State-Level Innovations and Positive Returns

Amid this national data vacuum, some states have begun to fill the gap. In California, researchers used linked administrative records from 2012 to 2020 to evaluate the effects of OJT programs. According to the Rothstein et al. (2022), program participants experienced sustained increases in earnings, averaging $1,400 more per year than similar individuals who did not receive training. These earnings gains persisted for up to four years post-training, suggesting long-term benefits beyond immediate employment outcomes.

The effects were particularly strong among women and among workers aged 25 to 44. Dislocated workers—those previously laid off—saw even greater improvements than low-income workers overall. Program type also made a difference: OJT in healthcare, manufacturing, and transportation/logistics yielded the largest income gains, reflecting alignment with sectors facing high labor demand. One notable finding was the absence of a "lock-in" effect. That is, participants did not experience short-term wage penalties from taking time out of the labor force to complete training. This finding contradicts long-standing concerns that training may delay immediate earning potential.

National Integrated Data Collection

On-the-job training is widespread, impactful, and under-documented. Evidence from California suggests strong and lasting earnings gains-particularly for targeted demographic groups and training in high-demand fields. Yet no system exists nationally that would combine employer, wage, and worker-level data over time to measure how many workers receive OJT, what kinds of skills are taught, or how such efforts are funded.

To address the lack of national visibility, the U.S. Department of Commerce in 2022 proposed launching a new longitudinal study of employer-provided training. The proposal outlines a four-year, $12 million effort designed to build the kind of linked administrative and survey datasets required to track OJT participation and impact at scale. However, this data proposal was never completed. Until such investment is made, policymakers will continue to rely on patchwork state data and outdated national surveys to understand employer training practices; and OJT will remain one of the most significant blind spots in American workforce policy, despite its promise as a tool for economic mobility.

10. Military Education

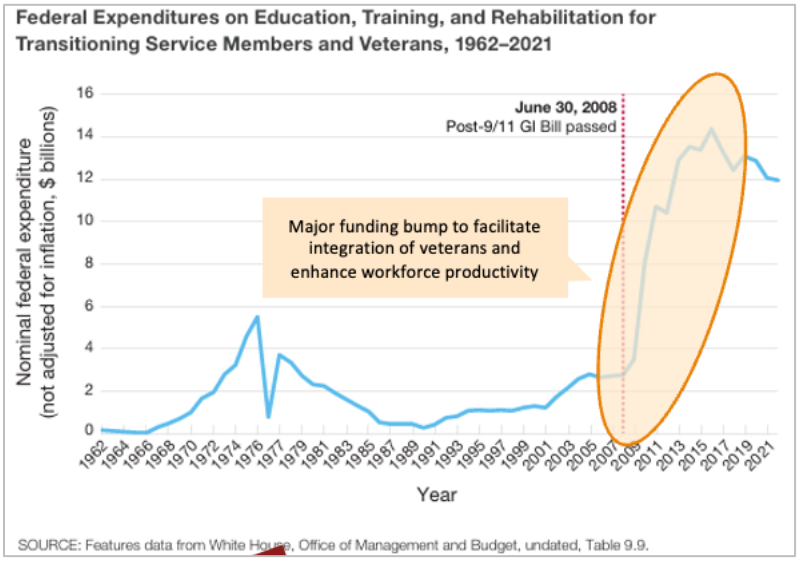
Military-connected education occupies a distinct yet under-analyzed space in the U.S. postsecondary landscape. There are three education phases: during enlistment, continuing education during service, and after completing military service. At the time of enlistment, service members take a multiple-choice test that measures a recruit's aptitude and academic skills for different armed service jobs. The Armed Services Vocational Aptitude Battery (ASVAB) determines training for all branches including eligibility for enlistment and suitability for various initial positions. ASVAB is also utilized to help high school students explore military options. Each military branch has a minimum score for enlistment and specific job training programs, though there is scant public information about the precise content of the ASVAB.

Military education includes a wide variation of education challenges for enlistees. A large aircraft carrier will employ highly technical weapons and logistics; but there is also a huge kitchen on board that needs staffing for low-level routine jobs. This means that there is a great deal of education going on, starting with basic training of 8 to 10 weeks for all soldiers that includes: physical, mental, and emotional fortitude; foundational military skills; combat skills; and values and teamwork.

