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Help Wanted

Workforce Participation, Wages, Job Desirability, and Skills Gaps
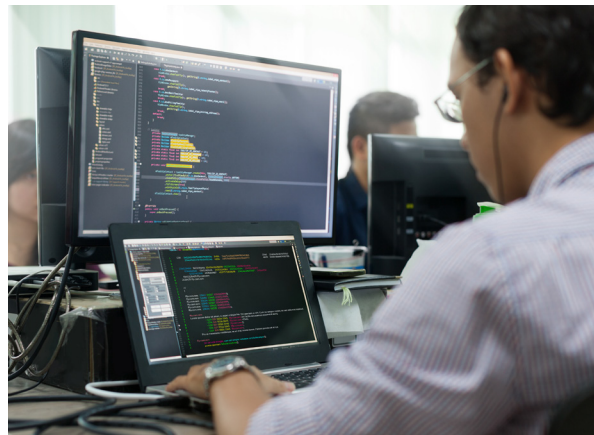
The mission of Utah Foundation is to promote a thriving economy, a well-prepared workforce, and a high quality of life for Utahns by performing thorough, well-supported research that helps policymakers, business and community leaders, and citizens better understand complex issues and providing practical, well-reasoned recommendations for policy change.

Help Wanted

Workforce Participation, Wages, Job Desirability, and Skills Gaps

In a December 2015 Utah Foundation Report, 71% of 151 major local employers reported some level of difficulty finding enough skilled or qualified employees. One-third claimed the worker shortage was the single greatest factor impeding their growth, and an overlapping but not identical third reported the scarcity of skilled workers as the worst quality of Utah's labor pool. More recent data indicate the trend has not changed.

An analysis of Utah's worker shortage identifies four principal contributing issues: a tight labor market, low wages, job desirability, and skills gaps. With unemployment near record lows, employers can either recruit from outside Utah or convince more Utahns to participate in the labor force. Women and young Utahns are possible targets. One way to convince higher participation levels is through higher wages. After accounting for inflation, there has been little to moderate wage increase in recent years.

Certain occupations are considered less desirable, such as those in construction, manufacturing and trades. Often these jobs offer living wages, and are available earlier in life because they do not require four-year degrees. Public awareness campaigns targeting graduating students and their parents hold promise.

Finally, there is the potential problem of skills gaps – when the workers available are missing the skills employers need. There are may solutions and they often depend on better collaboration between businesses and educational institutions.

In many ways, economic theory would indicate that a worker shortage should be self-correcting. As employers become more eager to find talented workers they would be expected to offer higher wages for difficult-to-fill occupations. Higher wages would convince more Utahns to participate in the labor force, convince students to gain the skills needed for those occupations, and even convince others working in different industries to seek training for required skills. Additionally, one business' problem is merely another's opportunity. Companies specializing in recruitment, consulting, staffing, and training benefit from worker shortages as they market their services to companies with difficult-to-fill positions.

KEY FINDINGS:

- **Utah's current labor force participation rate of 69% is still substantially lower than the 71-72% of the nineties and early aughts (see page 4).**
- **A 2015 survey of Utah businesses found the majority were offering lower wages than they were already paying current employees in difficult-to-fill positions (see page 2).**
- **Despite experiencing below-average unemployment rates for the past four years, wages have not increased as expected in a tight labor market (see page 5).**
- **While 63% of parents expect their children to earn four-year degrees, only 32% of Utahns historically do and only 29% of jobs in 2020 will require one (see page 7).**
- **Governments, educational institutions, non-profits, trade organizations, private companies, and others are all working both independently and collaboratively to solve the skills gap through different methods (see page 12-24).**

WORKER SHORTAGES AND DIFFICULT-TO-FILL POSITIONS

Many companies and even industries claim they are not able to find all the workers they need. In Utah, the construction industry is booming, but companies are suffering from a lack of manpower.[1] The tech industry struggles with the same problem.[2] In fact, one 2015 report claimed that a conservative estimate of Utah's open, unfilled technology jobs was between 10,000 and 15,000.[3] Shortages have also been reported for skilled manufacturing workers,[4] teachers,[5] and nurses.[6] Not only have there been numerous news articles about worker shortages for these occupations, but more current data is gathered by Utah's Department of Workforce Services on its labor exchange platform confirms these reports. As of April 2017, these and related professions are among the top 10% of most solicited jobs.[7]

From a 2015 Utah Foundation survey of 151 major local employers, 71% of companies reported difficulty finding enough skilled or qualified employees. One-third of companies surveyed claimed the worker shortage was the single greatest factor impeding their growth. An overlapping, but not identical, third of companies reported the scarcity of skilled workers as the worst quality of Utah's labor pool. More recent data indicate the trend has not changed. The Bureau of Labor Statistics reported that since January 2015, the number of job openings in the U.S. have exceeded the number of new hires.[8] This is unusual. For most of the history of the survey, monthly hires outnumbered monthly job openings. More openings than hires might indicate that employers are struggling to find the employees they need.[9] While data are not available by state, the western region of the U.S. demonstrates a similar trend.

There are a number of possible explanations for a worker shortage in Utah. The economy moves in a cyclical pattern, and there are recessions where there is a glut of potential employees and booms when the labor market is tight. Fluctuations in wages also drive the number of people interested in participating in the labor market. Some jobs are just more desirable to potential employees than others. It is also possible that there is a skills gap or misalignment between the skills learned in Utah's educational institutions and the skills desired by local companies.

It should be clear that this is nothing new. In 1948, Utah Foundation studied whether vocational programs were best provided in high school or vocational schools. It was an imperative question at the time as trade, industry, and distributive occupations made up 72% of jobs.[10] Utah Foundation also issued reports on education and workforce alignment in 1958, 1967, 1971, and 1980. These reports highlighted stackable degrees, transferable credits among all post-secondary institutions, keeping high school counselors abreast of future job projections, promoting early awareness for elementary students, and hands-on experiences for older students. Studying the topic decades later, many current recommendations are remarkably similar.[11]

TIGHT LABOR MARKET
Utah's Low Unemployment Rate

One of the simplest explanations for why companies cannot find enough employees is that Utah simply does not have enough workers. The US Congressional Budget Office estimates that the national natural

Utah's low unemployment rate contributes to worker shortage

Figure 1: Utah Unemployment Levels and Trends
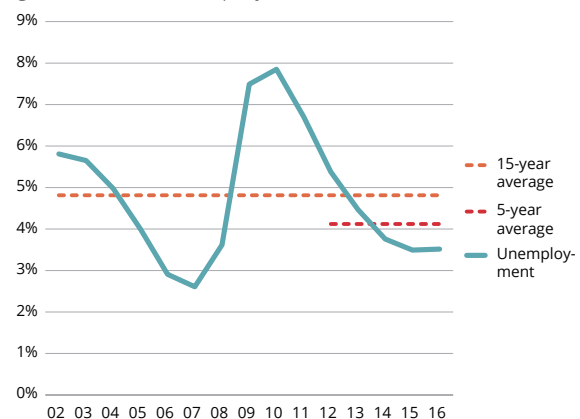
Source: Bureau of Labor Statistics.

rate of unemployment (the level of unemployment from normal job turn over, ignoring recessions and booms) is about 4.7%.[12] Utah's unemployment has been lower than this since February 2013.

Utah typically has lower levels of unemployment than the nation. Utah's unemployment historical average is somewhere between 4.5% and 5%, though the unemployment rate has been below this long-term average since July 2013.[13] With only 3% of Utahns unemployed, it is no surprise that companies are not finding enough qualified employees.

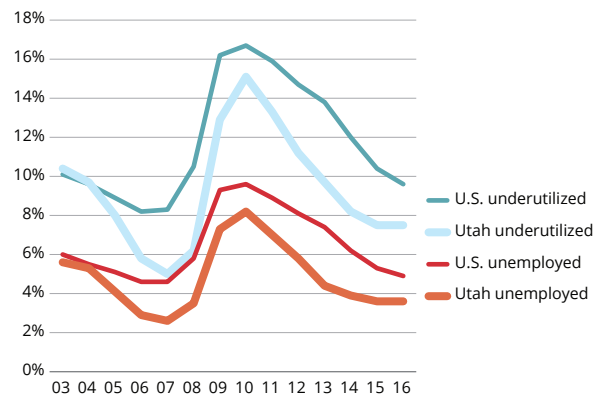**Utah's Low Labor Underutilization Rate**

While Utah's unemployment rate is the lowest it has been since 2008, many are critical of its simplistic definition of unemployment. The labor underutilization rate is a broader measurement that includes not only the unemployed, but discouraged workers, marginally attached workers, and those working part-time who would work full-time if they could. While economists understand that a natural rate of unemployment and underutilization exists, it is problematic to quantify exactly what that rate is. An analysis by DWS looking at 2014 underutilization reported that Utah's unemployment had dropped to expected levels. However, underutilization – which was at 8.2% – still could potentially decrease by another two percentage points before reaching the natural rate.[14] Utah's underutilization rate fell to 7.5% in 2015 and has held steady since.

Utah's lowest level of underutilization was 5% in 2007. This was the lowest observed rate of underutilization among all 50 states and Washington D.C. since 2003, the earliest data available. Accordingly, this level is probably below Utah's natural rate of underutilization. Economists at DWS consider rates of 5.8%-6.2% (2006 and 2008 respectively) to be more sustainable. However, 24 US states have never experienced a rate as low as Utah's current rate of underutilization of 7.5%. With that in mind, it may be that the current rate is closer to the natural rate.

