What Employers Want from Interns: Demand-Side Trends in the Internship Market

Carrie L. Shandra
Department of Sociology
State University of New York at Stony Brook
Carrie.Shandra@stonybrook.edu

Internships have become a ubiquitous component of the college-career transition, yet empirical evidence of the internship market is limited. This study uses data from 1.3 million internship postings collected between 2007-2016 in the United States to (1) identify trends in internship education, experience, and skill requirements over the Great Recession and recovery periods; (2) evaluate how these trends correspond to those observed in the traditional labor market; and (3) assess robustness across labor market sectors. Results indicate that internship education and skill requirements increased substantially throughout the recession and recovery periods, indicative of a longer-term structural shift in employer expectations about internship hiring. Additionally, growth in internship education and skill requirements largely outpaced growth in non-internship education and skill requirements over the same period, suggesting potential substitution of non-interns with interns. Post-recession employers still consider internships to be entry-level positions—yet now expect interns to have skills in hand.

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Internships are ubiquitous in the college-career transition in the United States. In the late 2010s, two-thirds of graduating seniors participated in at least one, up from 30% in 1995 (Higher Education Research Institute [HERI] 2006, 2018). And, employers consider internships to be more important than academic credentials like GPA or college major when evaluating graduates for employment (Chronicle of Higher Education 2012). Despite growing sociological attention to internships (Armstrong and Hamilton 2013, Arum and Roksa 2014, Frenette 2013, Jack 2019, Rivera 2016), little is known about the internship *market*—one that, like traditional jobs, can be characterized by employer requirements and may vary with fluctuations in the business cycle.¹

Yet internships are often not like traditional jobs. Because many internships are unpaid or underpaid, employers may be able to create additional internship vacancies at relatively little expense, changing the conditions of demand.² And many colleges now offer, if not require, participation in internships across academic majors (e.g., Chen et al. 2019a, Chen et al. 2019b), potentially inflating the supply. As a result, trends in the internship market may diverge from trends observed in the traditional job market.

The Great Recession and the subsequent recovery is a key period to observe these patterns. It was a time of cyclical variation in the overall job market (Blair and Deming 2020, Modestino, Shoag and Ballance 2016), enabling observation at periods of both expansion and contraction. According to college exit surveys, it was a time of unprecedented internship

¹ A notable exception is Jaeger et al. (2020), discussed in the conclusion of the current study.

² I use the terms “employer” and “hire” for ease of interpretation, although these terms are technically incorrect in the absence of an employment relationship—which does not exist if an intern is unpaid or paid less than a minimum wage.

growth, adding an estimated 4 million interns to the economy.³ And anecdotally, it was also a period when employers cut labor costs by replacing traditional employees with interns (Federico-O'Murchu 2013, Perlin 2012)—although neither the existence nor the permanency of this form of labor substitution has been empirically documented.

The first aim of this study is to establish foundational knowledge of the internship market by identifying what employers want from their interns—specifically, descriptive trends in internship requirements over the Great Recession and recovery periods. The next aim is to evaluate if and how these trends correspond to three theoretical labor market situations: *upskilling and downskilling*, where internship requirements fluctuated cyclically with unemployment; *structural change*, where internship requirements shifted more permanently upward after the Great Recession; and *substitution*, or evidence that employers substituted interns for non-interns. The final aim is to assess if these trends are industry-specific, or if they exist facross labor market sectors.

To do so, I use data from Burning Glass Technologies (BGT) on 1.3 million internship vacancies collected in the United States between 2007 and 2016 to evaluate three key characteristics of the internship market over the recession and recovery periods: The level of *education*, specifically the percentage of internship postings requiring a high school diploma or an Associate, Baccalaureate, or post-graduate degree. The level of *experience*, or the percentage of internship postings requiring less than two, three to five, or six or more years of job experience. And, the percentage of internship postings requiring various types of *specific skills* such as business, marketing, or information technology. These trends are evaluated by industry

³ Extrapolating from the last publicly available data on internship participation in the College Senior Survey (CSS) in 2006 (HERI 2006), a 2015 infographic of CSS results (HERI 2015), and data on total college enrollment from the Current Population Survey (U.S. Census Bureau 2019).

and in tandem with “non-internship” education, experience, and skills. Implications for the labor market, sociological analyses of internships, and internship practice are discussed.

LITERATURE REVIEW

The internship market should work like any other: firms demand labor and individuals supply it. Because internships are often described as training experiences (National Association of Colleges and Employers 2011, U.S. Department of Labor 2018)—where skills are presumably acquired—it could be hypothesized that employers have relatively low requirements for applicants’ education, experience, and existing skills. But firms hire interns for a variety of reasons aside from training (National Association of Colleges and Employers 2013), and highly competitive opportunities receive tens of thousands of applicants (Vasel 2019). It’s likely that internships will require some level of education, experience, and skills—but the fluctuation of these requirements over the business cycle is an open question. Previous studies of the broader labor market suggest several hypotheses.

Upskilling and Downskilling of Employer Requirements

The Great Recession was marked by a loss of 8.7 million jobs and a doubling of the unemployment rate—numbers that took until 2014 to rebound (U.S. Bureau of Labor Statistics 2020a, U.S. Bureau of Labor Statistics 2020b).⁴ For traditional jobs, these fluctuations in unemployment are typically related to employer hiring requirements. When unemployment is high and there is a surplus of qualified workers as during the Recession, employers can be choosier and increase skill requirements (“upskilling”). When unemployment is low, as during the recovery, employers may need to lower skill requirements to attract workers (“downskilling”).

⁴ The number of long-term unemployed, underemployed, and discouraged workers remained elevated as of the end of 2017 (Cunningham 2018).

BGT data are often used to evaluate these trends in the overall market,⁵ as they are purported to capture the near-universe of job vacancies posted online (Azar et al. 2018) and “skills” can be easily defined as the share of vacancies requiring a certain level of education or experience. Modestino and colleagues (2016, 2019) found evidence for these patterns of upskilling and downskilling using BGT data of the overall market, such that that employers increased their education and experience requirements when unemployment was high and labor was more plentiful. Conversely, they decreased these requirements when unemployment was low and labor was in shorter supply. If the internship market follows these trends, we would expect the following:

Hypothesis 1: Internship education, experience, and specific skill requirements increase as unemployment rises and decrease as unemployment declines.

Structural Change

Contrary to the cyclical upskilling and downskilling hypothesis, another possibility is that employers more permanently increased skill demands after the Great Recession, leading to structural changes in the labor market. This could be reflective of a mismatch between vacancies and workers: work organizations have jobs but—due to a variety of potential reasons like skill change, demography, or geography—cannot find the appropriate workers to fill them (Abraham 2015, Şahin et al. 2014).

Support for this pattern in the overall market comes from Blair and Deming (2020:8), who extended Modestino and colleagues’ (2019) earlier BGT findings to find that the cyclical patterns of upskilling fade within a few years. Instead, “large and persistent increases in skill

⁵ I use the term “overall market” because previous analyses of BGT do not distinguish between “internship” postings and “non-internship” postings. The percentage of internship postings in the “overall market” is less than 1%: in 2016, for example, there were 26,179,892 non-internship postings and 197,709 internship postings.

demand following the Great Recession” are “probably here to stay”. If the internship market follows these trends, we would expect:

Hypothesis 2: Internship education, experience, and specific skill requirements increase as unemployment rises and remain high as unemployment declines.

Potential Differences in Internship and Non-Internship Supply and Demand

These hypotheses are motivated by analyses of overall job vacancies. However, there are several reasons why supply and demand may operate differently in *internship* vacancies, as compared to *non-internship* vacancies.

First, demand. Under current interpretations of the Fair Labor Standards Act (FLSA) (U.S. Department of Labor 2018), there are certain conditions under which interns are not considered employees—and thus employers are not required to compensate them with at least a minimum wage.⁶ This means that many internships are unpaid or paid less than minimum wage via stipends or transportation assistance. As a result, interns may be of much lower cost to work organizations than traditional employees—and internship vacancies may be less expensive to create than traditional job vacancies.

Additionally, internships are often more temporary than traditional jobs, spanning the length of a summer or an academic semester. As a result, the cost to employers of making a “bad” hiring decision may be lower for interns than for traditional employees. Conversely, because many work organizations use internship programs to build their recruitment pool or as extended job interviews, making a “good” intern hiring decision may help reduce the cost of searching for traditional employees (Coco 2000, Society for Human Resource Management 2018).

⁶ In practice, interpretations of the FLSA “internship test” are contested and often legally contradictory. See (Brudney 2019, Malik 2014).

Second, supply. Many postsecondary degree programs encourage or mandate internship experience (Hora 2018), potentially inflating the supply of potential interns. Further, the link between unemployment and internship supply may also be unique. Evidence from a recent survey (Hora, Wolfgram and Chen 2019) of students who had not interned in the last year found that the need to work in a paid job was the most commonly cited barrier to internship participation—followed by course load, lack of opportunity, and insufficient pay. In multivariate models, those who were not employed were less likely than those who were employed to cite the need to work or insufficient internship pay as barriers to internship participation, net of GPA, parental income, and part-time college enrollment status. Therefore, those who are employed may be less likely to intern than both those who are unemployed and those who are out of the labor force—the latter group comprised of many who are going to school (U.S. Bureau of Labor Statistics 2015).

Substitution

These unique characteristics suggest that internship requirements may be less directly impacted by fluctuations in unemployment than non-internship requirements. Instead, it could be that work organizations are fully or partially substituting internships for traditional jobs.

Much of the evidence for substitution is anecdotal. During the Great Recession, some employers were suspected of cutting labor costs by replacing traditional employees with lower-cost interns (Federico-O'Murchu 2013, Perlin 2012). Although this strategy potentially violates current interpretations of the FLSA, instructions on “How to Hire an Intern Instead of an Employee” can easily be found online (Benjamin n.d.). It could be that the Great Recession prompted employers to increase internship hiring requirements, relative to traditional hiring requirements—and to continue doing so throughout the recovery.

A partial form of substitution might also be expected if employers became increasingly likely to use internship vacancies as a recruitment strategy to hire into non-internship vacancies—instead of hiring new workers directly into non-internship vacancies. This approach would not lead to complete substitution if some proportion of interns were eventually converted to traditional employees. The proportion of interns that were not converted could presumably complete tasks that would otherwise be assigned to traditional workers.

A complete test of the substitution hypothesis would require employer-level data on job vacancies and internship conversion over time. These data do not currently exist in federal establishment-based surveys like the Job Openings and Labor Turnover Survey (JOLTS) or the Current Employment Statistics (CES). However, a comparison of aggregate skill requirements for internships, versus non-internships, might suggest substitution if employers are disproportionately increasing requirements in internship postings, versus non-internship postings. In this situation, we might expect:

Hypothesis 3: Internship education, experience, and specific skill requirements increase more rapidly than non-internship education, experience, and specific skill requirements.

