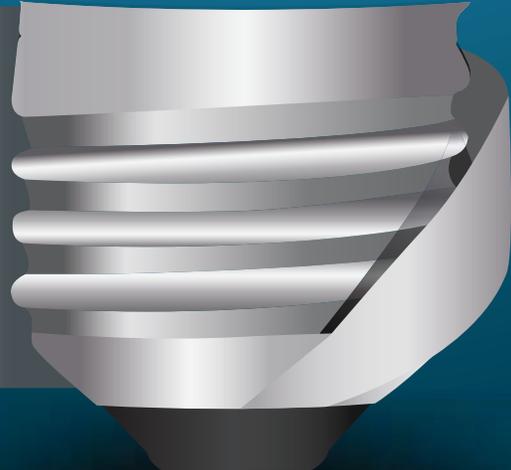


COMMONWEALTH CORPORATION

Building skills for a strong economy.



TOWARD A MASSACHUSETTS ECOSYSTEM OF LIFELONG LEARNING



Report of the Governor's Commission on Digital Innovation and Lifelong Learning

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May 2019

His Excellency Charles D. Baker
Office of the Governor
Massachusetts State House, Room 280
Boston, MA 02133

Dear Governor Baker:

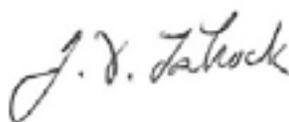
On April 23, 2018, you established the Commission on Digital Innovation and Lifelong Learning to advise you and Lieutenant Governor Polito on the future of higher education and workforce development in the Commonwealth of Massachusetts. Your Executive Order No. 581 directed the Commission to examine how the expanded use of innovative approaches in the lifelong learning space might better support the education and training needs of the people of Massachusetts, and to present a formal written report on its findings and recommendations. It has been my privilege to serve as the Chair of this Commission, and on behalf of my fellow Commissioners, I am pleased to submit herewith our report, *Toward a Massachusetts Ecosystem of Lifelong Learning*, for your consideration.

Our purpose has been to survey the main issues of concern, identify the many opportunities at hand, and issue a call for action, both in the near and longer terms. We have focused on outlining a conceptual vision of what a true ecosystem of lifelong learning in Massachusetts might look like, identifying the partners, structures, and resources that would be necessary to foster it, and detailing strategic and actionable steps that can be undertaken immediately. We believe this report offers a roadmap to develop an integrated lifelong learning system that in time will both leverage and strengthen our pre-school, elementary, secondary, and postsecondary education systems, and enable the people of our Commonwealth to meet and master the demands of a rapidly evolving workplace on a much greater scale.

Our Commission believes that the recommendations of this report can dramatically increase access to education and skill-building opportunities for a largely untapped market of learners—both those who are employed, and those who seek employment—and more closely align our postsecondary education and training ecosystems with the key industry sectors that are most crucial to our Commonwealth's future: Healthcare, Information Technology, and Advanced Manufacturing.

I know I speak for all our Commissioners in expressing our appreciation for the privilege of serving the Commonwealth in this capacity. Though this report represents the culmination of the Commission's work, as you will read in the forthcoming pages, it will soon inaugurate new action. In keen anticipation of this future progress, I remain,

Respectfully yours,

A handwritten signature in cursive script that reads "J. D. LaRock". The signature is written in dark ink and is positioned above the printed name and title.

Dr. J.D. LaRock
Commission Chair



MEMBERS OF THE COMMISSION ON DIGITAL INNOVATION AND LIFELONG LEARNING

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President and CEO
Commonwealth Corporation

Chris Gabrieli, Vice-Chair
Chairman
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Ex officio

Carlos Santiago
Commissioner
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Higher Education
Ex officio

INTRODUCTION

Governor Charles D. Baker issued Executive Order No. 581 on April 23, 2018, establishing the Commission on Digital Innovation and Lifelong Learning as an advisory body to make recommendations to the Governor and Lieutenant Governor on two main issues:

- (1) How to make use of innovations in higher education and workforce training to increase the education, skills, and employability of the people of Massachusetts throughout their lives; and
- (2) How to connect lifelong learning outcomes more closely with the needs of the Massachusetts economy and its future development.

The Commission was instructed to pay particular attention to the specific needs of adult learners, diverse learners, and opportunity youth in developing its recommendations.

The Commission pursued this charge by seeking to understand better the influences of, and opportunities contained within, the following realities:

- Rapid changes in technology, population demographics, and the state of the higher education sector are affecting the future employment and economic landscapes of our Commonwealth.
- Many adult, working, and out-of-school learners face significant barriers that constrain their ability to utilize traditional postsecondary education and training programs to gain and maintain the skills they need for a successful career. These barriers include constraints related to cost, time, program flexibility, transportation, childcare, and housing.
- Digital learning options and other innovative approaches for adult, working, and out-of-school learners have emerged and matured in recent years. These include online, hybrid, and competency-based learning education programs, prior learning assessment and experiential learning models, and soft skill development curricula. However, most of these are not yet available to Massachusetts residents at scale.
- Healthcare, Information Technology, and Advanced Manufacturing are among the most vital employment sectors for Massachusetts' future prosperity. As such, they should be important focal points of any meaningful effort to align lifelong learning opportunities with employer needs.
- Addressing needs and priorities on a systems basis is appropriate in order to achieve the scale necessary to ensure the long-term economic health of the Commonwealth of Massachusetts and its people.

Over the course of its inquiry, the Commission relied upon discussion among Commissioners and research conducted by the project team at Commonwealth Corporation to develop the findings and recommendations contained in this report. The Commission also profited from the experiences of employers as well as education and training providers, who provided valuable insights about emerging practices in formal presentations to Commissioners.

Finally, early deliberations of the Commission suggested that it would be beneficial to adopt a committee structure to address specific aspects of the Commission's vision more deeply. To this end, the Commission divided itself into three working committees, each with its own objectives, which met in July and August 2018 in the full Commission's stead.

The full text of Executive Order No. 581, a schedule of the Commission's public meetings (including the meetings of its Committees), a list of presentations to the Commission, a roster of Committee memberships, a bibliography of the literature that contributed to the report, and an acknowledgment of the Commission's staff are included in the appendices that conclude this document. Notes and audio transcripts of the Commission's meetings can be found at <http://commcorp.org/programs/commission-digital-innovation-lifelong-learning/>.



OUR COMMONWEALTH

Massachusetts has long been a leader in education, in the United States and beyond. In the colonial era, our Commonwealth gave the nation her first public school system, first institution of higher learning, and the first education law, enshrining learning as the foundation of a healthy society. As America transitioned from an agrarian to an industrialized economy over the course of the 19th century, Massachusetts established the nation's first state board of education, first state-funded teacher's college, and popularized common school education.

A generation ago, in response to growing concerns about the global competitiveness of our Commonwealth and its people, Massachusetts enacted pioneering K-12 education reform that implemented a transformative standards and accountability system, established and then expanded charter schools, and intensified efforts to close achievement gaps between students of different backgrounds. More recently, a resurgent workforce development system, recently rebranded as MassHire, is training new legions of un- and under-employed residents to thrive and prosper in the current tight labor market.

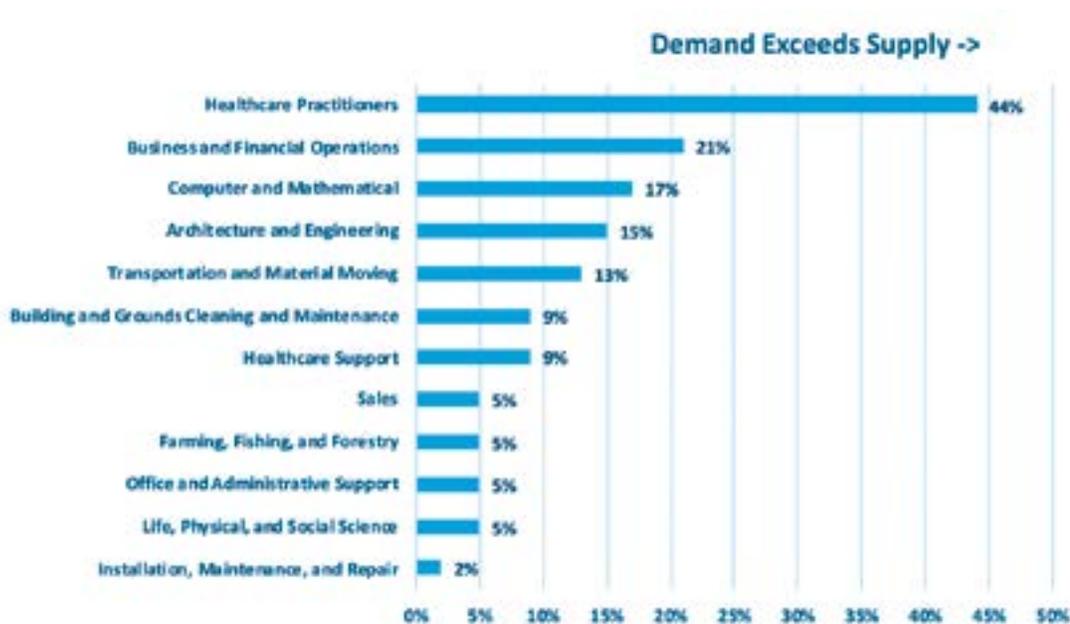
This history of excellence and innovation has yielded impressive results.¹ Massachusetts is widely acknowledged as the preeminent state in the nation in education, and on par with the best education systems in the world. We are home to an abundance of leading public and private colleges and universities. We are well positioned to remain at the forefront of the national and global discourses on education and training, and the forefront of human capital development.

Maintaining this lead, however, requires continued vigilance. This is especially true in light of a confluence of changes taking place right now: technological changes that are transforming the shape of work, demographic changes that are augmenting the diversity of our Commonwealth and its workforce even further, and generational changes that are dramatically diminishing the number of learners entering postsecondary education in Massachusetts.

Massachusetts is the most educated state in the country. However, we are experiencing a decline in postsecondary enrollments—a phenomenon that is already visible in the growing number of colleges that are folding, shrinking, and merging in our state. And there may be more to come: analysts project that the number of high school graduates in Massachusetts will decline by up to 15 percent in the next 15 years. This portends an unprecedented reduction in demand for higher education as we know it—and an unprecedented increase in the demand for qualified workers to fill jobs.²

As it stands, Massachusetts employers are already concerned about their ability to hire qualified employees. Despite record-high employment in the Commonwealth today, key jobs within critical industry sectors remain unfilled. The persistence of the “skills gap,” across many industries, demonstrates a disjuncture between the needs of employers and the capabilities of our workforce.

FIGURE 1: Job Demand vs. Supply Ratio by Occupation, U.S. (2018)



Source: Burning Glass

Over the course of the next decade, looming workplace transformations brought on by technology will only widen this gulf.

We believe these factors create a dual imperative for our Commonwealth. First, if we are to sustain our economy, we must re-evaluate whom we consider the core “market” of learners in our postsecondary education and training systems. Next, we must spur a reconceptualization of the range of programs, offerings and models that these systems provide, so we can successfully prepare many more people—and a broader range of people—for today’s and tomorrow’s jobs.

We must re-evaluate whom we consider the core “market” of learners in our postsecondary education and training systems. Next, we must spur a reconceptualization of the range of programs, offerings and models that these systems provide.

To that end, this report seeks to spark the activity that will establish a comprehensive ecosystem of lifelong learning in Massachusetts—one that will accommodate the learning and training needs and aspirations of a broad continuum of learners more fully. It is a call for ambitious change, yet it is well in step with our history of formulating new approaches to meet the evolving demands of our society. Most of all, it is a call for Massachusetts to embrace the full meaning of its identity as a Commonwealth by providing increased education and workforce opportunities that benefit all its people.

As a noted U.S. education commission observed a generation ago, history is not kind to idlers, but looks favorably upon enterprise and innovation.³ Our Commonwealth's past, with its rich legacy of pioneering action in education, is testament to this fact. Now, we need to meet a new range of challenges to solidify Massachusetts' place as an educational and economic leader—and most importantly, a positive future for our populace.



OUR CHALLENGE

The challenge to our ability to meet the educational needs and aspirations of learners in Massachusetts is being posed on three distinct fronts. First, the continued integration of new technologies in the workplace is redefining the mix of skills that workers need if they are to have a successful and sustained career. Second, Massachusetts is experiencing important demographic shifts that are redefining the population of learners and workers. Finally, a present and accelerating demographic decline in the number of high school graduates and college-goers in our Commonwealth challenges us to create new methods for learning and credentialing that are open to a larger segment of the population.