Despite lower-than-average unemployment rates and falling underutilization rates, Utah's workforce has been able to support higher than average job growth over the past four years. In fact, Utah's job growth over the past five years is second only to Washington D.C.[15] Such a tight labor market might make it difficult to find not just skilled workers, but any workers at all. However, even with low unemployment and

Utah and U.S. unemployment and underutilization rates have all fallen below 14-year averages.
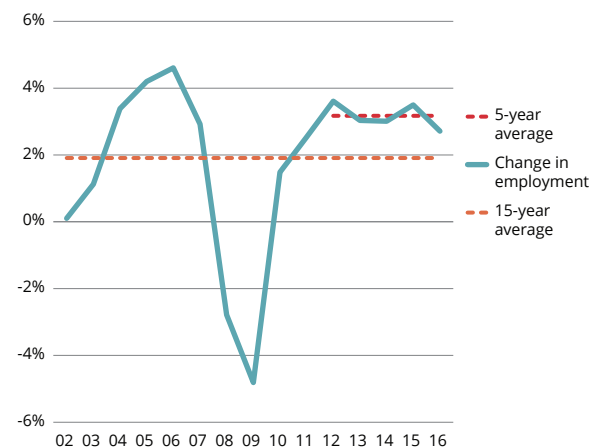
Figure 2: Unemployment and Underutilization Rates, Utah and U.S.

Source: Bureau of Labor Statistics.

Despite low unemployment, Utah has supported above average job growth in past four years

Figure 3: Annual Job Growth, Utah

Source: Bureau of Labor Statistics.

low underutilization rates there potential for more employees by convincing more Utahns to participate in the labor force.
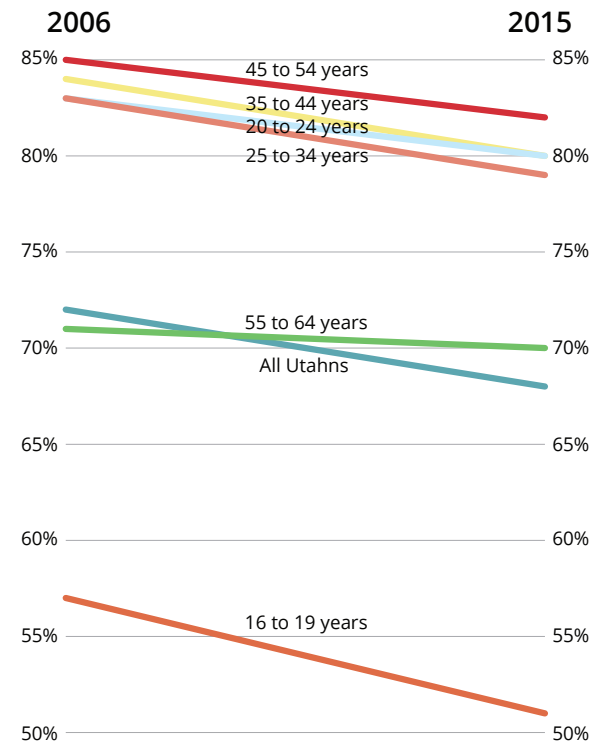
Utah's Low Labor Force Participation Rate

Local economists have explained that part of Utah's low unemployment rate is related to fewer people participating in the labor force.[16] Historically, a large share of working-age Utahns participated in the labor force. In fact, beginning in 1985, Utah was among the top-ten states with the highest share of its working-age population participating in the labor force.[17] That changed in 2009 in the wake of the Great Recession. A significant share of Utahns dropped out of the labor force when compared with other states. This number hit a low point of 67.7% in 2012, but has edged back up to 68.7% as of 2016.[18] Still, this is still short of the 71-72% range Utah experienced for most of the nineties and early aughts. The national explanation for a lower labor participation is that Baby Boomers are retiring out of the workforce. This is not the case in Utah, where labor force participation levels of those 55 and over decreased the least of all age groups. The 3% decrease in the share of Utah civilians in the labor force might seem small. However, if the same proportion of Utahns worked in 2015 as did in 2006, there would be 54,465 additional workers in Utah's labor force. For means of comparison, that would be enough to absorb every job created in 2016. It then follows that there are potentially plenty of people that businesses could entice back into the labor force to at least partially address a worker shortage.

From 2006 to 2015, labor force participation fell among all age groups, especially young and middle-aged Utahns

Figure 4: Utah Labor Force Participation Rates for Age Groups 16-65

Source: Department of Workforce Services.

Approaches

Current employment growth, unemployment rates, and underutilization rates suggest there are few workers available, and the large majority of Utahns looking for a job have found one. However, low labor force participation suggests there might be an untapped reserve. For a tight labor market with low unemployment and underutilization, two solutions present themselves: bring in working-age individuals from out-of-state, or encourage additional Utahns to participate in the labor force. To encourage in-migration, groups in Utah have discussed the possibility of relocation packages to help employers bring in the people they cannot find in Utah. There are several different mechanisms for how such a program might work. Businesses could offer relocation packages themselves. Another option could be similar to Maryland, where the state and participating employers offer matching funds for down payment assistance (although this specific program is focused on helping first-time homebuyers).[19] Alternatively, the state could offer tax breaks for companies who offer qualifying types of relocation support or down payment assistance. Packages such as this usually have time requirements, such as a three-year commitment from the relocating employee. Proponents argue that the additional income tax generated over the duration of the commitment will offset the relocation

assistance. In addition, many of these employees will potentially stay longer than the initial commitment, further adding to the state's return on investment.

Aside from incentivizing in-migration, more Utahns could participate in the labor force. In the event of a worker shortage, economic theory would expect this to happen naturally. Scarce labor leads to higher wages, which encourages retirees, students, or other non-job-seeking individuals to seek employment. If this natural balancing were not occurring fast enough, one targeted solution might be policies making it easier for women to participate in the labor force. Utah has the largest differential (16.7 percentage points) between men and women in the labor force of any state.[20] Issues such as low rates of promotion, pay gaps, parental leave, affordable quality childcare, and flexible work schedules have a significant impact on women's participation in the labor force.[21] Utah Foundation will look more broadly at the role of women in Utah's economy in 2017.

LOW WAGES

There are other possible explanations for Utah's labor shortage. One possibility is low wages. Employers might not be able to find enough employees who are willing to work at the wages being offered.

A continuing story of Utah's recovery from the Great Recession has been that, despite economic growth and low unemployment rates, wages have not risen as expected.[22] A 2015 survey of randomly sampled businesses commissioned by DWS found that two-thirds reported some degree of difficulty filling positions.[23] Of these difficult-to-fill positions, 68% of businesses offered below-median wages for each occupation, and 38% were offering wages in the bottom 25th percentile of earned wages. In other words, the wages offered for the difficult-to-fill positions were substantially lower than what business were paying current employees in the exact same occupation. Part of the reason low wage offers were so prevalent might be the fact that new hires often start at lower wages, or that establishments expect potential employees to negotiate higher wages. The report concludes, "despite the employer's general perception that low wages are not an overriding issue, relatively low offered wages compared to occupational norms may be playing a noteworthy role in making job openings difficult to fill."[24]

Of these difficult-to-fill positions, 68% of businesses offered below-median wages for each occupation, and 38% were offering wages in the bottom 25th percentile of earned wages

When looking at economic data on wages, there are two sources for state-level data. The first comes from a series of quarterly reports in which companies report the total amount of wages paid over the quarter and the monthly number of filled jobs (both full- and part-time).[25] This data set, known as the Quarterly Census of Employment and Wages (QCEW), produces reliable and consistent data and best addresses questions concerning how much firms pay in wages. A similar data source, but from the point-of-view of employees, comes from the Current Population Survey (CPS), which surveys 60,000 Americans monthly. In this survey, approximately 15,000 report their earnings each month. Since this is a survey and not a census, the data is subject to a higher level of variability and error than the QCEW. However, it provides more frequent and more recent data.[26] Because multi-job workers would be double-counted by the QCEW, CPS data best answers questions about how much workers are earning.

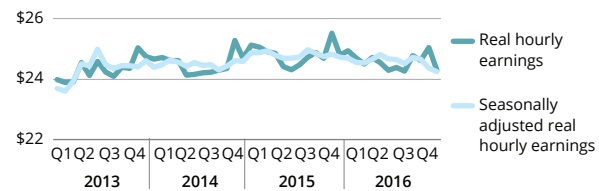**Despite low unemployment, Utah sees slow growth in real wages**

Figure 5: Monthly wages (QCEW), 2016 dollars
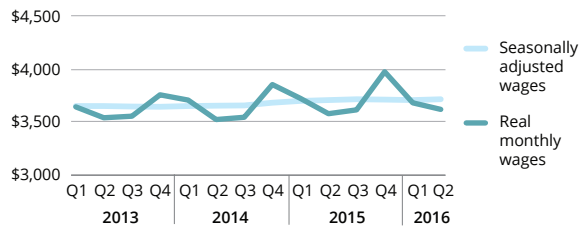
Source: Department of Workforce Services

Despite low unemployment, Utah sees slow growth in real earnings

Figure 6: Hourly Earnings (CPS), 2016 dollars

Source: Department of Workforce Services

When adjusted for inflation, both wage and earnings data have shown little or no growth. Any modest growth over the past five years certainly falls short of the kind of wage growth expected in a tight labor market.[27] However, DWS reports that the latest wages data, although not publicly released, appears to show the kind of growth expected in an economy with a tight labor supply.[28]

Also, while Utah's overall average wage has seen little growth, the average masks the changes occurring in specific industries. For example, the strong wage growth in the information, finance and insurance, and real estate industries, and the moderate wage growth in food and retail has been offset by wage decreases in the utilities, management, education, and recreation industries. This offset of wages rising in some sectors while falling in others might suggest the presence of a skills gap, which will be discussed later in this report.

