

Introduction:

Where we are and how we arrived here—A historical perspective

For generations, graduating from college with a degree has been viewed as the “gold standard”—the goal for all students. In reality, few other options were offered. Often, the students who were guided toward college by educators and parents were neither ready for, nor interested in, pursuing higher education immediately after high school.

The education community, parents and the public continue to convey to students the message that only a four-year college degree leads to success. However, statistical and anecdotal experience demonstrates that college enrollment upon high school graduation is not the best fit for all students. Radical changes in employment opportunities and entry-level foundational skills and knowledge have created the need to find each student’s best career path by considering not only the traditional four-year college route, but all other post-secondary paths.

Assemblywoman Patricia Egan Jones, D-Camden/Gloucester (5th Legislative District) recognized that our schools should not market college as the only path to success:

Our children all have very unique skills sets and learning styles from one another. Some of them are great in studying math, science, and literature in a classroom setting. Others learn by doing. Not all are interested in attending college and should not feel short of success by not doing so. As a representative of the Fifth Legislative District and member of the Assembly Education Committee, I applaud the state School Boards Association for working to expand access to vocational training. It is great to see the needs of all our children being met.¹⁰

Societal, parental, peer and school pressures steer students toward college even when they are age-ready but lack the life skills to succeed. Some students may experience disillusionment after incurring large college debt and experiencing difficulty finding well-paid employment. A “one-size-fits-all” system where college is the expectation, does a disservice to many students.

In addition, the significant number of college freshmen who are required to take non-credit remedial classes suggests that high school does not necessarily prepare students for the academic, social and/or other demands of college.

A 2015 report by the Governor’s Council on Higher Education cites statistics showing that 40 percent of students at New Jersey’s public colleges and universities require remediation, while 70 percent of entering freshmen at the state’s community colleges must take remedial courses. The report describes the impact of this “serious and continuing problem both in New Jersey and the rest of the country.”

After enrolling, many students learn that they must take remedial courses which do not earn college credits. The result is that many students become frustrated with the need for remedial courses and drop out. Additionally, having to pay for those courses, which do not count toward graduation, significantly increases costs and causes many to withdraw.¹¹

¹⁰ "All Hail the NJSBA for Task Force Access to Vocational Training." *Insider NJ*, October 25, 2017, accessed June 18, 2018, <https://www.insidernj.com/hail-njsba-task-force-access-vocational-training/>.

¹¹ “Strategic Priorities for New Jersey Higher Education,” April 2015, Governor’s Council on Higher Education, 15, accessed July 12, 2018, <http://www.nj.gov/highereducation/documents/pdf/2015Report.pdf>.

Certainly, many students succeed by following the traditional route of attending a four-year college directly upon graduation. But when educators, parents and society convey to students that any other route is inferior, they do a great disservice to those whose skills and interests may lead them on a different path. For some students, the best choice directly after high school may be a two-year college, a post-secondary program that does not lead to a degree, direct entry into the workforce, or enlistment with the military.

Task Force members observed that not only are students directed toward college, but in some cases, the schools fail to advise them of alternatives. Sometimes, guidance counselors will not discuss the possibility of vocational careers with students. And even when they do, the counselors have a hard time convincing parents that college may not be the best route for their students.

In some counties, strategies are in place to provide students with information on the wide range of post-secondary education and career paths. A Bergen County program enables schools and business to share information about rewarding careers for workforce-bound students. North Jersey Partners, in collaboration with PSEG, Suez, Verizon, Bergen Community College, Rapid Pump and Meter Service Co., Inc. and Machinery Services Corp., recently held a free information/resource-sharing event at Bergen Community College for parents, students and guidance counselors.

But not all counties have similar programs, or any meaningful sharing of information.

The mind-set that college is the superior route permeates the requirements established by the New Jersey State Board of Education, the Task Force found. All students must take courses that are geared toward attending college, and fulfillment of these requirements leaves little time in the school day for programs such as shop, automotive and workshop that could prepare students for careers.

***Too many students graduate college saddled with debt;
many have difficulty finding jobs to repay it.***

The National Center for Education Statistics data show that average tuition at a public four-year college climbed by nearly 250 percent over the past three decades.

For the 2015–16 academic year, the average annual price for undergraduate tuition, fees, room, and board was \$16,757 at public institutions, \$43,065 at private nonprofit institutions, and \$23,776 at private for-profit institutions. Charges for tuition and required fees averaged \$6,613 at public institutions, \$31,411 at private nonprofit institutions, and \$14,195 at private for-profit institutions.¹²

Over the past two years, the news media have focused on the burden of student loan debt. For example, NJTV reported that nearly two-thirds of students in the Garden State have loans. The average borrower carries more than \$30,000 in debt. The report references research by the George Washington School of Business, the New Jersey College Affordability Study Commission, and the New Jersey Association of State Colleges and Universities.¹³

¹² “Digest of Education Statistics, 2016,” IES, National Center for Education Statistics, Table 330.10, accessed June 18, 2018, https://nces.ed.gov/programs/digest/d16/tables/dt16_330.10.asp.

¹³ Erin Delmore, “New Jersey Ranks Ninth in Student Loan Debt | Video.” November 15, 2016, accessed June 18, 2018, <https://www.njtvonline.org/news/video/new-jersey-ranks-ninth-student-loan-debt/>.

Debbie Cochrane, vice president of the Institute for College Access & Success, a research and advocacy organization that focused on college affordability and accessibility, described the serious and dramatic ramifications of mounting student debt in an interview with a local radio station.

New Jersey ranks 11th in average debt for graduates who are leaving school with debt, and 8th, in terms of the share of students who are leaving school with debt. It can influence which type of job they take, where they're going to live, whether they buy a car—lots and lots of life decisions are influenced by how much debt students have.¹⁴

Nor does college graduation assure a great paycheck. An article from *MarketWatch* cites a study by the Federal Reserve Bank of New York, which found that 45 percent of those who graduated between 2009 and 2013 worked in a “non-college job,” defined as “a position in which fewer than 50 percent of the workers in that job need a bachelor’s degree.”

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The lowest skilled jobs (baristas, bartenders, and cashiers) accounted for 19.3% of the underemployed recent college graduates, paying an average of \$23,584. Another 25.2% worked in office and administrative positions paying an average of \$37,207. The highest-paid were in information processing and business support, where 11.4% were earning an average of \$59,059.

That’s still below the average pay for a job requiring a college degree, which is about \$78,500, the report states.¹⁵

The statistics are based on recent college graduates, and the *MarketWatch* article notes that these workers eventually move up to better paying jobs.

Despite a changing labor and economic environment—and an explosion of information—the predominant high school organization continues to operate on platforms standardized in the 1890s by the ‘Committee of Ten.’

The organization of today’s high schools is largely based on assumptions and structures recommended in an 1894 report by the Committee of Ten on Secondary School Studies¹⁶, published under the auspices of the National Education Association. The committee’s work was premised on Industrial Age concerns—primarily the need for standardization.

¹⁴ David Matthau, “The Average Student Debt for Every NJ College Last Year,” October 20, 2016, *New Jersey 101.5*, accessed on July 16, 2018, <http://nj1015.com/the-average-student-debt-for-every-nj-college-last-year/>.

See also:

Carla Astudillo, “This map blows up everything you think you know about student loan debt,” April 14, 2018, *NJ.com*, accessed on June 22, 2018 at <http://www.nj.com/data/2018/04/this-map-blows-up-everything-you-think-you-know-about-student-loan-debt.html>.

Dino Flammia, “Analysis Shows the Burden of Student Loan Debt in New Jersey,” May 3, 2018, *New Jersey 101.5*, accessed on June 22, 2018 at <http://nj1015.com/analysis-shows-the-burden-of-student-loan-debt-in-new-jersey/>.

¹⁵ Goldstein, Steve. “Nearly Half of College Grads Are Underemployed. But They’re Not Literally Baristas,” *MarketWatch*, January 11, 2016, accessed on June 22, 2018. <https://www.marketwatch.com/story/there-really-arent-many-baristas-with-college-degrees-research-finds-2016-01-11>.

¹⁶ *Report of the Committee of Ten on Secondary School Studies; with the Reports of the Conferences Arranged by the Committee*, National Education Association, (N.Y.: Amer. Bk., 1894), 17. Accessed June 22, 2018, <https://books.google.com/books?id=PfcBAAAAYAAJ&pg=PA3&lpg=PA3#v=onepage&q&f=false>.