TECHNOLOGY

It is well documented that the emergence of new technologies is shifting the mix of products and services in our economy, as well as the processes that are used to create them. Experts agree that the nature of work is now undergoing a fundamental transformation. Breakthroughs in automation and artificial intelligence are already affecting work and the workforce, and are expected to have large-scale impacts in the next decade. For example, studies project that:

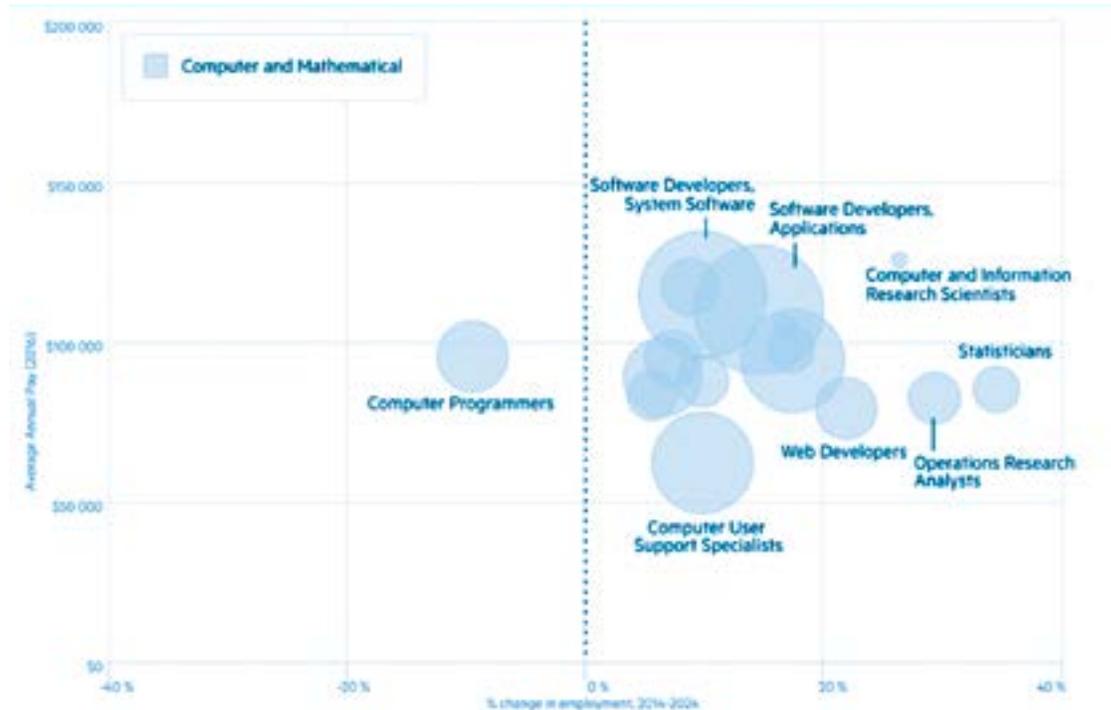
- Up to 44 percent of current work activity hours in the U.S. could be automated by 2030;
- Two out of three occupations could see at least 30 percent of their constituent work activities become automated; and
- Half of all existing work activities are already technically automatable by adapting currently demonstrated technologies.⁴

Unlike some alarmist prognosticators, our concern is not that the rise of robots and the application of artificial intelligence in the workplace will usher in a dystopian future of technological unemployment. In fact, because Massachusetts already has such a strong concentration of employers in the computer, software, and technology industries, our Commonwealth is likely to be among the winners as our society rushes headlong into the AI age.

Rapid technological change will exacerbate skills gaps, increasing the mismatch between employer demand for skilled talent and the capabilities of our available workforce.

As Figure 2 shows, forecasts indicate that nearly every occupational category having to do with computers, mathematics, and information technology will grow over the next half-decade.

FIGURE 2: Predicted Growth of Computer and Mathematical Jobs in Massachusetts through 2024



Source: Bostonmix, Massachusetts Executive Office of Labor and Workforce Development

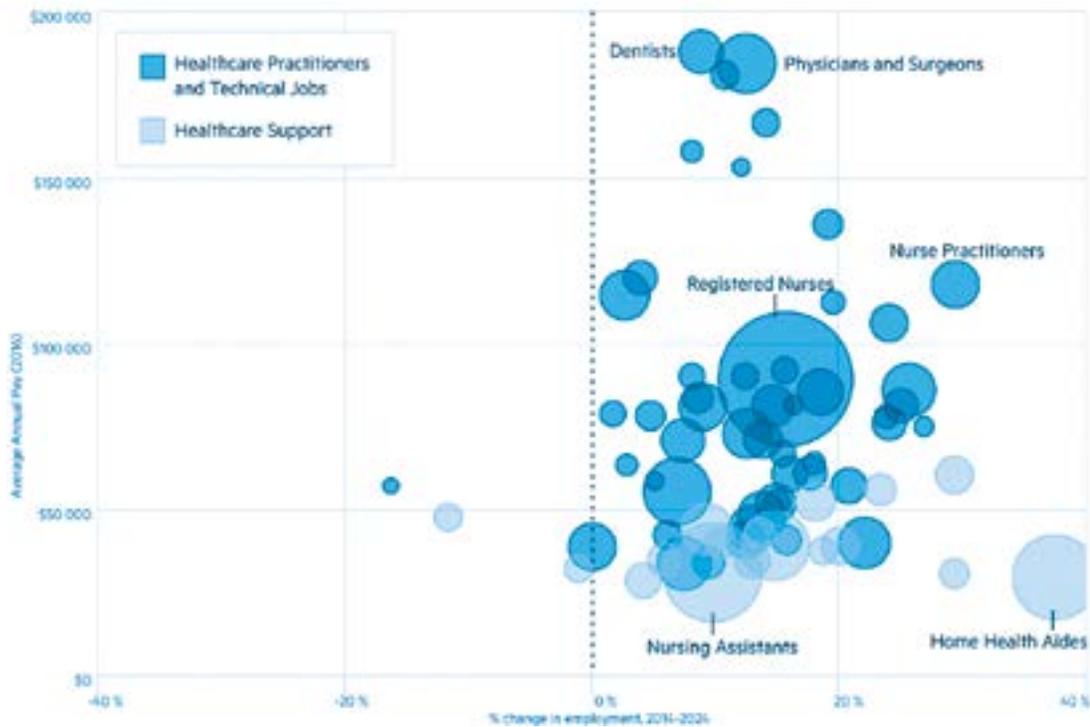
Instead, our concern is that existing skill gaps in the technology and information technology fields will grow wider as these new jobs are created. According to one study, there are already seventeen open technology jobs in our Commonwealth for every recent in-state computer science or mathematics graduate.⁵ Rapid technological change will exacerbate these skills gaps, increasing the mismatch between employer demand for skilled talent and the capabilities of our available workforce.

To be sure, some Massachusetts workers would do well to mind the digital doppelgangers in their midst. The fastest-declining jobs in Massachusetts through 2024⁶ are almost entirely comprised of occupations that rely on a human to manipulate a machine, but are now being replaced by jobs that involve the operation of computers—or by machines and robots that operate themselves. These workers will face a growing imperative to leverage their existing skills and knowledge so that they can be applied to new technological contexts: in a phrase, to move from tool-and-die, to A-and-I. Their success will depend both on the willingness of their employers to help them shift to these new contexts, and in the timely availability of education and training programs to help them do so.

Yet the biggest changes to the Massachusetts jobs landscape in the foreseeable future will be spurred not only by silicon and software, but by flesh and bone. As Figure 3 shows—and as the Workforce Skills Cabinet Regional Skills Blueprints confirm—healthcare will be a main driver of the state’s job growth in the years to come. Like computer and IT occupations, nearly every type of healthcare job is expected to grow in the next half-decade.

Notably, many of these will be entry-level—and lower-wage—jobs. This will create its own imperative: a need to provide employees in these jobs with upskilling opportunities so their work serves as a ladder to opportunity, rather than an anchor that chains them to their economic status quo. Again, the willingness of their employers to be open to such approaches—and to engage with the complicated institutional and regulatory issues that affect wage structures in the healthcare sector—will be vital.

FIGURE 3: Predicted Growth of Healthcare Jobs in Massachusetts through 2024



Source: Bostonomix, MA Executive Office of Labor and Workforce Development

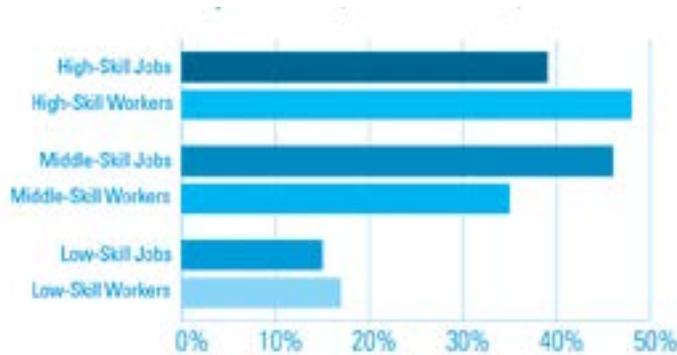
We need to provide employees in lower-wage jobs with upskilling opportunities so their work serves as a ladder to opportunity, rather than an anchor that chains them to their economic status quo.

FILLING THE SKILLS GAP

So what is the most promising approach to deal with this oncoming wave of job growth, change, and transformation across these key Massachusetts employment sectors? In recent decades, the Commonwealth's answer has been simple: produce more bachelor's and master's degree graduates.

Our state is excellent at producing highly skilled postsecondary graduates—it's what we're known for. As a matter of fact, Massachusetts is in the enviable position of having a surfeit of high-skill workers, even as the proportion of high-skill jobs in our economy is large, compared to most other U.S. states.

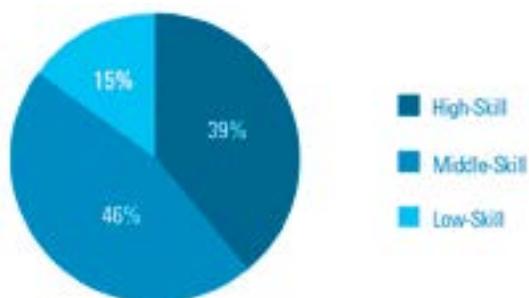
FIGURE 4: Available Jobs vs. Available Workers in Massachusetts by Skill Level (2015)



Source: National Skills Coalition

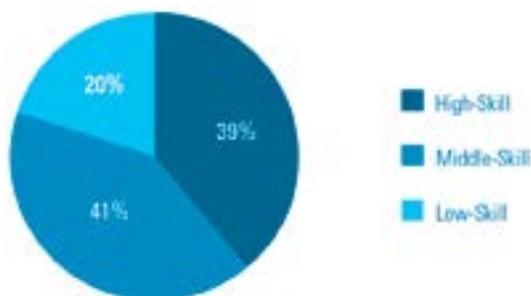
Yet as Figures 5 and 6 show, though high-skill jobs requiring a four-year or advanced degree represent a significant part of our state's economy, and will in the years to come, that is not where the action truly lies. Instead, skilled jobs that require education beyond high school, but not necessarily a college degree, will remain the leading category. What is more, a growing share of job openings in the coming years will be at the low end of the skills spectrum—underscoring the need to give already-working people learning and training opportunities that enable them to move up to higher skill jobs, in ways that are responsive to the rhythms and circumstances of their lives.

FIGURE 5: All Jobs in Massachusetts, by Skill Level (2015)



Source: National Skills Coalition

FIGURE 6: Anticipated Job Openings in Massachusetts, by Skill Level (through 2024)



Source: National Skills Coalition

This middle-skill mandate suggests the need for a shift from Massachusetts' traditional posture over the years, which has tended toward a "college for all" mentality, and a focus on the baccalaureate degree as the key to the economic kingdom.

Make no mistake: when a resident of our Commonwealth earns a bachelor's degree, that is a good thing. But earning a bachelor's degree is not always feasible for many learners, especially those who are already working. Nor is it always necessary. Indeed, a growing body of evidence suggests that an over-focus by employers on the bachelor's degree is excluding many Massachusetts residents from job opportunities for which they are actually qualified. For example, recent work by Commission member Joe Fuller indicates that more than 280,000 jobs in Massachusetts are vulnerable to degree inflation.⁷ Moreover, work by Fuller and Burning Glass CEO Matt Sigelman indicates that many job listings that require previous work experience are well suited for on-the-job training approaches, such as apprenticeships. According to their estimates, 16.6 percent of all job postings in Massachusetts that require 0-2 years of work experience could be filled with apprenticeships. This translates into nearly 28,000 jobs.⁸

Taken together, these insights call for a more nuanced, multifaceted approach to postsecondary learning and training—one that incorporates a wider array of models, and that aligns learning pathways more intentionally with employers' needs.