Approaches

If low wages are the reason Utah employers are unable to find enough employees, it is unclear what policymakers could do to help. The simplest solution, raising the minimum wage, would be unlikely to help in this area. Not only would any minimum wage increase be unpalatable in a Republican state such as Utah, but an increase to $10 per hour would only improve wages in an estimated 12% of the positions employers categorize as difficult-to-fill.[29]

It would be easy to fault employers in this situation. They are unwilling to offer decent wages and subsequently cannot find enough employees. However, low-wage offerings could be a result of extremely competitive markets. It might be the case that the revenue generated by an additional hire does not cover a wage for which Utahns are willing to work. That would suggest that Utah is currently at an economic equilibrium and that current employers need to adjust their expectations.

Alternatively, if additional encouragement were offered to those currently not seeking employment, or barriers which prevent women participating in the economy were removed (as mentioned in the previous section), more Utahns might be willing to work at the current level of wages.

JOB DESIRABILITY

Another explanation for possible labor shortages related to low wages – but different enough to merit its own discussion – is the desirability of available jobs. Many of the industries where Utah is seeing a worker shortage are those traditionally seen as less prestigious, such as construction, manufacturing, and skilled trades like plumbers or electricians. Whether deserved or not, some of these jobs have gained a reputation as "dirty,

dumb, dangerous, and disappearing."[30] These industries often expend great effort to buck that reputation, including participating in job fairs and other activities that target soon-to-be high-school graduates. Employers might be able to demonstrate to students how clean and technical modern manufacturing can be. However, when targeting younger adults, there is another hurdle – parental expectations.

In the U.S., education is seen as the great equalizer and a bachelor's degree key to achieving the American Dream. A 2015 Pew Research Center study found 71% of American parents with children under 18 considered a college degree as extremely important or very important.[31] Hispanic and Black parents were even more likely to consider it important (86% and 79%, respectively).[32] Even more pointedly, a 2012 study found 64% of American parents with children in grades 6-12 expect their child to obtain a bachelor's degree.[33]

When looking at the employee shortage across industries, some are quick to claim that the problem is a skills gap, or schools are not producing the skilled employees companies need. However, such a view does not take into account student demand for college and university courses. A 2016 report by DWS analyzing career and technical education in Utah broke programs out into four categories. These categories were based on whether students had a high or low level of interest in a program and whether the graduates from the program where in high or low demand. These data were based on reports from university officials, and while anecdotal in nature, can provide limited insights. The data varied by region, but there were a number of programs that multiple schools reported had high employer demand but low student demand. These programs included automotive or diesel systems technology, CNC (computer) machining, composite manufacturing, and commercial, diesel, and heavy-duty driving.[34]

While modern manufacturing is no longer the "dirty, dumb and dangerous" environment it may have been in the past, other industries such as construction have other desirability problems. Many construction jobs are seasonal, with little work during winter months. The number of construction jobs available also fluctuates more than many other industries. These jobs often pay well when compared to other positions with a similar educational/skill level. However, many of these desirability factors might lead potential workers to look elsewhere. In the case of young adults, parents might guide their children toward other pursuits.

Moreover, the view that a college degree is necessary for success in the modern world has become institutionalized. In a document outlining a set of goals over the next decade, Utah State Board of Regents concluded "higher education is necessary for individuals to succeed in the 21st century workforce, and having an educated population is necessary for Utah to continue on its trajectory of economic growth and prosperity."[35]

Approaches

Around two-thirds of parents want their children to complete a bachelor's degree. A higher education is

Parental expectations may hinder workforce alignment; while two in three parents expect their children to get a college degree, Utah's economy only needs one in three

Figure 7: Parental Expectations of Educational Attainment Compared to Actual and Needed Attainment
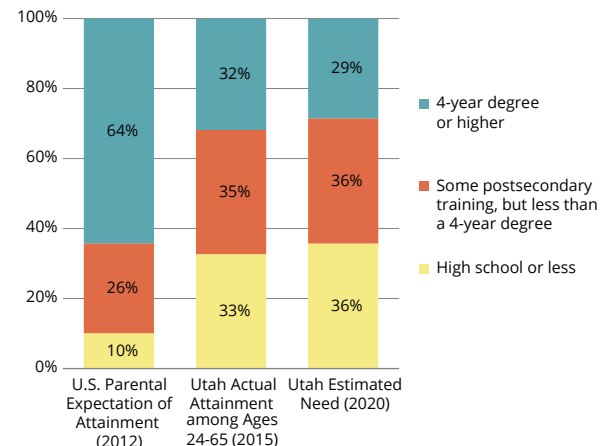
Source: Child Trends Data Bank, US Census, and Georgetown University.

considered "necessary" for success in the modern workforce. Yet, only one-third of Utahns historically reach that level of educational attainment.[36] Given that, industries that recruit potential employees at the high school level might be frustrated by parental, societal, and institutional expectations. Part of the solution to this problem relies on companies marketing themselves. Attempts to educate students and their parents include: class visits, job fairs, job shadowing, internships, and other tactics.[37] Some programs such as Talent Ready Utah and STEM Mentor Exchange try to help companies form stronger partnerships with schools.[38]

In 2016, the Utah Manufacturing Association received a $250,000 grant from the Utah Cluster Acceleration Partnership (UCAP) for its Make Manufacturing Your Future Initiative. This initiative partners with several colleges and universities to target millennials and help them understand the opportunities available in the manufacturing sector.[39]

There is also a role for high school counselors. Counselors can help students make informed decisions about pursuing four-year degrees, skilled training, or going directly to the workforce. However, counselors are often overworked and spend a substantial amount of time on tasks other than counseling.

SKILLS GAP

A fourth reason companies might not be able to find all the workers they need is because schools are producing students that are either not skilled enough, or do not have skills in the requisite areas.[40] There is some debate about the existence of a skills gap. Nobel Laureate Paul Krugman says the idea of a skills gap is a "zombie idea – an idea that should have been killed by evidence but refuses to die." Other economists also find little evidence consistent with a skills gap.[41] However, skills-gap believers think the lack of evidence is due to looking at broad, aggregate data rather than the more targeted places within industries where the skills gap exists.[42] Prominent business leaders have also been quite vocal about a skills gap.[43] Moreover, in a 2014 Business Roundtable survey of 126 CEOs, 97% reported that the skills gap was at least "somewhat problematic" for their companies in the United States.[44] While these CEOs might have identified it as "somewhat problematic," only 6% reported the skills gap to be "very problematic." This indicates that while a broad number of CEOs attribute problems to the skills gap, not many CEOs consider it an acute problem.

The idea of a skills gap is a "zombie idea – an idea that should have been killed by evidence but refuses to die."

In Utah, DWS specifically designed the aforementioned difficult-to-fill jobs survey to identify the existence of a skills gap. While it concluded that low-wage offerings were too prevalent to identify any specific industries, it did admit that production occupations (assemblers and fabricators, metal workers, machinists, welders, grinders, woodworkers, among others) did come close to meeting their criteria.[45]

Why are Skills Gaps important?

A mismatch between the skills provided by the workforce and the skills demanded by the economy is detrimental to nearly everyone. In a simplistic scenario, perhaps more people choose to become web developers rather than plumbers. After all, web developers do not have to be on call for emergencies, and they do not have to deal with clogged pipes. As a result, plumbing companies cannot find enough employees

to meet the community's needs. When plumbing emergencies happen, consumers face long wait times and expensive labor costs. Over time, however, web developers might find after graduating that all the jobs are already occupied. Because there are so many potential web developers to choose from, those lucky enough to find jobs discover the wages they were counting on to pay their student loans are no longer sufficient. Those who do not have the right connections to land jobs in web development earn even less because they are underemployed at local coffee shops. In a more balanced scenario, if students become plumbers and web developers in the ratios the economy demands, then the majority of those students will be able to find jobs in a reasonable amount of time with reasonable pay.

Friction Points

There are several points where the collaboration between businesses and educational institutions can break down. Educational institutions must want to meet industry's needs, understand those needs, and be flexible enough to change to meet those needs. Companies must understand their own needs, be willing to collaborate with others, and be able to communicate their needs to educational institutions. Problems at any one of these friction points will break down the process of collaboration and increase the likelihood of a skills gap.

A Mismatch of Priorities

The largest barrier to a higher level of integration between educational institutions and industry is a mismatch in priorities. Nearly all non-profit educational institutions have the benefit, well-being, and development of the student as their top priority. In contrast, firms and corporations prioritize profits. To optimize profits, companies would prefer to have as many candidates as possible from which to choose. This allows them to hire the best employees for the lowest cost. However, this also results in lower wages for those lucky enough to find jobs, and unemployment for those not chosen by the firms. This works against the priorities of the educational institutions, which prefer to see as many students as possible benefit from their education by being employed at high-wage jobs.

While the divergent interests fundamentally separate the two groups, there is overlap. College mission statements will often reference "meaningful employment" or "professional excellence."[46] Students benefit when they have skills to make them employable. Students themselves are conscious of the role of their education in ensuring employability. A 2015 survey found 60% of college freshmen reported that "this college's graduates get good jobs" was a "very important" consideration when selecting a college.[47]

Employers also benefit from well-rounded employees. Studies indicate that employees who meet more than minimum requirements are more likely to improve existing processes.[48] Companies often sponsor programs for their employees that foster community engagement, because engaged employees are often more productive in the workplace.[49]

While priorities between non-profit educational institutions and industry do not exactly align, there is enough common ground that they can find ways to work together. In Utah, most non-profit educational institutions are willing and open to several different ways of collaborating with businesses and industries.