Because public high schools with varied curricula were springing up around the country, the Committee of Ten issued a report to standardize public education and to prepare students for college. It identified inconsistency in the areas of graduation requirements, course offerings, curricula, expectations of student learning and times allotted for each subject.

The Committee of Ten recommended that all high school students take four years of English, mathematics and history/civics. And it rejected the notion of separating college-bound students from non-college bound.

Charles Eliot, president of Harvard University and author of the final report, stated, “Every subject which is taught at all in a secondary school should be taught in the same way and to the same extent to every pupil so long as he pursues it, no matter what the probable destination of the pupil may be, or at what point his education is to cease.”¹⁷

Today, our system retains the underlying assumption that its role is to prepare all students for a four-year college. The course sequencing and requirements...relate back to the days when there was a need to bring consistency to the many new schools within the fledgling public school system that had no common standards. For example, high school students typically study sciences in the following order: biology (9th grade); chemistry (10th grade) and physics (11th/12th grades). Why? In fact, there is no pedagogic rationale for this order; rather, they are laid out in the alphabetical order of the course titles.

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Citing research by organizations ranging from the CIA to the American Association of Colleges and Universities, a February 2017 *American School Board Journal* article illustrates the impact of the “manufacturing” model on school structure and why it is outdated.

Our current “assembly line” of 13 stations, from kindergarten to grade 12, attempts to do the same thing, the same way. Where the Model T had a station designed to add the front bumper and another station designed to add the rear bumper, we have a station (grade level) designed to add number sense and another station (grade level) designed to add algebraic thinking, and so on. Our organizational structure is fundamentally unchanged over the last 100 years. We have moved from the agricultural age to the manufacturing age to the digital age; we just forgot to move our schools along with it.

Our calendar is built to serve an agrarian economy that disappeared nearly a century ago. In 1870, 50 percent of all workers were employed in the agricultural or agricultural support industry. By 1950 that percentage had declined to 20 percent. Today less than 1 percent of all employment is related to agriculture..., and yet our calendar remains stubbornly rooted in a 19th century agrarian calendar.

Our curriculum was designed more than 100 years ago. The “seven cardinal principles,” written in 1918, remain fundamentally unchanged. The recommendations from the “Committee of 10” in 1894 to have a common amount of time dedicated to each and every subject remain in place

¹⁷ *Report of the Committee of Ten on Secondary School Studies*, 17.

today, 125 years later. If mathematics is a 60-minute period, then history, and art, and biology will also be 60-minute periods. That is how assembly lines functioned 100 years ago. It is how our curriculum functions today. The challenges of the 21st century are not the same as the challenges of the 20th century. Ninety-one percent of employers report that the challenges the modern workforce faces are more complex today than in the past...¹⁸

The NJSBA Task Force found that school operations are premised on dated educational models that are no longer relevant in this information age in which we live; some may have been adopted simply for the need for consistency. It is time to consider whether that sequence, and so many other aspects of the educational models used today, makes sense in the larger scheme of preparing students for life after high school.

Many well-paying jobs that do not require a college degree go unfilled because companies cannot find employees with the skills they need.

Our schools are failing to adequately prepare students for, or even advise them of, the many jobs that exist, the Task Force found.

According to the National Skills Coalition, an advocacy organization comprised of representatives of business, labor, community colleges, and workforce development, “middle-skill” jobs—those that require post-secondary education, but not a four-year degree—make up the largest part of the state’s and the nation’s labor markets. But key industries cannot find enough sufficiently trained workers to fill these jobs. Based on its research, the coalition predicts that demand for these jobs will remain strong through 2024.¹⁹

New Jersey currently has 44,000 vacant job openings that require middle skills, such as those in the building trades, according to Michele Siekerka, president and CEO of the New Jersey Business and Industry Association.²⁰

In a February 2018 article, Mike Wallace, NJBIA’s vice president for governmental affairs, cites a report from McKinsey & Company, a global management consulting firm, which concludes that 53 percent of New Jersey jobs are appropriate for people with middle-skills, yet only 37 percent of the state’s workforce fall into this category. The same report predicts that this situation will not significantly change in the near future, with half of all job openings through 2024 requiring middle skills.

¹⁸ Chris Colwell, "Educating the Class of 2030," *American School Board Journal*, February 2017, National School Boards Association, accessed June 22, 2018, <https://www.nsba.org/newsroom/american-school-board-journal/asbj-february-2017/educating-class-2030>.

¹⁹ “Middle-Skill Jobs State by State | New Jersey,” February 6, 2017, National Skills Coalition, accessed June 22, 2018, <https://www.nationalskillscoalition.org/resources/publications/2017-middle-skills-fact-sheets/file/New-Jersey-MiddleSkills.pdf>.

See also:

Tara Nurin, "Job Training Shifts to 'Middle Skills' to Put Millennials Back to Work," *NJ Spotlight*, May 6, 2014, , accessed June 22, 2018, <http://www.njspotlight.com/stories/14/05/06/job-training-shifts-to-middle-skills-to-put-millennials-back-to-work/?p=all>.

²⁰ "NJ Businesses Can't Find Enough Middle-Skill Workers," video posted to YouTube, March 30, 2018, New Jersey Business and Industry Association, accessed July 17, 2018, <https://www.youtube.com/watch?v=Pj8o-qNmXVE>.

Middle-Skill Jobs, State by State | New Jersey

February 6, 2017

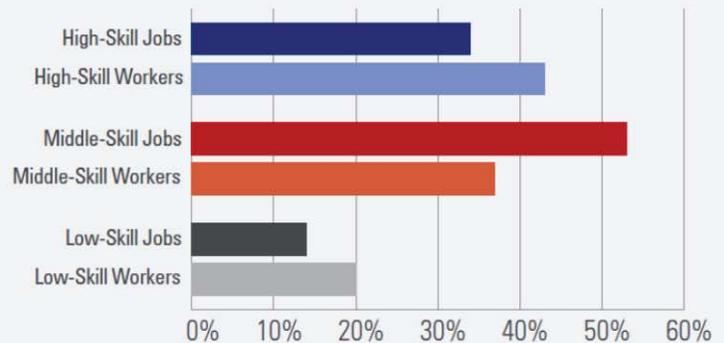


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A Middle-Skill Gap

Middle-skill jobs account for 53 percent of New Jersey's labor market, but only 37 percent of the state's workers are trained to the middle-skill level.

Jobs and Workers by Skill Level, New Jersey, 2015



Source: NSC analysis of Bureau of Labor Statistics Occupational Employment Statistics by State, May 2015, and American Community Survey data, 2015.

“With the crisis of college student debt, manufacturing and other technical skill jobs can be an affordable career alternative,” states Wallace. “Manufacturing pays much more than other industries; people in mechatronics²¹, for instance, make an average of \$105,000 per year. Students deserve to know all of the options available to them.”²² State and federal officials recognize the need to expand the workforce prepared with the technical education required by New Jersey’s middle-skill jobs.

“...we need to rapidly transform our state,” said U.S. Representative Josh Gottheimer (NJ-CD 5) during a forum at Bergen Community College’s Stryker Manufacturing Laboratory in March. “It turns out that in New Jersey, there are more high- and low-skill workers than most employers need, but not nearly enough qualified middle-skill workers. We have an employment, or skill, mismatch. Let’s help fill more of those middle-skill jobs by focusing on ‘middle skill education.’”²³

“There finally appears to be a broader recognition that there are multiple pathways to a successful professional life,” wrote state Senator Troy Singleton (LD 7) in an article posted in March on the website of the New Jersey Council of County Vocational–Technical Schools.

²¹ “Mechatronics” is a field in which “concepts from mechanical engineering, electrical engineering, and computer science are merged to design, build and operate products.” Source: “What Is the Difference between Robotics and Mechatronics?” TryEngineering.org, September 18, 2013, accessed July 17, 2018, <http://tryengineering.org/ask-expert/what-difference-between-robotics-and-mechatronics-also-how-does-mechanical-and-automation>.

²² Mike Wallace, “Targeting the Skills Employers Need Most,” *New Jersey Business*, February 1, 2018, New Jersey Business and Industry Association, accessed June 17, 2018, https://njmagazine.com/monthly_articles/targeting-skills-employers-need.

²³ “Gottheimer Outlines Vision for Future of Technology Jobs in New Jersey,” *Insider NJ*, March 19, 2018, accessed June 22, 2018, <https://www.insidernj.com/press-release/gottheimer-outlines-vision-future-technology-jobs-new-jersey/>.

