

PUBLIC POLICY COMMENTARY



Baton Rouge Area Chamber®
brac.org • 225.381.7125

Programming the Tech Sector Pipeline: Increasing the Value of Secondary School Computer Science Education

By Erika Haguette
Economic Research and Policy Analyst

[Education Week](#) recently reported that Delaware house lawmakers unanimously approved a bill, now under consideration in the senate, that requires all public high schools to offer at least one computer science course by the 2020-21 school year. If not this specific legislative path, the Baton Rouge Area Chamber (BRAC) believes that Louisiana needs to take similarly bold actions to satisfy the future needs of our rapidly-growing tech sector. For the biggest impact, the state must broaden the scope of its efforts to promote expanded high school enrollments in computer science courses by adopting an expertly-vetted and robust computer science curriculum that reaches a majority of students.

Background

The Baton Rouge Area has experienced strong growth in [employment](#), outpacing the state of Louisiana as a whole since 2013. For the tech sector, economic development project wins supported by BRAC in the past five years yielded 1,065 jobs and \$56.8M in payroll. Computing jobs are the [number one source of new wages](#) in the United States, with [more than two-thirds of all tech jobs residing in companies outside the tech sector](#), and representing 71 percent of all new jobs in STEM fields countrywide. However, [reports by the Board of Regents](#) indicate only 11 percent of Louisiana science, technology, engineering and math (STEM) graduates majored in computer science (CS) in 2015, representing 2 percent of all bachelor's degrees awarded by the state's public institutions.

In Louisiana, [demand for computing jobs is five times higher than the average demand rate for occupations statewide](#). Nevertheless, the remarkable job growth experienced in this industry reported by EMSI, an economic modeling database, has not seen an accompanying rise in the [number of graduates in the field](#), creating a workforce shortage that must be addressed.

This shortage is especially critical given our need to diversify economic growth. In 2015, [12 percent of Louisiana's revenue](#) was oil and gas-related. This reliance on one industry makes our economy highly susceptible to energy price shocks. To remain competitive and sustain its above-average growth, the Baton Rouge Area must focus on economic diversification, and the tech sector represents an opportunity to diversify our local economy with high-paying, persistent jobs that have a multiplier impact on area businesses. If our

LA Public Institutions Bachelor's Degrees



18,516	3,835	432
Total Degrees	STEM	CS

region does not work towards supporting the growth of this sector, past efforts would have been made in vain, and future opportunities will be lost.

In the Baton Rouge Area, growth in the tech sector has [spurred a surge in the number of students pursuing bachelor's degrees in computer science at Louisiana State University](#). Although the number of CS graduates in the Capital Region remains insufficient, this represents a meaningful workforce development success. To make tech-related higher education achievable by more students, and thereby to truly impact the number of available but unfilled tech sector jobs, better and more computer science education must take place in our regional secondary schools, thus creating a long-range talent pipeline for the industry.

Providing rigorous and expanded computer science curriculum to secondary students must be done in context. High school students in Louisiana have two diploma options available: the TOPS University diploma and the Jump Start Career diploma. The TOPS University diploma aligns with high school graduation requirements, as well as four-year college admissions requirements; thus any course approved by the Board of Elementary and Secondary Education (BESE) must also be approved by a majority of the Board of Regents' 14 four year institutions. Unlike TOPS, the Jump Start Career diploma focuses on preparing students for entry-level employment or post-secondary education at a 2-year college. **Jump Start Career diplomas accounted for 12 percent of 2014-15 high school graduates, while students who pursue the TOPS University diploma represented a vast majority, with 79 percent. However, these percentages are likely to change as the four-year transition to full Jump Start implementation is complete in Spring 2017.** Additionally, many of the TOPS students go on to pursue a bachelor's degree — a requirement for most tech sector occupations according to [Louisiana Star Jobs](#). Focusing computer science education initiatives on these students would lead to the biggest workforce impact and has the highest potential for addressing the shortage.

TOPS University vs. Jump Start Career: What Students Pursue



**Excludes now unavailable Basic Diploma*

Louisiana must formulate policy that makes computer science courses a more flexible option for both TOPS University and Jump Start Career students: a) allowing expertly-vetted and rigorous computer science courses as substitutes for required science and/or math courses; and b) creating a Jump Start pathway dedicated to coding and other skills that high school students can use to attain entry-level employment. These policies would promote the long-range workforce necessary to meet the growing demands of the Baton Rouge Area's tech sector, continuing its pattern of strong, diverse economic growth.