DATA AND MEASURES

Data for these analyses were collected by Burning Glass Technologies (BGT), a provider of labor market analytics and one of the only available sources of nationwide longitudinal data on internship vacancies. BGT has developed a proprietary database of online job postings collected since 2007, extracting and deduplicating data from nearly 40,000 online job sites—including large job boards and individual employer sites. These data have been used previously to examine market-level trends in traditional employment, including analyses of skill requirements and change (Börner et al. 2018, Deming and Kahn 2018, Hershbein and Kahn

2018, Modestino, Shoag and Ballance 2016). Comparable analyses have not (to my knowledge) evaluated skill change in the internship market.⁷ The present analyses focus on skill requirements in 2007 and between 2010-2016.⁸

Online job postings are advantageous for evaluating the labor market, as available evidence suggests they are the primary means through which vacancies are advertised (Carnevale, Jayasundera and Repnikov 2014) and a “reliable leading indicator of hiring” (Templin and Hirsch 2013). BGT data identify internships by the inclusion of the word “intern(s)” or “internship(s)” in the job title. Here, I use these criteria to define internship vacancies (N = 1,306,230) and exclude these terms in defining non-internship vacancies (N = 143,782,407).⁹

Skill requirements, following previous analyses (Modestino, Shoag and Ballance 2016, Modestino, Shoag and Ballance 2019), are constructed based on the share of postings requiring various levels of education and experience. For example, 8,911 of the 75,489 internship postings collected between January 1 and December 31 of 2007 require a bachelor’s degree—reflecting 11.8% of postings for that year.¹⁰

Weighted age- and education-specific unemployment estimates are generated from 1% single-year data from the American Community Survey (Ruggles et al. 2019). Percentages of 18- to 24-year-olds enrolled in college are taken from data published in the Digest of Education Statistics (U.S. Department of Education 2017).

⁷ BGT has occasionally published annual internship reports (e.g., BGT 2017).

⁸ BGT data are not available for the years 2008 and 2009. The analyses presented here draw from all years of data that were fully available at the time of download in January 2017.

⁹ Ns represent the total eligible universe of vacancies for the years 2007 and 2010-2016. Some analyses present select years for brevity, and not all vacancies in the supplemental analyses have complete industry data.

¹⁰ One concern might be that observed changes over time are driven not by substantive shifts in job postings, but by revision to the algorithm used to BGT to constructs each skill measure. BGT has made improvements to the coding of all data elements (including education, experience, skills, and the definition of internships); however, these improvements are also performed retroactively for all data elements (Taska 2019).

Supplemental Analyses: Skill Cluster and Industry

Another way to measure skills in online vacancy data is through required knowledge and competencies (Djumaieva and Sleeman 2018). In addition to coding each posting's level of education and experience, BGT also classifies the text of each vacancy into detailed skills that fall under a broader set of 28 “skill clusters”—defined as “skills that often travel together” (Nania et al. 2019). For example, if a job posting has skill requirements called “benefits analysis” and “quality assurance and control”, both skills are categorized under the “Business” skill cluster. Appendix Table 1 displays the detailed skills included within each skill cluster. This alternate measure can provide an additional test of the abovementioned hypotheses.

Finally, the robustness of these aggregate-level trends is also evaluated by industry, classified by BGT using 2-digit North American Industry Classification System (NAICS) codes. Appendix Table 2 presents the distribution of internships and non-internships by industry for postings with available industry data. These industry-specific analyses evaluate if the trends observed in the total internship and non-internship vacancies are sector-specific.

Analytic Strategy

Analyses proceed in two overall steps. To begin, I evaluate aggregate trends in the percentage of internship postings requiring levels of education and previous job experience. The extent to which these trends follow the unemployment rate (Hypothesis 1) or remain high throughout the recovery (Hypothesis 2) will provide evidence for upskilling/downskilling and structural change, respectively. The type of unemployment that is most relevant for the internship market has not been empirically established, but unemployment over the Recession and recovery period varied by age and degree level (Rothstein 2017) and employers may be more likely to target traditionally college-aged workers and recent college graduates. As a result,

I consider overall unemployment as well as unemployment among the traditionally college-aged (18-24) and among recent college completers (age 25-29). Additionally, I evaluate trends in baccalaureate-level and associate-level enrollment as a potential alternative form of labor supply.

Next, levels and rates of skill change between internship and non-internship postings over the recession and recovery period are evaluated for evidence of substitution (Hypothesis 3). Since this is an indirect test, I consider two additional robustness checks. The first evaluates if these aggregate patterns hold across industry, as internship hiring—as well as the level and growth of required internship skills—is likely to vary across industries.¹¹ The second considers an alternate measure of specific types of job skills, defined by BGT-generated “skill clusters” of knowledge and competencies (e.g., Djumalieva and Sleeman 2018).

RESULTS

Figure 1 presents the percentage of internship vacancies requiring education (Panel A) and previous job experience (Panel B), over time. Focusing first on education, most internship postings in 2007 did not specify any level of education. Those that did were more likely to require a Bachelor’s degree (12%) than a graduate (3%), high school (2%), or associate (1%) levels of education. Over time, these requirements remain largely stable for graduate (5%) and associate (2%) levels through 2016, with a small but steady increase in the percentage requiring a

¹¹ Industry-specific trends are presented to determine the consistency of results—however, they are also descriptively useful for establishing variation in internship demand. For example, a large employer survey conducted by the Collegiate Employment Research Institute (CERI) found over 90% of sampled organizations in the Information Services, Wholesale Trade, and Arts/Entertainment/Recreation industries hired interns or cooperative education students—much higher than the 45% of organizations in Administrative Services and 64% in Healthcare Services. Industry variation also emerged in the number of interns hired and the anticipated growth in internship hiring: Organizations in the Accommodations, Finance and Insurance, and Utilities industries had the highest median number of interns (23, 25, and 30, respectively) while those in Administrative Services, Agriculture, Professional, and Wholesale Trade Industries reported 5 or fewer. More than half of the organizations in the Administrative Services and Finance and Insurance industries reported wanting to increase their internship hiring, whereas less than one-third of those in Agriculture, Educational Services, Information Services, Professional, Transportation, and Utilities did (CERI 2018).

high school diploma (9%). The percentage of internships requiring a Bachelor's degree increases substantially during the recession (22% in 2010)—and continues to climb throughout the recovery period (38% in 2016).

Results for required experience are different. Although most internship postings do not require any experience in 2007, 0 to 2 years was the most common (6%), followed by 3-5 years (3%) and 6+ years (1%). The latter two are relatively stable throughout the recession and recovery, with the percentage requiring 0-2 years growing somewhat over the recession (10% in 2010) and leveling off to 9% in 2016.

These aggregate internship trends do not follow the cyclical pattern in unemployment (Figure 2, Panel A) as suggested by Hypothesis 1. In other words, the patterns of upskilling and downskilling observed in the overall market are not observed in internship vacancies. Although baccalaureate enrollment (Panel B)—a potential alternate measure of labor supply—did increase between 2012 and 2016, this uptick is not as steep as the rise in the percentage of internship vacancies requesting a Bachelor's degree in Figure 1, Panel A. The education-related internship trends observed here are more congruent with Hypothesis 2: a more permanent post-recession structural change in employer internship requirements.

Figure 3 repeats these analyses for non-internship vacancies to evaluate evidence for potential substitution of traditional jobs for internships. Both the share of non-internship vacancies requiring a Bachelor's degree (Panel A) and 3-5 and 6+ years of previous job experience (Panel B) follow the traditional cyclical pattern. Figure 4 compares the percentage point difference in education and experience requirements between 2007 and 2016 for non-internship and internship vacancies. Panel A demonstrates a greater percentage point increase in Bachelor's and Graduate level educational requirements for internships, versus non-internships.

This trend is not observed for job experience: the percentage point change for non-internships exceeds that for internships in all categories.¹²

Supplemental Analyses: Skill Cluster and Industry

Figure 5 compares internships and non-internship vacancies using an alternate indicator of requirements: skill clusters. The ten most common overall skills in 2016 are shown for brevity, with full results available in Appendix Table 3. Panel B presents results for non-internship vacancies. The two most common skills throughout the observation period—business and information technology—follow a cyclical rise during the recession and fall during the recovery. About 15% of non-internship vacancies require them in 2012, increasing to a high of 33% in 2012 and leveling off to 28% by 2016. The other skills (sales, client relations, finance, administration, health, supply chain, marketing, and education) do not show as pronounced a decline during the recovery, yet overall most tend to plateau. Skill requirements, overall, are higher in 2016 than in 2007.

In contrast, Panel A demonstrates continued growth in the percentage of internship vacancies requesting skills throughout the recession and recovery period. Whereas only 14% of vacancies required information technology skills in 2007, 40% did in 2012, and 48% did in 2016. The same pattern emerges for business: 10% of vacancies required business skills in 2007, 23% did in 2012, and 33% did in 2016. Most other skills also follow this pattern: the percentage of internship vacancies requiring administration, finance, sales, client relations, supply chain,

¹² The same—and often more pronounced—differences are observed when calculating percentage change in requirements, compared to percentage point change. For education, the percentage change for internships and non-internships, respectively: 295% versus 146% for high school; 101% versus 156% for associate's; 225% versus 55% for Bachelor's, and 2% versus 1% for graduate. For experience: 56% versus 112% for 0-2 years; -20% versus 41% for 3-5 years; -64% versus 50% for 6+ years.

health, and education skills increase between 2007 and 2012—and continue to increase between 2012 and 2016. Marketing is the sole exception in Panel A.

Comparing skill levels between Panel A and Panel B, a disproportionate share of internship vacancies requires information technology and business skills in 2016 (48% and 33%, respectively), versus non-internship vacancies (28% and 29%). The same is true for marketing, administration, and client relations.

Figure 6 compares the percentage point change in skills between 2007 and 2016 for internship and non-internship vacancies, arranged in order from largest to smallest percentage point change among non-internship vacancies. Five of the ten most common skills have greater percentage point increases among internship vacancies than among non-internship vacancies: business, information technology, administration, finance, and marketing. Two skills (supply chain and education) are about equal. Three skills (client relations, sales, and health) have greater increases in non-internship vacancies than internship vacancies. When calculating *percentage change* in the share of vacancies requiring each skill between 2007-2016 (see Appendix Table 3): internship vacancies demonstrate greater growth than non-internship vacancies in requiring all skill clusters but one—health.

As an extension and robustness check, Appendix Figures 1-20 and Appendix Tables 4-23 present all previous analyses of education, experience, and skills by industry. Despite some exceptions, the overall trends are consistent: Across industries, there was a large and sustained increase in the percentage of internship vacancies requiring a bachelor's degree throughout the recession and recovery period. Experience requirements remained relatively flat over time. Skill change—especially for information technology and business—also increased over the

observation period, with levels that (by 2016) were often higher in internship vacancies than non-internship vacancies.

DISCUSSION

Internships have become ubiquitous in the post-Great Recession United States. Participation among college students is at an all-time high (Higher Education Research Institute 2018), work organizations consider them to be key to the recruitment process (National Association of Colleges and Employers 2013), and internship experience is commonly required or recommended in college curricula (Chen et al. 2019a, Chen et al. 2019b). Yet empirical analyses remain limited.

The first goal of this study was to establish baseline knowledge of the internship market—specifically, trends in internship education, experience, and skill requirements over the Great Recession and recovery periods. Results from analyses of online internship vacancies indicate that the percentage of internships requiring a baccalaureate degree increased substantially during the recession, with continued growth throughout the recovery period. The same was true when considering the share of internships requiring specific skills—particularly information technology and business, but also most others such as administration, finance, and sales. In sum, employers expected more educated, more skilled interns post-recession than they did pre-recession.

At the same time, internship experience requirements remained low and relatively flat over the same period. These results suggest that employers recognize internships as entry-level positions—despite increases in their educational and skill requirements.