Education understanding industry needs

For educational entities to meet industry needs, they must understand those needs. Some departments in post-secondary institutions have boards of local industry leaders to provide input.[50] This allows institutions to create new classes, target specific industry certifications, or drop obsolete curricula based on the feedback

of the same individuals likely to hire students out of the programs. Industry accreditation bodies can also help ensure that broader industry requirements are met.

Often government agencies such as DWS or the Bureau of Labor Statistics communicate industry needs. Higher education institutions have been encouraged to use DWS projections in their justification of new programs.[51] These projections are also available to high school and college career counselors who can advise students on potential high demand jobs.

However, sometimes this understanding breaks down. Not all advisory boards are effective and school counselors are often limited by the large number of students for which they are responsible. Further, groups and individuals might misunderstand or question the reliability of industry or occupational projections provided by government agencies.

Industry understanding its own needs

For industry to communicate its needs to educational institutions, they first must understand their own needs. Not only can labor markets fluctuate quickly (think recessions and other cyclical trends), but technological disruption can make the jobs that individuals train for today become obsolete by the time they graduate. One report claims half of the skills that first-year electronics students learn are obsolete by the time they graduate.[52] In other words, educating individuals is a long-term process, but industry might not always be certain of their long-term needs.

Education's ability to meet industry needs

While educational institutions might be able to understand the needs of industry, that does not mean educational institutions can change to meet the needs of industry. Meeting industry needs could involve a drawn-out process of developing new curricula, approving that curricula with the educational administration, obtaining funding to create or expand a program, receiving approval from these new programs from oversight boards, finding capable teachers for the new curricula, and additional considerations. The ability of educational entities to change and adapt to industry needs is seen by many companies as difficult and needlessly bureaucratic.[53] While some educational institutions are more adept and flexible than others, bureaucratic requirements can be one of the limiting factors to a solution.

There is also a lag in what many educational institutions are able to produce. If there is a shortage of nurses, it takes two years to ensure new entrants have the proper training. A shortage of engineers means a four-year delay. It is also possible that once these individuals are trained, the need for them has waned or even disappeared. Not all jobs require two- or four-year degrees. For these occupations, educational institutions can meet industry needs in a timely manner.

Additional challenges present themselves when certain skills are best learned through practice. Some educational institutions are not capable of teaching such skills without internships, which can be expensive and difficult to arrange.

Educational institutions are also limited by student demand. While they can offer incentives such as scholarships to encourage students to participate in programs, they cannot force students to participate. As addressed earlier, if students are not interested, even the best tailored program will not meet industry needs.

Industry's willingness to collaborate

Companies not only need to be willing to work with educational institutions but with competing businesses as well. Many educational institutions have the capability to contract services with individual companies. However, educational institutions designed to benefit students will usually seek to meet industry needs rather than those of individual companies. By targeting industry needs, educational institutions prepare their students with skills that a variety of companies require. Accordingly, potential employees are not tied to the expansion or contraction of a single company, but a broader industry. Educational institutions often want to meet these industry needs, but competing companies sometimes must collaborate to jointly represent the needs. Industry associations like Utah Manufacturing Association or the Utah Technology Council can help facilitate these collaborations.

Not only do companies need to work with each other, but they also need to collaborate with educational institutions. Many companies have a hard time forming strong partnerships with educational institutions. While universities often have business development centers and entrepreneurship centers, options to

Utah pulls together toward an aligned workforce

Figure 8: Partial Network Graph of Stakeholders and Programs Promoting Workforce Alignment
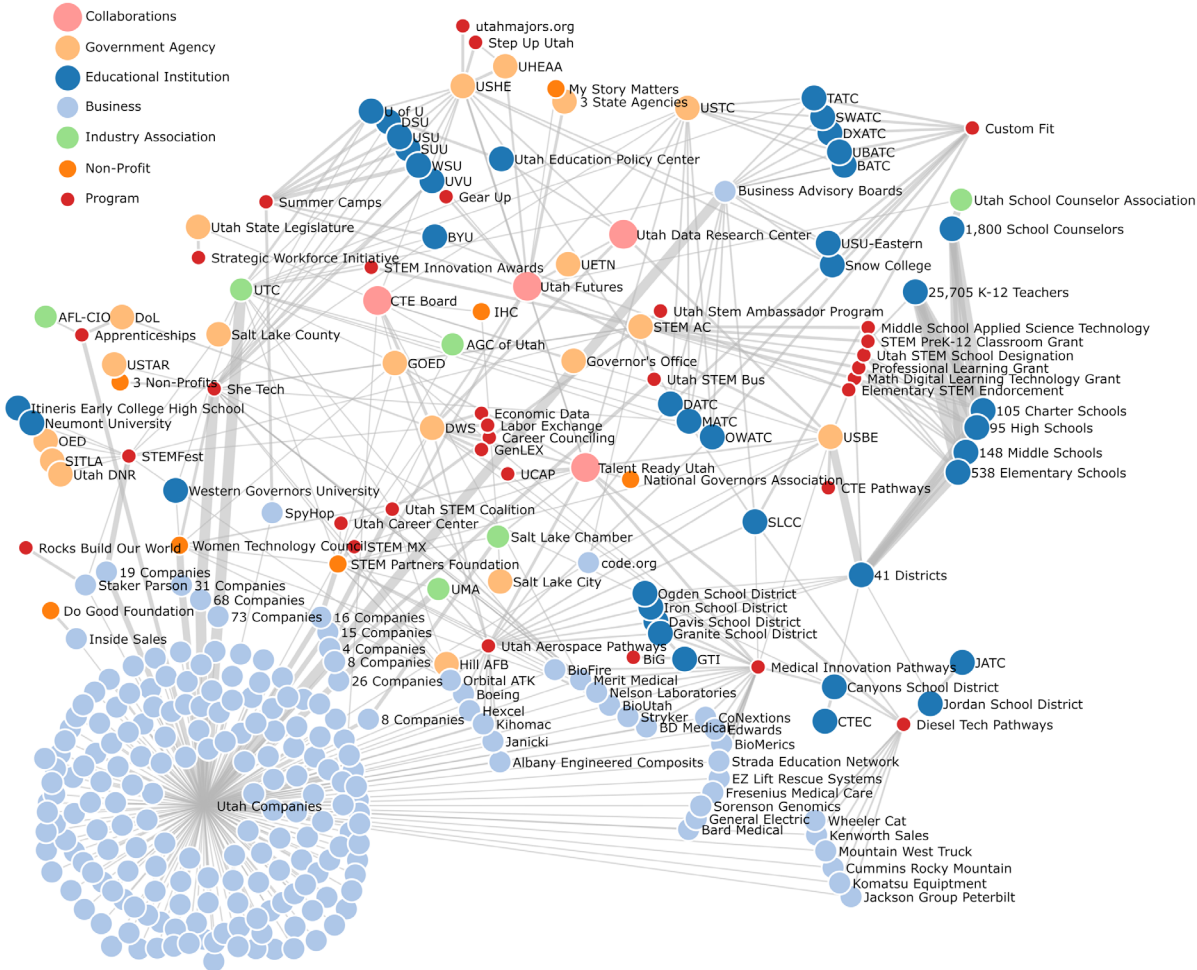
Source: Utah Foundation.

interact with K-12 institutions are a little less clear.

What Is and Could Utah be Doing?

Utah is currently very active in finding ways to connect business and educational institutions. Governments, educational institutions, non-profits, trade organizations, private companies, and others all work both independently and collaboratively to solve the skills gap through different methods. This next section outlines the roles and actions of several key groups of actors across the state.

Role of Government

The role of government in promoting integration between educational institutions and industry varies by the level of government (e.g. state as opposed to local) or by mission. It is generally considered good practice for governments and their agencies to avoid "picking favorites" and focus on providing an environment in which all businesses can thrive and succeed.

Parties Involved in Closing Skills Gaps

Government
    Governor's Office of Economic Development
    Department of Workforce Services
    State Legislature
    Utah State Board of Education
    Board of Regents and System of Higher Education
    Utah College of Applied Technology (UCAT/USTC) collaboration

Post-Secondary Education
    Public, four-year universities
    Community colleges
    Technical colleges
    For-profit schools

K-12
    School counselors
    Certification-based programs

Private Entities
    Companies
    Trade associations
    Non-Profit Organizations

Utah has three government agencies devoted to administering Utah's education system: Utah State Board of Education, Utah System of Higher Education, and the Utah College of Applied Technology. While these agencies are essentially part of Utah's education system, they do not actually provide education. Rather, they are governmental agencies that provide oversight and guidance to Utah's educational institutions. As a result, they are discussed under the government section rather than the educational institution section.

Governor's Office of Economic Development

The Governor's Office of Economic Development (GOED) has a number of roles in promoting growth in the economy in Utah. As it relates to integrating industry and educational institutions, it sees itself as a convener, an entity that brings the different parties together to work on a solution.[54] One example is GOED's role in the creation of the Utah Aerospace Pathways program. In this program, GOED brought together seven companies in the composites industry with K-12 and post-secondary educational institutions to meet the industry's workforce needs. Similar programs were developed for diesel engine technicians and the life sciences industry. These pathway programs have since become part of the Talent Ready Utah Initiative.

Embedded as part of GOED is the STEM Action Center, which focuses on promoting science, technology, engineering, and mathematics throughout Utah schools. Some of their programs include increasing STEM curriculum materials in the K-12 system, providing grants for schools to purchase software and equipment, covering tuition for elementary teachers to receive a STEM endorsement, and other similar programs.[55]

Department of Workforce Services

DWS seeks to be the one-stop shop for jobseekers. It sees itself as an individual-focused entity seeking the best outcome for the potential employee.[56] DWS seeks to meet that goal through an array of services including job coaching, an online labor exchange, and publishing state economic, industry, and occupational data.