The military supports continuing education through help with costs and logistics. That includes financial support for voluntary off-duty education programs, and certifications and licenses that are relevant to civilian jobs.

Military Education Support After Military Service is Finished

The federal government has made substantial investments in supporting servicemembers' transitions to civilian life, most notably through the Post-9/11 GI Bill. New research from the Department of Veterans Affairs and the U.S. Census Bureau shows that veterans who pursued degrees using GI Bill benefits earned $2,000-$15,000 more per year than non-participants, depending on the comparison group. Degree seekers were more likely to be female, Black, or Hispanic; living in urban areas; and ranked in the middle enlisted range. Yet core data on enrollment, attainment, and employment outcomes remain sparse. The system is characterized by "limited availability on enrollment" and a fragmented approach to outcome tracking (Kleykamp et al., 2024).



Kleykamp et al, 2024

These benefits made public four-year institutions the primary enrollment destination for military-affiliated students. However, few programs are designed to directly translate military-acquired skills into civilian job placement. The dominant federal strategy has been to offload the military-to-civilian transition onto state and private education institutions, rather than providing targeted skill translation or structured employment pipelines (Kleykamp et al., 2024).

While federal funding is robust, the programmatic focus is narrow. Most investment supports post-service degree attainment, with relatively little infrastructure aimed at skills recognition or employment placement. Programs like the Transition Assistance Program (TAP) and DoD SkillBridge offer some support, but the latter operates on limited budgets and reaches a small subset of transitioning personnel. RAND's 2024 report identifies serious transparency issues in these programs, with little public data on enrollment numbers, completion rates, or employment outcomes.

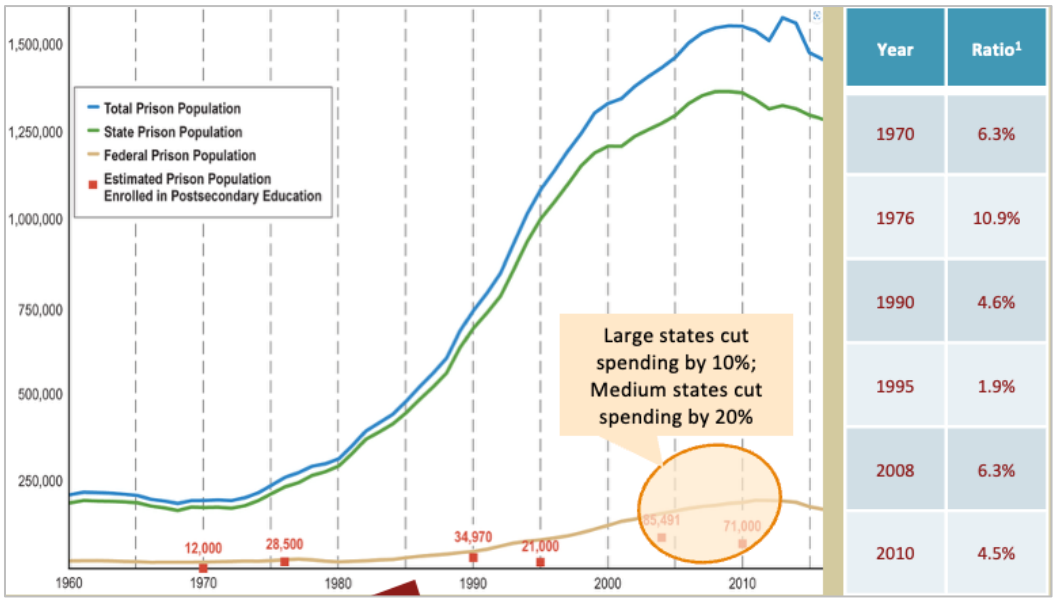
Measuring Return on Investment

In terms of future research, there is much to be done. Most critical is to measure the return on different post-service education pathways and assess how in-service training contributes to long-term labor market success. Research is also needed on the impact and scale of transition programs. Unfortunately, without better data and accountability frameworks, military-connected education will remain a high-cost, low-visibility sector—essential in purpose, but difficult to evaluate.