The second goal of this study was to evaluate how aggregate internship trends correspond to three potential labor market situations. Results indicate that internship requirements do not fluctuate cyclically with unemployment—neither overall, age-specific, or degree-specific rates. No support is found for the *upskilling* and *downskilling* explanation proposed by Hypothesis 1. Instead, it appears that internship requirements shifted more permanently upward after the Great Recession, providing evidence for *structural changes* to the internship market as proposed by Hypothesis 2. Furthermore, growth in internship educational and skill requirements outpaced growth in non-internship educational and skill requirements, suggesting some degree of *substitution* of non-interns with interns as proposed by Hypothesis 3.¹³

The third goal of this study was to assess if these trends were ubiquitous across labor market sectors. Evidence for structural change and substitution can be found across industries, although interesting differences are observed in the level skills required. For example, Appendix Figures 14 and 7 indicate higher skill levels in industries such as Professional Services and Finance and Insurance—versus Arts, Entertainment, and Recreation (Appendix Figure 4). Previous analyses of firm-level practices within these industries suggest widely different internship norms. For example, in Rivera’s (2016) analysis of investment banks, consulting firms, and law firms, internships were highly competitive, filled by a multi-stage hiring process, well-paid, and often designed to convert promising interns into full-time employees. These characteristics contrast with accounts of internships in the creative industries, where interns have been described as provisional labor, conversion to full-time employment is low, and positions are

¹³ It is true that faster skill growth—measured either by percentage point or percentage change—will emerge as long as internship requirements rise while non-internship requirements decline. However, faster internship skill growth also occurred in industries where non-internship requirements continued to rise (e.g., Public Administration) over the observation period.

often unpaid (Frenette 2013, Jacobson and Shade 2018). The results presented in this study can inform future analyses of industry- and firm-specific internship hiring and labor practices.

Limitations and Opportunities for Future Research

There are several limitations to the current analyses. First, data are only observed through 2016.¹⁴ These analyses capture the entirety of the recession and recovery period but cannot speak to more recent trends. Future research would be well-suited to address the question of *when* internship requirements stop rising—particularly as a growing number of colleges and departments adopt internship or other experiential learning requirements for graduation (e.g., SUNY Applied Learning Steering Committee 2016). Likewise, they cannot account for whether or how an internship is paid because many internship postings omit this information. Internships can be unpaid, paid less than minimum wage in the form of stipends or fellowships, or paid as traditional jobs—all of which entail varying costs to the intern or the employer. Ideally, population data would be collected on the characteristics of internship participation to better understand how compensation matters for the market and for individuals.

Next, these data speak to aggregate-level trends only, and cannot account for firm level, state level, or local labor market variation. An important new study used data scraped from one internship-specific website in 2016 and 2017 to find a link between paid internships and the state of the local labor market: the incidence of paid internships decreased in a core-based statistical area as the unemployment rate increased (Jaeger et al. 2020). Although this approach cannot account for retrospective trends, it has promise for future research on the correlates of the internship market. It could also help determine the extent to which the structural shift in

¹⁴ BGT data are proprietary and were obtained via a limited-term subscription.

internship requirements observed here might relate to compositional shifts in online job vacancies over time (Blair and Deming 2020).

Finally, these data provide a snapshot of internship hiring as measured by job postings—however, they cannot speak to other aspects of the hiring process. For example, many work organizations concentrate their internship recruitment efforts at a handful of “core” and “target” schools (Rivera 2016)—meaning that internship matching processes may be school-specific. Others may be inclined to hire the friends and family of existing employees or clients (Society for Human Resource Management 2018)¹⁵, and may not publicly advertise internship opportunities. Many questions remain about work organizations’ motivations for hiring interns, the recruitment and interview process, intern onboarding and supervision, and the factors that determine conversion to full-time employment.

CONCLUSIONS AND IMPLICATIONS

Internships exist in a market, and the education and skills required of interns in that market increased substantially throughout the recession and recovery periods. Post-recession employers now expect interns to have an array of skills in hand—despite continuing to consider internships to be entry-level positions.

One implication of these results is that analyses of labor market entry that cannot account for internship experience are omitting a crucial sorting mechanism. Multiple experimental studies suggest this to be true. Baert and colleagues’ (2019) audit study of Master’s-level résumés in Belgium found a 13% higher probability of being invited to a job interview for those with internship experience, versus those without. Nunley and colleagues’ (2016) US-based audit

¹⁵ The Society for Human Resources (2018), one of the largest human resources professional organizations in the world, cites multiple points in its business case for employers to establish an internship program. One is to “improve employee morale”, as “the possibility that a relative could land an internship with an organization can boost its employees’ productivity and job satisfaction”.

study of undergraduate-level résumés found that internship experience increased callback by 14%, with bigger returns for nonbusiness majors and applicants with higher grade point averages. Data collection mechanisms that include full internship history are crucial for understanding the role of internship participation in contemporary school-to-work transitions and early employment trajectories.

These findings also imply that the internship market cannot serve all students equally: if employers search for interns with skills already in hand, they may pass over less skilled internship seekers. Yet an increasing number of collegiate programs encourage or require internship participation for graduation, raising questions about the consequence for students with fewer existing job skills or students who are unable to participate due to financial constraints (e.g., Chen et al. 2019a). Prior sociological research indicates that internships function—depending on the type of experience—as both potential forms of privilege and as potential mechanisms of exploitation (Armstrong and Hamilton 2013, Arum and Roksa 2014, Frenette 2013, Jack 2019, Rivera 2016). Understanding if, how, and for whom internships translate into jobs matters for knowledge about labor market matching—but, more broadly, also for education and employment equity.

The same is true within the discipline of sociology. Internships have been touted as a way for faculty to facilitate students' labor market success (Ciabattari et al. 2018) and for students to put their sociology degrees to work (Joseph 2017). A recent survey by the American Sociological Association ([ASA] 2018b) found that “virtually all sociology departments (91 percent) reported offering internships to their undergraduates”. Of these, 37 percent of departments *required* them, and 78% were reported as “typically unpaid”. Yet many departments do not collect—or have access to—student data to evaluate if or how internship

participation matters for post-graduation outcomes (ASA 2018a). Departments can begin by auditing and monitoring their own internship programs for issues around access and quality¹⁶, and by using this information to inform practice.

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¹⁶ See Hora and colleagues (2017) for an evidence-based review of best internship practices.

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Figure 3. Percentage of non-internship postings requiring education (Panel A) and previous job experience (Panel B), over time

Source: Burning Glass Technologies. Percentage of postings requiring no education or experience not shown.

Figure 4. Percentage point difference, 2007-2016, in postings requiring education (Panel A) and experience (Panel B)

Source: Burning Glass Technologies. Percentage of postings requiring no education or experience not shown.

Figure 5. Percentage of internship (Panel A) and non-internship (Panel B) postings requiring specific skills

Source: Burning Glass Technologies.

Figure 6. Percentage point difference, 2007-2016, in postings requiring specific skills

Source: Burning Glass Technologies.

Figure 1. Percentage of internship postings requiring education (Panel A) and previous job experience (Panel B).

Source: Burning Glass Technologies. Percentage of postings requiring no education or experience omitted.

Figure 2. Percentage of the population unemployed (Panel A) and enrolled in education (Panel B).

Source: American Communities Survey (Panel A); National Center for Education Statistics (Panel B)

Appendix Table 1. Detailed skills included within each skill cluster

<i>Skill Cluster</i>	<i>Detailed Skills</i>
Administration	Administrative Support, Dictation, General Administrative and Clerical Tasks, Memoranda Preparation, Office Machines, Office Management, Scheduling, Telephone Skills
Analysis	Ad Hoc Analysis and Reporting, Business Intelligence Software, Business Intelligence, Data Analysis, Data Mining, Data Science, Data techniques, Data Visualization, Machine Learning, Mathematical Modeling, Mathematical Software, Mathematics, Natural Language Processing, Statistical Software, Statistics, Validation
Architecture and Construction	Carpentry, Conduits, Construction Inspection, Construction Labor, Construction Management, Construction Painting, Drywall, Electrical Construction, Estimating, General Architecture, Green Architecture, Insulation, Masonry, Road and Bridge Construction, Roofing
Business	Benefits Analysis, Business Communications, Business Consulting, Business Management, Business Process and Analysis, Business Solutions, Business Strategy, Category Management, Contract Management, Due Diligence, Event Planning and Management, Internal Controls, Key Performance Indicators, Knowledge Management, Operations Management, Optimization, Order Management, People Management, Performance Management, Pricing Analysis, Process Improvement, Product Improvement, Project Management, Property Management, Quality Assurance and Control, Real Estate and Rental, Risk Management, Technical Assistance
Customer and Client Support	Advanced Customer Service, Basic Customer Service, Cash Register Operation, Claims Processing, Payment Processing and Collection
Design	Animation and Game Design, Creative Design, Digital Design, Graphic and Visual Design Software, Graphic and Visual Design, Industrial Design, Presentation Design, User Interface and User Experience
Economics, Policy, and Social Studies	Economic Development, Economics, Policy Analysis, Social Studies, Urban Planning
Education and Training	Archiving, Child Development, Childhood Education and Development, Coaching and Athletic Training, Education Administration, Exercise Training, Higher Education, Instruction, Instructional and Curriculum Design, Interpretations and Translations, Learning Management Systems, Library and Cataloging, Peer Review, Program Management, Teaching, Test Administration, Training Programs
Energy and Utilities	Clean Energy, Electrical Power, Energy Efficiency, Energy Management, Energy Solutions, Gas Drilling, Hydraulic Fracturing, Natural Gas, Nuclear Energy, Oil Drilling, Oil Refining, Oil Reservoirs, Oil Well Intervention, Oil Wells, Petroleum Science, Power Generation, Power Plant, Solar Energy, Water Energy, Water Supply, Wind Energy

Engineering	Aerospace Engineering, Chemical Engineering, Circuitry, Civil and Architectural Engineering, Drafting and Engineering Design, Electrical and Computer Engineering, Engineering Activities, Engineering Software, Engineering Standards, Geotechnical Engineering, Hardware Description Languages, Imaging, Industrial Engineering, Mechanical Engineering, Process Engineering, Radio Frequency, Radio Frequency Equipment, Roads and Drainage, Robotics, Signal Processing, Simulation, Surveying
Environment	Air Quality, Conservation, Ecology, Emissions Management, Environmental Geology, Environmental Regulations, Environmental Work, Ethanol, Forestry, Hazardous Waste Management, Resource Management and Restoration, Waste Management, Water Testing and Treatment
Finance	Accounting and Finance Software, Accounts Payable and Receivable, Auditing, Banking Services, Billing and Invoicing, Budget Management, Cash Management, Commercial Lending, Commodities, Corporate Accounting, Cost Accounting, Costing, Financial Accounting, Financial Advisement, Financial Aid Counseling, Financial Analysis, Financial Management, Financial Reporting, Financial Trading, General Accounting, General Lending, Investment Management, Lending Assessment, Mergers and Acquisitions, Mortgage Lending, Specialized Accounting, Tax, Underwriting
Health Care	Advanced Patient Care, Allergies, Alternative Therapy, Anesthesiology, Animal Health and Veterinary Medicine, Basic Living Activities Support, Basic Patient Care, Blood Collection, Cardiology, Clinical Data Management, Clinical Informatics, Clinical Research, Dental Care, Dermatology, Ear, Nose, and Throat, Emergency and Intensive Care, Endocrinology, Eye Care, First Aid, Gastroenterology, General Medical Tests and Procedures, General Medicine, Geriatrics, Health Care Procedure and Regulation, Health Information Management and Security, Hematology, Infectious Diseases, Injury Treatment, Medical Billing and Coding, Medical Devices, Medical Documentation and Abstraction, Medical Procedure and Regulation, Medical Records, Medical Research, Medical Support, Mental and Behavioral Health Specialties, Mental Health Diseases and Disorders, Mental Health Therapies, Mobility Assistance, Nephrology, Neurology, Nuclear Medicine, Nutrition and Diet, Obstetrics and Gynecology, Oncology, Orthopedics, Pathology, Patient Education and Support, Patient Physical Measurements, Patient Reception, Pediatrics, Pharmacy, Physical Abilities, Physical Therapy, Public Health and Disease Prevention, Pulmonology, Radiology, Rehab Therapy, Rehabilitation, Routine Examination Tests and Procedures, Social Work, Speech Language Pathology, Surgery, Urology
Human Resources	Compensation and Benefits, Deductions, Employee Relations, Employee Training, Human Resource Management and Planning, Human Resource Management Systems, Occupational Health and Safety, Payroll, Recruitment, Talent Management