In many ways, DWS is the primary avenue for communicating industry needs to educational institutions. University programs often rely on DWS occupational projections to justify the creation of new programs.[57] Occupational wage and job growth data is also essential for programs that support college and career planning for Utah residents.

DWS not only hosts a labor exchange where employers and employees can connect, but they actively seek to improve the exchange. In 2012, DWS, in partnership with Montana's Department of Labor, received federal funding to experiment with the redesign of the labor exchange in a program called GenLEX.[58] A report on the effectiveness of the new changes found that users were just as satisfied using the original labor exchange.[59] As a result, DWS is continuing to seek feedback from users and implement changes to make the labor exchange more efficient.

In addition to providing services to employees and data for the industry, DWS is involved in the funding of new or expanding programs that seek to fill an area of job demand. The Utah Cluster Acceleration Partnership (UCAP) is a grant that generally promotes the creation and expansion of industry-aligned educational programs. It focuses on high-growth industry clusters as defined by GOED, as well as those that meet a regional economic need. The grant highly encourages matching funds from the benefiting local industries. In 2016, UCAP funded 20 different projects, with $2 million going to higher education and trade associations, and $1.5 million funding programs in public education. While this program is being transitioned into the Talent Ready Utah Initiative, DWS will continue to be the primary source of funding and continue to manage the grants.

State Legislature

The State Legislature has two principle roles in workforce alignment. First, it controls the budget and can appropriate funds to programs that promote workforce alignment. Second, it can create programs to promote workforce alignment or require government agencies to carry out actions it deems appropriate to promote workforce alignment. Some of the more recent actions undertaken by the State Legislature include:

- 2013 SB 169 – Education Task Force: This bill created a task force and issued a report.[60] In order to align education with economic development goals, the report had three recommendations:
  - incentivize the completion of Math 1050 for high school students,
  - support development for job and career counselors in secondary schools, and
  - create a governing board for the Utah Education Workforce Alliance and Utah Futures.[61]
- 2014 SB 34 – Statewide Data Alliance and Utah Futures: This bill created a steering committee for Utah Futures and provided funding for what later became the Utah Data Alliance.[62]
- 2015 HB 198 – Strengthening College and Career Readiness: This bill allocated $400,000 for a one-time grant to schools and districts to encourage the professional development of school counselors.[63]
- 2015 HB 337 – Career and Technical Education Comprehensive Study: This bill created a Career and Technical Education (CTE) Board within DWS and required the board to issue a comprehensive report of the effectiveness of Utah's current CTE offerings.[64] This report was released in November 2016. It concluded with the recommendation that because educational institutions are not producing

enough CTE graduates for the expected growth of the corresponding jobs, these institutions might need additional funding to keep up with the demand.[65] Future recommendations based on the report are expected to be forthcoming.

- 2016 SB 103 – Strategic Workforce Investments: This bill allocates funding to programs to meet the career and technical education needs of a region in one of GOED's targeted industries.[66] While similar to the Utah Cluster Acceleration Partnership program, the Strategic Workforce Investment can offer continuing funding to support the sustainability of a pathway.[67]
- 2017 SB 117 – Higher Education Performance Funding: Creates a special fund to incentivize universities to increase outcomes desired by the State Legislature.[68]
- 2017 SB 194 – Utah Data Research Center Act: This act changes the Utah Data Alliance to the Utah Data Research Center and houses it in the Department of Workforce Services' Workforce Resource and Analytics Division. It also provides some funding for the center and requires a prioritized list of research requests and an online data visualization tool.[69]
- 2017 SB 238 – Higher Education Governance Revisions: This bill transforms the Utah College of Applied Technology into the Utah System of Technical Colleges, revises the role of the Utah Board of Regents, increases coordination among state educational entities, permits more flexibility in creating and terminating university programs, and other changes.[70]

Utah State Board of Education

The Utah State Board of Education refers to both a governing board of 15 individuals and a government agency responsible for the K-12 education system. The members of the governing board represent 15 areas across the state. As of 2016, board members have been selected through the election process. Board members have a number of duties, but those most pertinent to addressing the skills gap include:

- establishing minimum standards for local education agencies (districts and charter schools),
- preparing a budget for the intuitions and agencies under the board, and
- defining, establishing, and implementing core standards.

One of the ways the board is taking action is the recent (2015) approval and implementation of a new set of science standards for 6th-8th graders.[71] The new standards move away from rote memorization to applied learning by integrating topics that were traditionally kept separate such as chemistry, physics, and biology. The new standards also place a greater emphasis on engineering and experimentation.[72]

The term Utah State Board of Education (USBE) also refers to the governmental agency previously known as the Utah State Office of Education. USBE is the state agency that creates the standards and objectives around which local school districts design their curriculum. They are also involved in the creation and administration of dozens of other programs, many of which involve making sure students are well trained for the workforce.

Within the USBE is the Career and Technical Education (CTE) department, which prepares students for careers most in demand and is part of the economic development of the state.[73] High school students are required to take at least one credit hour of CTE courses for graduation.[74] Beginning in the 2014-2015 school year, USBE implemented a curriculum for a College and Career Awareness class that taught students about potential jobs after high school. This varied from USBE's normal practice, which designs standards but allows teachers to design the curriculum to meet those standards. This new curriculum allowed a clear measurement of the effects of the change. After the initial year, teachers were able to make approved changes to the curriculum.

In addition, USBE publishes a list of 57 pathways that outline the steps students need to take in junior high and high school to prepare for specific career fields.[75] The occupations outlined are targeted toward careers in demand and are part of the state's targeted economic development. Included are short assessments of the potential wages, future demand, and workforce trends.

Board of Regents and the Utah System of Higher Education

The Board of Regents is the governing body of the Utah System of Higher Education (USHE). It consists of 16 Utah citizens and a student representative appointed by the governor.[76] Its role is to provide system-wide leadership, evaluate university presidents, and link system capacity to workforce needs. It also submits a budget request for higher education to the Governor and State Legislature.

The Board of Regents sees USHE as "the primary workforce pipeline in the state."[77] In a recently approved Strategic Plan 2025, the Board of Regents outlined a number of goals for USHE. Two of these goals aim to increase the number of students who attend the USHE system and to increase the share of students who receive a degree in a timely manner. By increasing both the number of students and the share of students who successfully graduate, industries should have a larger pool of potential employees. The strategic plan states that part of increasing the level of timely completion is leveraging "applied research, industry partnerships, and degree programs explicitly established to meet workforce needs."[78]

As of 2015, a small amount of funding for schools is tied to how well universities are meeting specific goals. One of the goals outlined was "responsiveness to workforce needs as measured by degrees in area of high market demand."[79] By connecting funding to university performance, the Board of Regents and Utah State Legislature can align the goals of the universities with their own goals. However, even if all the money set aside for fiscal year 2019 ($23 million) were used to incentivize only the University of Utah, it would account for less than 10% of the institution's state-appropriated budget and just 4% once student tuition and fees are included.[80] While that may be enough to incentivize a single university, once $23 million is spread among the 20 educational institutions in UCAT and USHE, it is unlikely to cause educational institutions to seriously change their behavior. Unless funding accounts for a higher share of a university's income, it is unlikely that universities will prioritize the incentivized goals.[81]

USHE is encouraging its member universities to create stackable credentials, which allow students to build on certifications, certificates, and associate degrees before receiving bachelor's degrees. In the event a student leaves without receiving a four-year degree, they will still have a college credential. Additionally, if the student decides to return, they can build on existing credentials rather than starting from scratch.[82] USHE also promotes transferable degrees and credit. Associate degrees from USHE institutions are transferable and can account for general education requirements. Schools in the USHE system generally accept credit from individual classes transferred from USHE institutions and other accredited universities. However, the process can become complex as each university has a specific course-by-course matriculation agreement with each individual university.[83] USHE also promotes reverse credit transfers. Many students transfer before completing an associate's degree. Reverse transfers allow students to transfer current class credits back to their previous institution to fulfill the requirements for an associate degree.[84]

While the programs discussed above do not directly address the skills gap, they do add additional flexibility, making it easier for students to enter, progress in, and exit Utah's system of higher education. Ultimately, this flexibility allows for more students to attend and complete university programs, creating a larger pool of potential employees for companies.

UtahMajors.org is a program run by USHE that allows parents, students, and counselors to connect majors of member institutions to DWS occupational data. It is yet another tool to help Utahns identify the path to achieve their career goals.

Utah College of Applied Technology or Utah System of Technical Colleges

Legislation has rebranded the Utah College of Applied Technology as the Utah System of Technical Colleges (USTC) as of July 1, 2017.[85] While USTC is a state agency that governs education similar to USBE and USHE, USTC differs from its sister agencies in a fundamental way. The mission statement of USBE focuses on "Utah children" and the USHE mission statement identifies "Utah residents" as their focus, but the mission of USTC is to "meet the needs of Utah employers."[86] In other words, while the primary constituents of USBE and USHE are Utah individuals, the primary constituents of USTC are Utah businesses. They meet the needs of Utah employers by ensuring that Utah businesses have access to a workforce with the requisite technical skills. This puts USTC in a unique place among educational state agencies. In order to ensure that USTC meets those goals, its board of trustees consists of specific industry representatives as mandated by state law.[87]

> *The mission statement of USBE focuses on "Utah children" and the USHE mission statement identifies "Utah residents" as their focus, but the mission of USTC is to "meet the needs of Utah employers."*

Governmental Collaboration

There are several joint efforts where many of these agencies collaborate to raise awareness among individuals of industry needs, as well as help companies partner with educational institutions.

One example of collaboration is Utah Futures, a partnership of governmental and educational institutions. It focuses on providing information to those preparing for careers. Its assortment of tools can help Utahns discover what kind of income they need to support their desired lifestyles, what jobs provide that level of income, how prevalent those jobs are, and the qualifications for those jobs.