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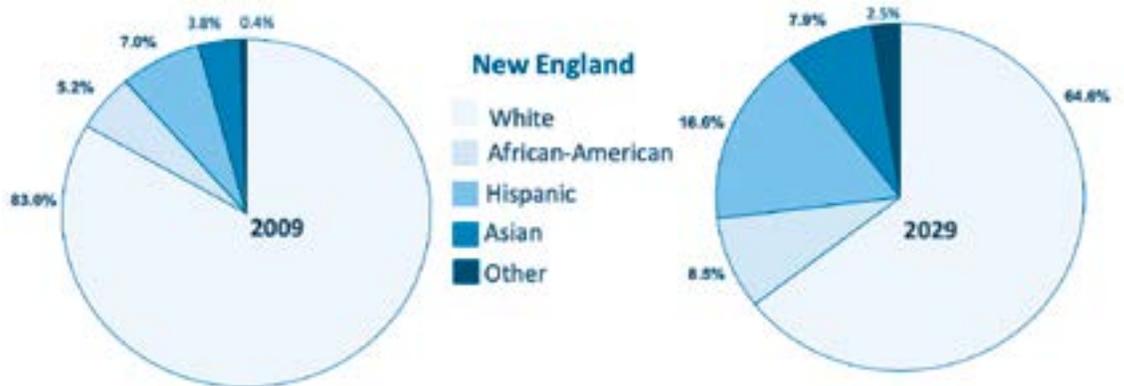
We need to recommit to prioritizing the specific learning and working needs of recent immigrants and English Language Learners.

CHANGING DEMOGRAPHICS

The advance of technology is only one dimension of our challenge to support the educational needs and aspirations of a broad continuum of learners. Equally important shifts are changing the makeup of our Commonwealth and reconstituting our learning and working populations.

New England continues to diversify rapidly. Demographers project large increases in the region's Latino population, and meaningful increases in the share of other ethnicities as well. In Massachusetts alone, by 2030, Latinos are projected to make up 22 percent of all public high school graduates in our Commonwealth—an increase from less than 14 percent in 2018.⁹

FIGURE 7: Predicted Change in New England Labor Force Demographics through 2029



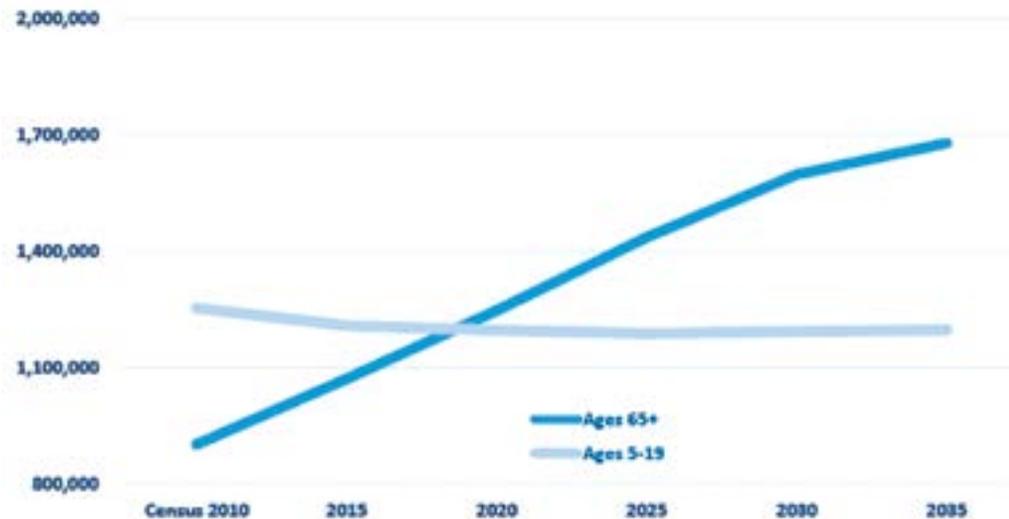
Source: Modestino, Mismatch in the Labor Market

Currently, one-fifth of the population in Massachusetts speaks a language other than English at home, with the lion's share of this group comprised of Spanish-speakers. Additionally, almost six percent of the state's households are linguistically isolated, meaning that no member of the household aged 14 years or over is able to speak English very well.¹⁰ English-speaking ability is a significant determinant of a worker's ability to succeed in the job market:¹¹ 95 percent of respondents in a recent survey of Massachusetts employers rated English language proficiency "important" or "very important" for their employees' career advancement.¹²

Although Massachusetts residents have achieved higher levels of education in recent years, these gains are uneven across race and ethnicity groups. Growth in postsecondary attainment for African-American and Latino residents has lagged: only 24 percent of African-Americans and 18 percent of Latinos hold a bachelor's degree or higher, compared with 41 percent of the overall state population.¹³ We are gravely concerned that these current disparities in postsecondary attainment will worsen if we do not take action to make education and training opportunities more accessible to a broader continuum of learners. As such, we need to recommit to prioritizing the specific learning and working needs of recent immigrants and English Language Learners.

The demographic changes occurring in the Commonwealth are also made plain by the average age of our population, which is steadily rising. Older adults (age 65+), who comprise the largest and fastest-growing segment of the U.S. population, are projected to make up almost a quarter of our Commonwealth's population by 2035; in 2016, older adults comprised only fifteen percent of the overall population.¹⁴

FIGURE 8: Population Projections of Older and Younger People in Massachusetts through 2035



Source: University of Massachusetts Donahue Institute

As workers choose to postpone retirement and extend their careers, our traditional model of delivering education and training at the front end of a person's life must change, so that older workers can seek the new skills needed to be employable later in life.

THE COST AND CUSTOMER CRISIS IN HIGHER EDUCATION

Recent years have witnessed ballooning costs and stagnant achievement levels in higher education. This has both tested the value proposition of postsecondary education as it is currently constructed, while simultaneously inhibiting learners' ability to pursue it. Although Americans almost universally agree upon the importance of higher education, eight in ten U.S. adults agree or strongly agree that colleges and universities must change in order to better meet the needs of today's students.¹⁵

We believe that jobs and postsecondary learning are inextricably linked. It is a simple fact that a person's ability to find a good job and build a successful career in our economy hinges more than anything on their education. For example:

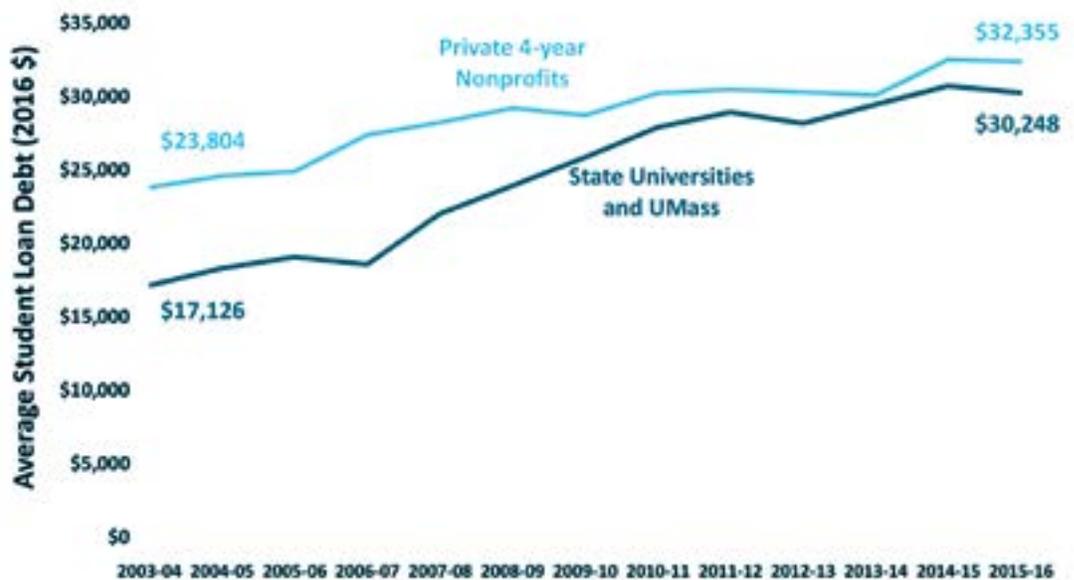
- Fifty-five percent of high-quality jobs go to workers who hold at least a bachelor's degree.¹⁶
- The unemployment rate is 2.5 percent among those with a bachelor's degree, compared with 4.6 percent among high school graduates who never attended college.¹⁷
- Over a lifetime, individuals with a bachelor's degree make eighty-five percent more (on average, a total of \$2.8 million) than those with only a high school diploma.¹⁸

The value of postsecondary education in the job market will continue to increase with the widespread integration of new technologies in the workplace. However, far too many learners find themselves trapped between the Scylla of ineffectual education and the Charybdis of student debt. Between 2000 and 2015, the average total cost of attendance at public four-year institutions in the U.S. increased by more than 70 percent.¹⁹ In Massachusetts, 65 percent

Far too many learners find themselves trapped between the Scylla of ineffectual education and the Charybdis of student debt.

of students attending public and private four-year colleges carried student loan debt in 2016, with an average debt load of more than \$30,000.²⁰ Yet higher levels of student achievement have not accompanied this rapid escalation in costs; rather, academic outcomes have stagnated. Fewer than half of first-time, full-time bachelor's degree-seeking students at four-year institutions graduate on time, and only about 60 percent do so within six years.²¹ Many never graduate at all.

FIGURE 9: Average Student Debt Levels of Massachusetts College Graduates, 2016



Source: Massachusetts Budget and Policy Center

At the same time, long-held beliefs about the connection between traditional higher education degrees and the demands of the job market are now being questioned. According to a 2013 McKinsey survey of recent four-year college graduates, nearly half report that their job does not require a four-year degree.²² The same study finds that 40 percent of graduates from the country's top colleges were unable to find jobs in their chosen fields.

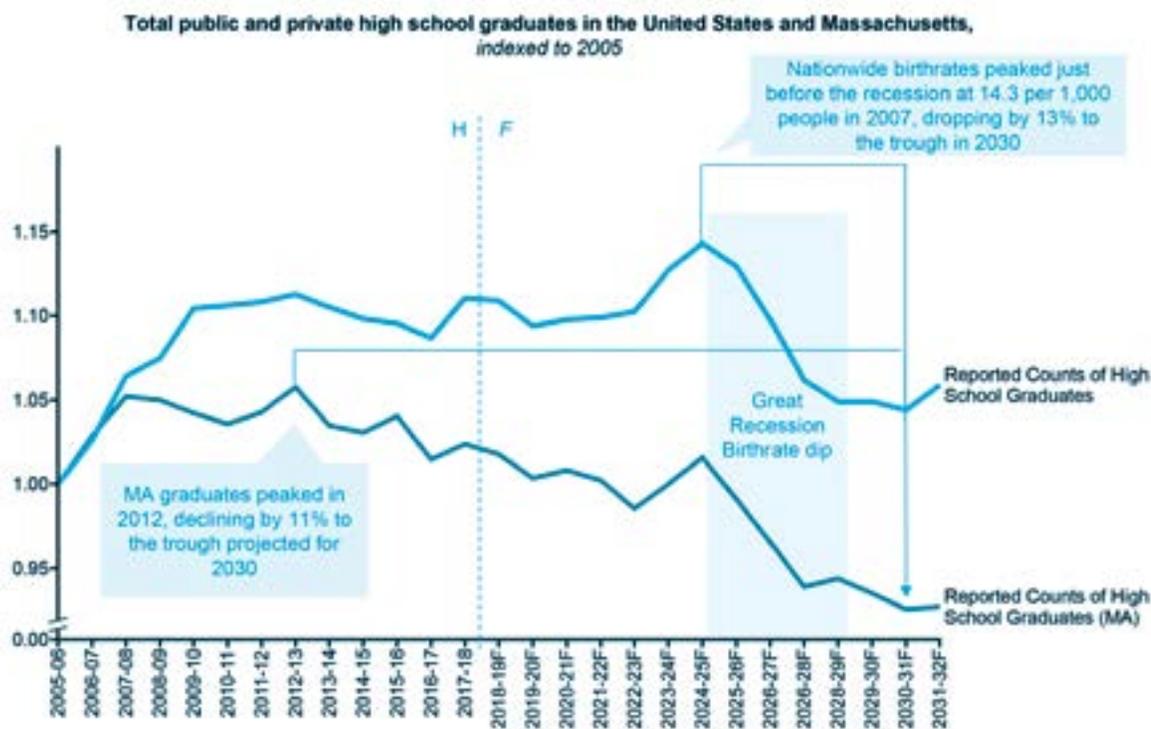
Perhaps more ominously, the wage premium for bachelor's degrees appears to have hit a ceiling. According to a 2017 study by Robert G. Valletta of the Federal Reserve:²³

The expansion of the higher education wage premium has not been completely uniform over time...with rapid growth in the 1980s followed by progressively slower growth ("flattening"). During the years 2000 through 2010, the wage premium for college-educated workers rose by only a small amount. Most recently, from 2010 to 2015, the wage premium for those with college and graduate degrees was largely unchanged, suggesting that the factors propelling its earlier rise have disappeared.