Industry Knowledge	Accounting Services, Administrative and Business Support, Advertising, Agricultural Chemicals, Agricultural, Air Transportation, Aircraft Repair, Allied Health Care, Aluminum, Ammunition, Apparel, Art Production, Asset Management, Automotive, Automotive Repair, Aviation, Banking, Biologics, Blood and Organ Banks, Bridal Services, Broadcasting, Business Services, Chemical, Civil Engineering, Collection Services, Computer and Information Technology, Construction, Consulting Services, Consumer Goods, Cosmetics, Data Services, Educational Services, Electrical Engineering, Employment Services, Engineering, Entertainment, Environmental, Extermination and Pest Control Services, Facilities Maintenance, Financial Lending, Financial Services, Financial Trading, Food and Beverage, Freight Transportation, Funeral Services, Furniture, Ground Transportation, Health Care, Home Health Care, Home Improvement, Hospitality and Leisure, Household Appliance, Household Electronics, Human Resources, Industrial Engineering, Industrial Gases, Insurance, Intermodal Transportation, Investment Services, Lawn and Garden, Legal and Law Enforcement, Local Government, Luxury Products, Management, Manufacturing and Production, Marketing, Mechanical Products, Media and Communication, Mental Health, Metal, Payroll Services, Personal Care, Pharmaceutical, Plastics Material, Postal Services, Printing Services, Public Relations, Publishing, Rail Transportation, Real Estate, Rental and Leasing, Research and Development, Retail, Retirement, Security and Patrol Services, Social Services, Supply Chain and Logistics, Tax Services, Telecommunications, Transportation, Travel and Tourism, Utilities, Vehicles and Parts, Veterinary Medicine, Wood Products
Information Technology	Advanced Microsoft Excel, Android Development, Anti-Malware Software, Application Programming Interface, Artificial Intelligence, Basic Computer Knowledge, Big Data, C and C++, Cloud Solutions, Cybersecurity, Data Management, Data Warehousing, Database Administration, Document Management Systems, Enterprise Messaging, Enterprise Resource Planning, Extensible Languages, Extraction, Transformation, and Loading, General Networking, Geographic Information System Software, Health Checks, Help Desk Support, Integrated Development Environments, Internet of Things, Internet Services, iOS Stack, IT Hardware, IT Management, Java, JavaScript and jQuery, Mainframe Technologies, Microsoft Development Tools, Microsoft Office and Productivity Tools, Microsoft SQL Extensions, Microsoft Windows, Middleware, Mobile Development, Network Configuration, Network File System, Network Protocols, Networking Hardware, Operating Systems, Oracle, Other Programming Languages, PHP Web, Productivity Software, Programming Principles, Project Management Software, SAP, Scaling, Scripting Languages, Scripting, Software Development Principles, Software Development Tools, Software Quality Assurance, SQL, System Design and Implementation, Systems Administration, Technical Support, Telecommunications, Test Automation, Version Control, Web Content, Web Design, Web Development, Web Servers, Wiki
Legal	Federal Acquisition, Forensics, Intellectual Property, Labor Compliance, Law Enforcement and Criminal Justice, Legal Research, Litigation, Regulation and Law Compliance

Maintenance, Repair, and Installation	Appliance Repair and Maintenance, Basic Electrical Systems, Bike Repair, Electrical and Mechanical Labor, Equipment Operation, Equipment Repair and Maintenance, Hand Tools, Hazard Identification, Heavy Equipment, HVAC, Painting, Plumbing, Power Tools, Schematic Diagrams, Tailoring and Sewing, Vehicle Repair and Maintenance
Manufacturing and Production	Brazing and Soldering, Computer-Aided Manufacturing, Lean Manufacturing, Machine Tools, Machinery, Manufacturing Design, Manufacturing Processes, Manufacturing Standards, Materials Process, Materials Science, Metal Fabrication, Micro Manufacturing, Product Development, Product Inspection, Welding
Marketing and Public Relations	Advertising, Brand Management, Concept Development, Corporate Communications, Customer Relationship Management, Fundraising, General Marketing, Grant Applications, Investor Relations, Market Analysis, Marketing Management, Marketing Software, Marketing Strategy, Media Strategy and Planning, Online Advertising, Onling Marketing, Packaging and Labeling, Promotional Materials, Promotions and Campaigns, Public Relations, Social Media, Web Analytics
Media and Writing	Art and Illustration, Audio Production, Broadcast, Content Development and Management, Journalism, Media Production, Multimedia, Music, Visual Design Production, Writing
Personal Care and Services	Animal Care, Child Care, Food and Beverage Service, Housekeeping, Personal Care
Public Safety and National Security	Emergency Services, Fire Inspection, Government Clearance and Security Standards, Intelligence Collection and Analysis, Loss Prevention, Physical Security, Surveillance, Transportation Security
Sales	Account Management, Business Development, Business-to-Business Sales, Company Product and Service Knowledge, E-Commerce, General Sales Practices, General Sales, Inside Sales, Insurance Sales, Merchandising, Online Sales, Outside Sales, Prospecting and Qualification, Retail Sales, Sales Analysis, Sales Management, Salesmanship, Solution Sales Engineering, Specialized Sales, Technical Demonstrations, Technical Sales, Telemarketing, Trade Shows
Science and Research	Biological Disciplines, Biopharmaceutical Manufacturing, Cellular Biology, Chemical Analysis, Drug Development, Genetics, Laboratory Research, Molecular Biology, Nondestructive Testing, Research Methodology, Scientific Disciplines, Surveys
Supply Chain and Logistics	Air Transport, Facility Managmeent and Maintenance, General Shipping and Receiving, Inventory Management, Logistics, Material Handling, Operations Analysis, Procurement, Retail Store Operations, Supplier Relationship Management, Supply Chain Management, Supply Chain Planning, Transportation Operation and Management, TSA Regulation, Warehouse Management

Appendix Table 2. Distribution of postings, by industry, year, and internship status

	2007		2010		2012		2014		2016	
	N	%	N	%	N	%	N	%	N	%
<i>Internship industries</i>										
Accommodation and Food Services	883	1.78	1,294	1.93	2,093	1.71	3,280	2.24	4,272	2.78
Administrative and Support and Waste Management	445	0.90	725	1.08	1,451	1.19	1,338	0.91	1,227	0.80
Agriculture, Forestry, Fishing and Hunting	119	0.24	243	0.36	344	0.28	870	0.59	681	0.44
Arts, Entertainment, and Recreation	710	1.43	2,413	3.60	3,684	3.02	3,422	2.33	2,604	1.70
Construction	335	0.68	384	0.57	790	0.65	2,099	1.43	2,413	1.57
Educational Services	1,703	3.44	2,571	3.83	4,604	3.77	5,961	4.06	5,352	3.49
Finance and Insurance	4,265	8.61	5,383	8.03	9,658	7.91	14,050	9.58	15,998	10.43
Health Care and Social Assistance	3,652	7.37	3,970	5.92	6,363	5.21	8,492	5.79	10,177	6.63
Information	5,206	10.51	8,939	13.33	17,035	13.95	16,140	11.00	15,071	9.82
Management of Companies and Enterprises	105	0.21	207	0.31	336	0.28	481	0.33	593	0.39
Manufacturing	9,462	19.10	12,771	19.04	23,661	19.37	31,424	21.43	34,289	22.35
Mining, Quarrying, and Oil and Gas Extraction	260	0.52	371	0.55	814	0.67	766	0.52	572	0.37
Other Services (except Public Administration)	8,749	17.66	3,422	5.10	4,250	3.48	4,694	3.20	3,486	2.27
Professional, Scientific, and Technical Services	7,301	14.74	11,967	17.84	24,808	20.31	25,271	17.23	26,905	17.54
Public Administration	1,568	3.17	1,518	2.26	3,031	2.48	6,589	4.49	5,475	3.57
Real Estate and Rental and Leasing	547	1.10	1,946	2.90	2,923	2.39	3,729	2.54	3,943	2.57
Retail Trade	2,439	4.92	6,153	9.17	9,422	7.72	9,445	6.44	11,070	7.22
Transportation and Warehousing	821	1.66	1,522	2.27	3,316	2.72	4,423	3.02	4,742	3.09
Utilities	563	1.14	558	0.83	1,480	1.21	2,270	1.55	2,228	1.45
Wholesale Trade	403	0.81	712	1.06	2,059	1.69	1,919	1.31	2,300	1.50
N	49,536	100	67,069	100	122,122	100	146,663	100	153,398	100
	2007		2010		2012		2014		2016	
	N	%	N	%	N	%	N	%	N	%
<i>Non-internshp industries</i>										
Accommodation and Food Services	433,714	4.88	547,241	5.99	630,798	5.60	1,225,216	7.81	1,588,541	7.55
Administrative and Support and Waste Management	737,569	8.30	580,852	6.35	720,358	6.40	573,118	3.65	893,295	4.25
Agriculture, Forestry, Fishing and Hunting	8,012	0.09	9,757	0.11	14,380	0.13	30,185	0.19	28,197	0.13
Arts, Entertainment, and Recreation	65,297	0.73	74,876	0.82	108,301	0.96	134,700	0.86	155,129	0.74
Construction	99,836	1.12	83,049	0.91	121,249	1.08	178,999	1.14	263,744	1.25
Educational Services	424,693	4.78	456,130	4.99	682,267	6.06	904,934	5.77	946,371	4.50

Finance and Insurance	1,071,243	12.05	864,586	9.46	1,067,976	9.49	1,430,170	9.12	1,854,202	8.81
Health Care and Social Assistance	1,912,460	21.51	1,964,839	21.49	2,176,001	19.33	3,094,443	19.72	4,703,837	22.35
Information	397,839	4.47	392,966	4.30	508,168	4.51	545,794	3.48	746,997	3.55
Management of Companies and Enterprises	26,584	0.30	20,906	0.23	23,748	0.21	26,829	0.17	40,618	0.19
Manufacturing	976,213	10.98	854,792	9.35	1,196,619	10.63	1,446,338	9.22	1,743,166	8.28
Mining, Quarrying, and Oil and Gas Extraction	50,328	0.57	65,432	0.72	76,977	0.68	85,844	0.55	48,128	0.23
Other Services (except Public Administration)	180,262	2.03	192,130	2.10	238,418	2.12	324,309	2.07	368,201	1.75
Professional, Scientific, and Technical Services	1,047,414	11.78	1,152,823	12.61	1,409,774	12.52	1,586,078	10.11	2,161,674	10.27
Public Administration	267,266	3.01	258,329	2.83	353,665	3.14	512,066	3.26	470,598	2.24
Real Estate and Rental and Leasing	176,512	1.99	300,883	3.29	275,916	2.45	320,016	2.04	398,150	1.89
Retail Trade	620,216	6.98	888,281	9.72	1,042,359	9.26	2,128,337	13.57	2,424,510	11.52
Transportation and Warehousing	270,916	3.05	306,800	3.36	419,818	3.73	903,413	5.76	1,950,556	9.27
Utilities	49,265	0.55	38,465	0.42	54,501	0.48	89,377	0.57	83,505	0.40
Wholesale Trade	75,367	0.85	89,116	0.97	137,419	1.22	148,663	0.95	173,331	0.82
N	8,891,006	100	9,142,253	100	11,258,712	100	15,688,829	100	21,042,750	100

Source: Burning Glass Technologies. Select years shown for brevity.