Barriers to Expand Computer Science Education

To maximize workforce impact, Louisiana must focus on initiatives that expose as many students as possible to computer science, giving them access to quality course offerings and skill-building workplace experiences that prepare them to pursue further education and careers in the field.

This is much easier said than done. Interviews with state and local education administrators revealed key issues that may prevent the implementation of a program that could effectively address the workforce shortage in the short run, most notably: a) the lack of rigorous curricula; and b) a shortage of instructor human capital necessary to expand computer science course offerings at the high school level.

One major roadblock in the expansion of computer science education in Louisiana is the fact that the Louisiana Department of Education (LDE) has limited control over the rigor of courses offered in individual schools and districts. This means that two distinct schools can, for example, provide “Computer Science I” courses in which School A teaches Microsoft Office basics while School B’s students learn how to code. While competence in navigating Microsoft Office is certainly a critical skill for most white-collar work, it should not be equated with the technical knowledge and skills necessary to activities like website, app, or software development. Without a standardized rigorous computer science curriculum or an official set of rigorous standards and expectations, it is virtually impossible for the state to ensure that students are receiving high-quality instruction, or even being properly introduced to the subject. This can lead students to develop a misguided first impression which can hinder any effort to raise the number of graduates interested in pursuing higher education and careers in the tech sector after high school.

The LDE has also recognized human capital as a key barrier. More specifically, not only does Louisiana lack instructors capable of teaching computer science, it has not yet developed an efficient training program to solve this issue. To exacerbate the problem, the recruitment of teachers with bachelor’s degrees in computer science has proven challenging. Many factors may contribute to this reality, such as the high wages available in most private sector tech jobs and the persistent and unfortunate low levels of computer science degree pursuit by females. This last concern is especially important when considered in tandem with the knowledge that [80 percent of teachers in Louisiana are female](#). If the schools and districts are not capable of hiring or even training teachers, students will not receive computer science education, regardless of the quality and rigor of the chosen curriculum.

Existing Computer Science Education Options

In recent years, the state has taken some positive steps regarding the need for more and improved computer science education, most notably in high school, with the implementation of Jump Start pathways and AP™ Computer Science A (AP CS). Both initiatives intended to increase student accessibility to computer science, with Jump Start reaching the high school students who graduate with a Career diploma, and AP CS representing a pre-requisite-free option for the high schoolers pursuing a TOPS University diploma. Although these programs indicate a step in the right direction, each have issues: Jump Start curricula may not be rigorous enough to prepare students for the computing workforce, while AP CS ultimately reaches a minimal number of high schoolers.

Jump Start

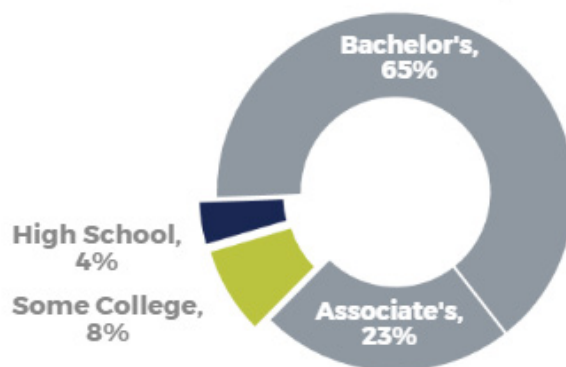
Louisiana’s Jump Start program is a high school diploma pathway that requires that students earn a regionally-relevant, industry-based credential, preparing them for entry-level employment or post-secondary education at a technical or community college. It is tailored to students who do not immediately plan on pursuing a four-year degree, thus Jump Start graduates are not eligible to attend those institutions, unless they begin at a two-year college and later transfer, or take extra classes while in high school. Jump Start was created with the intention of improving the state’s Career diploma (which, prior to Jump Start, was neither popular nor effective in preparing students for entry-level jobs), and aligning career and technical education with regional workforce needs.

Jump Start has received rave reviews from business and industry, especially in the areas of skilled craft and manufacturing. Yet according to computer science industry leaders, the program does not lend itself as well to their field. The main issue is the lack of variety and rigor of most tech certifications offered.