All of this strongly suggests that we need to shift our focus from merely increasing the number of bachelor’s degrees to developing a more differentiated set of industry-recognized postsecondary credentials—including micro-credentials that align to the job market.

This shift in focus will be timely as higher education faces the steepest drop-off in its traditional learner base in years. According to a number of projections,²⁴ the number of high school graduates in Massachusetts will decline by around 15 percent by 2032. Meanwhile, the number of college-going students in Massachusetts will decline by more than 15 percent by 2039. If these forecasts come to pass, they will not only entail an unprecedented customer crisis for traditional higher education institutions, but also significantly compromise our ability to ensure a steady supply of entrants into a skilled workforce.

FIGURE 10: Predicted Declines in Traditional Population of College Students, Massachusetts vs. U.S. (through 2032)



Source: Western Interstate Commission on Higher Education

We need to shift our focus from merely increasing the number of bachelor’s degrees to developing a more differentiated set of industry-recognized postsecondary credentials—including micro-credentials that align to the job market.

We believe that the strength of our Commonwealth's postsecondary ecosystem lies in its pluralism and diversity. The story of higher education in Massachusetts—and indeed, the story of the sector as a whole—has been one of continuous innovation and expansion. Often compelled by external changes, colleges and universities have regularly evolved in response to new learners and new learning goals. The University of Massachusetts, for example, began as a single land-grant college founded to provide instruction in scientific agriculture, and has since expanded to a diverse network of five full-fledged public research universities, buttressed by UMassOnline. Our current array of state universities largely emerged from the old “normal schools,” which focused on preparing teachers. The growth of community colleges in the 20th century further expanded postsecondary educational opportunities for residents of the Commonwealth at lower cost, and often with learners' workforce needs in mind.

As we face yet another inflection point in our economy and society—and hence, an inflection point for the institutions that help propel them—we welcome the dawn of postsecondary education's next stage of evolution. We believe a new model for lifelong learning ought to be at the core of this next evolution: one that not only leverages the strengths of our existing education and training institutions, but also includes more options that will enable a broader continuum of learners to gain skills and credentials, work experience, and share more equally in the prosperity of our Commonwealth.



OUR OPPORTUNITY

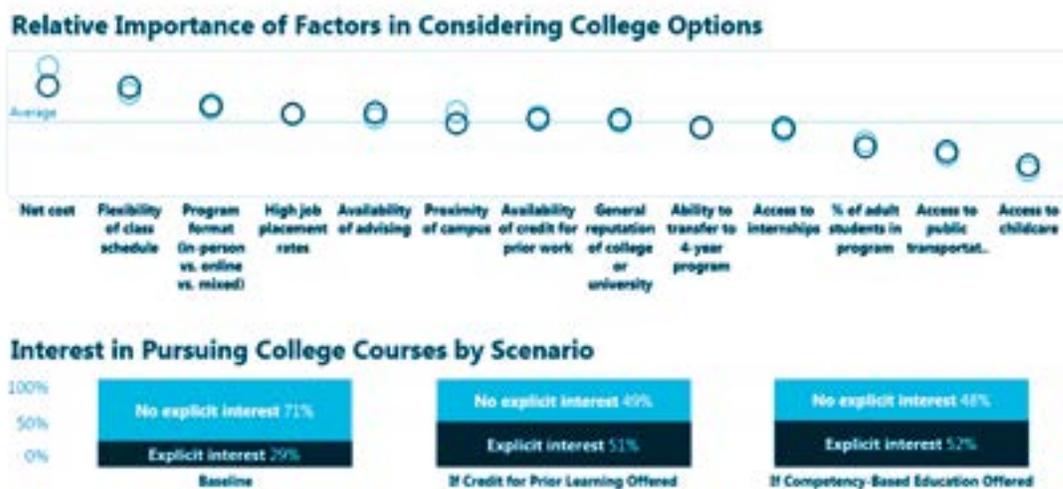
In view of the landscape just described, the opportunity before us is to dramatically increase access to postsecondary education and training for what we believe is a largely untapped market of learners. We note that almost one in five adults in our Commonwealth have some college credit but lack a full credential.²⁵ Our goal is to address, specifically, the needs of these adult learners—the majority of whom are incumbent workers with some college but no degree, or with no college experience—as well as the older segment of the “opportunity youth” population (people who are between 16 to 24 years old and are neither in school nor working).

Our opportunity is to embrace and promote innovative educational practices that better meet the needs of these underserved target populations. High-quality online educational delivery—at this point, a maturing, well-tested approach, but one that has not been leveraged to its full extent in the Commonwealth—needs to be scaled up further to bring greater postsecondary opportunity to our people. Other approaches such as competency-based learning, prior learning assessment systems, experiential learning models, and soft skill development curricula should be scaled further as well. Our challenge is to marshal these various approaches into an organized system that supports lifelong learning—meeting the needs of learners as they prepare for labor force entry, and seek to develop further skills that will help them advance from the entry level.

There is already a high degree of interest in such approaches. An October 2017 survey of adult learners in Massachusetts with high school diplomas but no bachelor’s degrees found that a baseline of 71 percent of respondents indicated no interest in enrolling in traditional college courses. However, when the same respondents were asked to reassess their interest if credit for prior learning were offered, and again if competency-based learning were offered, the results flipped: each time, a majority of respondents indicated strong interest in pursuing postsecondary learning, given these features.²⁶

Our opportunity is to align learning systems to serve these learners—whom we might more accurately call “New Traditional” students—and let them know that education systems should bend to their needs, not the other way around.

FIGURE 11: Factors Affecting Adult Learner Interest in Attending College



Source: Massachusetts Department of Higher Education

Our opportunity is to induce a shift in the way we conceptualize the market of learners in the Commonwealth—and indeed, a shift in whom we understand a “typical” postsecondary learner to be. Popular conceptions of what college is, and who college students are, hew tightly to images of recent high school graduates who enroll full-time on a physical campus and spend four years in broad preparation and a socializing experience. This image stigmatizes “non-traditional” learners who do not conform to this mold, making them feel as though they are somehow acting incorrectly if they do not follow this idealized—and often unduly expensive—path.

Ironically, the reality is that these so-called “non-traditional” students have outnumbered traditional students in college for decades. In fact, since 1995, more than 70 percent of all undergraduates in the U.S. have possessed at least one characteristic of a non-traditional learner.²⁷ Our opportunity is to align learning systems to serve these learners—whom we might more accurately call “New Traditional” students—and let them know that education systems should bend to their needs, not the other way around.

One way to accomplish this is to reject time as a proxy for learning. An important shift has begun that emphasizes learning through the progressive acquisition and mastery of specific competencies. Competency-based learning helps ensure that learners master critical skills needed for success in a job or career. This approach also helps higher education move away from a time-based approach that purports to measure learning based on the number of hours a learner has spent sitting in a class. Focusing on competencies not only helps students identify their strengths and address their weaknesses, but also encourages institutions to design more flexible educational pathways that do not mandate physical attendance or the passage of a set duration of time in order to earn a credential.

In this vein, we recognize that each learner's journey is unique, and cannot be modeled by a lockstep pathway. There is no reason why the student who completes a degree or credential in six years should be viewed any differently from one who completes it in two, four, or eight years. An institutional focus on outcomes rather than seat time would encourage learners, who might otherwise feel dispirited, to complete their degree or credential regardless of the time that they require.

Our opportunity is to capitalize on the positive momentum that already has been advanced by a cornucopia of public and private players in the digital innovation and lifelong learning spaces. Entities such as edX, UMassOnline, Western Governors University, College for America and Duet, as well as corporate leaders like Partners HealthCare and General Electric, are already delivering flexible education and training programs to a broad continuum of learners in our Commonwealth, and beyond. The positive results they have achieved hint at the impact that could be generated if a well-supported ecosystem were developed to coordinate and support these entities, build common goals, areas of focus, and a common language between institutions and employers, and align lifelong learning outcomes with the economic priorities of key industry sectors in Massachusetts, thus narrowing the skills gap.

An institutional focus on outcomes rather than seat time would encourage learners, who might otherwise feel dispirited, to complete their degree or credential regardless of the time that they require.

LEARNER PROFILE:

YAZIRIS LUCERNA

Yaziris Lucerna is currently employed as the OBGYN Finance Coordinator at Brigham and Women's Hospital in Boston. She is also currently a learner enrolled in an innovative program developed by College for America, at Southern New Hampshire University, in collaboration with Partners HealthCare, Inc. The program is an online, competency-based Certificate in Healthcare Management Fundamentals that fully articulates to both associate and baccalaureate degree programs. The overall sequence is designed to increase access to higher education for working adults—focusing on learners who are current employees of Partners member hospitals and who are interested in earning additional credentials in order to improve their career.

After graduating from high school, 'Yari' started college but found that it was a financial burden. She dropped out of college and started working in an administrative support job at the Massachusetts General Hospital, a founding member of the Partners HealthCare network.

Working at MGH contributed to the development of Yari's career interest in healthcare management. She readily participated in several specialized staff trainings – CPT testing, a math boot camp, a course in medical terminology, and an online college prep course. She regularly received job promotions, and was recognized twice with an award for administrative excellence.

She perfectly exemplified the type of employee that Partners sought to support with the online program. Learners are drawn from Partners HealthCare staff; program offerings focus on developing frontline entry-level staff, helping develop both foundational skills as well as skills that contribute to promotability and career advancement.

In the foundation level Certificate in Healthcare Management Fundamentals program, students master key competencies such as creating positive patient experiences, learning medical terminology and concepts, and understanding ethical obligations. Students complete competency-based, real-world projects, developing valuable skills in the process. The competency-based approach allowed Yari to learn at her own pace, and she was able to balance her studies with the demands of raising a child as a single mother. Course competencies are directly related to what Yari was being asked to deliver at work.

Yari believes that the student support system created for the program is critical. Coaches at both College for America and at the employer site provide support and structure for learning. The Partners advisor helps manage the learning process and also prioritizes each learner's effort, making sure that the online experience has a context and relation to the learner's expected on-the-job delivery. The program's online approach never creates a situation where the learner feels like they are on their own.

Having earned a certificate, Yari is currently enrolled in the associate's degree component of the program sequence. She has set a personal goal to complete a bachelor's degree by the time her oldest daughter graduates from high school.



EDUCATION AND WORK

Learning is valuable for learning's sake. We recognize and are heartened by the fact that many learners in our Commonwealth obtain higher education not just as a means to an end, but as an end in itself. Yet we must also acknowledge that the vast majority of students who decide to pursue education beyond high school do so with the concrete goal of employment in mind. The link between higher education and work is indisputable: sixty-seven percent of U.S. adults believe that it is very important to attain a college degree in order to get a good job, and the prospect of securing a better job upon graduation is consistently the most prevalent reason that incoming freshmen cite for choosing to attend college.²⁸

Nonetheless, students do not always receive the job-related benefits of postsecondary education they set out to obtain. Barely a third of recent graduates from four-year institutions believe that they are entering the workforce with the skills and knowledge to be successful in the job market.²⁹ Meanwhile, employers in Massachusetts consistently report that they are unable to find skilled workers to fill jobs, many of which stay vacant for weeks at a time, just as they complain of their employees' lack of preparation, even for entry-level positions. This persistent mismatch between employee preparation and employer demands suggests that our learning and training systems can—and should—do much more to prepare students for the workplace.

A troubling asymmetry of perception between educators and employers exemplifies this need. One recent study reports that ninety-six percent of college and university chief academic officers believe their institution is very or somewhat effective at preparing students for the workforce. Meanwhile, a contemporaneous poll found that barely a third of business leaders agreed.³⁰ All too often, the worlds of education and work seem to operate in separate domains. Postsecondary institutions rarely explicitly tie a student's completion of a degree or credential to that student's career readiness. College graduates enter the labor market hoping—but not necessarily knowing—that they have developed the suite of hard and soft skills they need to get a good job.

People simply cannot rely on the skills that they acquired in the first quarter of their lives to sustain them economically—and neither can their employers.

FIGURE 12: Why Employers Say It's Hard to Fill Positions, U.S. (2017)



Source: Manpower Group

This lack of integration between the worlds of education and work is no longer sustainable. Today, a typical adult will occupy a series of jobs across a variety of industries that each will demand a different skill mix. Workers are now required to be regular and ongoing learners, continually developing and updating existing skills and acquiring new ones to keep pace with new technologies, new products and services, new and different job requirements, and shifts that are needed to successfully manage a long-term career. People simply cannot rely on the skills that they acquired in the first quarter of their lives to sustain them economically—and neither can their employers.