11. Correctional Education

Correctional education (CE) occupies a uniquely constrained space in the American education and workforce ecosystem. While postsecondary education for incarcerated individuals has consistently demonstrated strong outcomes—particularly in reducing recidivism and improving post-release employment—overall enrollment in CE programs has remained flat, even as the U.S. prison population surged between the 1980s and the mid-2010s. This disconnect is largely attributable to volatile public policy, inconsistent funding, and limited institutional prioritization.

Between 1978 and 2016, the U.S. incarcerated population more than quadrupled, yet the estimated percentage of that population enrolled in postsecondary education did not rise in tandem (Davis et al., 2014). One turning point came after the Great Recession, when fiscal austerity measures led to widespread budget cuts. Medium-sized states reduced spending on correctional education by as much as 20 percent, and large states by about 10 percent. This represented a significant setback for a system that is heavily reliant on public appropriations and typically low on the policy priority list during downturns.



Year	Ratio[1]
1970	6.3%
1976	10.9%
1990	4.6%
1995	1.9%
2008	6.3%
2010	4.5%

Davis et al, 2013

Program Effectiveness and Barriers

Despite funding instability, the empirical case for CE remains among the strongest in the education field. According to a landmark RAND meta-analysis, incarcerated individuals who participate in CE programs are 43 percent less likely to recidivate than those who do not and are 13 percent more likely to find employment post-release (Davis et al., 2013). These impacts surpass those of many other interventions in the education and workforce development sectors, underscoring CE's potential not just as a rehabilitative tool, but also as a public safety and labor market strategy.

However, program fragility remains a central challenge. CE is rarely treated as a core education strategy and still lacks a stable, sustained federal investment mechanism. As a result, CE offerings remain underfunded, poorly integrated, and frequently deprioritized during economic downturns (Monday et al., 2025). Many successful programs are small-scale, operating in isolated facilities or through temporary grants. Program availability also varies significantly by facility type, with private prisons frequently offering fewer educational opportunities than their public counterparts.

With these considerations in mind, there are two interrelated priorities that should guide future research. The first is to identify which CE models are most effective under resource constraints, particularly in varying institutional contexts. In that effort, more focus should be on youth ages 16 to 25. Moreover, data is required to help evaluate whether successful

programs can scale across different correctional environments—public, private, local, and federal—without losing fidelity or impact.

Final Comments and Overall Observations

Contrary to the dominant narrative of decline in U.S. education, the analysis presented here reveals a system that has evolved substantially, and often successfully, over the last four decades. At least 73 percent of high school graduates proceed on to some form of postsecondary education soon after they graduate. The broader landscape of American education includes a combination of secondary and postsecondary education that tells a story of student growth and progress despite data gaps across multiple sectors.

Measurements of Success, Current and Future

Across the domains analyzed, several positive stories stand out:

- **Advanced Placement (AP)** has seen massive expansion, rising to 23,000 schools and over 5 million exams annually while maintaining or improving pass rates. This signals genuine academic rigor amid democratized access.
- **Dual Enrollment** has rapidly scaled, especially in community colleges, bringing college coursework to nearly 1 in 5 high school students nationwide. Lagging states are catching up fast, signaling sustained future growth. More data is needed concerning program quality and student outcomes.
- **Apprenticeships** have surged by 73 percent in the last decade, expanding beyond construction into healthcare, IT, and utilities. Completion rates have returned to historical norms, suggesting the system is advancing, not just growing.
- **College and university 4-year graduation rates** are at all-time highs, with significant gains since 2007. Degrees and certificates have increased at 2-year public colleges. A combination of policies has helped to cause this positive outcome.
- **Credentials and Certifications** continue to grow rapidly and expand in scope. Licensed individuals are more than twice as likely to be employed full-time compared to their non-licensed peers.
- **Correctional Education** reduces recidivism by 43 percent and increases employment rates post-release by 13 percent. These are among the strongest outcomes of any education or training program in the country, yet the programs remain underfunded and with fewer participants than in the past.

These positive trends are not isolated. Rather they are systemic. They reveal that American education, far from failing outright, has quietly adapted to serve millions of learners through flexible, applied, and workforce-linked pathways.