Appendix Table 3. Total skill growth, by year and internship status

	Internships					Non-internships				
	2007	2012	2016	% point Δ , 2007-2016	% Δ , 2007-2017	2007	2012	2016	% point Δ , 2007-2016	% Δ , 2007-2017
Administration	4.2	14.6	16.2	12.0	288.1	6.8	16.6	16.8	10.0	146.3
Agriculture	0.1	0.4	0.6	0.5	400.1	0.1	0.3	0.2	0.2	198.7
Analysis	3.1	8.6	14.0	10.9	345.8	3.3	8.6	7.8	4.5	136.6
Architecture	0.9	2.5	4.0	3.0	319.5	1.3	2.9	2.8	1.5	109.5
Business	9.7	22.8	32.8	23.1	237.3	13.8	32.9	29.1	15.3	110.3
Client relations	2.2	6.6	8.3	6.2	287.2	5.9	16.0	17.1	11.2	189.6
Design	2.8	9.2	8.0	5.2	186.1	1.5	3.2	2.1	0.6	43.7
Economics	0.8	2.7	4.2	3.3	397.1	0.5	1.1	0.9	0.5	93.3
Education and training	1.8	5.2	6.1	4.4	249.9	2.8	8.6	8.0	5.2	186.5
Energy, utilities	0.2	1.0	1.4	1.1	514.3	0.4	1.1	0.8	0.4	88.7
Engineering	4.3	9.6	15.1	10.7	247.4	2.8	5.7	4.3	1.4	50.1
Environment	0.7	1.8	2.6	1.9	264.2	0.6	1.5	1.3	0.7	120.2
Finance	4.4	8.9	12.8	8.4	192.4	8.5	17.8	15.8	7.2	84.9
Health	2.6	5.5	7.3	4.6	174.4	4.9	14.0	14.9	10.1	207.1
Human resources	0.9	3.7	5.8	4.9	530.6	2.3	6.5	7.0	4.7	207.9
Industry knowledge	1.8	3.7	5.2	3.4	194.4	2.5	4.6	4.4	1.9	76.3
Information technology	14.5	40.1	48.1	33.6	232.0	15.5	33.4	28.0	12.5	80.4
Legal	0.6	2.3	3.4	2.8	481.2	1.3	4.0	3.7	2.4	187.5
Maintenance	0.9	2.8	3.7	2.9	326.3	2.1	5.3	5.7	3.6	175.7
Manufacturing	1.7	4.7	6.5	4.8	290.0	2.7	6.4	5.6	3.0	112.1
Marketing and PR	5.9	20.6	18.2	12.3	208.4	3.9	10.4	10.1	6.1	154.9
Media and writing	3.4	10.9	9.3	5.9	175.4	2.2	4.6	3.6	1.4	64.6
Ministry	0.0	0.0	0.0	0.0	-61.8	0.0	0.0	0.0	0.0	1.5
Personal care	0.1	0.5	1.1	1.0	958.0	0.4	1.9	3.0	2.6	574.8
Public safety	0.1	0.6	0.9	0.8	613.9	0.6	2.4	2.5	1.9	334.1
Sales	3.8	10.4	11.5	7.7	203.2	7.7	17.8	17.9	10.3	133.7
Science and research	1.9	4.3	6.2	4.3	231.1	1.6	3.5	2.8	1.2	79.9
Supply chain	1.8	5.7	7.9	6.1	331.5	4.0	9.7	10.0	6.0	152.5

Source: Burning Glass Technologies. Select years shown for brevity.

Appendix Table 4. Accommodation and food services industry skill growth, by year and internship status

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	3.2	8.6	7.1	4.0	125.1	10.6	16.0	19.2	8.5	80.4
Associate's degree	0.8	2.5	3.2	2.4	304.5	1.4	2.5	1.9	0.5	34.1
Bachelor's degree	6.8	12.5	23.9	17.1	252.1	6.5	8.7	7.0	0.5	8.4
Graduate or professional degree	0.8	2.0	9.8	9.0	1134.3	0.2	0.4	0.2	0.0	-1.8
<i>Experience</i>										
0 to 2 years	8.4	9.2	8.7	0.4	4.2	15.2	23.7	20.8	5.5	36.3
3 to 5 years	3.3	2.0	4.2	1.0	29.0	8.6	12.9	9.1	0.4	5.1
6+ years	0.3	0.2	5.4	5.1	1498.4	2.0	2.4	1.6	-0.4	-21.7
<i>Skill cluster</i>										
Administration	4.6	16.7	24.7	20.1	432.9	6.7	14.4	14.8	8.1	121.2
Agriculture	0.3	0.5	0.2	-0.2	-51.8	0.0	0.1	0.1	0.0	192.0
Analysis	1.9	4.5	8.4	6.5	335.3	2.2	3.8	5.2	3.0	136.9
Architecture	0.6	0.7	1.1	0.5	86.0	0.6	1.3	1.5	0.9	140.4
Business	6.3	18.3	36.0	29.6	467.3	13.8	25.2	23.6	9.8	70.9
Client relations	2.4	9.2	20.6	18.2	766.1	6.3	17.6	20.7	14.5	231.7
Design	0.6	6.2	5.2	4.6	817.7	0.4	0.8	0.4	0.0	-1.7
Economics	0.5	1.6	2.0	1.6	349.6	0.1	0.2	0.2	0.0	38.3
Education and training	0.6	4.5	16.2	15.7	2768.9	1.8	3.7	3.0	1.2	65.4
Energy, utilities	0.0	1.0	0.3	0.3	--	0.2	0.4	0.5	0.3	--
Engineering	1.0	1.9	3.5	2.5	242.2	0.6	0.9	0.7	0.1	16.9
Environment	0.0	1.1	1.4	1.4	--	0.2	0.5	0.5	0.4	--
Finance	2.7	9.1	19.9	17.2	631.2	8.2	15.8	12.7	4.5	54.7
Health	0.6	2.2	12.8	12.2	2161.2	1.4	3.9	4.6	3.2	223.6
Human resources	0.8	4.5	11.2	10.4	1317.3	3.4	7.5	7.9	4.5	133.4
Industry knowledge	1.4	4.4	4.7	3.4	247.9	1.5	3.2	4.0	2.5	169.2
Information	9.9	30.5	31.7	21.8	221.4	7.7	13.2	10.9	3.2	41.8
Legal	0.3	1.1	1.8	1.4	423.6	0.5	1.3	1.6	1.1	217.5
Maintenance	0.5	2.0	2.2	1.7	380.6	1.1	3.0	4.6	3.5	314.5
Manufacturing	0.8	1.1	1.6	0.8	100.8	0.6	1.6	2.3	1.7	302.8
Marketing and PR	5.5	19.5	18.8	13.2	238.7	2.2	5.9	6.2	3.9	176.9
Media and writing	0.7	6.8	7.3	6.6	978.3	0.7	1.7	1.1	0.4	56.0
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.9	3.6	9.8	8.9	982.6	5.0	12.3	17.4	12.3	244.7
Public safety	0.2	0.5	0.6	0.4	168.7	0.5	2.8	3.2	2.7	520.1
Sales	3.7	9.0	9.3	5.6	148.7	7.2	13.4	13.0	5.8	80.5
Science and research	0.7	1.5	1.7	1.1	154.9	0.2	0.4	0.3	0.1	43.3
Supply chain	1.2	4.5	16.0	14.8	1185.3	4.7	11.2	9.9	5.3	113.0

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 5. Administrative and support and waste management industry skill growth, by year and internship status

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	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	2.7	8.5	13.1	10.4	386.6	8.8	17.6	31.5	22.7	256.6
Associate's degree	0.9	3.5	4.0	3.1	344.3	1.8	3.0	2.7	0.9	52.8
Bachelor's degree	16.2	27.8	34.0	17.8	110.0	14.7	23.8	13.2	-1.4	-9.7
Graduate or professional degree	2.0	7.0	3.5	1.5	73.3	0.7	1.1	0.5	-0.2	-30.9
<i>Experience</i>										
0 to 2 years	4.5	7.2	14.3	9.8	217.3	13.8	20.7	27.2	13.4	96.8
3 to 5 years	4.3	2.1	1.6	-2.6	-61.8	13.4	21.1	12.5	-0.8	-6.2
6+ years	0.2	0.1	0.0	-0.2	-100.0	3.2	7.0	3.3	0.1	4.6
<i>Skill cluster</i>										
Administration	5.8	15.4	17.4	11.6	198.5	7.7	15.7	17.6	9.9	127.7
Agriculture	0.0	2.8	2.3	2.3	--	0.2	0.8	1.3	1.2	775.6
Analysis	1.3	6.5	12.1	10.8	800.6	2.6	6.9	3.4	0.8	30.5
Architecture	0.0	1.0	4.7	4.7	--	1.0	2.0	2.2	1.1	109.0
Business	12.1	27.6	33.4	21.3	175.4	11.2	26.1	20.2	9.0	79.6
Client relations	5.8	7.9	11.0	5.2	88.3	8.3	17.5	25.3	17.0	203.9
Design	2.2	8.9	6.7	4.4	197.4	1.2	3.5	1.0	-0.2	-16.7
Economics	0.7	1.4	3.6	2.9	431.9	0.2	0.5	0.3	0.1	29.2
Education and training	2.5	5.6	6.4	4.0	160.5	1.7	3.8	8.0	6.3	360.5
Energy, utilities	0.0	0.6	2.0	2.0	--	0.3	0.7	0.5	0.1	44.2
Engineering	2.5	6.3	9.8	7.3	295.6	2.0	4.3	1.8	-0.2	-10.6
Environment	1.6	1.9	3.7	2.1	--	0.6	1.1	1.2	0.6	109.2
Finance	4.3	11.2	13.6	9.3	218.8	8.3	14.2	10.4	2.1	25.9
Health	2.2	2.8	1.4	-0.9	-38.3	2.4	6.2	6.1	3.8	159.5
Human resources	0.7	8.1	6.8	6.1	903.4	2.4	6.2	9.6	7.3	306.5
Industry knowledge	2.2	3.9	3.5	1.3	55.9	2.3	4.0	3.8	1.4	62.6
Information	19.3	47.0	53.1	33.8	175.0	17.4	39.5	25.5	8.1	46.4
Legal	0.4	2.3	2.9	2.5	552.8	1.1	3.7	6.6	5.5	480.6
Maintenance	1.8	1.5	3.3	1.5	85.9	1.8	4.3	5.6	3.8	206.3
Manufacturing	2.0	6.3	4.6	2.6	129.7	1.7	5.3	3.5	1.8	106.6
Marketing and PR	9.2	27.7	21.9	12.7	137.9	4.0	10.9	11.7	7.8	196.3
Media and writing	3.6	9.0	7.2	3.6	99.5	2.2	4.9	5.2	3.0	135.4
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.0	0.1	0.2	0.2	--	0.1	0.4	0.7	0.6	592.5
Public safety	0.2	1.0	0.8	0.6	262.7	0.8	2.9	6.9	6.1	797.2
Sales	11.2	23.7	20.0	8.7	77.7	11.0	19.9	27.9	16.9	153.3
Science and research	0.7	2.7	4.0	3.3	492.4	0.8	1.9	1.1	0.3	43.0
Supply chain	2.9	5.5	8.1	5.1	176.2	3.1	6.4	7.5	4.5	145.6

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 6. Agriculture, forestry, fishing and hunting industry skill growth, by year and internship status