As such, future efforts to make postsecondary education more accessible to a broad continuum of learners cannot be exclusively informed by purely academic goals and objectives; we must also incorporate insights from the world of work. After all, employers are clear about what they need. They emphasize the importance of independent and critical thinking, the ability to write clearly, and basic mathematics skills. They value candidates who are adept at soft skills such as oral communication and teamwork.³¹ They prize employees who demonstrate qualities like initiative, problem solving, and leadership.³²

Our goal must be to bring the worlds of education and work into communion with each other. New approaches that encourage deep and intentional co-design between employers and education providers will help ensure that learning content is responsive both to the demands of the workplace, as well as the aspirations of each learner. And prioritizing for workforce needs in postsecondary education will help yield a robust pipeline of skilled talent from education to employment that is vital to the continued strength of our Commonwealth's economy.

LEARNER PROFILE:

ROUAA AHMAD

Rouaa Ahmad had already earned a four year bachelor's degree, but found that she needed to shift directions in order to find employment in the burgeoning information technology sector. Rouaa grew up in Iraq, and lived in Syria for three years before coming to the U.S. as a refugee with her family at the age of ten. She graduated from Lynn Classical High School, and participated in a Workforce Innovation and Opportunity Act (WIOA)-funded after-school mentoring and career path program at Girls, Inc.

Rouaa enrolled at Salem State University, earning a bachelor's in science degree—graduating magna cum laude with a major in Psychology and a minor in Human Biology. Although she earned an academic degree, Rouaa discovered that she had no real connection to her desired career after graduation. She worked with counselors at the North Shore Youth Career Center, where she learned about a pilot training program designed for young people in their twenties who were interested in the information technology sector but could not find entry-level employment because they lacked a relevant credential.

She entered the program, taught through North Shore Community College, and began training for IT Helpdesk Certification. The class was taught through a combination of approaches, with in-person classes combined with online homework, assessments, and examinations, as well as online testing necessary to earn the certificate. Rouaa completed the program successfully, earning certifications in Cybersafe and IT Fundamentals. She passed the online CompTIA IT Fundamentals Exam (FCO-U51), and now has documented competencies in information technology as well as industry-recognized certifications listed on her résumé.

Rouaa was the first in her class to find a job, becoming employed in August 2018. She works as a Help Desk Technician at ePosterboards in Charlestown, Massachusetts. She recognizes the need to constantly update her skills to stay current in the IT world, and has been gaining direct experience while planning to earn additional, advanced certifications. She has developed an interest in coding, and is currently weighing options for earning a credential in coding.



FINDINGS

In proceeding with our inquiry, the Commission on Digital Innovation and Lifelong Learning studied the current landscape of postsecondary education and training in Massachusetts in light of changing technology, demography, and employer needs. Our discourse homed in on three broad areas: (1) the resources and options available to our learner population of interest, as well as the barriers that they face; (2) the role of employers within our key industry sectors; and (3) the structure of education and training systems in Massachusetts. Across our meetings, our discussions yielded the following findings, conclusions, and areas of consensus.

FINDINGS REGARDING LEARNERS

The Commission finds that Massachusetts must create new opportunities to enable entry-level workers and older opportunity youth to obtain postsecondary learning and training. We find that:

- There is a large market of potential learners within this target population. The number of working-age people in Massachusetts who have some college but no degree is at least 600,000 and may be as high as 1 million. We believe that an ecosystem of lifelong learning, properly supported, should aspire to educate a critical mass of these learners.
- Although Massachusetts' higher education system is working hard to serve many of our target students, there is still a large underserved population who lack access to the kind of flexible, affordable, and employer-aligned opportunities they need to acquire skills, find jobs, and build careers. Most of the standard postsecondary pathways in our Commonwealth have been designed to serve younger, non-working people who have the time and resources to devote large, uninterrupted periods for generalized learning and socialization. This model is inapt for working adults, as well as lower-income people, who must structure their learning around needs related to time, cost, transportation, childcare, and housing. We find and affirm that more online and hybrid approaches are greatly needed to serve these learners.
- There is a lack of infrastructure in place to support learners throughout their educational pathways. Particularly among our target population, a learner's ability to access holistic support services can be a critical determinant of their success. Any solution to the

challenge of expanding educational access in our Commonwealth must include a robust student support element.

- In view of the increasing diversity of our Commonwealth, any attempt to increase postsecondary education and training in Massachusetts must incorporate opportunities that are responsive to the particular needs of diverse individuals, recent immigrants and English Language Learners.

FINDINGS REGARDING EMPLOYERS

The Commission finds that the ability of a system of lifelong learning to serve learners successfully will also depend on the meaningful and sustained engagement of employers. We find that:

- Healthcare, Information Technology, and Advanced Manufacturing are the three industry sectors that exhibit the most potential for scale and impact in our Commonwealth because of their importance to our economy, as well as their projected rates of job growth in the next decade. Of these, Healthcare stands out for early attention, because it is the primary locus of future job growth in every region of the Commonwealth, and it includes numerous job classifications with well-articulated skill sets and credentialing or licensure requirements.
- Credentialism—that is, the practice among employers of adding degree requirements to job openings that are not strictly needed for someone to do the job—is a widespread and harmful phenomenon. The bachelor’s degree today has become a proxy for general competency, even for some jobs that historically have not required a degree.³³ We find a need for employers to reform their human resources practices in view of this phenomenon. We believe a renewed focus by employers on harmonizing their hiring criteria with the actual skills necessary for success on the job will open up employment opportunities for qualified candidates, reduce inefficiencies for companies by expediting their hiring processes, and encourage learners to consider the full range of degree and non-degree educational pathways available to them.³⁴
- Employers are less likely to require that prospective job candidates hold bachelor’s degrees when they have alternative means to reliably and efficiently identify skill proficiency, such as when a job has strict licensing or certification standards.³⁵ Creating rigorous and job-specific education or training programs that focus on evaluating a learner’s skills and competencies against a defined, industry-recognized standard can combat degree inflation.
- Employers and industry sectors should be encouraged to invest more in their talent supply pipelines. Some strategies that companies can adopt include proactively identifying emerging job clusters, forecasting future skill requirements, and adjusting their benefit schemes to help employees pay for further learning and training.
- Employers, individually and collectively, should be encouraged and helped to cultivate deeper relationships with education and training providers so that they can communicate their needs and provide meaningful input in designing curricula. New structures, such as a statewide collaborative of signature employers in a particular sector, may be fruitful in this regard.
- Employers should consider providing more paid internships and experiential, work-based learning opportunities for youth, including out-of-school youth, to foster a broader and deeper pipeline of individuals who can proceed successfully from pre-employment to employment.³⁶

Credentialism—the practice among employers of adding degree requirements to job openings that are not needed for someone to do the job—is widespread.

Competency-based programs should be a primary focus of new postsecondary program development in Massachusetts.

FINDINGS REGARDING EDUCATION AND TRAINING SYSTEMS

The Commission finds that while Massachusetts' existing postsecondary education and training systems are succeeding in many ways, the current landscape contains gaps in terms of serving the population we call "New Traditional" learners. We find that:

- Massachusetts has the opportunity to leverage its unique agglomeration of public and private two- and four-year colleges and universities, MassHire workforce boards, and innovative providers in the education, training, and alternative credential space much further. We believe that the creation of a state-supported ecosystem might encourage and incent these entities to collaborate toward the goal of creating many more lifelong learning programs.
- Similarly, Massachusetts has the opportunity to expand its use of online and hybrid approaches in postsecondary education and training much more. While entities such as UMassOnline, edX, and MassColleges Online are doing much valuable work, we find that robust online and hybrid opportunities—which would provide greatly-needed flexibility for many who cannot access traditional options—are unevenly distributed across our education and training system, to the detriment of learners. The expansion of online and hybrid opportunities in Massachusetts should be utilized to create more affordable options for learners.
- Sub-baccalaureate and sub-associate's programs are key to expanding the continuum of postsecondary education and training for entry-level workers and opportunity youth who are too often being left behind by our current system. We believe that Massachusetts should devote significant effort to supporting the creation of many more short-form, digitally-enabled credential programs that are highly employer-aligned. These credential programs can and should often stack into associate's and bachelor's pathways, so that their existence creates new customer pathways for traditional higher education programs.
- Likewise, competency-based programs should be a primary focus of new postsecondary program development in Massachusetts. We find that seat time and credit hour schema in postsecondary education—while satisfactory for many learners—pose unacceptable and unnecessary barriers for many others. We believe that the expansion of competency-based programs in Massachusetts will offer significant new opportunities for entry-level workers and opportunity youth who seek further education and training, shorten the time for many learners to earn a meaningful credential, and foster greater affordability in postsecondary education as well.

LEARNER PROFILE:

SONIA LIVINGSTON

Sonia Livingston is close to completing a one year Group Leader Apprenticeship Program at Mack Technologies in Westford, Massachusetts—a combination of classwork and direct work experience designed to help employees at the Mack plant move forward in a career pathway in manufacturing.

Sonia was hired in 2010 and worked at Mack as a rework operator. Over the years, she was trained in different areas on the production floor and always showed the initiative to continue learning. She became a line lead, and expressed a desire to move into a group leader role.

Sonia recognizes the value of the training. "Taking these classes has benefited me by staying calm when things seem out of control. I can communicate better, can take more positive action and I am more respectful towards my peers. The experience has made me a more confident group leader. I am able to plan more for jobs that are assigned and know what needs to be done. These classes have made a real difference in each one of us, and we can all see the difference it has made in each other. By taking these classes, I hope to grow more in the company and someday qualify to be a supervisor. I have more confidence in myself than I ever had and feel as if I am able to take on any task."

Debbie Dalkas, Human Resources Manager at Mack Technologies, reported on the difference that Mack's investment in group leader training has meant for Sonia. "This training has been incredible for her. She has grown so much. The training provided her with both work skills and life skills that she uses in her daily work here, whether it's speaking with her production team or in direct engagements with senior management. Sonia has said she wants to continue moving up in the company to become a supervisor/manager."

John Kovach, Executive VP of Global Operations for Mack Technologies, had very positive things to say about the entire apprenticeship program. "We are now approaching the end of our more than one year training program. The participants have one of the most beneficial exposures to job specific training imaginable. We have seen incredible advancements in their competence, confidence, leadership, and participation in the company."

The classroom components for the apprenticeship were provided through Middlesex Community College, developing the content in partnership with staff at Mack Technologies.



RECOMMENDATIONS

In view of the preceding findings, the Commission makes the following recommendations:

RECOMMENDATION 1: MASSACHUSETTS SHOULD TAKE COMPREHENSIVE STEPS TO DEVELOP AN ECOSYSTEM OF LIFELONG LEARNING.

The Commission believes that Massachusetts should embrace the idea of lifelong learning as an activity that is an expected part of people's learning and working lives, especially in this time of rapid change to the state's workforce, and the very nature of work. Developing an ecosystem of lifelong learning means engaging employers, education and training institutions, civic leaders, and the public to support the growth of learning programs to help adults thrive and advance in their working lives, even amid these changes. It means developing new learning options for people who have not succeeded, or been able to access, current learning and training programs. Over time, having an ecosystem of lifelong learning means that Massachusetts residents will view engaging with these learning options as something no more novel than going to high school, or pursuing a college education.

To foster Massachusetts' ecosystem of lifelong learning, the Commission recommends that a Lifelong Learning Council, modeled after the statewide STEM Council, be developed. The Council should include (but not be limited to) representatives from employers, educational institutions, the MassHire workforce system, and entrepreneurs and experts in innovative learning and training models.

The Council should be supported by a public or quasi-public segment of state government in its activities, which would be broadly oriented toward:

- Analyzing the most pressing labor market needs for which lifelong learning programs could be a solution;
- Convening and coordinating relevant stakeholders to develop lifelong learning programs;
- Advancing ideas and policy proposals to incent such programs;
- Organizing gatherings and issuing reports to amplify public awareness of, and support for, Massachusetts' lifelong learning ecosystem.

The Council should deliver an annual report of its activities and accomplishments to the MassHire Workforce Board.

RECOMMENDATION 2: MASSACHUSETTS SHOULD LAUNCH A NEW EFFORT TO EXPAND THE AVAILABILITY OF DIGITALLY-ENABLED, COMPETENCY-BASED, EMPLOYER-ALIGNED EDUCATION PROGRAMS FOR ENTRY-LEVEL EMPLOYEES, STARTING IN 2019.