However, these gains have not been matched by investment in measurement, trend data or evaluation:

- **High school Career and Technical Education** has developed better career pathways and more linkages to postsecondary education. However, longitudinal data systems are underdeveloped to evaluate effectiveness.
- **Remedial education** has changed dramatically in its concepts and approach, but benefits are unknown within existing data systems.
- **Transfer pathways,** although central to the community college mission, remain inefficient. Most students transfer without earning a credential, and articulation

failures cause widespread credit loss.

- **Credential programs** have diversified and expanded, but tracking systems have not. Policymakers cannot yet distinguish between high-quality, market-aligned certificates and low-value credentials.
- **Military education** remains opaque. Despite billions in funding, there is limited visibility into enrollment, skill conversion, or post-service outcomes due to data silos and security-driven limitations.
- **On-the-job training,** though effective in isolated state evaluations, lacks any national data infrastructure-leaving the largest form of workforce training in the country virtually invisible. OJT is one of the best ways to provide applied and active learning.

The Policy Challenge Ahead

The takeaway is not that the U.S. education system is not broken. It is that it is *incompletely understood.* Key parts of the system—those with proven returns—are operating in the relative darkness or are misunderstood.

If the U.S. is serious about preparing citizens for economic resilience, civic participation, and lifelong learning, then we see three imperatives:

1. **Elevate what works.** Scale programs with clear returns on investment such as AP, dual enrollment, apprenticeships, and correctional education into broader federal and state strategies, with targeted funding and accountability.
2. **Fix the data infrastructure.** Build cross-agency systems that track participation, progression, and outcomes across all postsecondary pathways, not just for transfer to four-year degree programs. Statistics should be presented with separate categories for youth 15–25 years of age.
3. **Develop policies for a major overhaul of the existing systems.** For example, Jobs for the Future (2021) proposes merging grades 11-14 into a single, integrated, and free system. It seeks to eliminate the rigid divide between high school and college, creating a new, equitable educational model that combines academic instruction with workplace learning for 16-to-20-year-olds, directly aligning with modern economic needs.

The U.S. education system is in transformation. In many sectors, postsecondary education is quietly succeeding. The challenge now is to bring success and weakness into full view, build the systems to support attainment, and close the distance between potential and performance.

REFERENCES

Advance CTE. (2018). *What is CTE*. https://careertech.org/wp content/uploads/2023/01/What_is_CTE_2018.pdf

Advance CTE. (2025). *Making course readiness count*. https://careertech.org/wp-content/uploads/2025/06/Making_Career_Readiness_Count_Report_2025_Update.pdf

American Institutes for Research. (2025). *A study of post-9/11 GI Bill student outcomes*. https://www.air.org/project/study-post-911-gi-bill-student-outcomes

Apprenticeships for America. (2019). *Report: The National Apprenticeships data ecosystem*. https://apprenticeshipsforamerica.org/news/afa-publications/94/94-Report-The-National-Apprenticeships-Data-Ecosystem

Brock, T., Mateo, A., & Ray, A. (2025). *Community colleges: History, performance, paths*. Community College Resource Center. https://ccrc.tc.columbia.edu/publications/community-colleges-history-performace.html

College Board. (n.d.). *AP national and state data*. AP Central. https://apcentral.collegeboard.org/about-ap/ap-data-research/national-state-data

College Board. (2005). *Advanced Placement report to the nation*. https://secure-media.collegeboard.org/digitalServices/pdf/ap/rtn/ap-report-nation_2005.pdf

College Board. (2014). *The 10th annual AP report to the nation*. https://secure-media.collegeboard.org/digitalServices/pdf/ap/rtn/10th-annual/10th-annual-ap-report-to-the-nation-single-page.pdf

College Board Advocacy and Policy Center. (2013). *Recurring trends and persistent themes: A brief history of transfer*. https://secure-media.collegeboard.org/digitalServices/pdf/advocacy/policycenter/recurring-trends-persistent-themes-history-transfer-brief.pdf

Community College Research Center. (n.d.). *Developmental education*. https://ccrc.tc.columbia.edu/research/developmental-education.html

Community College Research Center. (2024). *Understanding dual enrollment*. https://ccrc.tc.columbia.edu/publications/understanding-dual-enrollment.html

Credential Engine. (2022). *Counting U.S. secondary and postsecondary credentials report.* https://credentialengine.org/resources/counting-u-s-secondary-and-postsecondary-credentials-report/