“Employers – now more than ever – are looking for potential employees who can think critically, can perform specific skill-sets and are capable with their hands.”²⁴

A 2011 report by the Pathways to Prosperity Project, based at the Harvard Graduate School of Education, maintains that the United States is failing to prepare millions of young people to lead successful lives due to a college-prep approach, and points to the shortage of workers who have the training to fill middle-skill jobs.

How much and what kind of post-secondary education is really needed to prosper in the new American economy?

The message is clear: in 21st century America, education beyond high school is the passport to the American Dream. But how much and what kind of post-secondary is really needed to prosper in the new American economy?

The [Georgetown University Center on Education and the Workforce] projects that 14 million job openings—nearly half of those that will be filled by workers with post-secondary education—will go to people with an associate’s degree or occupational certificate. Many of these will be in “middle-skill” occupations such as electrician, and construction manager, dental hygienist, paralegal and police officer. While these jobs may not be as prestigious as those filled by B.A. holders, they pay a significant premium over many jobs open to those with just a high school degree. More surprisingly, they pay more than many of the jobs held by those with a bachelor’s degree. In fact, 27 percent of people with post-secondary licenses or certificates—credentials short of an associate’s degree—earn more than the average bachelor’s degree recipient.²⁵

After the release of the *Pathways to Prosperity* report, the Harvard Graduate School of Education joined with Jobs for the Future, a Boston-based nonprofit organization focused on creating educational and economic opportunity for low-income youth and adults, to create the Pathways to Prosperity Network. The network includes partners in eight states. In 2014, it issued a report, *The Pathways to Prosperity Network: A State Progress Report 2012–2014*, which noted advances made in the eight states to develop career paths in fields such as information technology, health care and advanced manufacturing, and in building political and financial support for these efforts.²⁶

Another report, *Creating Pathways to Prosperity: A Blueprint for Action* includes recommendations for state and federal policy and educational programming.²⁷ Also released in

²⁴ Troy Singleton, "A Renaissance of Vocational and Technical Education," Career Tech NJ, March 29, 2018, New Jersey Council of County Vocational-Technical Schools, accessed June 22, 2018, <https://www.careertechnj.org/news/blog-renaissance-vocational-technical-education-senator-troy-singleton/>.

²⁵ William C. Symonds, Robert Schwartz, and Ronald F. Ferguson, *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century*, report, Graduate School of Education, Harvard, February 2011, 2-3, accessed June 22, 2018, <https://dash.harvard.edu/handle/1/4740480>.

See also:

Emily Hanford, "A 21st-century Vocational High School," American RadioWorks, September 11, 2014, American Public Media, accessed June 22, 2018, <http://www.americanradioworks.org/segments/a-21st-century-vocational-high-school/>.

²⁶ "The Pathways to Prosperity Network: A State Progress Report, 2012-2014," June 1, 2014, The Pathways to Prosperity Network, accessed June 22, 2018, <https://www.jff.org/resources/pathways-prosperity-network-state-progress-report-2012-2014/>.

²⁷ Ronald F. Ferguson and Sara Lamback, "Creating Pathways to Prosperity: A Blueprint for Action," June 14, 2014, Graduate School of Education, Harvard, accessed June 22, 2018, <http://www.agi.harvard.edu/pathways/CreatingPathwaystoProsperityReport2014.pdf>.

2014, the report was issued by the Pathways to Prosperity Project at the Harvard Graduate School of Education and the Achievement Gap Initiative at Harvard University.

These efforts were spearheaded by Robert Schwartz and Ronald F. Ferguson, two of the co-authors of the 2011 report. In a Graduate School of Education news release announcing the publication of the reports, Ferguson emphasized the need to broaden the perspective on post-secondary success.

We need to acknowledge that people can be skilled workers and great human beings without four-year degrees. Every young person needs career preparation beyond high school, but that can take many forms. We need cultural and institutional shifts in order to expand our will and capacity to help young people to explore a variety of career alternatives and prepare for success in whichever ones they eventually choose.²⁸

Present curricula do not prepare students with practical, job-ready skills.

School curricula are not geared toward preparing students to pass the specific tests leading to certifications and licenses that are required for entry in particular trades, the Task Force found.

Passing these tests may require months of preparation and study. For example, to obtain the commercial driver's license (CDL), applicants must submit to a multi-step process involving vision, road and knowledge tests.²⁹ (The latter consists of a 50-question general assessment, with additional tests for each endorsement, such as hazardous material, passenger, school bus, double and triple trailer, tank vehicle, etc.)

Where practical courses would assist students in obtaining the credentials that could lead directly to the workforce, our schools have a void.

Job-readiness, however, may involve more than just preparation to take a skills test or obtain a credential. To be successful in the workplace, employees need certain life skills, such as appreciating the importance of calling in when sick, and being prompt. Discussing these expectations, and practicing their implementation, is particularly important for students who live in communities with limited opportunity for summer employment.

Businesses often use an "experiential learning" approach that could serve as a model for schools. According to Task Force member Tammy Molinelli, who serves as executive director of the Workforce Investment Board in Bergen County, many companies will hire applicants who do not have a four-year degree but who demonstrate responsibility and possess general job-related skills. The businesses will train those individuals and, at the same time, allow them to explore their interests and grow into the careers that they enjoy. The companies will nurture talent and pay for their credentials.

²⁸ "Pathways to Prosperity Releases New Reports," Harvard Graduate School of Education, July 1, 2014, accessed June 22, 2018, <https://www.gse.harvard.edu/news/14/07/pathways-prosperity-releases-new-reports>.

²⁹ "Getting Your Commercial Driver License (CDL)," New Jersey Motor Vehicle Commission, accessed July 18, 2018, <http://www.state.nj.us/mvc/drivertopics/gettingcdl.htm>.

Career and Technical Education in New Jersey—A History

Interest in vocational education—today, called “Career and Technical Education,” or CTE—became stronger near the turn of the 20th century, prompted in part by economic and social changes. “Factory owners were facing a shortage of skilled labor in a rapidly industrializing society. And public schools were seeing an influx of immigrants and farm kids,” according to an American RadioWorks broadcast, “The Troubled History of Vocational Education.”³⁰

In the 1890s, New Jersey “school officials began to question whether high school curricula met the needs of youth who did not wish to go to college. The ‘literary’ high school programs were impractical; in this newly industrialized state, courses in manual training, cooking, music, and drawing appeared, and some schools introduced ‘commercial curriculums.’”³¹

In the 1890s, school officials began to question whether high school curricula were meeting the needs of youth who did not wish to go to college.

New Jersey statute that authorizes the establishment of county vocational high schools dates back to 1913,³² with the first such district established in Middlesex County the following year.³³ However, public school vocational training programs existed before then.

In 1910-1911, the “Newark Vocational School opened with 40 pupils and 2 teachers. Three years later a state law authorized state aid for vocational schools, to give special training for industry, agriculture and homemaking. In 1917, federal support for these programs became available with the enactment of the Smith-Hughes Act.”³⁴

The 1950s saw the establishment of several more county vocational school systems. “The economy was still dominated by manufacturing and agriculture. At the time, fewer than 10 percent of U.S. students earned a bachelor’s degree or higher... In that context, early vo-tech programs, aimed at teaching students a marketable trade, provided a valuable service to the community, the economy and the students themselves.

“Those programs utilized a shared-time system where students took academic courses at their local high school for part of the day, and then were transported to technical classes, eventually graduating from their local high school with a certificate of completion”³⁵ or state license.

³⁰ Emily Hanford, “The Troubled History of Vocational Education,” American RadioWorks, September 9, 2014, American Public Media, accessed June 22, 2018, <http://www.americanradioworks.org/segments/the-troubled-history-of-vocational-education/>.

³¹ Donna Kaye, “Highlights in the Evolution of New Jersey Education,” 1997, New Jersey School Boards Association, 7, a paper summarizing information from the following sources:

Roscoe L. West, *Elementary Education in New Jersey: A History, Vol. 7, The New Jersey Historical Series* (Princeton: D. Van Nostrand Co., Inc., 1964);

Robert D. Bole, and Laurence B. Johnson, *New Jersey High School: A History, Vol. 8, The New Jersey Historical Series* (Princeton: D. Van Nostrand Co. Inc., 1964), and

Carolyn M. Campbell, M. Peryl King, and Martha T. Smith, *Chickaree in the Wall: A history of one-room schools in Ocean County, N.J.* (Neptune, NJ: American Press 1987).