Even as a broader ecosystem of lifelong learning is socialized, the Commission is mindful of the fact that tens of thousands of Massachusetts adults have learning and training needs that need to be met now. We are buoyed by examples of learning and training initiatives, such as the successful collaboration between Partners HealthCare and the College for America program, which have utilized digital platforms to give working adults the learning and training they seek in a format that is responsive to their needs, and which have advanced these workers' skills, economic stability, and career prospects. We also note the longstanding success of in-person training programs, such as those offered through partnerships of employers, the MassHire system, and the Commonwealth's public colleges and universities, which could be adapted for hybrid or online delivery.

In light of the pressing need to serve adult workers in new ways, the Commission recommends that Massachusetts launch a new statewide initiative in 2019 to expand the availability of lifelong learning programs for working adults in entry-level jobs. The Commission recommends that this initiative include the following elements:

- In view of data from the Commonwealth's Regional Skills Blueprints, which indicate large skills gaps and strong future job growth in healthcare, new lifelong learning programs should focus on occupations in the healthcare sector first, and then broaden to encompass two other strategic sectors—information technology and advanced manufacturing.
- A wide range of education and training providers should be encouraged to participate in the development of new lifelong learning programs, including community colleges, public and private universities and their online divisions, the MassHire workforce system, education providers that utilize competency-based education models, alternative education providers such as massive open online course (MOOC) providers, and consortia of these entities.
- New lifelong learning programs should be encouraged to incorporate the following design elements:
 - Close co-design with an employer or employers;
 - A strong digital element, such as hybrid or fully online delivery;
 - An instructional design that utilizes competency-based education approaches, allowing learners to proceed at a personalized (as opposed to a pre-determined) pace;
 - Robust soft skills development, including the development of communication, teamwork, self-advocacy and self-efficacy skills;
 - Appropriate supports for learners, which may include preparation for learning in an online environment, or coaching;
 - As applicable, the integration of approaches that are attuned to the needs of English language learners;
 - Use of an open-source model that will allow successful practices from one program to be incorporated into other programs.
- The initiative should incorporate insights about healthcare employment needs and skills gaps from the Health Care Skills Collaborative that will be launched by the Baker Administration in early 2019.

The Commission recommends that the planning phase of this initiative commence in early 2019 with private funding that has been secured by Commonwealth Corporation, complemented by public resources to support curriculum development and the actual launch of a suite of new lifelong learning programs focused on advancing entry-level workers in healthcare occupations.

RECOMMENDATION 3: MASSACHUSETTS SHOULD TAKE IMMEDIATE STEPS TO ALIGN THE STATE'S CURRENT WORKFORCE DEVELOPMENT AND EDUCATION RESOURCES TO SUPPORT THE EXPANSION OF DIGITALLY-ENABLED, COMPETENCY-BASED, EMPLOYER-ALIGNED EDUCATION PROGRAMS.

In generating new ideas to reduce skills gaps among Massachusetts residents and address employment needs in key industry sectors, the Commission has been inspired by successful models from the Commonwealth's workforce development and postsecondary education systems. The Commission believes that certain funding streams in these areas are well positioned to accelerate the development of lifelong learning programs for Massachusetts. Specifically, the Commission recommends the following:

- Encourage the Workforce Competitiveness Trust Fund (WCTF), starting with the 2019 procurement, to be utilized to accelerate the growth and delivery of digitally-enabled, competency-based training programs for underemployed workers.
- Encourage employers to utilize the Workforce Training Fund program (WTFP) to support the delivery of more training that is online, competency-based, and oriented toward entry-level workers, including those who are English language learners, and enable WTFP funds to be utilized to support the development of such programs.
- Ensure that the online training exchange that is currently being developed for the Workforce Training Fund is aligned with the Commonwealth's broader efforts to expand digitally-enabled lifelong learning programs.
- Ensure that higher education initiatives that have supported competency-based approaches, such as the Massachusetts Department of Higher Education's Performance Incentive Fund, are aligned with the broader effort to expand digitally-enabled lifelong learning programs.
- Make MassGrant state scholarship aid available for students who enroll in digitally-enabled, employer co-designed lifelong learning programs.
- Enable funds from the new MassGrant Plus program to be used to support enrollment in non-credit or non-degree workforce programs, especially digitally-enabled programs.
- Continue state support for the effort, currently underway, to develop a credit for prior learning consortium among the state's community colleges, and integrate this effort into the effort to build a lifelong learning system in Massachusetts.
- Examine how MyExperienceCounts, the state's credit for prior learning portal, can be utilized more effectively in general, and more specifically to help learners who enroll in lifelong learning programs gain credit for their prior experience and learning.

RECOMMENDATION 4: MASSACHUSETTS SHOULD PURSUE ADDITIONAL POLICY AND PROGRAMMATIC CHANGES TO FOSTER THE DEVELOPMENT OF DIGITALLY-ENABLED, COMPETENCY-BASED, EMPLOYER-ALIGNED EDUCATION PROGRAMS FURTHER OVER THE LONG TERM.

In addition to funding alignment, the Commission also supports the following policy and programmatic measures to expand digitally-enabled lifelong learning programs, and to support the development of a lifelong learning ecosystem in Massachusetts:

- Align the state's YouthWorks program, which provides summer and year-round job opportunities to disadvantaged youth, with the state's Connecting Activities program, in order to create new opportunities for youth to access a pathway of recurring work-based learning experiences.
- Significantly accelerate efforts to develop more YouthWorks placements in the healthcare, information technology, and advanced manufacturing sectors, including placements that allow participants to earn an industry credential.
- Enable public institutions of higher education to forgive the outstanding tuition and fee balances of students who return to pursue lifelong learning programs by reimbursing the institutions the amount of this foregone revenue.
- Ensure that the Massachusetts Board of Higher Education's academic program approval process promotes the efficient approval of digitally-enabled, workforce-aligned programs; consider an expedited approval process for such programs.
- Support the U.S. Department of Education's efforts, currently being pursued through the negotiated rulemaking process, to modify federal definitions for distance education and the credit-hour standard, in order to enable and incent innovative postsecondary education and training models.
- Work with regional accreditors and relevant programmatic accreditors to gain their increased support for innovative postsecondary education and training models, such as short-form, digitally-enabled, competency-based models.
- Explore the use of income-share agreements as a way to enable learners without ready resources to make use of lifelong learning programs.
- Partner with a prominent foundation to explore an XPrize-type competition to significantly accelerate programmatic and ecosystem development in the lifelong learning sphere.



A CULTURE OF LIFELONG LEARNING

We will know that our recommendations will have been successful if we are able to socialize the idea of lifelong learning as a discrete part of our education ecosystem, and in so doing, instill a culture of lifelong learning in Massachusetts. We take a culture of lifelong learning to mean a society where:

- Education and work are viewed not as discrete processes that take place separately—or in that order—but as continuous phenomena that overlap and repeatedly feature over the course of a person’s full life;
- Residents of the Commonwealth are broadly aware of lifelong learning as an organized activity that Massachusetts is encouraging and supporting;
- The value of informal learning gained through training, employment, and other forms of real-world experience bears weight and is recognized in the job market;
- There is no normative or standardized definition of the learner who pursues postsecondary education;
- Each prospective learner is familiar with the full range of postsecondary educational pathways available to them, from online- to campus-based options, and is able to access support services in order to make an informed decision about the pathway that will best promote their learning and working aspirations; and
- A system of lifelong learning is well integrated with existing systems of education (the K-12 system and existing higher education infrastructure) to create a pipeline of learners pursuing postsecondary education.

This will require a commitment not only from policymakers and education and training providers, but also from employers and the general public. The public, including older adults and workers in the middle of mature careers, must adapt to changes in the workplace and be willing to receive education and training at multiple stages of life. Employers, meanwhile, will

need to be more flexible and willing to invest in their human capital by encouraging workers to update their skills while on the job, even if doing so would compel the worker to take a break from their employment. We strongly believe that such a commitment to worker development is mutually beneficial: in the long term, when employers invest in and support their employees, they set them up not to leave, but to stay and scale the job ladder at their company.

We are confident, however, that taking the steps involved in implementing the recommendations of this report will sow the seeds of a culture of lifelong learning in our Commonwealth. If we build the educational infrastructure that the jobs of tomorrow demand today, we will in time empower a new generation of lifelong learners, equipped with the relevant skills, competencies, and credentials, to succeed in our economy.

With history as our guide, we believe that by supporting the learning and working aspirations of adult learners and opportunity youth, aligning postsecondary outcomes more intentionally with the needs of the labor market, and socializing lifelong learning as an essential part of the educational ecosystem in Massachusetts, we will enable many more people in our Commonwealth to keep pace with ongoing changes in the workplace and to pursue a productive career. Just as previous Massachusetts leaders met the economic and societal challenges of their times by establishing the common school, high school, public university systems, and community colleges, each time expanding educational access to a successively larger share of the populace, we must establish a first-in-the-nation system of lifelong learning in our Commonwealth to meet the demands of a new age.

The task of establishing such a system is neither simple nor straightforward. It will require the earnest and sustained engagement of all those who hold a stake in our Commonwealth's economic future: educators and policymakers, employers and workforce partners, and above all, learners. The good news is that Massachusetts has made bold strides in this area before. We should take pride in our past—and now must let it inform and inspire our future.

We have heard the voice of the learner in our Commonwealth. It is a chorus of high school graduates, opportunity youth, entry-level employees, underemployed workers, unemployed adults, and ambitious professionals. It is burdened by apprehension about the swirling change around us, but carries an undertone of hope. It is amplified by a sense of urgency. Its volume is measured not by decibels but by hundreds of thousands of people. And it is saying that now is the time for Massachusetts to act—that the opportunity is ripe for our Commonwealth to invest in a comprehensive system of lifelong learning that will pay off for all of our people.

Let us seize the moment.

APPENDIX A: EXECUTIVE ORDER

Executive Order No. 581: Establishing the Commission on Digital Innovation and Lifelong Learning

DATE: 04/23/2018

ISSUER: Governor Charles D. Baker

By His Excellency
CHARLES D. BAKER
GOVERNOR

EXECUTIVE ORDER NO. 581 ESTABLISHING THE COMMISSION ON DIGITAL INNOVATION AND LIFELONG LEARNING

WHEREAS, it is a priority of this Administration to maximize opportunities for the people of Massachusetts to learn, increase their skills and abilities, secure productive and meaningful employment, and progress in their careers throughout their lives;

WHEREAS, all people in Massachusetts, including adult learners, people who are pursuing education while working, diverse learners, and young people disconnected from traditional education systems need affordable, flexible, high-quality options for higher education and training;

WHEREAS, increased automation and the continued integration of technology into all segments of the Massachusetts economy are changing how many jobs are performed, causing some jobs to disappear, and fostering the creation of new types of jobs, giving rise to the need for more people to engage in lifelong learning;

WHEREAS, Massachusetts' future economic strength depends on its continued leadership in education, progress in reducing skills gaps, and success in aligning its education and training ecosystems with the needs of the largest and fastest-growing industry sectors in the Commonwealth;

WHEREAS, the expanded use of approaches such as online learning, experiential learning, and career-focused learning may enhance the strength of Massachusetts' education and training ecosystems even further;

WHEREAS, throughout its history, Massachusetts has been a leader in advancing innovations in education and training that have been emulated throughout the world;

NOW, THEREFORE, I, Charles D. Baker, Governor of the Commonwealth of Massachusetts, by virtue of the authority vested in me by the Constitution, Part 2, c. 2, § 1, Art. I, order as follows:

Section 1. The Commission on Digital Innovation and Lifelong Learning is hereby established to advise the Governor and Lieutenant Governor on issues relating to the future of higher education, workforce development and employability in light of the changing nature of technology, work, and the demography of the Commonwealth. The Commission shall examine innovations related to the structure and content of higher education and training and recommend affordable, effective approaches to increase the education, skills, and employability of the people of Massachusetts throughout their lives.

Section 2. The Commission shall consist of up to twenty-one (21) members, including but not limited to a Chair, Vice Chair, members representing the higher education, employer, workforce development, technology, and research communities, and, serving in their ex officio capacity, the Secretaries of the Executive Offices of Education, Labor

and Workforce Development, and Housing and Economic Development, or their designees. The president of the Commonwealth Corporation shall serve as Chair of the Commission. Each member, including the Chair, shall be appointed by the Governor and shall serve at his pleasure, without compensation, in an advisory capacity until the expiration of this Executive Order pursuant to Section 6.

Section 3. The Commission shall review and assess the educational, skill development, and lifelong learning needs of the people of Massachusetts and make recommendations to the Governor and Lieutenant Governor, with a particular focus on how to meet such needs affordably, with high quality, using digital formats or models that are closely connected to the needs of the Massachusetts economy and its future development.