Credential Engine. (2025a). *Counting credentials 2025 report*. https://credentialengine.org/all-resources/2025-counting-credentials/

Credential Engine. (2025b). *New report finds 1.85 million credentials and opportunities for learners, workers, and employers*. https://credentialengine.org/2025/12/09/new-report-finds-1-85-million-credentials-and-opportunities/

Credentials Matter. (n.d.). The State of Credentials. https://credentialsmatter.org/data-exploration/the-state-of-credentials/

Davis, L. M., Bozick, R., Steele, J. L., Saunders, J., & Miles, J. N. V. (2013). *Evaluating the effectiveness of correctional education: A meta-analysis of programs that provide education to incarcerated adults*. RAND Corporation. https://www.rand.org/pubs/research_reports/RR266.html

Davis, L. M., Steele, J. L., Bozick, R., Williams, M. V., Turner, S., Miles, J. N. V., Saunders, J., & Steinberg, P. S. (2014). *How effective is correctional education, and where do we go from here? The results of a comprehensive evaluation* (RR564). RAND. https://www.rand.org/pubs/research_reports/RR564.html

Eberstadt, N. (2025). *Knowledge, skills, and the global balance of power: What international standardized achievement tests tell us about national economic potential and prospects*.

American Enterprise Institute. https://www.aei.org/research-products/working-paper/knowledge-skills-and-the-global-balance-of-power-what-international-standardized-achievement-tests-tell-us-about-national-economic-potential-and-prospects/

Executive Office of the President of the United States. (2015). *Occupational licensing: A framework for policymakers*. https://obamawhitehouse.archives.gov/sites/default/files/docs/licensing_report_final_nonembargo.pdf

Executive Office of the President of the United States. (2024). *Fact sheet: Biden-Harris administration announces new actions to support registered apprenticeships and reduce licensing barriers*.

Fink, J. (2024). *How many students are taking dual enrollment courses in high school? New national, state, and college-level data*. Community College Research Center. https://ccrc.tc.columbia.edu/easyblog/how-many-students-are-taking-dual-enrollment-courses-in-high-school-new-national-state-and-college-level-data.html

Finn, C. E., Jr., & Scanlan, A. E. (2019). *Learning in the Fast Lane: The Past, Present, and Future of Advanced Placement*. Princeton. https://press.princeton.edu/books/hardcover/9780691178721/learning-in-the-fast-lane

Hanushek, E. A., & Woessmann, L. (2015). *The knowledge capital of nations: Education and the economics of growth*. MIT Press.

Hatch, T. (with Corson, J., & Van Den Berg, S. G.). (2021). *The education we need for a future we cannot predict*. Corwin.

Hoffman, N., Vargas, J., Venezia, A., & Miller, M. S. (Eds.). (2007). *Minding the gap: Why integrating high school with college makes sense and how to do it*. Harvard Education Press.

Hossler, D., Shapiro, D., Dundar, A., Ziskin, M., Chen, J., Zerquera, D., & Torres, V. (2012). *Transfer and mobility: A national view of pre-degree student movement in postsecondary institutions* (Signature Report no.2). National Student Clearinghouse Research Center. https://nscresearchcenter.org/signaturereport2/

Integrated Postsecondary Education Data System. (n.d.). *Graduation and retention rates: What is the graduation rate within 150% of normal time at 2-year postsecondary institutions?* National Center for Education Statistics. *https://nces.ed.gov/ipeds/trendgenerator/app/answer/7/21?sideid=4--1%7C2%7C3*

Irwin, V., De La Rosa, J., Wang, K., Hein, S., Zhang, J., Burr, R., Roberts, A., Barmer, A., Bullock Mann, F., Dilig, R., & Parker, S. (2022). *Report on the condition of education 2022* (NCES 2022-144). National Center for Education Statistics, U.S. Department of Education. https://nces.ed.gov/pubs2022/2022144.pdf

Irwin, V., Wang, K., Tezil, T., Zhang, J., Filbey, A., Jung, J., Bullock Mann, F., Dilig, R., & Parker, S. (2023). *Report on the condition of education 2023* (NCES 2023-144rev). National Center for Education Statistics, U.S. Department of Education. https://nces.ed.gov/pubs2023/2023144rev.pdf