³² L. 1913, c. 294, *Acts of the One Hundred and Thirty-Seventh Legislature of the State of New Jersey*, 598, accessed July 31, 2018, <https://njlaw.rutgers.edu/cgi-bin/diglib.cgi?page=1&collect=njleg&file=137&zoom=120>.

³³ “MCVTS Centennial / Centennial Timeline,” Middlesex County Vocational & Technical Schools, accessed July 31, 2018, <https://www.mcvts.net/Page/5965>.

³⁴ Kaye, 8.

³⁵ Leslie Garisto Pfaff, “Tech Time: New Jersey’s Vocational Schools,” New Jersey Monthly, September 18, 2014, accessed July 18, 2018, <https://njmonthly.com/articles/towns-schools/tech-time-new-jerseys-vocational-schools/>.

“...by the 1970s, the good jobs that required just a high school education were beginning to disappear,” according to an American RadioWorks broadcast, the Troubled History of Vocational Education. “Technology and globalization were increasing the skill levels required for most occupations, and making the labor market more volatile. Entire sectors of the economy were being wiped out, and new kinds of jobs were being created.”³⁶

In the early 1980s, many education experts argued that high school should be about preparing kids for college, not work. This was buttressed by conclusions in the 1983 report, “A Nation At Risk,”³⁷ and the fear that American students were falling behind their peers academically.

The American RadioWorks report indicates that, by the late 1990s, vocational education had developed an image problem and was perceived by some as a “dumping ground for kids who weren’t succeeding in the traditional academic environment.” These students included those with behavioral problems and learning disabilities. “In many school districts, vocational education wasn’t much more than a ‘second-tier special ed program,’” according to Jim Stone, director of the National Research Center for Career and Technical Education.³⁸

Prompted by the “A Nation At Risk” and federal education policy, such as the “Goals 2000: Educate America Act,” enacted in 1994, states including New Jersey embraced standards-based education reform.³⁹ “Standards represent what we want all of our students to know by the time they graduate high school; that means being ready to succeed in higher education and employment,” said NJSBA Executive Director Dr. Lawrence S. Feinsod, as New Jersey began a review of its standards in 2015.⁴⁰

Today, New Jersey’s public schools operate 1,025 state-approved CTE programs.

In 2001, Congress passed the No Child Left Behind Act, the reauthorization of the federal Elementary and Secondary Education Act, which reinforced academic standards for all schools and programs, including those dedicated to CTE.

“The law required states, in exchange for federal education funding, to test their students every year and insure that all students would eventually be proficient in math and reading. All students meant the kids in vocational programs too.... Under No Child Left Behind, those programs could eventually be shut down for poor performance.”⁴¹

Today, New Jersey’s public schools operate 1,025 state-approved CTE programs.⁴²

³⁶ Hanford, "The Troubled History of Vocational Education".

³⁷ “A Nation At Risk,” National Commission on Excellence in Education, April 1983, U.S. Department of Education, accessed July 19, 2018, <https://www2.ed.gov/pubs/NatAtRisk/risk.html>.

³⁸ Hanford.

³⁹ Robert B. Schwartz and Marian A. Robinson, "Goals 2000 and the Standards Movement," 2000, Brookings Papers on Education Policy, summary by ERIC-Institute of Education Sciences, accessed July 19, 2018, <https://eric.ed.gov/?id=EJ898336>.

⁴⁰ "NJSBA Comments on Governor's Common Core Proposal," May 28, 2015, New Jersey School Boards Association, accessed July 19, 2018, <https://www.njsba.org/news-publications/press-releases/njsba-comments-governors-common-core-proposal-2/>.

⁴¹ Hanford.

⁴² “Career and Technical Education Programs & Programs of Study in NJ Schools” (Excel Spreadsheet), August 7, 2018, New Jersey Department of Education, accessed July 23, 2018, <https://www.state.nj.us/education/cte/pubvoc.xlsx>.

The Current CTE Structure

Each of New Jersey’s 21 counties has a board of education that governs vocational-technical school district. “These boards oversee the 65 vocational high schools... (Some have one campus; some have several.) In total, they serve approximately 32,000 full-time and share-time students.”

“Although many of these schools originated as part-time programs (students would attend a traditional high school and go to the vocational school for part of the day), many schools have shifted to full-time programs—a movement started when leaders opted to create full-time ‘career academies.’”⁴³

2014–15

	Number of Schools with CTE Programs	Number of Students Participating in CTE
Vocational School Districts	21	31,091
Comprehensive High Schools	90	45,673
Community Colleges	19	118,225

SOURCE: "Next Generation CTE: The Future Is Now," presentation to New Jersey School Boards Association annual conference (Workshop) by Marie Barry, Assistant Division Director, Office of Career and Technical Education, New Jersey Department of Education, October 26, 2016, accessed July 23, 2018, <http://www.careertechnj.org/wp-content/uploads/2016/10/10.26.16-Next-Generation-CTE-The-Future-is-Now.pptx>.

The county CTE high schools prepare students for careers after high school, and the curriculum is updated and adapted to changing industries, the NJSBA Task Force found. They align high school CTE with postsecondary options, including continued technical training or college. On its website, the New Jersey Council of County Vocational Technical Schools indicates that graduates may find employment as chefs, graphic designers, auto technicians, emergency first responders, health care providers, construction trades professionals, and small business owners. In addition, students can earn industry certifications and state licenses, which provide a significant edge in the job market or when pursuing a college degree or further training.⁴⁴

Under state law and regulation, county vocational boards do *not* have an exclusive right to run CTE schools or programs. In fact, in 2017, the state approved the creation of business programs in four traditional districts (in addition to new district CTE programs in health, plant science, graphic design, construction, and manufacturing across five districts).⁴⁵ During the 2017-2018 school year, 1,025 state-approved CTE programs were in operation in New Jersey’s public schools.⁴⁶

⁴³ Andy Smarick, “The Evolving High School CTE: New Jersey’s Distinctive Approach to Career Education,” November 2017, American Enterprise Institute, 3, 4, accessed July 18, 2018, <http://www.aei.org/wp-content/uploads/2017/11/The-Evolving-High-School-CTE.pdf>.

⁴⁴ "For Students and Parents," Career Tech NJ, New Jersey Council of County Vocational Technical Schools, accessed July 23, 2018, <https://www.careertechnj.org/for-students-and-parents/>.

⁴⁵ Smarick, 20.

⁴⁶ “Career and Technical Education Programs & Programs of Study in NJ Schools,” <https://www.state.nj.us/education/cte/pubvoc.xlsx>.

“As of 2016, traditional district-based high schools [in New Jersey] served about 48,000 students in CTE programs, about 50 percent more than the CTE-specific county vocational schools.” According to statute, *N.J.S.A. 18A:54-5*, “The board of education of any school district or regional school district may establish and maintain vocational schools.” Although the statute remains on the books, regulations implementing this statute were repealed in 1991 along with state funding for such schools run by traditional districts.⁴⁷

In a recent opinion article in *NJ Spotlight*, three superintendents presented a case for state support of CTE programs in comprehensive high schools.

...traditional comprehensive high-school CTE programs provide students with valuable career training, including courses sequenced and aligned with industry standards, advised by industry partners, and combined with internships and onsite applied learning opportunities...

CTE programs in comprehensive high schools are an integral part of New Jersey’s vocational education puzzle. Yet these programs receive significantly fewer resources than comparable programs offered by the county institutions.⁴⁸

County vocational schools receive funding from four primary streams: county taxes appropriated by the county board of freeholders, state aid, district-paid tuition, and federal sources under the 2018 “Strengthening Careers and Technical Education for the 21st Century Act”⁴⁹ (Perkins V), the reenactment of the Carl D. Perkins Act, which is “a principal source of federal funding to states and discretionary grantees for the improvement of secondary and postsecondary career and technical education programs across the nation.”⁵⁰

‘CTE programs in comprehensive high schools are an integral part of New Jersey’s vocational education puzzle.’

According to the USDOE, provisions in Perkins V (2018) will allow school districts to use federal funds to provide all students, not just those enrolled in CTE, career exploration and development activities in the middle grades and for comprehensive guidance and academic counseling in the upper grades.⁵¹

The New Jersey Department of Education’s “Taxpayer’s Guide to Education Spending 2017,” www.state.nj.us/education/, indicates that approximately 22 percent of the county vocational school district revenue comes from tuition paid by other school districts.⁵²

There is no state funding category specifically for CTE programs in comprehensive high schools. At the time of this report, a small number of comprehensive high schools had received funding through federal Perkins Act grants.