Utah law requires counselors, educators, parents, and students to meet regularly to develop student educational and occupational portfolios. Counselors will often use materials created by Utah Futures to help students understand what potential occupations best fit, and the steps it would take to get there. While still in development, Utah Futures is working on creating community partnerships with different organizations and companies, that could then offer internships, provide scholarships, announce job fairs, and publicize other opportunities to students. Utah Futures also connects to the resources of its members, such as the occupational and economic data provided by DWS.

DWS will also soon be hosting the Utah Data Center. Rebranded from the Utah Data Alliance, this is a group of six agencies which link their respective educational and workforce datasets. By linking their respective data, they can create a comprehensive longitudinal dataset. It follows Utahns through their primary and secondary education to their post-secondary education in Utah's technical colleges or USHE, and on to their employment industry, wages, and history. This allows for robust analysis of the effect of educational changes on workforce outcomes and the potential for data-driven policymaking.

The Talent Ready Utah initiative was launched by the governor in his 2017 State of the State Address. It was originally supported through a grant from the National Governors Association. This initiative forms a partnership across several governmental agencies and is staffed by GOED employees. The initiative seeks to strengthen partnerships between businesses and educational institutions by providing contact information for the correct people, coordinating meetings, or convening groups to create new pathways programs. The partnership encourages the development of work-based learning programs such as internships, project based learning, or other student-engagement initiatives. In addition to administrating the newly formed pathways programs (discussed in more detail later in this report), they are currently coordinating efforts for two or three additional pathways programs. Other existing programs have been consolidated to some degree under the Talent Ready Initiative. The Utah Cluster Acceleration Partnership program was recently merged with Talent Ready Utah, although the DWS will continue to fund it.

Role of Post-Secondary Education

Public, Four-year Universities

One of the primary reasons students attend universities is to receive the training they need to excel in their future careers. This is evident from the way colleges often use their job placement statistics to market themselves to prospective students. But if addressed at a more philosophical level, universities' mission statements often prioritize "academics first" and "rigorous learning," and promote "substantive scholarly and creative work" and "the discovery, creation and application of knowledge," leading to "personal growth" and "civic responsibility."[88] While these mission statements acknowledge their goals to lead students to "professional excellence" and "enrich the professional and personal lives of students," it is clear that their primary focus is more than just making sure that local industries have the workers they need.[89]

That being said, public four-year universities play a large role in ensuring a skilled workforce for many industries. University board of trustees provide leadership for each of Utah's public universities. The Governor appoints eight of the ten members for each of these boards. The boards of Salt Lake Community College and Utah Valley University are required by law to have business or industry representatives.[90] While the same requirement does not exist for Utah's other public universities, business and industry leaders are often among those appointed. In addition, some colleges within universities have advisory boards made up of local industry leaders to ensure that their coursework meets industry-wide standards. Accreditation bodies in many disciplines often serve a similar function, ensuring core skills and knowledge are taught before approving university programs.

Beyond meeting industry's workforce needs, universities often play a vital role in the creation of new companies. University professors and students take new discoveries to market and entrepreneurial students start new businesses. More stringent requirements to have universities align with existing and future workforce needs might come at the cost of other roles that a university plays in an economy. For example, tying funding to alignment with workforce needs would likely result in less funding for innovative research or support programs for entrepreneurial students. Both of these efforts create new inventions, economic growth, and additional jobs, but do not necessarily meet the current industry workforce needs.

The 2017 approval of Senate Bill 238 modified the process for public universities to create and terminate programs. Rather than ultimate approval resting with the Board of Regents, each university's board of trustees will have the ability to approve creating new programs or closing old programs.[91] This will permit additional flexibility for universities to meet the needs of local businesses.

The bill also slightly changed the role of Utah's public universities. Except for the University of Utah, all other public four-year universities are required to include career and technical education in their primary roles. Previously, the Board of Regents determined the universities' primary roles.[92] It is unclear if this will increase the duplication of efforts between USHE and USTC. A 2015 report found little overlap, but with technical education becoming a primary role for universities, that might change.[93]

Community Colleges

Community colleges in many ways have a dual mission serving both students aiming to transfer to universities and students who need specific training for the workforce. Community colleges serve students who are seeking affordable and more accessible stepping stones into universities. They also allow for a more affordable route to gaining needed skills and knowledge for the workforce. By remaining more accessible than many universities, community colleges ensure that a larger population can obtain needed skills. SLCC is the only educational institution in Utah with the "community college" in its name, but Snow College and USU-Eastern provide similar roles. While officially classified as masters and baccalaureate universities, WSU, UVU, and DSU are open admissions universities. Open admissions policies permit any high school graduate or GED certificate holder to enroll in classes regardless of GPA or SAT/ACT scores. Similar to community colleges, the increased accessibility of these institutions allows a larger share of Utahns to gain the knowledge and skills they need to better meet the needs of local businesses.

Technical Colleges

Technical colleges in Utah are devoted to filling industry's workforce needs. In 2016, the technical colleges belonging to the USTC awarded over 8,000 certificates to more than 7,000 students. Moreover, 80-95% of those students were able to find a job in the field, join the military, or continue their education.[94]

The USTC currently administers eight technical colleges. During the aughts, the applied technology colleges serving central Utah, southeastern Utah, and Salt Lake County were merged into Snow College – now Utah State University-Eastern – and SLCC.[95] While these are no longer associated with the USTC system, they serve as local technical colleges for their respective districts and make similar efforts to involve industry leaders in program development.

Technical colleges in the USTC system also form close partnerships with local companies to ensure they are teaching the right skills and developing programs that meet current needs. Every college in USTC has an industry advisory board for each program made up of leaders from local companies. This ensures that colleges in the USTC system understand the skills and certifications needed by each industry.

Moreover, Utah technical colleges support a "Custom Fit" program where companies can specifically design training curricula to be taught by technical colleges. This custom training can both serve prospective employees yet to be hired as well as update the skills of existing employees.[96] In 2016, USTC technical colleges partnered with 1,645 companies to train 15,297 employees through the Custom Fit program.[97]

Utah technical colleges also generally use competency-based education (CBE) models.[98] Rather than attending classes for a set time, students participate in a course until they have achieved the requisite skills, knowledge, and abilities before moving on to the next course. CBE allows flexibility as students make progress at their own pace. Often CBE can save students time and money as they can progress faster than time-based credit hour models of learning. CBE also creates additional flexibility for students to enter and exit the program throughout the year rather than starting in January or September and ending in May or

December. The timing more efficiently meets business demands, which need new workers throughout the year, not just during months traditionally associated with graduation.

For-Profit Schools

While many non-profit universities will have similar goals to public universities, for-profit colleges and universities have different priorities. They aim to maximize profit by satisfying their customers – their students. It seems likely that many of these institutions prioritize their job placement rate to ensure their students get a good return on their investment.[99]

However, several reports indicate that students who attend for-profit institutions receive no benefit over community college or no college at all.[100] A National Bureau of Economic Research report concluded that students who enrolled in for-profit colleges had similar earnings to those who enrolled in community colleges, despite much higher costs of attendance.[101] In fact, the U.S. Department of Education reported that of the more than 5,000 career programs with available data, 72% of those programs offered by for-profit institutions produce graduates that earn less than high school dropouts. By comparison, only 32% of programs offered by public institutions produced graduates that earn less than high school dropouts.[102] While for-profit colleges and universities seem to be well positioned to address a skills gap, the data available indicates they might not be the best solution for all attendees.

Role of K-12

By 2020, 36% of Utah jobs are projected to require a high school degree or less.[103] This means for one-third of Utah students, the K-12 education system will be the primary professional development training they receive. However, the K-12 education system also must balance the needs of the 63% of students who will need to attend some form of higher education. The K-12 system is also focused on making sure students are safe and have the basic skills required for citizenship.

Understanding the role of the K-12 educational system in preparing a qualified workforce can be complicated. It will be the primary professional development for one-third of Utah residents, but will provide only the foundation for professional development for the other two-thirds. Professional development for students occurs over a much longer time frame. As a result, K-12 education systems often focus on developing skills that make students generally employable rather than training them for a specific industry. Rather than teaching a programing language like JavaScript, the K-12 educational system tends to focus on developing general skills such as creative thinking, communication, collaboration, and creativity (often known as the four c's). These are skills that are fundamental for employees in any industry and provide the foundation for specialized skill development later in their education. Specialization does become more available during high school.

While the state creates standards, it is up to local districts and schools to create the curricula. The local development of curricula in the K-12 system can allow teachers to meet the need of local employers. It also results in little standardization across schools and districts. One district might create great potential employees while students in the next district might be lacking.

In addition, while schools and districts have local control over curricula, businesses and industries are not always able to influence its development. One way outside entities attempt to influence curricula development is by offering grants to implement certain programs. A good example is the STEM Action Center, which offers a number of grants to teachers, schools, and districts for the implementation of programs that promote science, technology, engineering, and math.[104]

In many ways, the role of the K-12 educational system is less direct in solving an employee shortage or skills gap. Local schools and districts develop individualized curricula. Opportunities for companies to collaborate are harder to find and their effect diluted across the thousands of schools spread across the state. The focus on foundational skills creates potential employees who have broad, general skills. However, this might not be enough for certain industries that require more specific skills.

School Counselors

One common focus of reform in the K-12 system is school counselors. Optimally, high school counselors should be able to discuss and decide a student's best options for the future with both the student and parents. For many, that will include applying to college. For other students, a more optimal route might include some certification or technical training. For others, seeking a job upon graduation is the best option.