Jobs for the Future. (2020). *Youth apprenticeships*. https://www.jff.org/youth-apprenticeship/

Jobs for the Future. (2021). The Big Blur: An Argument for Erasing the Boundaries Between School, College, and Careers. https://www.jff.org/idea/the-big-blur-an-argument-for-erasing-the-boundaries-between-high-school-college-and-careers-and-creating-one-new-system-that-works-for-everyone/

Kleiner, M. M., & Krueger, A. B. (2013). *Analyzing the extent and influence of occupational licensing on the labor market*. Journal of Labor Economics, *31*(S1), S173-S202. https://doi.org/10.1086/669060

Kleykamp, M., Wenger, J. B., Roer, E. H., Kubasak, M., Hubble, T., & Skrabala, L. (2024). *Federal programs to assist military-to-civilian employment transitions: Limited scrutiny and substantial investment in education programs* (RRA 1363). RAND Corporation. https://www.rand.org/pubs/research_reports/RRA1363-12.html

Leech, H. (2025). *The National apprenticeship data system: Field report*. Apprenticeships for America. https://apprenticeshipsforamerica.org/news/afa-publications/94/94-Report-The-National-Apprenticeships-Data-Ecosystem

Legislative Analyst's Office. (2025). *Assessment of CSU's Graduation Initiative 2025*. https://lao.ca.gov/Publications/Report/5099

Lerman, R., Kramer, F., Pedroza, J., & Nightingale, D. (2008). *Retrospective on registered apprenticeship: A review of program initiatives and their policy implications*. Employment and Training Administration, U.S. Department of Labor. https://www.dol.gov/sites/dolgov/files/ETA/publications/ETAOP_2008-15.pdf

Levine, I. (2025). *Interest surging in nondegree credentials, but how do students finance them?* The Pew Charitable Trusts. https://www.pew.org/en/research-and-analysis/articles/2025/10/23/interest-surging-in-nondegree-credentials-but-how-do-students-finance-them

Lightcast. (2024). *The credential challenge*. https://lightcast.io/resources/blog/lightcast-credentials

Marken, S., Gray, L., & Lewis, L. (2013). *Dual enrollment programs and courses for high school students at postsecondary institutions: 2010–2011* (NCES 2013-002). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/pubs2013/2013002.pdf

McClennan, N., Vander Ark, T., & Pashia, M. (2024). *Expanding access, values, and experiences through credentialing*. Getting Smart. https://www.gettingsmart.com/whitepaper/expanding-access-value-and-experiences-through-credentials/

Monday, A., Lewis, B., Lopez, S., Bardelli, T., Pisacreta, E. D., Pokharel, J., & Pokornowski, E. (2025). *Why data and why now? The importance and challenges of data for higher education in prison*. Ithaka S&R. https://sr.ithaka.org/publications/why-data-and-why-now/

National Assessment of Educational Progress. (n.d.). Long-Term trend assessment (1970–2023 trends). National Center for Education Statistics. https://nces.ed.gov/nationsreportcard/ltt/

National Center for Education Statistics. (2024a). *Annual earnings by educational attainment*. Institute of Education Sciences, U.S. Department of Education. https://nces.ed.gov/programs/coe/indicator/cba

National Center for Education Statistics. (2024). *Career and Technical Education in the United States*. U.S. Department of Education, Institute of Education Sciences. https://nces.ed.gov/programs/coe/indicator/tob

National Center for Education Statistics. (2024b). Digest of Education Statistics. nces,edgov/pubs2024/2024114.pdf

National Student Clearinghouse Research Center. (2023). *Completing College: National and state reports*. https://nscresearchcenter.org/Completing-College/

National Student Clearinghouse Research Center. (2025). *Tracking transfer*. https://nscresearchcenter.org/tracking-transfer/

The Nation's Report Card. (n.d.). *Long-Term Trend Assessment Results: Reading and Mathematics*. https://www.nationsreportcard.gov/ltt/?age=9

NCES. (2013). *Dual Enrollment Programs and Courses for High School Students and Postsecondary Institutions*. https://nscresearchcenter.org/category/transfers/

OECD. (2023). *PISA 2022 results (volume 1): The state of learning and equity in education.* https://www.oecd.org/en/publications/2023/12/pisa-2022-results-volume-i_76772a36/full-report/long-term-trends-in-performance-and-equity-in-education_d66743ab.html