⁴⁷ Smarick, 26.

⁴⁸ Chuck Sampson, J. Kenyon Kummings, and Christopher H. Kobik, "Op-Ed: Comprehensive High Schools, a Key Piece of the Vo-Tec Puzzle," *NJ Spotlight*, May 23, 2018, accessed July 23, 2018, <http://www.njspotlight.com/stories/18/05/22/op-ed-comprehensive-high-schools-a-key-piece-of-the-vo-tec-puzzle/>.

⁴⁹ "Strengthening Career & Technical Education for 21st Century Act Signed," ED.gov Blog, U.S. Department of Education, August 02, 2018, accessed September 06, 2018, <https://blog.ed.gov/2018/08/strengthening-career-technical-education-21st-century-act-signed-law/>.

⁵⁰ "Perkins Act," Perkins Collaborative Resource Network, U.S. Department of Education, Office of Career, Technical, and Adult Education, accessed July 31, 2018, <https://cte.ed.gov/legislation/about-perkins-iv>.

⁵¹ "Strengthening Career & Technical Education for 21st Century Act Signed," ED.gov Blog.

⁵² "Taxpayers' Guide to Education Spending, 2017," New Jersey Department of Education, April 20, 2017, accessed July 23, 2018, <https://www.state.nj.us/education/guide/2017/>.

Vocational Education was:	Career Technical Education is:
<ul style="list-style-type: none">• Basic academics with technical skills related to specific jobs	<ul style="list-style-type: none">• High-level academics with technical training to enter jobs or college
<ul style="list-style-type: none">• Primarily for non-college goers	<ul style="list-style-type: none">• For anyone interested in field
<ul style="list-style-type: none">• Based on assumption individuals will always work in same occupation	<ul style="list-style-type: none">• Preparation for a changing workplace, including the ability to change careers
<ul style="list-style-type: none">• Often used to track some students into job training and away from college	<ul style="list-style-type: none">• Again – for anyone interested in field, college and non-college goers alike

SOURCE: "Career and Technical Education: Building New Pathways into the Labor Market," Center for Public Education, National School Boards Association, December 8, 2016, accessed September 06, 2018, <http://www.centerforpubliceducation.org/research/career-technical-education-glance>.

Many county vocational schools, which traditionally focused on the trades or “middle skills,” are becoming increasingly geared toward the “college-bound” student, highly selective, and lacking in capacity to accommodate many applicants.

The county CTE districts have limited capacity. “They are...in high demand, receiving, on a statewide average, about 2.5 applicants for every available seat,” states an article on the New Jersey Council of County Vocational-Technical Schools website.⁵³ In testimony at an October 2017 hearing on a proposed statewide bond issue to fund expansion of the county CTE schools, Judy Savage, NJCCVTS executive director, noted that “of the nearly 30,000 students who applied this year to attend a vocational school, only a little more than 12,000 could be accepted due to space constraints.”⁵⁴

Many of the county CTE schools offer “career academies” in areas such as engineering, visual and performing arts, health sciences, and information technology. These programs need to be expanded, according to the New Jersey Employer Coalition for Technical Education, created by the NJCCVTS and the New Jersey Business and Industry Association.

These 21st century CTE programs are not the vocational schools of the past: they integrate rigorous academic content and technical skills to prepare all types of students for college and careers, not just for a specific job. Today, more than 32,000 students attend New Jersey’s county vocational-technical schools, but the student and parent demand for CTE programs exceeds the space available.”⁵⁵

⁵³ Kathryn Forsyth, "NJ 101.5 Highlights the Value of Career and Technical Education and Opportunities in Trade and Technical Careers," Career Tech NJ, September 9, 2016, New Jersey Council of County Vocational Technical Schools, accessed July 23, 2018, <https://www.careertechnj.org/news/nj-101-5-highlights-the-value-of-career-and-technical-education-and-opportunities-in-trade-and-technical-careers/>.

⁵⁴ John Reitmeyer, "New Bond Issue Edges Closer as Vo-Techs Make Case for Urgent State Funding," *NJ Spotlight*, October 18, 2017, accessed July 31, 2018, <http://www.njspotlight.com/stories/17/10/17/new-bond-issue-edges-closer-as-vo-techs-make-case-for-urgent-state-funding/>.

⁵⁵ "NJ Employer Coalition for Technical Education," Career Tech NJ, New Jersey Council of County Vocational-Technical Schools, accessed June 22, 2018, <https://www.careertechnj.org/nj-employer-coalition-for-technical-education/>.

In 2014, *New Jersey Monthly's* biannual education issue included an article about the county vocational-technical schools' career academies, stressing their focus on college preparation. It described the admissions policy⁵⁶ at Monmouth's High Technology High School, considered one of the nation's top academic high schools and one of five career academies operated by the district.

Today, these career academies attract many of their counties' top students, routinely garner local and national awards and send a striking percentage of their students to the best colleges in the country.

For the 2014-15 school year, 347 hopeful Monmouth County eighth-graders applied to High Technology High; only 80 were offered enrollment. The application process is a numbers game in which students strive to score as close to 100 points as possible: Prospective students take an entrance exam on which they can score a maximum of 35 points in each of two subjects, math and language arts. They also submit their final seventh-grade and first-marking-period eighth-grade transcripts, and the school uses a complex rubric to convert their GPAs into point scores ranging from 0 to 15 per grade. The school then accepts the highest-scoring students (with at least 75 points) from each Monmouth County school district from which there are applicants (generally, 35 to 40 of the county's 45 districts are represented). The rest of the slots are accorded to the highest-ranking students that remain after the first round. Similar entrance processes are used at most of the Garden State's career academies which, like High Technology, tend to be small and have low student/teacher ratios.⁵⁷

Accepting high achieving students who would otherwise attend their K-12 or regional high school districts of residence has generated friction between county vocational schools and other districts. The Task Force found that the growth of the career academies for high-achieving college-bound students has drawn some vocational districts away from the mission to serve students interested in a career in the trades.

In 2012, the North Wildwood Board of Education, concerned about the admissions rates and competitive application processes at county vocational schools, proposed policy to the NJSBA Delegate Assembly challenging the use of testing as the basis for enrollment.

The board's resolution resulted in additions to NJSBA's *Manual of Positions and Policies on Education*.

The NJSBA believes that county vocational boards of education should have the ability to structure their admissions policies in a comprehensive holistic way, of which testing appropriate to the program is a component, but not the sole criterion for admission. The ultimate decision on admission should lie within the discretion of the county vocational school district.

The NJSBA believes that the state should provide funding and support to local school districts to facilitate the development of career-readiness programs to assist students who are unable to attend county vocational programs, including revisions to the funding formula to reflect the increased per pupil cost for vocational education provided in the local high school.

"Career Education: Vocational-Technical Education," *Manual of Positions and Policies on Education*, FC6142.12, May 2012, New Jersey School Boards Association, accessed July 31, 2018, <https://www.njsba.org/wp-content/uploads/2016/02/resources-policy-ppm-6000-6142-12.pdf>.

⁵⁶ "Career Academy Admissions," Monmouth County Vocational School District, accessed August 01, 2018, <https://www.mcvsd.org/career-academy-policy.html>.

⁵⁷ Leslie Garisto Pfaff, "Tech Time: New Jersey's Vocational Schools," *New Jersey Monthly*, September 18, 2014, accessed July 18, 2018, <https://njmonthly.com/articles/towns-schools/tech-time-new-jerseys-vocational-schools/>.

In recent public statements, NJCCVTS officials have echoed the concerns of the NJSBA Task Force on Educational Opportunities for the Non-College-Bound Learner, expressing the need for programming that prepares students for those careers that do not require a bachelor’s degree. During an October 2017 hearing on a proposed state bond issue to provide a half billion dollars for expansion of the county CTE schools, “vocational-school officials...made the case that as the job market is starting to tip more toward workers with technical skills, and as the cost of going to a four-year college continues to rise, it makes sense for the state to invest more heavily in career and technical education.”⁵⁸

At the same hearing, the NJCCVTS executive director cited the organization’s statewide needs assessment, which showed that “only two schools said they had no need to expand facilities or build new ones to keep up with demand. In all, the council determined there’s a need for \$891 million in spending to meet the construction, renovation, and equipment needs across the state.”⁵⁹

On August 27, 2018, Governor Murphy signed the “Securing Our Children's Future Bond Act,” which would fund expansion of CTE programs—but only in county vocational school districts and community colleges. Totaling \$500 million, the bond act would finance facility projects as follows:

- \$350 million for county vocational school district CTE grants (to be used to construct and equip educational facilities to expand existing or offer new programs) *and* for school security project grants;
- \$50 million for county college career and technical education grants;
- \$100 million for school district water infrastructure improvement grants.⁶⁰

The bond issue will appear on the November 6, 2018 General Election ballot.