Ideally, high school counselors would have the best information available during these discussions. They would have up-to-date information on wages and long-term annual openings. Much of this data is available through DWS. There are also a number of other programs that can act as a resource for school counselors including Utah Futures and Step Up Utah.

While well informed counselors providing individualized college and career insights might be the optimal solution, high school counselors have several other competing responsibilities. These could include helping students complete high school successfully, helping students set up schedules, and dealing with behavioral problems. Moreover, high-school counselors are often tasked with other unrelated duties such as proctoring tests, monitoring the cafeteria, covering classes, or creating schedules.[105] Many of these tasks could be carried out by non-certified individuals.[106] These extra tasks limit the time counselors can spend providing career or college advice with students and their parents.

As of 2015, there was one counselor for every 350 Utah high school students. The national average is 1:284, and the ratio recommended by the American School Counselor Association is 1:250

Moreover, counselors often deal with hundreds of students. As of 2015, there was one counselor for every 350 Utah high school students. The national average is 1:284, and the ratio recommended by the American School Counselor Association is 1:250.[107] Such high ratios limit the amount of help high school students can obtain from counselors. It is also likely that many of the neediest students are those most likely to slip through the cracks. As mentioned, the 2015 Legislature approved $400,000 in grants for counselor training.[108] Certainly, better trained and better informed counselors would be beneficial for students and subsequently the economy at large. Better outcomes could also be achieved through lower counselor-to-student ratios and the prioritization of counseling over other tasks that could be carried out by non-certified individuals.

Certification-Based Programs

Larger school districts that have more resources available and a larger pool of students can often create certification-based programs. These programs usually involve a series of specialized courses that students can complete in addition to their regular coursework that aim to provide specific and industry-focused training. In addition, students that complete these programs are generally ready for entry-level positions upon graduation from high school. Examples include Granite Technical Institute (GTI), Jordan Academy

for Technology and Careers, Canyons Technical Education Center, and others. The GTI also houses the Bioinnovations Gateway, which is a high-tech training facility that provides incubator space, resources, and equipment for emerging biotechnology and medical device companies. In return, these companies accept students as interns, which provides the students a unique academic experience through real-world practice. These types of programs help high school students secure entry level jobs in high-demand areas right out of high school.

Role of Private Entities

Companies

In many ways, companies bear the brunt of the burden of any worker shortage. They are responsible for both finding short-term solutions and influencing policy or economic incentives to solve the long-term problem. Private companies also play a role in alleviating the worker shortage through offering recruiting, consulting, staffing, and training services. The next section reviews a number of ways companies are involved.

Direct pathways for high school students and adult learners

Private companies have collaborated directly with government agencies, local school districts, and technical colleges to create direct pathway programs. These pathway programs allow high school students and adult learners to become qualified to work for a number of different companies across an industry.

Utah Aerospace Pathways is a collaboration between 15 different entities across private business, public K-12 education, and the higher education systems. Boeing, Albany Engineered Composites, Hexcel, Janicki, Orbital ATK, Hill Air Force Base, Utah Manufacturing Association, Lockheed Martin, and MSC Aerospace worked together with Granite, Davis, Ogden, and Iron County school districts, along with SLCC and the UCAT system, to create the Utah Aerospace Pathways program. The program has two tracks, one for high school students and one for adult learners.

High school students who enroll in the program take introductory coursework in composites before entering a paid internship with one of the company partners. Upon completion of high school, students attend another two semesters of training provided by one of the local technical colleges. After completion of the program, they are then qualified to start an entry-level position at one of the participating companies. Adult learners follow a similar path, with the exception that all of the educational experiences are provided by the local technical college.

The Utah Aerospace Pathways program also provided the framework for several other partnerships. This includes the Utah Diesel Technology Pathway, which focuses on the qualifications for diesel technicians, and the Medical Innovations Pathway, which focuses on the medical device and medical lab industries.

One key part is the cooperation of potentially competing companies across an industry. If there were only one company involved, the demand for new workers might fluctuate. However, if a group of companies is involved, it mitigates some of the risks for participating students. While no single company is hiring all the time, it is much more likely that one of eight partners will be hiring soon after program completion.

Student engagement experiences

The direct pathways programs has a visible effect on the local pool of qualified workers. some companies choose to be involved in a more indirect route through early student engagement experiences. One

example is Staker Parson. Through the "Rocks Build Our World" program, Staker Parson aids the fourth-grade geology science curriculum by providing an interactive learning experience about the role of aggregates by using chocolate chip cookie dough. Another example is Inside Sales.com, which partnered with a local elementary school to have volunteers from the company donate hours to teach students how to code. While these programs do not directly benefit the companies and their need to find qualified workers, they plant the seeds in young students and give them an idea of what they could possibly do in future professions.

Internships

While less direct than the pathways program, internships provide students the opportunity to experience companies and decide whether they are occupations they would like to pursue. It is also an opportunity for companies to test hire a number of potential employees and then offer permanent positions to the most exemplary of interns. Many companies across the state partner with local school districts to provide such programs, including Hunt Electric, L-3, Autoliv, Nucor Steel, and others.[109] Countless companies offer internships to college students.

Project-based learning

In project-based learning programs, companies partner with a local class and provide projects for groups of students or individuals to work on. Often these partners also provide mentors, speakers, and curriculum input to help the program succeed. Project-based learning programs offer students the opportunity to complete projects based on industry standards, gain experience, and get a taste for what future employment might be like. One example of such project-based learning in Utah is the Park City School District Center for Advanced Professional Studies. Industry partners have included Adobe, Dear Valley Resort, Skull Candy, and the U.S. Air Force.
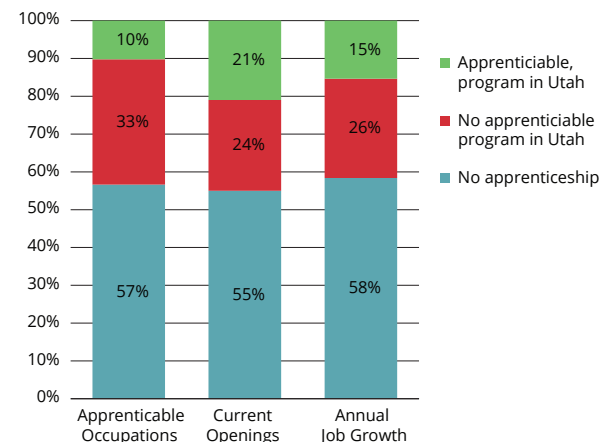
Apprenticeships

Apprenticeships combine on-the-job training with classroom instruction. Pay increases occur over the length of the apprenticeship commensurate with increased skill. At the end of the apprenticeship program, apprentices receive an industry credential demonstrating their expertise. Private entities such as businesses, trade associations, or labor unions and the partnerships they form are the foundation of good apprenticeships. The U.S. Department of Labor (DOL) provides support for businesses to create these apprenticeships. Once apprenticeships are registered with the DOL, businesses gain access to federal grants through the Workforce Innovation and Opportunity Act, additional technical support, and in some states, tax credits.[110]

Many associate apprenticeships are strictly within the construction and trades industries. Many mistakenly think that apprenticeships are only for construction, manufacturing, or trade jobs. While

Close to half of current and future job openings could be trained through apprenticeships; a quarter do not yet have existing apprenticeship programs

Figure 9: Apprenticable Occupations in Utah
Source: Department of Labor, Department of Workforce Services, and Utah Foundation.

Legend:
- Apprenticiable, program in Utah (green)
- No apprenticiable program in Utah (red)
- No apprenticeship (teal)

	Apprenticable Occupations	Current Openings	Annual Job Growth
Apprenticiable, program in Utah	10%	21%	15%
No apprenticiable program in Utah	33%	24%	26%
No apprenticeship	57%	55%	58%

the construction industry has by far the most active apprenticeships across the United States (144,583), the second highest is the military with 95,001. Not too surprisingly, the industry with the third most active apprenticeships is manufacturing with 14,422. What may surprise many is that manufacturing is followed closely by public administration, with 13,715 active apprenticeships.[111]

Indeed, registered apprenticeships are available in a wide variety of industries. Healthcare could have apprenticeships for licensed practical nurses, community health workers, emergency room specialists, health information, management data analysts, pharmacy techs, dental lab techs, and many others. The tech industry could potentially have apprenticeships available for computer programmers, computer systems analysts, software application designers, and IT specialists. Public service and safety apprenticeships could be available for positions such as correction officers, police officers, firefighters, security guards, and paramedics. The media industry has apprenticeships available for graphic designers and television and motion picture directors and animators. There could be apprenticeship positions available for retail managers, paralegals, meteorologists, energy auditors, and environmental analysts.[112]

Apprenticeships can be highly flexible. They can be for new hires to teach them the basic skills they need for the job, or they can be used as an award for high-achievers allowing them to move up the career ladder. Partnerships with Custom Fit programs at Utah's technical schools can help employers more easily meet education requirements. Moreover, because apprenticeships start paying at day one, and apprentices continue to receive wages as they learn in the classroom and on the job, companies are more likely to find willing employees.

Apprenticeships are a tool that companies have increasingly turned to over the past two years – as indicated by the number of active apprentices increasing by 35%.[113] In the federal fiscal year (October -September) 2016, there were 2,887 active apprentices in Utah across 211 programs.[114] When comparing the number of active apprenticeships to Utah's labor force, Utah is slightly below average with 19 active apprentices for every 10,000 Utahns in the labor force, while the nation has 23 active apprenticeships for every 10,000 Americans in the labor force.[115] Apprenticeships have the potential to help meet current and future job needs in Utah. Over 40% of all jobs currently available, and all jobs expected to be created annually over the next decade, are for occupations that could have an apprenticeship. Yet over half of these occupations do not have any existing apprenticeship programs in the state. This data might indicate that Utah could help bridge a skills gap through apprenticeship programs.