There are six Jump Start graduation pathways that include computer science courses, few of which are even currently offered in our region’s 13 school districts. **Those that do offer IT-related courses for Jump Start pathways are focused on design courses, not the type of coding courses that industry indicates are the building blocks for future high tech employment success.**

Jump Start pathways are intended to align to specific occupations identified by the Louisiana Workforce Investment Council (WIC) as high-growth and high-wage. Unfortunately, according to data from Louisiana Star Jobs, out of the 26 careers listed by the WIC as end points for IT-related pathways, all but three require an Associate's or Bachelor's degree. This means **only 12 percent of jobs in the computer science field are available to the typical Jump Start graduate – someone who likely intends to enter the workforce immediately after high school.**

Tech Jobs Educational Requirement



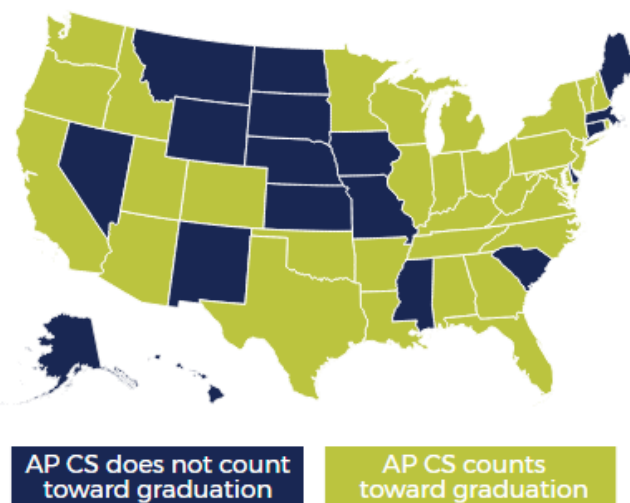
The LDE also provides a list of pathway-specific courses applicable to each pathway. For some pathways, this list contains over 100 possible course titles that may culminate in very few possible certifications. The a la carte nature of the courses creates a strong likelihood that two students at different schools will have very different experiences and skills upon completion, but still receive the same certification. Because of this, tech sector employers report uncertainty in the actual value of the certification received, removing a key purpose of having a certification process.

As aforementioned, the LDE has no control over the content — or therefore, the rigor — of courses offered, only the credentialing examination. Industry experts suggest that a student who has graduated from one of the computer science-related Jump Start pathways without completing coding courses is not fully prepared to pursue careers in the field. Because many Jump Start students will pursue entry-level jobs upon graduation, computer science-related pathways should provide students with a marketable skill and/or credential that sets them apart from other entry-level job applicants. The skepticism of the tech community regarding a Jump Start graduate's ability to competently fill entry-level positions shows that the current Jump Start IT-related pathways fail to meet this basic purpose. Nevertheless, BRAC recognizes the tremendous value of the Jump Start program and continues to strongly encourage the LDE to pursue further improvements to these pathways, or design a new, more coding-intensive pathway that will actually prepare students to attain entry-level employment.

AP[™] Computer Science

Advanced Placement represents a great alternative to overcome the state's inability to regulate the rigor of courses because of its standardized rigorous curriculum and test. Moreover, these courses give students the opportunity to earn college credit while in high school and are free of pre-requisites – increasing student accessibility to them. Nevertheless, common misconceptions among students lead many to refrain from taking AP[™] courses due to fear of the perceived difficulty or amount of work associated with such courses.

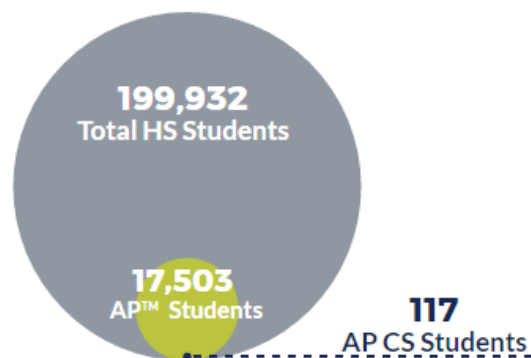
Recognizing the need for students skilled in computer science, in 2016 Louisiana joined the 32 states that allow [AP Computer Science A \(AP CS\)](#) to count for a core graduation requirement. This was made possible through a policy change by the State Board of Elementary and Secondary Education (BESE) allowing AP CS to fulfill a math credit for the TOPS University diploma. This policy went into effect in 2015-16 with the aim to incentivize



students to take the course. However, [when compared to 2014–15 data](#), the number of total students who took the AP CS exam statewide actually fell from an already low 164 to 150, and the passing rate dropped by almost 10 percent. This shows that AP™ may not be the best alternative to pursue in our efforts to incentivize student participation in computer science education.

AP™ courses have additional barriers to student participation. In 2015–16, only 40 percent of public high schools offered AP™ courses in Louisiana, and **less than 10 percent of public high school students took any AP tests.** **Moreover, of those few students, only 0.7 percent (117) took the AP CS test** — with less than half achieving a passing score of 3 or higher. These numbers show that although AP™ courses are already offered and count toward high school graduation in Louisiana, the vast majority fails to attract a significant enough number of students. Commendable efforts have been made to increase AP™ class participation and testing success, and the number of students who took AP™ tests in 2016 was over two and a half times higher than it was five years ago. Nevertheless, the tech sector workforce shortage requires a solution that can attract more students than AP™ currently does. Considering the goal should be to not only improve the quality of computer science education but also the rate of participation, AP™ has not yet demonstrated the potential to effectively address the workforce issue in the short run.