SHANDRA 41

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	1.7	3.2	4.6	2.9	170.9	10.2	16.1	22.5	12.3	120.5
Associate's degree	0.0	2.6	1.5	1.5	--	1.6	3.1	2.6	1.0	62.4
Bachelor's degree	2.5	20.1	32.9	30.4	1204.7	18.6	27.9	25.6	7.0	37.8
Graduate or professional degree	0.0	2.6	3.4	3.4	--	2.0	5.1	2.6	0.5	25.6
<i>Experience</i>										
0 to 2 years	2.5	5.2	4.4	1.9	74.7	16.4	23.8	30.6	14.2	86.2
3 to 5 years	0.0	2.3	1.0	1.0	--	16.8	28.6	18.1	1.3	7.4
6+ years	0.8	0.0	0.1	-0.7	-82.5	3.4	5.3	5.3	1.9	56.4
<i>Skill cluster</i>										
Administration	0.8	16.0	20.9	20.0	2381.4	9.2	21.3	27.3	18.0	195.3
Agriculture	1.7	7.0	7.0	5.4	319.4	4.6	10.4	8.1	3.5	77.0
Analysis	1.7	4.7	9.0	7.3	433.0	4.2	10.9	16.6	12.4	296.0
Architecture	4.2	2.0	2.1	-2.1	-51.1	3.0	5.8	5.0	1.9	63.5
Business	3.4	17.2	36.0	32.6	970.3	18.1	40.7	43.8	25.7	141.5
Client relations	0.0	2.6	6.6	6.6	--	6.9	10.3	12.5	5.5	79.9
Design	0.8	4.4	3.5	2.7	319.4	2.2	1.9	2.0	-0.3	-13.0
Economics	0.0	1.5	4.1	4.1	--	0.8	2.6	3.1	2.3	266.5
Education and training	0.0	11.3	7.5	7.5	--	3.7	9.9	9.2	5.5	147.7
Energy, utilities	0.0	4.1	1.5	1.5	--	0.7	2.2	1.7	1.1	163.2
Engineering	10.9	5.5	7.6	-3.3	-30.1	3.7	6.9	6.6	2.9	77.6
Environment	1.7	12.8	25.7	24.0	1429.0	4.2	13.7	15.0	10.8	253.5
Finance	0.8	5.2	5.7	4.9	581.5	10.4	19.8	15.1	4.6	44.3
Health	0.8	5.2	7.9	7.1	843.6	3.0	9.2	10.7	7.7	254.9
Human resources	0.0	1.2	5.3	5.3	--	3.1	9.1	8.5	5.4	175.2
Industry knowledge	1.7	3.8	3.5	1.8	109.7	2.1	5.0	5.2	3.2	151.6
Information	22.7	26.5	41.3	18.6	81.9	17.6	33.1	33.1	15.5	87.7
Legal	0.8	2.6	3.4	2.5	301.9	1.7	3.9	3.4	1.8	104.8
Maintenance	0.0	0.9	11.5	11.5	--	5.1	10.6	12.7	7.7	151.0
Manufacturing	1.7	3.5	2.6	1.0	57.3	3.8	9.6	10.4	6.5	170.8
Marketing and PR	9.2	15.4	10.4	1.2	12.8	4.9	11.1	10.5	5.6	115.9
Media and writing	1.7	4.9	6.0	4.3	258.2	2.7	3.8	3.9	1.2	45.5
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.0	2.9	4.7	4.7	--	0.3	2.0	7.5	7.2	2126.8
Public safety	0.0	0.6	0.4	0.4	--	1.1	4.1	6.9	5.7	497.9
Sales	9.2	9.6	7.5	-1.8	-19.0	8.9	14.2	13.9	5.0	56.7
Science and research	0.0	8.4	24.5	24.5	--	3.1	11.2	10.6	7.5	237.9
Supply chain	0.0	10.8	7.3	7.3	--	6.4	15.7	17.8	11.4	177.0

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 7. Arts, entertainment, and recreation industry skill growth, by year and internship status

SHANDRA 42

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	2.1	6.7	5.7	3.6	170.8	10.0	26.3	30.9	20.9	209.1
Associate's degree	0.1	1.9	4.3	4.2	2953.8	1.2	2.1	2.1	0.9	71.5
Bachelor's degree	7.3	11.8	24.4	17.1	233.0	9.8	15.3	14.5	4.7	47.9
Graduate or professional degree	2.3	2.7	2.2	0.0	-1.2	0.9	1.3	1.0	0.1	10.1
<i>Experience</i>										
0 to 2 years	1.5	4.3	5.5	3.9	252.0	14.0	31.2	28.4	14.4	103.1
3 to 5 years	2.5	1.8	0.7	-1.8	-71.2	9.2	13.5	10.8	1.7	18.0
6+ years	0.0	0.3	0.2	0.2	--	2.6	3.6	2.4	-0.2	-8.3
<i>Skill cluster</i>										
Administration	5.5	28.6	26.7	21.2	385.9	7.4	20.1	19.6	12.2	165.1
Agriculture	0.0	0.5	1.4	1.4	--	0.2	0.5	0.5	0.3	155.9
Analysis	0.3	2.5	7.2	6.9	2449.3	1.8	5.1	5.1	3.2	177.3
Architecture	0.1	4.6	1.4	1.3	908.8	1.3	2.4	2.4	1.2	92.0
Business	3.5	20.7	28.0	24.5	695.1	10.4	27.3	24.6	14.2	137.0
Client relations	0.6	7.7	8.4	7.9	1399.6	4.5	18.6	20.1	15.5	341.7
Design	3.0	13.7	16.4	13.4	453.1	1.4	3.2	2.1	0.7	53.6
Economics	0.7	0.2	1.7	1.0	145.4	0.3	0.4	0.4	0.1	19.8
Education and training	3.5	14.4	10.1	6.6	187.9	4.0	12.3	13.6	9.6	236.9
Energy, utilities	0.0	0.0	0.3	0.3	--	0.2	0.3	0.5	0.3	115.8
Engineering	0.4	0.6	3.1	2.7	636.2	1.1	2.3	1.6	0.5	43.0
Environment	2.1	1.9	5.6	3.5	167.2	1.0	1.2	1.4	0.4	39.8
Finance	3.1	7.4	6.5	3.4	109.5	6.8	17.3	16.4	9.6	141.3
Health	2.1	3.5	5.9	3.8	178.1	3.2	13.2	13.3	10.1	319.0
Human resources	0.6	1.7	2.9	2.4	418.0	2.6	8.4	8.1	5.5	215.1
Industry knowledge	1.0	1.9	2.1	1.1	114.2	1.3	2.5	3.3	2.0	154.4
Information	6.5	32.3	43.3	36.8	568.6	10.0	21.5	17.3	7.3	72.7
Legal	0.3	0.2	0.8	0.5	172.7	0.7	2.6	2.0	1.2	168.8
Maintenance	0.6	8.4	3.1	2.5	452.1	2.2	6.9	5.8	3.6	158.6
Manufacturing	0.8	2.2	1.2	0.4	45.4	1.0	2.7	2.5	1.5	144.9
Marketing and PR	8.0	33.1	30.8	22.8	283.6	4.0	11.8	8.9	5.0	124.5
Media and writing	5.9	22.6	20.9	15.0	253.8	2.4	7.7	5.1	2.7	110.9
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	-79.0
Personal care	0.8	1.8	3.8	3.0	354.4	3.3	8.4	10.5	7.2	217.7
Public safety	0.0	0.3	0.5	0.5	--	0.4	3.0	3.3	2.8	627.2
Sales	3.1	16.4	10.0	6.9	222.2	4.4	17.1	16.0	11.6	262.6
Science and research	2.1	3.3	8.3	6.2	292.6	1.0	2.3	1.6	0.6	56.7
Supply chain	0.8	10.3	5.1	4.3	508.9	3.1	9.0	8.3	5.2	167.3

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 8. Construction industry skill growth, by year and internship status

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	2.1	5.9	6.6	4.5	217.3	22.1	16.7	20.5	-1.6	-7.2
Associate's degree	3.6	4.6	3.1	-0.4	-12.1	1.6	2.7	2.6	1.0	61.9
Bachelor's degree	20.6	30.1	47.8	27.2	132.0	14.0	20.0	20.4	6.4	45.3
Graduate or professional degree	7.5	2.2	3.9	-3.5	-47.2	0.8	1.2	0.7	-0.1	-9.5
<i>Experience</i>										
0 to 2 years	10.7	9.9	12.5	1.7	16.1	12.4	18.6	18.5	6.1	49.3
3 to 5 years	14.6	2.2	5.6	-9.1	-62.0	17.4	24.1	24.4	7.0	40.6
6+ years	0.6	0.6	0.5	-0.1	-23.6	7.5	10.9	9.6	2.1	27.8
<i>Skill cluster</i>										
Administration	5.7	26.7	31.5	25.8	454.6	10.2	18.0	20.8	10.6	103.0
Agriculture	0.9	2.4	1.4	0.5	52.7	0.3	0.5	0.5	0.2	95.4
Analysis	0.0	10.1	10.1	10.1	--	1.7	4.5	4.7	3.0	172.9
Architecture	14.9	43.9	50.2	35.3	236.2	17.8	28.3	32.3	14.5	81.1
Business	12.2	37.5	51.3	39.1	319.5	17.5	29.6	32.1	14.6	83.4
Client relations	1.5	6.2	10.2	8.7	580.3	5.3	10.4	11.8	6.6	125.5
Design	3.0	9.5	8.0	5.0	167.9	0.9	2.0	1.7	0.8	85.6
Economics	0.3	1.9	2.2	1.9	635.8	0.4	0.7	0.5	0.2	42.8
Education and training	1.5	4.2	4.4	2.9	191.5	1.6	4.5	4.3	2.7	171.1
Energy, utilities	0.3	2.3	2.4	2.1	719.1	2.1	5.5	4.2	2.1	102.1
Engineering	13.1	25.4	41.7	28.6	217.4	8.3	12.2	11.7	3.4	41.0
Environment	2.1	6.8	6.4	4.3	207.4	2.2	4.5	3.6	1.4	65.1
Finance	5.4	13.9	16.8	11.5	213.1	8.5	14.5	17.2	8.7	101.9
Health	0.3	2.4	2.2	1.9	621.9	1.1	2.9	3.4	2.3	215.9
Human resources	0.3	3.8	12.2	11.9	3981.6	2.7	7.0	8.5	5.8	219.9
Industry knowledge	0.9	6.3	4.5	3.6	399.8	3.2	6.5	6.8	3.5	109.6
Information	7.8	43.3	52.5	44.8	577.1	12.8	25.0	25.5	12.7	99.7
Legal	0.3	0.8	1.0	0.7	233.2	0.8	1.7	1.7	0.9	112.6
Maintenance	1.5	6.1	10.5	9.0	605.3	13.3	21.9	24.9	11.6	87.0
Manufacturing	2.1	3.8	4.5	2.4	114.2	5.8	11.9	11.8	6.1	105.3
Marketing and PR	3.6	10.6	6.8	3.2	89.7	2.4	7.0	5.9	3.5	147.8
Media and writing	1.2	3.9	3.6	2.5	205.4	1.9	2.7	2.7	0.8	40.7
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.0	0.6	0.2	0.2	--	0.2	1.2	1.0	0.8	423.6
Public safety	0.0	3.5	1.5	1.5	--	0.8	1.4	1.6	0.8	94.0
Sales	2.7	7.3	8.3	5.6	208.5	7.3	12.4	12.5	5.1	69.9
Science and research	2.4	4.2	4.7	2.3	96.1	1.4	2.2	1.7	0.3	23.8
Supply chain	3.3	18.6	17.5	14.2	433.9	6.3	13.2	15.6	9.4	150.3

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 9. Educational services industry skill growth, by year and internship status