There are many studies of apprenticeship models in other countries that suggest that it could greatly benefit the American economy.[116] Recent studies on apprenticeship in the United States are limited, but indicate promising results. The Department of Labor reports that apprenticeships are good for employees, with 91% of apprentices employed upon graduation with an average starting salary of $60,000.[117] Additional studies indicate benefits for employers also. A 2016 study on apprenticeship in Maine found 6 of 8 companies saw a monetary return on investment, and all companies would have if they had monetized the benefits of recruitment, retainment, and advancement.[118] A case-study of a specific apprenticeship partnered with companies across three states reported increased productivity and reduced turnover among participating companies.[119] A U.S. Department of Commerce study of 13 companies found unanimous support for the idea that apprenticeships increased productivity, reduced turnover, and provided a competitive advantage over competing firms.[120] In this study, the two companies that did measure their return-on-investment saw a 40-50% ROI. While these reports are positive, they provide only small samples or case studies. Larger studies would increase the legitimacy of these claims and ensure they are not a result of cherry-picking.

Examples of apprenticeship programs in Utah include those through the Association of General Contractors and other industry associations, various union-based associations, and even some individual businesses.[121] In 15 states, the government has chosen to play a role, either offering tax breaks to companies that provide registered apprenticeships or tuition assistance for registered apprentices.[122] There might be a potential role for the state of Utah in encouraging apprenticeship programs.

Donating equipment

Many occupations require training with specialized equipment, and the cost of necessary training equipment can be prohibitive. Often, companies will donate training equipment to ensure educational institutions have the capabilities to train potential employees. Alternatively, sometimes vendors or manufactures provide specialized equipment or programs to help influence its adoption across the industry. These donations and discounts help save educational institutions (and subsequently taxpayers) millions of dollars. They also can ensure that students have the most updated skills using industry standard programs and equipment.

Private companies directly tackling the problem

The idea behind an entrepreneurial capitalist market system is that new businesses are created every day to address unmet needs. If businesses are having a difficult time finding qualified employees, entrepreneurial individuals can create new companies focused on solving those problems.[123] Recruiting companies can help find talented individuals willing to relocate. Consulting companies can help employers optimize offered wages. Staffing companies can meet temporary needs. Training companies can help employees acquire missing skills. One of the most successful examples in Utah is Pluralsight, which offers training in software development, IT, and other areas focused on the tech industry. Another Utah company, GraduationAlliance, offers a "Workforce Diploma" program that targets young adults who do not have high school degrees. The program allows participants to earn not only high school diplomas, but also gain specific skills and industry certifications that partnering employers have agreed to preferentially hire. In many ways, one company's problem is another's opportunity.

Trade Associations

Trade associations provide a unique role in ensuring companies can find enough qualified employees. They are in a position to obtain quality data from their members and gain a good understanding of what their industry most needs. Using these data, they can formulate solutions and represent the collective resources of its membership in effecting change. One example is the Utah Technology Council (UTC). Based on the survey results of its members, the UTC commissioned and published a report looking at the number of job openings across the tech industry in Utah.[124] Similarly, the Utah Manufacturing Association pooled the resources of its membership to fund part of Make Manufacturing Your Future Initiative, a campaign to recruit more millennials into the manufacturing sector.[125] Many trade associations channel these group resources into the creation and funding of apprenticeship programs.

The U.S. Chamber of Commerce has invested its own resources in studying the problem and offering solutions. One recommendation was that companies should take a supply-chain management approach to their human resources.[126] Through managing their supply chain, companies can form partnerships with specific companies. These companies could be those that use the product or service they provide, or a company that provides a service or product that they purchase. For example, an auto manufacturer might form partnerships with a steel refinery and an iron extraction company. The automaker can then covey the demand and rely on a consistent supply of steel to manage its own production, ensuring that inputs are ready when needed. Similarly, the U.S. Chamber of Commerce encourages companies to form analogous

relationships with educational institutions. In some ways, this is the approach taken with the pathways programs mentioned above.

Role of Non-Profit Organizations

Non-profits can contribute in many different ways depending on their purpose. LDS Employment Resource Services is a non-profit that offers training to help individuals find, obtain, or upgrade their jobs. Private foundations can also play a role. InsideSales.com employees volunteer through the company's Do Good Foundation and help kids learn to code, among other objectives.

Dangers in Education Integration

Much of this report has taken for granted the benefits of aligning educational institutions with industry needs. However, not everyone agrees that closer collaboration between business and educational institutions is a good thing. There is concern that government taking action on worker shortages or skills gaps represents an intrusion on the free market. This next section outlines concerns with businesses becoming more integrated with educational institutions and the concerns of government intervention.

Potential Adverse Impacts on Education from Businesses

Companies will often donate their educational materials for use in the classroom. This potentially raises a number of concerns. Parents and other groups worry information in books or pamphlets provided as a free resource for teachers or students could potentially carry biased information, or at least represent a conflict of interest.[127] One such example is the Chevron sponsorship of the Energy4me program, which provides students and teachers with information about "energy sources and how they impact the environment."[128]

Alternatively, corporations might push curriculum or policy changes that allow them to sell their product.[129] Other companies might be willing to donate equipment because it advertises their product, or free materials such as textbook covers that contain advertisements.[130] In other cases, corporate sponsorship of billboards, gyms, or even entire schools provides even more blatant marketing.[131] The ethical questions in this are obvious. Children are more vulnerable to marketing due to their age and lack of critical thinking skills. Donated products also implicitly receive endorsement through their use by teachers who occupy positions of trust.[132] Parents are often protective of their children and do not wish them to be exposed to subtle advertising. As a result, closer ties between corporations and schools run the risk of marketing to students, providing biased information, or otherwise taking advantage of students.[133]

Additional concerns relate to privacy. Adults can choose to not use programs or apps that collect copious amounts of personal data such as Facebook or Google. However, students have less of a choice if schools require or strongly encourage the use of programs that gather personal data. For example, companies have offered computer equipment for free on the condition that students participate in taste tests, internet survey panels, and focus groups.[134] There is also the other less obvious tracking data gathered through normal computer use. Not only are individuals concerned with what data is collected, but additional concerns arise around the idea of companies selling student data to third parties, the control users have over their private data, and what kind of safeguards are used to protect student data from hackers.

Aside from questionable corporate influence on students, there is the intrinsic conflict of interest between educational institutions and private companies. The optimal case for private companies is for educational institutions to produce as many potential employees in their industry as possible. A large pool of potential employees allows companies to select only the best and to pay new hires much less. The worth of the

education provided to those individuals would subsequently be less than if the pool had a more diverse array of skills useful across a spectrum of industries.

Furthermore, companies have different views of what the role of schools should be. Some companies would prefer that high schools focus on teaching skills and certifications, rather than ensuring that students have a well-rounded education or ensuring that students are prepared to be good citizens.

While there is no doubt that most companies have few ulterior motives when working with schools, the acknowledgment of these potential conflicts of interest help insure negative side effects of collaboration between educational institutions and industries are limited.

The Proper Role of Government in Addressing Worker Shortages

Not only are there questions about how involved companies should be with educational institutions, but there are serious concerns about the proper role of government in addressing a skills gap. In the earlier example demonstrating the harm of a skills gap, there were too many computer programmers and not enough plumbers. The mismatch lead to long wait times for consumers who needed plumbing service, and low wages and high unemployment for computer programmers. A state agency might recognize the problem and attempt to provide incentives for more individuals to become plumbers. Rather than just fixing the problem, the state agency might overcorrect, resulting in too many plumbers and not enough computer programmers. Unemployment and low wages would then become prevalent among plumbers. The low supply of computer programmers would drive up costs for technology companies and hinder growth and innovation. Because government agencies have a reputation of being less nimble and adaptable to quickly changing economic conditions, many would prefer government not be so directly involved in addressing the problem.

Additionally, some question the need for governmental intervention. As mentioned above, employee shortages or skills gaps are merely opportunities for recruiting, staffing, consulting, and training companies that can help business solve their employee problems. Economic theory also generally considers employee shortages and skills gaps to be temporary and self-correcting. Wages in industries struggling to find enough qualified employees should rise. Students would respond to those wage increases choosing to obtain the skills needed for those positions. Others might retrain and switch industries to take advantage of the wage differential. As those positions are filled, wages would come down slightly and other industries willing to pay more would be more competitive.

There are risks with government intervention, and often the economy is self-correcting. Accordingly, some would prefer less government action and a greater reliance on free market forces. Whatever the solution to the problem might be, the proper role of government action in addressing the skills gap is an important aspect of the conversation.

CONCLUSION

While it is clear that many companies in Utah are struggling to find enough qualified employees, the underlying problem is not obvious. A generally tight labor market, low wages, a desirability problem, and a mismatch between skills available and skills needed all play a role in finding enough qualified employees.

Over the past six years, Utah has had one of the fastest expanding economies in the United States. This growth could result in a small pool of potential employees.

However, if companies truly needed additional employees, they should be willing to pay for it. Yet indications of rising wages are only just occurring. Rising wages would also encourage more Utahns to participate in the labor force.

Additional complications revolve around the perception of certain jobs as undesirable, often those in manufacturing, construction, and trades. Additional outreach might need to be made to millennials who have different job and career expectations when compared to retiring baby boomers.

If there is indeed a skills gap in Utah, the state has been very proactive in attempting to bridge it. Stakeholders include various government offices, educational institutions, non-profit groups, unions, occupational associations, and private companies. These groups have taken action to ensure companies can find the workers they need by promoting collaboration among stakeholders, increasing career awareness, and ensuring a variety of quality educational opportunities.

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