LA Public Schools AP™ Participation



Potential Expanded Computer Science Education

One initiative with the potential to overcome the key barriers to expanded high school computer science education is [Exploring Computer Science \(ECS\)](#), an introductory computer science high school course present in many school districts nationwide. ECS is a rigorous one-year program mapped to national academic standards, national computing standards, and California and Illinois state standards. The organization behind the ECS curriculum provides an array of publicly available online resources and free teacher training programs across the country, thus making it cheaper to implement and facilitating teacher certification.

[The research behind ECS](#) started in 2000 and led to the founding of the Computer Science Equity Alliance (CSEA) in 2004, aimed at increasing access to and participation in computer science in high school. Initially, and similar to our situation in Louisiana, the CSEA focused on widespread implementation of AP Computer Science due to it being the only rigorous standardized curriculum available at the time. But with the support of the National Science Foundation, teachers and computer science experts in Los Angeles collaborated with the CSEA to create ECS for the Los Angeles Unified School System. In the 2015-16 school year over 25,000 students nationwide participated in ECS, which is present in many school districts in the United States, including the 7 largest. In fact, even Mississippi, which typically lags behind Louisiana in education standings, [adopted ECS in 50 schools in 34 districts](#) starting this school year, training almost 70 high school teachers across the state.

ECS's most noteworthy supporter is the National Science Foundation (NSF). Underscoring the importance of human capital, the NSF stated that "the first step in helping students take full advantage of these opportunities is to ensure they have great teachers who are prepared to teach accessible, engaging, and rigorous courses," and [announced that it](#) will award over \$25 Million to fund initiatives that intend to further computer science

education. These initiatives include professional development for teachers for instruction of either ECS or AP Computer Science Principles, creation of instructional materials, and more.

Locally, through a partnership with IBM, the Foundation for East Baton Rouge School System recently formed the East Baton Rouge Parish School System Computer Science Learning Community, with the goal of “[increasing] student access, interest, and achievement in computer science K-12.” BRAC hopes this learning community will become a catalyst for the adoption of ECS or a similar curriculum throughout EBRPSS, the largest school district in the Capital Region.

Conclusion

BRAC is pleased that conversations with LDE policymakers indicate their full support and commitment to finding solutions to address the need for expanded computer science education. The potential for greater engagement of high school students in computer science courses to significantly impact the tech sector workforce is undeniable. **While BRAC will continue to track and advocate for improvements to computer science Jump Start pathways, our primary recommendation is to focus on students pursuing the TOPS University diploma by increasing access to high-quality computer science courses in school.** This may be done through implementation of the ECS curriculum or an equivalent non-AP™ alternative.

Many other states have made significant strides towards increased access to computer science curricula. What most of these initiatives have in common is the focus on maximizing student exposure to computer science at all schools and grade levels. In Louisiana, this means initially focusing on the high number of students pursuing the TOPS University diploma. Also worth noting is that many of the states seeing positive results have done so through public-private partnerships, the course of action chosen by the Foundation for East Baton Rouge School System through its partnership with IBM.

Every student should have exposure to quality computer science education. **A nationally recognized, rigorous computer science curriculum should be a part of Louisiana’s TOPS University diploma options in order to reach the largest number of students.** Through the implementation of an effective, low-cost program such as ECS, stakeholders would be able to attest to the rigor of the course and assure that teachers are being adequately trained and students are receiving the computing education they deserve. Regardless of the curriculum, whether it be ECS or something of similar caliber, all students in the Capital Region should have access to high-quality computer science courses no matter their school or grade level.

Diversification is essential to ensure the Baton Rouge Area’s economy remains one of the strongest in Louisiana and the high concentration of IT jobs found outside of tech companies shows that computer science education provides skills that go beyond the technology sector and can be useful in a variety of fields. Relying on only a few industries to promote growth in our economy may work short-term, but it represents a significant risk. Investing in computer science education will lead to a larger, better-prepared workforce capable of fulfilling the needs of this growing industry and will, in turn, promote further economic progress throughout the region.

Erika Haguette is responsible for conducting research, analysis and maintaining data on the key economic and policy sectors in the Baton Rouge Area, including workforce development, education, transportation and market trends impacting the region.