While the New Jersey School Boards Association supported the legislation, it expressed serious concern that the proposal would not provide funding for comprehensive high schools, which need to expand their CTE offerings.

To date, there have been limited funding initiatives to expand student access to CTE in comprehensive high schools.

In May 2018, the New Jersey Department of Education announced the award of approximately \$3 million in grants to seven county vocational school districts. The state-funded program, now in its fourth year, supports county vocational-technical schools that partner with school districts that

⁵⁸ John Reitmeyer, "New Bond Issue Edges Closer as Vo-Techs Make Case for Urgent State Funding," *NJ Spotlight*, October 18, 2017, accessed July 31, 2018, <http://www.njspotlight.com/stories/17/10/17/new-bond-issue-edges-closer-as-vo-techs-make-case-for-urgent-state-funding/>.

⁵⁹ Reitmeyer.

⁶⁰ “Legislative Update: Governor Signs Vo-Tech, School Security Bond Measure; Voters to Decide its Fate,” *School Board Notes*, September 5, 2018, <https://www.njsba.org/news-publications/school-board-notes/september-5-2018-vol-xlii-no-6/legislative-update-governor-signs-vo-tech-school-security-bond-measure-voters-to-decide-its-fate/>.

operate comprehensive high schools, business and industry and postsecondary institutions to expand access to CTE programs.⁶¹

Eligibility for the grant is limited to county vocational school districts, which serve as the lead agencies for the partnerships. Six K-12 districts and one regional high school district are among the secondary school partners in the grant program announced in May.⁶² (See Appendices III and IV, “County Vocational-Technical School Partnership Grants” and “Murphy Administration Announces Vo-Tech Partnership Grants,” respectively.) Although a step in the right direction, this initiative is inadequate to serve the statewide need for CTE expansion.

Another legislative proposal ([S-1827/A-482](#)) would authorize the state’s Economic Development Authority to issue \$50 million in bonds to provide grants for certain county vocational school district facilities projects and increase the debt service aid for such projects. The grants would only be allocated to county vocational school districts that increase capacity by the larger of 10 percent or 75 students, or which convert part-time programs to a full-time basis for at least 75 students.

This legislation, currently in the Senate and Assembly Education Committees, does not address the rigorous, selective admissions policies that make it difficult for many non-college-bound students to gain admission to CTE programs. And it falls short of the \$891 million that the NJCCVTS indicates is needed to meet facility needs in the county vocational districts.

The NJSBA Task Force found that additional financial support to expand CTE programs in comprehensive high schools, as well as county vocational-technical districts, is essential to ensure that career-focused students have access to training for the growing number of middle-skill positions. It also believes that the state Department of Education should encourage the sharing of services among neighboring districts to create an array of CTE opportunities for students. These efforts should also allow send-receive relationships for programs with low enrollment, which can then be realistically funded through the support and collaboration of two or more districts.

***K-12 and regional high school districts lack the financial resources
and certificated staff needed for CTE programs.***

Comprehensive high schools that try to operate CTE programs in-house are challenged to find creative solutions to finance them. CTE programs tend to be costly, typically requiring modern equipment and tools, safety measures, and small class sizes. And federal and state dollars are not available on the required scale, with only a few districts able to secure the few available.

A dearth of qualified, certified staff to teach CTE courses exacerbates the situation, the Task Force found. New Jersey provides for CTE endorsement based upon education and/or work experience.⁶³

⁶¹ "County Vocational School District Partnership Grant-Cohort 4-Competitive," New Jersey Department of Education, November 2017, accessed August 07, 2018, <https://www.state.nj.us/cgi-bin/education/grants/gropops2.pl?string=recnum&maxhits=1>.

⁶² "Murphy Administration Announces Vo-Tech Partnership Grants," New Jersey Department of Education, May 7, 2018, accessed June 22, 2018, <https://www.state.nj.us/education/news/2018/0507voc.htm>.

⁶³ Certification and Induction: Career and Technical Educators, New Jersey Department of Education, accessed August 1, 2018, <https://www.nj.gov/education/educators/license/cte/infofaq.htm#15>.

It provides alternate routes to certification through which established tradespeople with the subject-matter knowledge can obtain a teaching certification in their skill area based on employment experience. Brookdale Community College is the sole provider of an NJDOE-endorsed formalized pilot program for alternate-route CTE certification.⁶⁴

In its deliberations, the Task Force found that some provisions of Administrative Code governing CTE endorsement (contained in [N.J.A.C. 6A:9B](#)) are ambiguous and overly restrictive and, therefore, may contribute to the shortage of teachers in this area. (See discussion on page 55.) A comprehensive review of these regulations is warranted, the Task Force believes.

The NJSBA Task Force believes that county colleges have been increasingly taking over the traditional role of the county vocational schools, and offering programs in the various trades.⁶⁵ The community colleges do not face the same teacher certification requirements as do public school districts.

Community college instructors can teach courses in the trade and middle-skill areas based on their professional experience.

Dwindling numbers of people are applying to fill vacancies as CTE instructors, and a quarter of all existing CTE teachers are 59 years of age or older.

The New Jersey Department of Education recognizes the CTE teacher shortage.

The NJDOE held focus groups with vocational-technical and comprehensive high schools to hear about obstacles they faced in hiring teachers to address the CTE teacher shortage, especially in high-demand occupational areas like STEM, health sciences, agriculture, and information technology. Dwindling numbers of people are applying to fill vacancies as CTE instructors, and a quarter of all existing CTE teachers are 59 years of age or older.⁶⁶

In October 2017, the department announced the receipt of \$876,081 through the federal CTE Teacher Pathway Initiative.⁶⁷ The grant will fund a three-year program to attract up to 150 industry experts and current teachers to CTE positions in 29 school districts.

Through the program, prospective CTE teachers will have the opportunity to teach part-time with a mentor teacher in a classroom, while allowing them to continue working at their current job. The grant will help pay for the educator-preparation training that prospective teachers must receive before working in a classroom, as well as provide stipends for the mentors and potential teachers.⁶⁸

⁶⁴ "Career and Technical Education Teacher Training Program," Brookdale Community College, accessed August 01, 2018, <https://www.brookdalecc.edu/continuinged/careerdevelopment/cte/altroute/arprogram/>.

⁶⁵ Rob Jennings, "This Was a Car Dealership for Nearly a Century. Now It Will Be a College Classroom," NJ.com, July 30, 2018, NJ Advance Media, accessed August 1, 2018, https://www.nj.com/sussex-county/index.ssf/2018/07/this_was_a_car_dealership_for_nearly_a_century_now.html#incart_river_index.

⁶⁶ "NJDOE Announces Grant to Increase Numbers of Career and Technical Education Teachers," New Jersey Department of Education, October 31, 2017, accessed August 1, 2018, <https://www.nj.gov/education/news/2017/1031cte.htm>.

⁶⁷ "Career and Technical Education (CTE) Teacher Pathway Initiative," New Jersey Department of Education, accessed August 1, 2018, <https://www.nj.gov/education/cte/cert/pathway/>.

⁶⁸ "NJDOE Announces Grant to Increase Numbers of Career and Technical Education Teachers".

The NJSBA Task Force notes that, while each of the 21 county vocational-technical schools received the funds, only eight comprehensive high schools with CTE programs were eligible to participate.

The Task Force believes that the New Jersey Department of Education should also consider an endorsement process for CTE, similar to the one created by the Center for Teaching and Learning, to increase the number of teachers qualified to teach physics. The program, sanctioned by the NJDOE, has helped to alleviate a shortage of physics teachers.

[The Center for Teaching and Learning] worked with the New Jersey Department of Education to develop a summer program that trains existing science teachers to begin teaching the...algebra-based physics course. The teachers continue their training over the course of the next year. After passing the Praxis exam in physics and general science, participating teachers become certified by the state to teach physics. They also earn 30 credits from Kean University, which can be applied to a master's degree. The CTL course for teachers was made possible after a state law was adopted authorizing alternative methods of certifying new physics and chemistry teachers.⁶⁹

Comprehensive high schools have collaborated with government, community colleges and/or industry to implement innovative programs that lead to careers in CTE.