OECD. (2024). *Survey of adult skills 2023: United States.* https://www.oecd.org/en/publications/survey-of-adults-skills-2023-country-notes_ab4f6b8c-en/united-states_427d6aac-en.html

Office of Career, Technical, and Adult Education. (2014). *National Assessment of Career and Technical Education: Final report to Congress*. U.S. Department of Education. https://cte.ed.gov/resources/national-assessment-career-and-technical-education-final-report-congress

Provasnik, S., & Planty, M. (2008). *Community colleges: Special supplement to The Condition of Education 2008* (NCES 2008-033). Institute of Education Sciences, National Center for Education Statistics, U.S. Department of Education. https://nces.ed.gov/pubs2008/2008033.pdf

Rothstein, J., Santillano, R., & Von Wachter, T. (2022). *Identifying the impacts of job training programs in California*. California Policy Lab. https://www.capolicylab.org/wp-content/uploads/2022/09/Identifying-the-impacts-of-job-training-programs-in-California.pdf

Scott, W. R., & Kirst, M. (2017). *Higher education and Silicon Valley: Connected but conflicted*. Johns Hopkins University Press.

Shapiro, D., Dundar, A., Huie, F., Wakhungu, P. K., Bhimdiwali, A., Nathan, A., & Youngsik, H. (2018). *Transfer and mobility: A national view of student movement in postsecondary institutions, fall 2011 cohort* (Signature Report no. 15). National Student Clearinghouse Research Center. https://nscresearchcenter.org/signaturereport15/

Shapiro, D., Dundar, A., Huie, F., Wakhungu, P. K., Yuan, X., Nathan, A. & Bhimdiwali, A. (2017). *Completing college: A national view of student completion rates, fall 2011 cohort* (Signature Report no. 14). National Student Clearinghouse Research Center. https://nscresearchcenter.org/signaturereport14-

Shapiro, D., Dundar, A., Wakhungu, P. K, Yuan, X., & Harrell, A. (2015). *Transfer and mobility: A national view of student movement in postsecondary institutions, fall 2008 cohort* (Signature Report no. 9). National Student Clearinghouse Research Center. https://nscresearchcenter.org/signaturereport9/

Tyton Partners. (2025). *Listening to learners*. https://tytonpartners.com/listening-to-learners-2025/

U.S. Bureau of Labor Statistics. (2019). *Labor force statistics from the current population survey*. https://www.bls.gov/cps/aa2019/cpsaat49.htm

U.S. Census Bureau. (n.d.). *National training, education, and workforce survey (NTEWS)*. https://www.census.gov/programs-surveys/ntews.html

U.S. Census Bureau. (2023). *Educational attainment in the United States: 2022*. https://www.census.gov/data/tables/2022/demo/educational-attainment/cps-detailed-tables.html

U.S. Bureau of Labor Statistics. (n.d.). *Economic News Release: BLS Reports on Employer-Provided Formal Training*. https://www.bls.gov/news.release/sept1.toc.htm

U.S. Department of War. (2024). *Fiscal year 2024–2025 recruiting media roundtable with service leaders*. https://www.war.gov/News/Transcripts/Transcript/Article/3952493/fiscal-year-2024-2025-recruiting-media-roundtable-with-service-leaders/

U.S. Department of Education. (2014). *National assessment of career, technical, and adult education: Final report to Congress*. https://www.ed.gov/sites/ed/files/rschstat/eval/sectech/nacte/career-technical-education/final-report.pdf

U.S. Department of Education. (2024). *National evaluation of CTE Comprehensive Assistance Centers: Interim Report*. https://ies.ed.gov/use-work/resource-library/report/evaluation-report/national-evaluation-comprehensive-technical-assistance-centers-interim-report

U.S. Department of Labor. (2011). *FY 2011 data and statistics*. https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2011

U.S. Department of Labor. (2021). *FY 2021 data and statistics*. https://www.dol.gov/agencies/eta/apprenticeship/about/statistics/2021

Wren, S. (2025). *Developmental education reform evolving from pilot to policy*. Education Commission of the States. https://www.ecs.org/developmental-education-reform-evolving-from-pilots-to-policy/