To achieve this objective, the Commission's members shall first identify up to five themes to be addressed by the Commission during its operation. Such topics could include, for purposes of example only, online and competency-based approaches to education and training, experiential and job-embedded learning models, new types of education and training programs and credentials, responses to the impact of automation, artificial intelligence and other forms of technology on jobs and the economy of Massachusetts, and the particular needs of adult learners, diverse learners, and opportunity youth. The work of the Commission shall culminate with the submission of the report required in Section 4 below.

The Commonwealth Corporation will provide staffing to support the work of the Commission, and may ask the executive office secretariats to supply data, reports and other relevant information and assistance.

Section 4. The Commission shall meet no fewer than four times at the direction of the Chair, including at a meeting with the Governor and the Lieutenant Governor. The Commission shall submit a formal written report to the Governor and Lieutenant Governor, summarizing the Commission's work, methodology, findings and recommendations on each of its priorities pursuant to Sections 1 and 3 above, and providing metrics to measure the effect of such recommendations, if implemented, on the Commonwealth of Massachusetts and its people.

Section 5. The Chair, as needed, may establish subcommittees comprised of members of the Commission and non-members drawn from various groups and organizations committed to issues that are relevant to the purposes of the Commission, or who possess expertise necessary to accomplish the purposes of this Executive Order. All subcommittees shall be chaired by a member of the Commission designated by the Chair. Subcommittees shall meet from time to time, as scheduled by the Chair or the Chair's designee.

Section 6. This Executive Order shall take effect upon execution and shall continue in effect until December 31, 2018.

Given at the Executive Chamber in Boston this 23rd day of April in the year of our Lord two thousand eighteen and of the Independence of the United States of America two hundred forty-one.

CHARLES D. BAKER
GOVERNOR
Commonwealth of Massachusetts

WILLIAM FRANCIS GALVIN
Secretary of the Commonwealth

GOD SAVE THE COMMONWEALTH OF MASSACHUSETTS

APPENDIX B: COMMISSION MEETING SCHEDULE

Event: Full Commission Meeting

Date: April 23, 2018

Time: 3:00 – 5:00 p.m.

Location: Conference Room 3, 21st Floor, 1 Ashburton Place, Boston, MA 02108

Event: Full Commission Meeting

Date: May 22, 2018

Time: 10:00 a.m. – 12:00 p.m.

Location: Conference Room 3, 21st Floor, 1 Ashburton Place, Boston, MA 02108

Event: Full Commission Meeting

Date: June 26, 2018

Time: 3:00 – 5:00 p.m.

Location: Conference Room 3, 21st Floor, 1 Ashburton Place, Boston, MA 02108

Event: Committee Meetings

Date: July 31, 2018

Times: Committee One, 10:00 a.m. – 12:00 p.m.; Committee Two, 12:00 – 2:00 p.m.; Committee Three, 2:00 – 4:00 p.m.

Location: Commonwealth Corporation, 5th Floor, 2 Oliver Street, Boston, MA 02109

Event: Committee Meetings

Date: August 28, 2018

Times: Committee One, 10:00 a.m. – 12:00 p.m.; Committee Two, 12:00 – 2:00 p.m.; Committee Three, 2:00 – 4:00 p.m.

Location: Commonwealth Corporation, 5th Floor, 2 Oliver Street, Boston, MA 02109

Event: Full Commission Meeting

Date: September 25, 2018

Time: 10:00 a.m. – 12:00 p.m.

Location: Commonwealth Corporation, 5th Floor, 2 Oliver Street, Boston, MA 02109

Event: Full Commission Meeting

Date: October 30, 2018

Time: 10:00 a.m. – 12:00 p.m.

Location: Commonwealth Corporation, 5th Floor, 2 Oliver Street, Boston, MA 02109

APPENDIX C: PRESENTATIONS TO THE COMMISSION

Perspectives on the Healthcare Sector

Presented: at the First Meeting of the Commission on April 23, 2018

By: Oz Mondejar, Senior Vice President for Mission and Advocacy, Partners Continuing Care, Inc.

Perspectives on the Manufacturing Sector

Presented: at the First Meeting of the Commission on April 23, 2018

By: Joanna Dowling, President, Custom Group/Center for Manufacturing Technology

The Incumbent Worker as Learner: Performance Outcomes for Partners HealthCare's Program

Presented: at the Second Meeting of the Commission on May 22, 2018

By: Kathryn Decelles, Career Coach, Partners HealthCare System, Inc.; and Yaziris Lucerna

Organization: UMassOnline

Presented: at the Third Meeting of the Commission on June 26, 2018

By: Don Kilburn, Chief Executive Officer, UMassOnline and Todd Hitchcock

Organization: EdX

Presented: at the Third Meeting of the Commission on June 26, 2018

By: Anant Agarwal, Chief Executive Officer, edX

Organization: Western Governors University

Presented: at the Third Meeting of the Commission on June 26, 2018

By: Kimberly Estep, Chancellor, Western Governors University Tennessee

Organization: Duet

Presented: at the Third Meeting of the Commission on June 26, 2018

By: Mike Larsson, President, Duet; and Michelle Carroll, Director of Employment Services, Duet

APPENDIX D: ROSTER OF COMMITTEE MEMBERSHIPS

Committee One: Lifelong Learning

Rosalin Acosta

David Cedrone (designee for Carlos Santiago)

Jean Eddy

Chris Gabrieli

Reinier Moquete

Marjorie Ringrose

Juan Vega (designee for Jay Ash)

Michelle Weise

Committee Two: Programmatic Aspects of Lifelong Learning

Susan Cicco

Jennifer Davis Carey

Joseph Fuller

Laurie Leshin

James McGaugh (designee for Linda Boff)

James Peyser

Sanjay Sarma

Committee Three: Institutional Partners in the Massachusetts System

Joanna Dowling

Michael Horn

Don Kilburn

Michael London

Patricia Meservey

Oz Mondejar

Christina Royal

Mary Sarris

APPENDIX E: BIBLIOGRAPHY

- Accenture, Burning Glass & Harvard Business School. (2015). Bridge the Gap: Rebuilding America's Middle Skills. Retrieved from <http://www.hbs.edu/competitiveness/Documents/bridge-the-gap.pdf>.
- Alvaro Lima, A., Kim, C., & Schuster, Luc. (2017). Powering Greater Boston's Economy: Why the Latino Community is Critical to our Shared Future. (The Boston Foundation, Latino Legacy Fund). Retrieved from <https://www.tbf.org/-/media/tbforg/files/reports/latino-report-final.pdf?la=en&hash=FDA5EA78BC3265C11A16EDFBAC99DAFFFD6F8425>.
- Aoun, J. (January 2016). Robot-Proof: How Colleges Can Keep People Relevant in the Workplace. (Chronicle of Higher Education). Retrieved from <https://www.chronicle.com/article/Robot-Proof-How-Colleges-Can/235057>.
- Aspen Institute (February 2013). Helping Adult Learners Navigate Community College and the Labor Market. (Courses to Employment, No. 4). Retrieved from https://assets.aspeninstitute.org/content/uploads/files/content/docs/pubs/update_cte_march2013.pdf.
- Benedikt Frey, C. & Osborne, M. (September 2017). The Future of Employment: How Susceptible are Jobs to Computerisation? (Oxford University, Oxford Martin Programme on the Impacts of Future Technology). Retrieved from https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf.
- Burning Glass Technologies (2014). Moving the Goalposts: How Demand for a Bachelor's Degree is Reshaping the Workforce. Retrieved from https://www.burning-glass.com/wp-content/uploads/Moving_the_Goalposts.pdf.
- Burning Glass Technologies (2017). The Narrow Ladder: The Value of Industry Certifications in the Job Market. Retrieved from http://www.burning-glass.com/wp-content/uploads/BurningGlass_certifications_2017.pdf.
- Cahill, C. (July 2016). Making Work-Based Learning Work. (Jobs for the Future). Retrieved from https://jfforg-prod-prime.s3.amazonaws.com/media/documents/WBL_Principles_Paper_062416.pdf.
- Carnevale, A., Strohl, J., & Ridley, N. (2017). Good Jobs that Pay Without a B.A. (Georgetown University, Center on Education and the Workforce). Retrieved from <https://goodjobsdata.org/wp-content/uploads/Good-Jobs-States.pdf>.
- Center for Community College Student Engagement. (2018). Show me the Way: The Power of Advising in Community Colleges (Austin, TX: The University of Texas at Austin, College of Education, Department of Educational Leadership and Policy, Program in Higher Education Leadership). Retrieved from http://www.ccsse.org/nr2018/Show_Me_The_Way.pdf.
- Commission on the Future of Undergraduate Education. (2017). The Future of Undergraduate Education. (American Academy of Arts & Sciences). Retrieved from https://www.amacad.org/multimedia/pdfs/publications/researchpapersmonographs/CFUE_Final-Report/Future-of-Undergraduate-Education.pdf.
- Commonwealth Corporation. (2013). Strategic Employer Engagement: Building Dynamic Relationships with Employers in Teen and Young Adult Employment Programs. Retrieved from http://commcorp.org/wp-content/uploads/2016/07/youthworks-resource_strategic-employer-engagement.pdf.
- Community College Research Center. (2017). Implementing Holistic Student Support: A Practitioner's Guide to Key Structures and Processes (Educause Center for Analysis and Research). Retrieved from <https://library.educause.edu/resources/2017/9/implementing-holistic-student-support-a-practitioners-guide-to-key-structures-and-processes>.
- Conway, M., Blair, A. & Helmer, M. (May 2012). Courses to Employment: Partnering to Create Paths to Education and Careers (Aspen Institute). Retrieved from <https://www.aspeninstitute.org/publications/courses-employment-partnering-create-paths-education-careers/>.
- Council for Adult and Experiential Learning (2015). State System PLA Adoption: Lessons from a Three-System Initiative. Retrieved from <https://www.cael.org/pla/.../state-system-pla-adoption-lessons-from-a-three-system-initiative>.

- Cruse, L., Eckerson, E. & Gault, B. (February 2018). Understanding the New College Majority: The Demographic and Financial Characteristics of Independent Students and their Postsecondary Outcomes. (Institute for Women's Policy Research). Retrieved from <https://iwpr.org/publications/independent-students-new-college-majority/>
- Dworak-Muñoz, L. (2004). Building Effective Employer Relations (Aspen Institute). Retrieved from <https://www.aspeninstitute.org/publications/building-effective-employer-relations/>.
- General Assembly & Burning Glass Technologies. (2015). Blurring Lines: How Business and Technology Skills Are Merging to Create High Opportunity Hybrid Jobs. Retrieved from https://www.burning-glass.com/wp-content/uploads/Blurring_Lines_Hybrid_Jobs_Report.pdf.
- Hoffher, J. (May 2016) There are 17 open jobs for every new tech college graduate in Massachusetts (Boston.com). Retrieved from Hoffher, J. (<https://www.boston.com/jobs/jobs-news/2016/05/19/17-open-tech-jobs-every-new-college-graduate-massachusetts>)
- Horn, M. (2017). Here's How 'Renewable Learning Funds' Can Transform Workforce Development (Forbes Magazine). Retrieved from <https://www.forbes.com/sites/michaelhorn/2017/12/13/heres-how-renewable-learning-funds-can-transform-workforce-development/#4898ffd16c81>.
- Horn, M. (2017). Profiling the Rise of Income Share Agreements In Higher Ed. (Forbes Magazine). Retrieved from <https://www.forbes.com/sites/michaelhorn/2017/06/15/profiling-the-rise-of-income-share-agreements-in-higher-ed/#5b8aaab25fee>.
- Horn, M. (2017). Taming the Wild West Of Digital Badges And Credentials. (Forbes Magazine) Retrieved from <https://www.forbes.com/sites/michaelhorn/2017/10/12/taming-the-wild-west-of-digital-badges-and-credentials/#4bbb918c2cf0>.
- Jones, S. (2018). Automation and AI Use to Triple by 2019. (ISG Insights). Retrieved from <https://isg-one.com/articles/automation-and-ai-use-to-triple-by-2019>.
- Klein-Collins, R. (2012). Competency-Based Degree Programs in the U.S.: Postsecondary Credentials for Measurable Student Learning and Performance (Council for Adult and Experiential Learning). Retrieved from https://cdn2.hubspot.net/hubfs/617695/CAEL_Reports/2012_CompetencyBasedPrograms.pdf
- Klein-Collins, R. & E. Baylor. (November 2013). Meeting Students Where They Are: Profiles of Students in Competency-Based Degree Programs (Center for American Progress and the Council for Adult and Experiential Learning). Retrieved from <https://cdn.americanprogress.org/wp-content/uploads/2013/11/CAEL-student-report-corrected.pdf>.
- Long, B. & Chan, M. (2017). The Massachusetts Student Financial Aid Study. (Harvard Graduate School of Education). Retrieved from https://scholar.harvard.edu/files/btl/files/long_chan_-_ma_aid_study_-_full_report_appendices_2017-10_final_revised.pdf.
- Malia Krauss, S. (October 2017). How Competency Based Education May Help Reduce Our Nation's Toughest Inequities. (Lumina Foundation). Retrieved from <https://www.luminafoundation.org/files/resources/how-cbe-may-reduce-inequities-1.pdf>.
- Manyika, J., Lund, S., Chui, M., Bughin, J., Woetzel, J., Batra, P., Ko, R. & Sanghvi, S. (November 2017). Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages (McKinsey Global Institute). Retrieved from <https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages>.
- MassHire North Shore Workforce Investment Board, North Shore Alliance for Economic Development & MassHire North Shore Career Center. (2017). The Future of Work on the North Shore. Retrieved from <https://masshire-northshorewb.com/wp-content/uploads/NSWIB-Report-8.5x11-updated-final-5-16-18.pdf>.