Vernon Township Public Schools

At a meeting of the Task Force, Art DiBenedetto, then-superintendent, and Charles McKay, assistant superintendent, of the Vernon Township Public Schools, described a successful program in their high school, made possible through a Department of Education Career Pathways Grant. The NJDOE-administered funding, totaling \$800,000, is aimed at expanding career pathway programs in seven to eight districts with comprehensive high schools.⁷⁰

The Sussex County school district provides an example of how comprehensive high schools can meet the needs of career-focused students. In Vernon Township, 40 percent of the students were headed to a four-year college, another 40 percent to a community college, and 20 percent to the workforce.

“We asked what are the five best jobs the kids in Vernon can get in New Jersey, and we aligned our CTE to that.”

The high school introduced six new CTE programs. In addition, district worked with the Department of Education to assure that the teachers had CTE certification through what the superintendent described as a rather complex application process. The school day was expanded to nine periods, and the district partnered with the community college which offered evening courses. As a result, students had the opportunity to

⁶⁹ Janet Bamford, “Physics for All,” *New Jersey School Leader*, July-August 2014, 18, New Jersey School Boards Association, accessed August 1, 2018, <https://www.njsba.org/news-publications/school-leader/julyaugust-2014-volume-45-1/physics-for-all/>.

⁷⁰ “Building Capacity for Career Pathways: A Pilot Program for Comprehensive High Schools-Year 3 of 5,” New Jersey Department of Education, accessed August 1, 2018, <http://www.nj.gov/cgi-bin/education/grants/gropops2.pl?string=recnum&maxhits=1>.

graduate high school with associate degrees. Of Vernon Township High School's 997 students, 435 took some classes in the CTE area.

The programs consist of three-course sequences in areas such as health, construction, engineering, graphics, hospitality and marketing. The speakers highlighted the Hospitality and Management program, as well as an Allied Health program through which students may earn college credits from Rutgers in health-related fields. The later program provides a foundation for three post-secondary career pathways: pre-med; community college for nursing; or direct employment as an EMS.

The Vernon Township program suggests that, through partnerships and collaboration with government, trade unions, higher education and the business community, comprehensive high schools can meet students' CTE needs.

"In these career programs, teachers can actually answer students who ask, 'Why do I need to learn that?'"

Colorado CareerWise

The NJSBA Task Force viewed a video about Colorado's innovative CareerWise program, the nation's first statewide youth apprenticeship program. Established through a public-private partnership, CareerWise provides three-year apprenticeships to students, starting in their junior year of high school and leading to industry credentials and associate degrees.

The curriculum is developed by businesses, colleges and K-12 schools. Through the program, high school juniors and seniors attend class three days a week, and work as apprentices on site for the other two days. A major goal is to help the state address the "middle skills gap" and meet the state's current and projected need to fill 40,000 technology jobs. By linking enterprises with the school district, students are armed with knowledge of the "ins and outs of finance, information technology, business operations, or advanced manufacturing." Students also learn good communication and time management skills, valuable for workplace success.⁷¹

While currently funded through federal and state business and philanthropy, the hope is that eventually industry will provide the largest investment.

The Colorado program was inspired by the apprenticeship program used successfully in Switzerland. In Switzerland, 40 percent of companies offer apprenticeships and two-thirds of young people participate in them, as a result, the nation has a 3.2 percent youth unemployment rate.

Research shows that Swiss students who take part in apprenticeships have lower unemployment and higher earnings than peers who stick to the exclusively academic track.⁷²

⁷¹ Hari Sreenivasan, PBS NewsHour, Rethinking College Series, "Colorado Apprenticeship Program Turns the Factory Floor into a Classroom," PBS, August 30, 2017, accessed June 25, 2018, <https://www.pbs.org/newshour/show/colorado-apprenticeship-program-turns-factory-floor-classroom>.

⁷² Catherine Gewertz, "Schools and the Future of Work: Can Apprenticeships Pave the Way to a Better Economic Future," *Education Week*, September 27, 2017, accessed August 1, 2018, <https://www.edweek.org/ew/articles/2017/09/27/can-apprenticeships-pave-the-way-to-a.html>.

The job market of the future promises to look very different than that of today. Artificial intelligence is replacing workers in many traditional areas of employment.

During its deliberations, the Task Force reviewed research on the impact of artificial intelligence and other advanced technology on employment. The research is convincing; it would be reckless to ignore it.

“Robots and AI-powered digital agents already rival humans at translating languages, playing strategy games, and flipping hamburgers,” wrote Benjamin Herold in *Education Week’s* special coverage on Schools and the Future of Work. “They’ve started driving cars and diagnosing cancer. Increasingly, they’re able to learn by observing humans, rather than being programmed by us.”⁷³

A recent report by the international accounting firm PwC suggests that 38 percent of jobs in the United States will be replaced by robots and artificial intelligence by the early 2030s. The report concludes that while robotics and artificial intelligence will disrupt and change labor markets, many new jobs will also be created. The long-term effect should be positive for the economy as a whole, provided that business and government work together to help people through the transition.⁷⁴

A 2013 study, *The Future of Employment: How Susceptible Are Jobs to Computerisation?* by academicians at the University of Oxford’s Oxford Martin School and Department of Engineering Science, suggests that 47 percent of total United States employment is at risk of automation over the next two decades. According to the study, telemarketers, insurance underwriters and appraisers, tax preparers, and cashiers were among the most likely to see their jobs threatened by automation, while mental-health and substance-abuse social workers, oral surgeons, choreographers, and physicians and elementary school teachers were among those more protected.⁷⁵

47% of total United States employment is at risk of automation over the next two decades. Telemarketers, insurance underwriters and appraisers, tax preparers, and cashiers are among the most likely to see their jobs threatened by automation.

In an analysis based on the Oxford study, independent information designer Henrik Lindberg applied the Oxford projections to 2016 data from the U.S. Bureau of Labor Statistics to chart how many Americans currently work in a wide range of occupations, and how likely those occupations will be automated by

⁷³ Benjamin Herold, “Schools and the Future of Work: Automation and artificial intelligence are disrupting the labor market. What do K-12 educators and policymakers need to know?” September 27, 2017, *Education Week*, accessed June 22, 2018, <https://www.edweek.org/ew/articles/2017/09/27/the-future-of-work-is-uncertain-schools.html>.

⁷⁴ John Hawksworth, Richard Berriman and Saloni Goel, “Will robots really steal our jobs? An international analysis of the potential long term impact of automation,” February 2018, PwC, PricewaterhouseCoopers LLP, https://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/impact_of_automation_on_jobs.pdf.

⁷⁵ Carl Benedikt Frey and Michael A. Osborne, *The Future of Employment: How Susceptible Are Jobs to Computerisation?* Oxford Martin School, University of Oxford, September 17, 2013, accessed June 22, 2018, https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf.

2030. Jobs most vulnerable to automation included retail sales, cashiers, bookkeepers-accountants-auditors, wait staff, fast food and counter workers, and office clerks. Among those least affected would be teachers, nurses, computer and information analysts, police, and first-line office supervisors.⁷⁶

In 2017, the University of Redlands Institute for Spatial Economic Analysis (ISEA) used the Oxford study to rate the probability of automation for the 700 most common jobs, and then mapped out which metropolitan areas have a high share of those jobs and would be hit hardest by automation. The ISEA study predicts that almost all large American metropolitan areas may lose more than 55 percent of their current jobs because of automation in the next two decades.⁷⁷ As reported in Education Week, futurist [Martin Ford](#) sees big problems ahead. The author of *Rise of the Robots* (Basic Books, 2015), Ford notes that automation has already begun replacing assembly-line workers, warehouse stockers, and cashiers. Paralegals, radiologists, line cooks, truck drivers, insurance underwriters, travel agents, lab technicians, tax preparers, and office assistants could be next. And because artificial-intelligence systems can write their own code, many six-figure computer-science jobs could eventually be lost to technology, too.⁷⁸

The jobs that seem most at risk of replacement by robotics or artificial intelligence include those in which responsibilities are defined through a step-by-step process, according to an article in *Fortune*. Also, jobs that involve physical and repetitive tasks are susceptible to automation. At least for now, there seems to be job security for those who “build and fix stuff”—like plumbers, welders, electricians, engineers and scientists.⁷⁹

At least for now, there seems to be job security for those who “build and fix stuff”—like plumbers, welders, electricians, engineers and scientists.