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	2.9	9.2	12.8	9.8	335.3	6.2	14.3	18.3	12.1	196.6
Associate's degree	1.6	2.4	2.4	0.7	45.5	2.3	4.6	4.7	2.4	105.9
Bachelor's degree	10.3	29.1	32.6	22.3	217.5	13.5	27.7	29.3	15.7	116.5
Graduate or professional degree	3.1	7.8	6.4	3.3	107.1	7.7	19.6	14.7	7.1	92.3
<i>Experience</i>										
0 to 2 years	4.9	10.4	11.6	6.7	135.2	10.0	19.4	19.3	9.3	93.1
3 to 5 years	3.2	5.0	3.9	0.7	22.1	10.3	21.9	19.2	8.8	85.8
6+ years	0.5	0.8	0.8	0.4	75.0	2.4	4.9	4.2	1.8	76.0
<i>Skill cluster</i>										
Administration	4.9	18.5	18.4	13.5	273.1	7.6	20.4	21.4	13.9	183.4
Agriculture	0.1	0.4	1.3	1.2	1029.6	0.2	0.5	0.4	0.3	170.9
Analysis	2.5	6.6	9.4	7.0	281.8	3.6	9.9	10.4	6.9	193.0
Architecture	0.9	1.4	1.5	0.5	57.1	0.9	2.0	2.1	1.2	131.0
Business	7.8	22.3	25.6	17.9	230.7	10.6	28.4	28.5	17.9	169.4
Client relations	2.8	6.3	4.9	2.1	77.4	3.1	7.9	8.7	5.7	183.8
Design	1.6	7.9	8.6	6.9	420.5	1.5	3.7	2.9	1.4	94.8
Economics	0.9	2.7	2.1	1.2	124.7	0.9	2.6	2.3	1.5	171.9
Education and training	4.1	17.1	19.8	15.7	381.8	9.5	32.0	32.8	23.3	245.0
Energy, utilities	0.0	0.5	0.6	0.6	--	0.2	0.7	0.6	0.3	138.1
Engineering	1.2	2.9	3.5	2.4	200.7	1.4	3.4	2.7	1.3	92.9
Environment	0.8	2.3	2.4	1.6	215.8	0.6	1.4	1.4	0.8	121.7
Finance	3.7	8.1	9.1	5.4	147.0	6.9	16.6	15.9	9.1	132.2
Health	2.7	9.8	13.0	10.3	382.8	6.7	17.7	20.9	14.2	211.2
Human resources	1.8	4.5	5.3	3.5	190.5	2.2	6.2	7.6	5.5	249.4
Industry knowledge	0.8	1.1	1.8	0.9	113.6	1.0	2.0	1.7	0.7	66.0
Information	11.1	32.3	34.2	23.2	208.6	11.9	29.7	26.1	14.2	119.8
Legal	1.1	2.8	3.0	2.0	188.1	1.2	4.0	4.1	2.9	231.1
Maintenance	0.4	1.3	1.8	1.4	340.9	1.3	3.3	3.5	2.2	174.3
Manufacturing	0.5	1.6	2.2	1.7	313.7	1.0	2.4	2.3	1.2	118.7
Marketing and PR	5.0	19.8	20.1	15.1	302.1	3.0	9.4	9.3	6.3	210.4
Media and writing	1.9	10.4	12.1	10.2	543.4	3.1	8.8	7.6	4.5	148.8
Ministry	0.1	0.0	0.0	0.0	-68.2	0.0	0.0	0.0	0.0	-50.4
Personal care	0.1	0.7	1.2	1.2	2000.1	0.5	1.7	2.5	2.0	397.2
Public safety	0.1	0.4	0.4	0.3	250.0	0.3	0.9	1.0	0.7	203.6
Sales	2.4	5.3	5.6	3.2	132.8	2.2	4.2	3.7	1.5	69.7
Science and research	1.0	4.1	5.5	4.5	452.2	3.1	6.9	6.5	3.4	110.2
Supply chain	1.5	3.6	5.3	3.9	264.0	2.6	6.5	7.2	4.6	175.9

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 10. Finance and insurance industry skill growth, by year and internship status

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	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	2.3	8.7	10.6	8.3	364.2	10.8	19.8	19.2	8.4	77.4
Associate's degree	1.6	2.9	1.5	0.0	-1.7	1.9	3.2	3.5	1.6	83.9
Bachelor's degree	15.3	36.1	44.6	29.3	191.9	22.8	35.6	37.7	14.9	65.5
Graduate or professional degree	3.2	6.8	6.1	2.9	91.3	1.9	3.8	3.7	1.8	93.7
<i>Experience</i>										
0 to 2 years	7.7	6.9	7.4	-0.3	-3.4	15.7	26.0	26.3	10.6	67.5
3 to 5 years	1.9	2.0	1.5	-0.4	-21.4	18.3	28.3	25.5	7.2	39.4
6+ years	0.6	0.3	0.2	-0.5	-74.4	5.4	10.8	10.4	5.0	92.5
<i>Skill cluster</i>										
Administration	5.7	16.3	14.2	8.5	150.4	9.0	18.3	17.7	8.7	96.3
Agriculture	0.0	0.1	0.1	0.1	126.6	0.0	0.1	0.1	0.1	180.9
Analysis	6.0	15.8	20.3	14.3	240.3	5.6	13.4	12.2	6.6	118.1
Architecture	0.5	0.8	0.9	0.4	70.9	0.8	1.5	1.5	0.7	87.8
Business	11.9	32.4	37.7	25.8	216.2	21.7	43.7	42.7	21.0	96.9
Client relations	4.8	13.7	10.4	5.5	114.4	12.6	29.9	30.2	17.6	139.6
Design	1.9	3.8	3.6	1.6	82.8	1.2	2.2	1.8	0.6	53.5
Economics	4.7	13.0	12.0	7.3	155.1	1.6	3.3	3.1	1.4	87.4
Education and training	2.0	6.4	6.1	4.2	208.3	3.3	7.8	7.2	3.9	120.2
Energy, utilities	0.0	0.3	0.6	0.5	1073.0	0.1	0.3	0.3	0.1	81.4
Engineering	1.6	3.6	4.8	3.2	199.1	0.9	1.8	2.1	1.2	136.4
Environment	0.4	0.5	0.5	0.1	28.0	0.3	0.4	0.3	0.0	7.8
Finance	13.3	23.5	27.2	13.8	103.7	20.9	41.2	39.3	18.4	87.8
Health	3.8	4.9	5.9	2.1	56.8	4.2	9.4	10.4	6.2	147.1
Human resources	1.7	4.2	5.1	3.3	191.5	3.2	7.5	7.5	4.3	132.9
Industry knowledge	3.6	4.7	5.7	2.1	57.9	5.2	9.4	11.2	6.0	116.6
Information	21.1	50.8	53.8	32.7	154.8	22.6	42.7	42.6	20.0	88.7
Legal	1.1	3.4	6.6	5.5	499.0	2.3	6.9	7.0	4.7	206.5
Maintenance	0.8	0.6	0.8	0.0	-1.2	0.7	1.3	1.4	0.7	101.5
Manufacturing	1.7	3.2	2.7	1.0	61.1	1.9	3.9	3.4	1.6	83.5
Marketing and PR	9.8	17.0	14.0	4.2	42.9	6.4	13.2	12.7	6.3	97.1
Media and writing	2.5	7.5	5.4	2.9	117.0	2.2	3.6	3.1	0.9	38.3
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.0	0.2	0.0	0.0	6.6	0.2	0.6	0.3	0.2	84.3
Public safety	0.2	0.8	0.7	0.5	326.6	0.7	1.9	1.9	1.2	178.5
Sales	5.4	11.4	10.2	4.7	87.1	15.9	32.8	31.8	15.8	99.4
Science and research	1.1	2.5	2.5	1.4	122.9	0.8	1.4	1.5	0.7	80.3
Supply chain	1.6	3.9	3.4	1.8	107.2	3.3	5.8	5.6	2.4	72.1

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 11. Finance and insurance industry skill growth, by year and internship status

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	3.3	12.6	14.9	11.6	353.3	7.4	16.2	15.0	7.6	103.4
Associate's degree	1.3	2.9	3.4	2.0	152.7	6.8	13.8	18.8	12.0	174.8
Bachelor's degree	7.7	19.0	28.2	20.5	265.9	8.1	16.2	16.4	8.3	102.0
Graduate or professional degree	2.4	6.9	6.6	4.2	174.8	3.1	6.6	6.1	3.0	96.8
<i>Experience</i>										
0 to 2 years	7.9	11.3	13.2	5.3	67.0	16.1	29.8	34.8	18.6	115.7
3 to 5 years	1.8	1.4	2.1	0.3	17.7	7.6	15.2	11.3	3.7	49.1
6+ years	0.4	0.1	0.2	-0.2	-54.5	1.5	3.1	1.8	0.3	21.6
<i>Skill cluster</i>										
Administration	3.9	15.1	16.5	12.6	321.8	4.9	13.4	13.4	8.6	176.3
Agriculture	0.0	0.1	0.1	0.1	187.1	0.0	0.0	0.0	0.0	-26.9
Analysis	1.6	6.7	8.4	6.8	426.5	1.4	3.9	3.4	2.0	138.1
Architecture	0.2	0.5	0.6	0.4	207.6	0.3	0.5	0.4	0.2	66.0
Business	5.6	19.5	25.6	20.0	356.5	8.1	20.7	18.5	10.5	129.7
Client relations	2.4	7.4	7.1	4.8	202.1	2.7	8.3	7.4	4.7	176.0
Design	0.8	3.9	3.2	2.4	279.7	0.3	0.5	0.3	0.0	11.0
Economics	0.3	1.0	1.9	1.6	526.4	0.1	0.3	0.3	0.1	101.4
Education and training	2.1	10.9	8.4	6.2	296.1	3.4	10.9	11.4	8.1	239.7
Energy, utilities	0.1	0.5	0.1	0.0	-28.2	0.1	0.1	0.1	0.0	42.6
Engineering	0.8	2.6	2.9	2.2	271.2	0.4	0.7	0.6	0.2	51.8
Environment	0.4	0.9	0.5	0.1	26.8	0.2	0.5	0.8	0.6	343.4
Finance	2.5	7.7	7.9	5.4	212.4	3.8	10.1	8.5	4.8	126.6
Health	10.4	31.4	35.8	25.4	245.7	16.8	47.2	47.2	30.4	180.7
Human resources	1.2	7.2	5.6	4.4	353.7	1.7	5.2	5.2	3.4	200.1
Industry knowledge	1.3	1.7	2.0	0.8	60.7	0.7	1.2	1.0	0.2	33.1
Information	6.5	29.5	26.7	20.2	310.8	5.3	12.8	10.7	5.4	103.0
Legal	0.6	2.5	2.2	1.7	289.6	0.9	3.3	3.5	2.6	293.5
Maintenance	0.2	1.5	1.3	1.1	446.2	0.6	1.6	1.5	0.9	139.4
Manufacturing	0.5	1.8	1.7	1.2	219.4	0.5	1.0	0.8	0.3	62.0
Marketing and PR	3.3	13.5	14.4	11.1	340.9	1.4	4.1	3.4	2.1	152.2
Media and writing	1.4	5.9	5.6	4.2	298.3	0.6	1.4	0.9	0.3	52.9
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	-18.7
Personal care	0.2	1.6	1.1	0.8	334.6	0.6	2.3	3.1	2.5	430.8
Public safety	0.0	0.4	0.6	0.5	1909.6	0.3	0.9	1.0	0.7	221.5
Sales	1.3	5.4	4.9	3.6	270.8	1.6	3.5	2.8	1.3	79.1
Science and research	2.2	3.9	4.2	2.0	92.1	1.8	2.9	2.8	0.9	51.7
Supply chain	1.2	3.7	3.6	2.4	212.7	1.3	3.0	2.7	1.4	109.9

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 12. Information industry skill growth, by year and internship status