MassInc Polling Group. (September 2016). Massachusetts business leaders focus on real world skills, good teachers. Retrieved from <https://www.mbae.org/wp-content/uploads/2016/11/FINAL-Report-2016-MBAE-Employer-Poll-for-web.pdf>.

McKinsey & Company (December 2017). Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation, McKinsey Global Institute (McKinsey Global Institute). Retrieved from <https://www.mckinsey.com/~media/mckinsey/featured%20insights/Future%20of%20Organizations/What%20the%20future%20of%20work%20will%20mean%20for%20jobs%20skills%20and%20wages/MGI-Jobs-Lost-Jobs-Gained-Report-December-6-2017.ashx>.

New England Board of Higher Education. (2018). Learning for Life and Work. (Report of the Commission on Higher Education & Employability). Retrieved from http://www.nebhe.org/info/pdf/policy/Learning_for_Life_and_Work_Report.pdf?utm_source=Employability+Update&utm_campaign=Employability+Commission+Newsletter&utm_medium=email.

Pearson Education, Inc. (2018). The Future of Skills, Employment in 2030. Retrieved from <https://futureskills.pearson.com/research/#/welcome-video>.

Pearson Education, Inc. (2013). Putting Students First: The Case for Competency-Based Education. Retrieved from <https://www.pearson.com/content/dam/one-dot-com/one-dot-com/us/en/pearson-ed/downloads/CBL-digital-V2-9.3.2014v2.pdf>.

Sherman, A. & Klein-Collins, Rebecca. (2016). State Policy Approaches to Support Prior Learning Assessment (Council for Adult and Experiential Learning). Retrieved from https://www.cael.org/hubfs/premium_content_resources/Home_page_books/CAEL_HCM-PLA-State-Policy-Report-2016.pdf.

Soares, A. Gagliardi, J. & Nellum, C. (2017). Aligning Post-Secondary Education with Real Life for Adult Student Success. (American Council on Education). Retrieved from <https://www.acenet.edu/news-room/Documents/The-Post-Traditional-Learners-Manifesto-Revisited.pdf>.

Strada Education, Inc. & Gallup. (2018). Strada-Gallup Education Consumer Insights. Retrieved from <https://stradaeducation.gallup.com/home.aspx>. https://www.nationalskillscoalition.org/resources/publications/file/NSC-WBL_PolicyToolkit.pdf

Weise, M. & Christensen, C. (July 2014). Hire Education: Mastery, Modularization, and the Workforce Revolution (Christensen Institute). Retrieved from <https://www.christenseninstitute.org/publications/hire-education/>.

Whitmore Schanzenbach, D., Nunn, R., Bauer, L., Mumford, M. & Breitwieser, A. (October 2016). Seven Facts on Noncognitive Skills from Educations to the Labor Market. (Hamilton Project). Retrieved from http://www.hamiltonproject.org/papers/seven_facts_on_noncognitive_skills_from_education_to_the_labor_market.

Wilson, B. (October 2017). Work-Based Learning Policy for Out-of-School Youth and Disadvantaged Adults. (National Skills Coalition). Retrieved from https://www.nationalskillscoalition.org/resources/publications/file/NSC-WBL_PolicyToolkit.pdf.

Wilson, R. (January 2015). A Resource Guide to Engaging Employers. (Jobs for the Future). Retrieved from <https://www.jff.org/resources/resource-guide-engaging-employers/>.

APPENDIX F: ENDNOTES

- ¹ Adam McCann, States with the Best & Worst School Systems, WalletHub, <https://wallethub.com/edu/states-with-the-best-schools/5335/> (Accessed 10/1/18)
- ² Nathan D. Grawe, Demographics and the Demand for Higher Education, Supplemental Materials, <https://people.carleton.edu/~ngrawe/HEDI.htm> (Accessed 10/1/18)
- ³ National Commission on Excellence in Education, A Nation at Risk: The Imperative for Educational Reform, <https://www2.ed.gov/pubs/NatAtRisk/risk.html> (Accessed 10/1/18)
- ⁴ James Manyika et al. Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages, McKinsey & Company, <https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages>. (Accessed 10/1/18)
- ⁵ Justine Hofherr, There are 17 open jobs for every new tech college graduate in Massachusetts, Boston.com, <https://www.boston.com/news/jobs/2016/05/19/17-open-tech-jobs-every-new-college-graduate-massachusetts> (Accessed 10/1/18)
- ⁶ Asma Khalid et al., What the data tell us about the future of work in Mass., WBUR, <https://www.wbur.org/bostonmix/2017/10/30/future-jobs-data-massachusetts> (Accessed 1/16/19)
- ⁷ Joseph B. Fuller and Manjari Raman, Dismissed by Degrees, Accenture, Grads of Life, Harvard Business School, Burning Glass Technologies and Harvard Business School <https://www.hbs.edu/managing-the-future-of-work/Documents/dismitted-by-degrees.pdf> (Accessed 1/16/19)
- ⁸ Joseph B. Fuller and Matthew Sigelman, Room to Grow: Identifying New Frontiers for Apprenticeships, <https://www.hbs.edu/managing-the-future-of-work/Documents/room-to-grow.pdf> (Accessed 1/16/19)
- ⁹ Massachusetts Department of Higher Education, 2017 Enrollment at Massachusetts Public Colleges & Universities—Trends, Challenges & Opportunities, slide 12, <http://www.mass.edu/datacenter/2017enrollmentestimates.asp> (Accessed 10/1/18)
- ¹⁰ Massachusetts Department of Public Health, Health of Massachusetts, April 2010, <https://www.mass.gov/files/documents/2016/07/vs/hom-chapter-1.pdf> (Accessed 10/1/18)
- ¹¹ Jennifer Cheeseman Day and Hyon B. Shin, How Does Ability To Speak English Affect Earnings, U.S. Census Bureau, https://www.census.gov/hhes/socdemo/language/data/acs/PAA_2005_AbilityandEarnings.pdf (Accessed 10/1/18)
- ¹² Naome Jeanty and Raija Vaisanen, Promoting Success: What it takes to move beyond an entry-level job, Commonwealth Corporation, http://commcorp.org/wp-content/uploads/2018/06/Promoting-Success_Final.pdf (Accessed 10/1/18)
- ¹³ 2012-2016 American Community Survey 5-Year Estimates
- ¹⁴ Press release, Baker-Polito Administration Establishes Council to Address Aging in Massachusetts, <https://www.mass.gov/news/baker-polito-administration-establishes-council-to-address-aging-in-massachusetts> (Accessed 10/1/18)
- ¹⁵ Brandon Busteded, The Coming Disruption in Higher Education, slides 3 & 4, Gallup, <http://www.sacscoc.org/2017AMHo/CS%20Handouts/SACSCOC%20Busteded%2012.5.17.pdf> (Accessed 10/1/18)
- ¹⁶ Anthony Carnevale, et al., Good Jobs that Pay Without a BA: A State by State Analysis, Georgetown University, Center on Education and the Workforce, <https://goodjobsdata.org/wp-content/uploads/Good-Jobs-States.pdf> (Accessed 10/1/18)
- ¹⁷ Elka Torpey, Measuring the Value of Education, U.S. Bureau of Labor Statistics, <https://www.bls.gov/careeroutlook/2018/data-on-display/education-pays.htm> (Accessed 10/1/18)
- ¹⁸ Anthony Carnevale, et al., The College Payoff: Education, Occupations, Lifetime Earnings, Georgetown University, Center on Education and the Workforce, <https://cew.georgetown.edu/cew-reports/the-college-payoff/> (Accessed 10/1/18)

- ¹⁹ Kenneth Megan, et al., Higher Education Trends: Rising Costs, Stagnant Outcomes, State Initiatives, Bipartisan Policy Center, <https://bipartisanpolicy.org/wp-content/uploads/2017/03/BPC-Higher-Education-Rising-Costs-Stagnant-Outcomes.pdf> (Accessed 10/1/18)
- ²⁰ The Institute for College Access and Success, Project on Student Debt, State by State Data, https://ticas.org/posd/map-state-data#overlay=posd/state_data/2015/ma (Accessed 10/1/18)
- ²¹ U.S. Department of Education, The Condition of Education 2018, Chapter 2- Postsecondary Education, Section: Programs, Courses and Completion, National Center for Education Statistics, https://nces.ed.gov/programs/coe/pdf/coe_ctr.pdf (Accessed 10/1/18)
- ²² André Dua, Voice of the Graduate, McKinsey & Company, <https://www.mckinsey.com/industries/social-sector/our-insights/voice-of-the-graduate>. (Accessed 10/1/18)
- ²³ Robert Valletta, Recent Flattening in the Higher Education Wage Premium: Polarization, Skill Downgrading, or Both?, National Bureau of Economic Research, <https://www.nber.org/chapters/c13705>, (Accessed 10/1/18)
- ²⁴ Peace Bransberger and Demarée K. Michelau, Knocking at the College Door: Projections of High School Graduates, December 2016, Western Interstate Commission for Higher Education, <https://knocking.squarespace.com/reports/2017/3/22/full-report> (Accessed 10/1/18) and Nathan Grawe <https://people.carleton.edu/~ngrawe/HEDI.htm>
- ²⁵ Massachusetts Department of Higher Education, Bridges to College Program Overview, http://www.mass.edu/strategic/read_bridges.asp (Accessed 10/1/18)
- ²⁶ <http://www.mass.edu/datacenter/2017enrollmentestimates.asp>
- ²⁷ U.S. Department of Education, Web Tables: Demographic and Enrollment Characteristics of Nontraditional Undergraduates: 2011-12, National Center for Education Statistics, <https://nces.ed.gov/pubs2015/2015025.pdf> (Accessed 10/1/18)
- ²⁸ Kevin Eagan, et al., The American Freshman: National Norms Fall 2016, Cooperative Institutional Research Program at the Higher Education Research Institute at UCLA, <https://www.heri.ucla.edu/monographs/TheAmericanFreshman2016.pdf> (Accessed 10/1/18)
- ²⁹ Strada-Gallup 2017 College Student Survey, Crisis of Confidence: Current College Students Do Not Feel Prepared for the Workforce, Gallup & Strada Education Network, https://stradaeducation.gallup.com/reports/225161/2017-strada-gallup-college-student-survey.aspx?g_source=link_usafunds&g_campaign=item_211634&g_medium=copy (Accessed 10/1/18)
- ³⁰ Gallup and Lumina Foundation, What America Needs to Know About Higher Education Redesign: The 2013 Lumina Study of the American Public's Opinion on Higher Education and U.S. Business Leaders Poll on Higher Education, <https://www.gallup.com/services/176759/america-needs-know-higher-education-redesign.aspx> (Accessed 10/1/18)
- ³¹ MassINC Polling Group, Mass. business leaders focus on real world skills, good teachers, <https://www.mbae.org/wp-content/uploads/2016/11/FINAL-Report-2016-MBAE-Employer-Poll-for-web.pdf> (Accessed 10/1/18)
- ³² http://commcorp.org/wp-content/uploads/2018/06/Promoting-Success_Final.pdf
- ³³ Burning Glass Technologies, Moving the Goalposts: How Demand for a Bachelor's Degree is Reshaping the Workforce, https://www.burning-glass.com/wp-content/uploads/Moving_the_Goalposts.pdf [Accessed 10/1/18]
- ³⁴ Joseph B. Fuller et al., Bridge the Gap: Rebuilding America's Middle Skills, Accenture, Burning Glass Technologies, Harvard Business School, <http://www.hbs.edu/competitiveness/Documents/bridge-the-gap.pdf> (Accessed 10/1/18)
- ³⁵ https://www.burning-glass.com/wp-content/uploads/Moving_the_Goalposts.pdf
- ³⁶ <http://www.hbs.edu/competitiveness/Documents/bridge-the-gap.pdf>

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