One only needs to look around to see how artificial intelligence has already infiltrated our lives. Consider the numerous artificial intelligence applications (apps) that collect information when a user makes requests and then utilize that information to better recognize the user’s speech with results that are tailored to the user’s preferences. For example, Microsoft says that Cortana, its voice-controlled virtual assistant comparable to Apple’s Siri, “continually learns about its user” and that it will eventually develop the ability to anticipate users’ needs.⁸⁰

⁷⁶ Benjamin Herold, "The Future of Work Is Uncertain, Schools Should Worry Now," Education Week, June 20, 2018, accessed August 1, 2018, <https://www.edweek.org/ew/articles/2017/09/27/the-future-of-work-is-uncertain-schools.html>.

⁷⁷ "Future Job Automation to Hit Hardest in Low Wage Metropolitan Areas like Las Vegas, Orlando and Riverside-San Bernardino," Institute for Spatial Economic Analysis, University of Redlands, School of Business, May 3, 2017, accessed August 1, 2018, <https://www.iseapublish.com/index.php/2017/05/03/future-job-automation-to-hit-hardest-in-low-wage-metropolitan-areas-like-las-vegas-orlando-and-riverside-san-bernardino/>.

⁷⁸ Herold, *Schools and the Future of Work* “Automation and artificial intelligence are disrupting the labor market. What do K-12 educators and policymakers need to know?”.

See also:

Joe Pompeo, “Robot reporter Wordsmith begins its advance,” October 20, 2015. *Politico*, accessed June 22, 2018, <https://www.politico.com/media/story/2015/10/robot-reporter-wordsmith-begins-its-advance-004229>.

⁷⁹ Barb Darrow, "Here Are the Jobs Automation Will Kill next," *Fortune*, May 20, 2015, accessed August 1, 2018, <http://fortune.com/2015/05/20/here-are-the-jobs-automation-will-kill-next/>.

⁸⁰ Giselle Abramovich, "5 Examples Of AI In Our Everyday Lives," CMO.com by Adobe, January 29, 2018, accessed August 1, 2018, <https://www.cmo.com/features/articles/2018/1/22/5-examples-of-ai-in-our-everyday-lives.html#gs.Ej0OuwM>.

Predictive technology is already being used with many devices and services, not only with smart phones and virtual assistants, but also in video games, smart cars, purchase prediction for major retailers like Amazon and Target, fraud detection in credit cards, online customer support, security surveillance, music and movie recommendations services, and smart home devices.

In the area of medicine, artificial intelligence is used to review x-rays and other diagnostic results, achieving levels of accuracy that exceed those of humans. In the area of law, research and brief-writing—traditionally the domain of junior associates—is being accomplished with artificial intelligence. And media outlets like Fox, the Associated Press and Yahoo News, are using Wordsmith Technology (a natural language template engine created by Automated Insights) to write financial summaries, sports recaps and other simple, data-driven stories that were typically written by journalists.⁸¹

New skills will be necessary to compete in the future job market.

Educators and policy-makers across the country are examining how to create reforms that will make education relevant to the 21st century student. A recent article in the *American School Board Journal* references Daniel Pink, an author specializing in the workplace, management and behavioral sciences, who said that our society has entered a “conceptual age,” that is, “an era that requires creativity and innovative thought around complex problems not easily solved by linear thinking...”⁸²

In the *ASBJ* article, author Chris Colwell, chair of the education department at Stetson University in Florida, states that efforts to “to modernize curriculum, instruction, and assessment systems” cannot succeed “as long as we attempt to implement these initiatives on top of our current 20th century teaching and learning platform. There are fundamental systems problems underlying P-12 education in 2016 that need to be resolved in order for any new solutions and innovations to truly take root.”

Colwell identifies three fundamental problems with our current system of education:

- First, our system is not modern. It is based on assumptions dating back a hundred years.
- Second, our current model does not align with what we know about learning. It is largely based on avoiding failure, which ignores that learning is based on taking risks, making mistakes and learning from failure. Much of our system is based on teaching to the test.

An analysis of what 21st century employers are looking for in terms of skill sets for their workforce center[s] around the employee’s communication skills, the ability to solve complex problems, to have a work ethic, and commitment to excellence; they look for employees with

⁸¹ Amanda Davis, “How Artificial Intelligence has Crept into our Everyday Lives,” The Institute, IEEE, June 8, 2016, accessed June 22, 2018, <http://theinstitute.ieee.org/technology-topics/artificial-intelligence/how-artificial-intelligence-has-crept-into-our-everyday-lives>.

⁸² Chris Colwell, “Educating the Class of 2030,” *American School Board Journal*, February 2017, National School Boards Association, accessed August 2, 2018, <https://www.nsba.org/newsroom/american-school-board-journal/asbj-february-2017/educating-class-2030>, citing Daniel H. Pink, *A Whole New Mind: Moving from the Information Age to the Conceptual Age* (New York: Riverhead Books, 2005).

grit, with resilience, with tenacity ... Our “modern” design “isolates students from each other. Learning is measured as an interaction between the student and a standardized test. Working in groups is called cheating. Being active and noisy is poor classroom management. Creativity is an after-school activity.”⁸³

- Third, our current model of assessing student learning does not align with the knowledge and skills that 21st century graduates need. Current assessments can evaluate math, vocabulary, reading, history and geography skills and knowledge. “What is not easily assessed by standardized multiple choice exams, however, is the ability of the student to demonstrate the skills that 21st century employers are looking for; the ability to solve complex problems, think critically and creatively, take risks, assess the veracity of information, and work in teams,” states Colwell.

Since the late 1980s, authors and pundits have cited variations of the following observations: “A weekday edition of today's New York Times contains more information than the average person in seventeenth-century England was likely to come across in an entire lifetime.”

In fact, in the Age of Siri and Alexa, the volume of information requires critical thinking and research skills are necessary to access, evaluate the veracity of, and use the vast amounts of information available. [The video “Did You Know? Shift Happens,” provides a perspective on the impact of the information explosion on education and the workplace.⁸⁴ It was produced in 2007 by Karl Fisch, technology director at a Colorado High School, and updated for 2018 by Scott McLeod, founding director of the Center for the Advanced Study of Technology Leadership in Education at the University of Colorado Denver.]

In *Education Week's* special coverage of “Schools and The Workplace” Benjamin Herold wrote that, if the predictions of automation’s impact on the job market are correct, “...today's students are going to need a new set of skills, regardless of what field they enter.

Every young person entering the 2030 labor market might need a solid grounding in statistics and data science, the thinking goes. Farmers, for example, would need to make sense of torrents of data generated by sensors and drones on soil and weather conditions.

To maintain their edge, workers would also need to focus on cultivating the human qualities that robots still lack, such as creativity, empathy, and abstract thinking.

And because most jobs could constantly evolve, today's students could eventually face a make-or-break question: Can you adapt?⁸⁵

“When the potter’s wheel was invented, potters were concerned that this advancement would put them out of work. But in fact, they either learned how to use the new technology or were trained in one of the new fields that emerged from the increased production of pots. Additional distribution needs, glaziers, packers, sales force and so forth created new and exciting jobs.”

– NJSBA President Dan Sinclair
(recounting the words of a fellow school board member)

⁸³ Colwell.

⁸⁴ Fisch Karl and Scott McLeod, "Did You Know (Officially Updated for 2018)," YouTube, September 03, 2016, accessed August 2, 2018, <https://www.youtube.com/watch?v=u06BXgWbGvA>.

⁸⁵ "The Future of Work Is Uncertain, Schools Should Worry Now," <https://www.edweek.org/ew/articles/2017/09/27/the-future-of-work-is-uncertain-schools.html>.

In its February 2018 report, the international accounting firm PwC recommends that government, working with employers and education providers, “should therefore invest more in the types of education and training that will be most useful to people in this increasingly automated world.”⁸⁶

Given all these sobering projections, the NJSBA Task Force on Educational Opportunities for the Non-College-Bound Learner believes that it is time to look at the existing teaching and learning platform with fresh eyes. We must be willing to reinvent the way we approach preparing our students not only with the hard skill set, but also with the critical thinking, empathy, creative and collaborative problem-solving, and communication skills they will need to succeed in the emerging job market after high school.

⁸⁶ Hawksworth, *et al.*, https://www.pwc.com/hu/hu/kiadvanyok/assets/pdf/impact_of_automation_on_jobs.pdf.