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	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	2.4	7.7	5.7	3.3	136.9	8.3	12.0	14.8	6.5	78.3
Associate's degree	0.8	1.4	0.7	-0.1	-13.2	2.1	3.4	5.2	3.1	146.8
Bachelor's degree	14.1	28.2	35.5	21.4	152.2	24.5	42.9	45.7	21.2	86.8
Graduate or professional degree	4.0	5.3	6.4	2.3	57.7	1.7	2.9	2.1	0.4	22.2
<i>Experience</i>										
0 to 2 years	8.9	5.7	6.0	-2.9	-33.0	13.8	22.0	22.2	8.4	60.6
3 to 5 years	3.3	1.3	1.0	-2.3	-70.7	17.4	28.3	22.5	5.1	29.2
6+ years	1.6	0.2	0.6	-1.0	-64.6	7.0	13.5	19.8	12.8	183.5
<i>Skill cluster</i>										
Administration	8.6	15.3	12.2	3.6	41.9	10.9	18.0	13.8	2.9	26.9
Agriculture	0.0	0.0	0.1	0.1	245.4	0.0	0.1	0.0	0.0	33.6
Analysis	4.6	8.2	13.9	9.3	200.7	5.6	11.3	10.2	4.5	80.0
Architecture	0.4	0.8	1.2	0.8	179.3	1.4	2.3	2.0	0.6	43.2
Business	14.0	23.9	29.2	15.2	109.1	24.3	47.0	46.5	22.2	91.3
Client relations	3.4	5.7	5.5	2.1	60.8	12.7	24.1	21.8	9.1	71.9
Design	6.7	13.7	12.8	6.1	90.6	3.7	7.4	5.6	1.9	52.2
Economics	0.8	2.1	3.4	2.6	324.4	0.6	1.1	1.1	0.5	78.0
Education and training	2.4	4.3	4.5	2.2	92.4	4.3	7.2	7.6	3.3	75.1
Energy, utilities	0.1	0.4	0.4	0.3	314.5	0.3	0.9	0.6	0.4	126.9
Engineering	3.1	7.0	8.2	5.0	160.9	3.1	7.2	5.5	2.3	73.7
Environment	0.3	0.4	0.7	0.5	160.2	0.3	0.8	0.5	0.3	93.5
Finance	6.6	8.6	9.4	2.9	43.7	14.4	21.9	21.5	7.1	49.7
Health	1.4	2.1	2.4	1.0	71.3	1.7	3.5	4.9	3.1	180.2
Human resources	1.2	3.3	3.5	2.4	206.9	3.4	6.9	6.7	3.3	97.0
Industry knowledge	2.2	3.4	5.2	2.9	132.0	3.9	6.9	7.8	3.9	101.2
Information	27.3	47.4	52.5	25.2	92.2	32.4	58.6	57.7	25.2	77.8
Legal	0.8	1.5	1.9	1.1	129.8	1.3	3.1	2.9	1.6	126.6
Maintenance	1.1	1.3	1.2	0.1	13.1	3.2	6.0	4.8	1.6	50.5
Manufacturing	1.8	4.4	4.7	2.9	158.5	3.1	7.4	8.5	5.3	171.8
Marketing and PR	10.5	25.7	26.5	16.0	152.9	10.4	22.7	24.5	14.1	136.2
Media and writing	9.1	22.2	18.3	9.2	101.1	6.0	12.5	10.7	4.7	78.9
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.1	0.2	0.2	0.1	67.8	0.1	0.2	0.4	0.3	221.1
Public safety	0.1	0.6	0.3	0.2	245.4	0.5	1.7	1.4	0.9	172.4
Sales	6.2	11.6	11.4	5.2	84.1	18.7	35.0	38.1	19.4	104.0
Science and research	1.8	3.2	3.3	1.5	86.1	1.0	2.5	2.1	1.1	103.4
Supply chain	1.7	3.7	3.4	1.6	91.7	6.0	11.3	9.9	3.9	65.1

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 13. Management of companies and enterprises industry skill growth, by year and internship status

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	1.0	4.8	7.9	7.0	732.2	11.3	13.0	21.6	10.3	90.9
Associate's degree	0.0	3.9	0.8	0.8	--	3.9	3.2	5.1	1.3	33.3
Bachelor's degree	23.8	32.1	54.3	30.5	128.1	35.5	41.8	40.7	5.2	14.5
Graduate or professional degree	10.5	6.8	3.2	-7.3	-69.4	1.9	4.0	2.0	0.1	4.5
<i>Experience</i>										
0 to 2 years	2.9	7.1	14.2	11.3	395.8	17.1	17.9	21.9	4.8	28.1
3 to 5 years	2.9	4.8	2.9	0.0	0.3	27.5	31.5	27.8	0.3	1.0
6+ years	0.0	0.0	0.7	0.7	--	10.1	14.4	12.1	1.9	19.2
<i>Skill cluster</i>										
Administration	8.6	16.4	21.9	13.4	155.8	17.6	23.8	29.1	11.5	65.2
Agriculture	0.0	0.0	0.2	0.2	--	0.0	0.1	0.1	0.1	528.3
Analysis	1.9	5.4	9.1	7.2	378.1	6.2	9.4	9.4	3.1	50.5
Architecture	1.0	2.4	3.9	2.9	307.3	2.0	3.8	4.5	2.5	129.3
Business	26.7	20.5	48.7	22.1	82.8	33.4	49.8	49.8	16.4	49.2
Client relations	1.0	3.9	7.8	6.8	714.5	14.8	24.3	28.8	13.9	93.8
Design	0.0	8.9	6.6	6.6	--	2.5	3.6	2.7	0.2	9.7
Economics	0.0	0.9	4.0	4.0	--	1.1	1.8	1.7	0.6	55.2
Education and training	1.9	2.7	5.9	4.0	209.9	5.4	8.3	8.4	3.1	57.2
Energy, utilities	1.0	0.3	1.9	0.9	94.8	0.9	1.4	1.4	0.5	55.4
Engineering	7.6	4.2	13.3	5.7	74.9	4.0	5.8	6.1	2.1	52.2
Environment	0.0	0.6	1.9	1.9	--	0.0	0.0	0.0	0.0	--
Finance	12.4	14.3	17.5	5.2	41.7	28.8	38.3	39.6	10.7	37.2
Health	2.9	5.1	4.6	1.7	59.4	2.4	6.9	7.3	4.8	196.1
Human resources	3.8	6.5	9.3	5.5	143.5	6.7	13.5	16.3	9.7	145.2
Industry knowledge	3.8	5.1	5.9	2.1	54.9	4.7	7.4	8.3	3.6	77.3
Information	21.9	38.4	59.2	37.3	170.2	36.4	50.5	52.0	15.6	43.0
Legal	1.0	0.9	3.4	2.4	254.1	3.7	7.5	7.3	3.5	95.4
Maintenance	1.0	2.1	3.2	2.3	236.4	2.2	4.4	5.8	3.5	157.0
Manufacturing	2.9	5.7	16.0	13.2	460.7	3.5	8.1	8.2	4.7	136.0
Marketing and PR	12.4	27.1	17.4	5.0	40.3	8.7	19.4	18.1	9.4	108.0
Media and writing	2.9	11.0	10.3	7.4	260.0	4.4	6.3	5.0	0.7	15.1
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.0	0.0	0.3	0.3	--	0.5	0.8	1.7	1.2	262.9
Public safety	0.0	0.0	1.3	1.3	--	0.9	3.2	3.1	2.2	253.0
Sales	9.5	10.1	12.6	3.1	32.8	18.7	30.4	30.6	12.0	64.0
Science and research	1.0	4.2	5.1	4.1	431.2	1.1	2.8	2.3	1.3	117.6
Supply chain	9.5	5.7	7.9	-1.6	-16.8	7.9	14.8	18.0	10.1	128.4

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 14. Manufacturing industry skill growth, by year and internship status

SHANDRA 49

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	3.7	9.2	7.6	4.0	108.7	8.4	15.7	22.7	14.3	169.7
Associate's degree	1.1	2.1	2.0	0.9	75.0	2.3	3.8	3.8	1.5	66.8
Bachelor's degree	22.7	42.1	51.8	29.1	128.5	29.2	43.8	39.6	10.4	35.7
Graduate or professional degree	3.8	8.7	6.7	3.0	79.1	2.2	3.9	2.4	0.3	12.8
<i>Experience</i>										
0 to 2 years	7.3	7.6	10.1	2.8	37.9	12.6	17.7	20.6	7.9	62.8
3 to 5 years	2.4	2.2	1.6	-0.8	-32.2	21.0	30.3	26.3	5.2	24.9
6+ years	1.0	0.1	0.1	-0.9	-89.9	9.3	16.2	13.4	4.1	44.1
<i>Skill cluster</i>										
Administration	5.4	9.8	11.9	6.5	119.3	9.5	19.0	19.7	10.3	108.3
Agriculture	0.2	0.5	0.4	0.2	84.4	0.1	0.4	0.2	0.1	93.3
Analysis	6.8	17.0	20.5	13.7	202.5	6.4	14.4	15.0	8.6	133.2
Architecture	1.2	3.1	3.7	2.5	205.0	2.8	5.3	5.4	2.6	90.9
Business	14.3	31.1	36.9	22.6	158.7	24.1	47.5	44.8	20.6	85.6
Client relations	3.1	6.6	6.7	3.6	114.7	7.0	16.2	16.2	9.2	131.1
Design	3.3	6.5	6.8	3.5	107.5	2.8	5.1	3.8	1.0	35.6
Economics	1.1	2.4	3.0	2.0	187.8	0.5	0.9	0.9	0.4	69.1
Education and training	1.8	4.5	4.6	2.7	149.2	3.7	8.7	7.9	4.2	115.8
Energy, utilities	0.5	1.5	1.7	1.1	215.1	1.1	2.2	2.0	0.9	78.4
Engineering	13.2	29.8	31.6	18.4	138.7	11.7	20.6	17.4	5.7	48.6
Environment	1.0	2.3	2.0	1.0	100.8	1.1	2.6	2.5	1.4	128.1
Finance	5.0	9.7	10.6	5.5	110.0	11.7	20.4	19.1	7.4	63.5
Health	3.1	6.2	6.6	3.5	113.0	5.6	10.2	10.3	4.7	84.2
Human resources	1.6	5.2	6.7	5.1	310.2	3.4	8.7	10.4	7.0	208.5
Industry knowledge	4.6	7.7	8.8	4.2	91.8	5.9	10.5	10.8	4.9	82.4
Information	25.4	51.9	57.4	32.1	126.4	26.0	48.1	44.9	18.9	72.9
Legal	0.7	3.2	3.9	3.1	423.9	2.1	5.1	5.1	3.0	141.6
Maintenance	2.5	6.0	7.1	4.5	177.8	5.8	12.6	14.3	8.5	145.9
Manufacturing	6.5	14.9	17.5	11.0	169.2	12.2	25.6	25.9	13.6	111.6
Marketing and PR	6.0	13.3	14.5	8.5	140.3	7.3	15.9	16.6	9.3	126.9
Media and writing	2.8	5.7	6.9	4.1	143.8	3.1	5.8	4.7	1.7	53.5
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.1	0.4	0.4	0.4	585.3	0.3	1.0	2.5	2.2	816.5
Public safety	0.4	0.7	0.8	0.4	108.8	0.8	1.9	1.8	1.0	137.0
Sales	5.3	9.2	11.0	5.7	107.9	11.4	21.9	21.5	10.1	89.1
Science and research	5.4	11.3	11.1	5.7	106.8	4.4	8.6	8.2	3.8	86.0
Supply chain	4.5	11.0	12.0	7.5	163.9	9.3	19.0	20.9	11.6	124.3

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 15. Mining, quarrying, and oil and gas extraction industry skill growth, by year and internship status

SHANDRA 50

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	4.2	4.3	4.9	0.7	15.7	8.3	22.1	22.2	13.9	168.9
Associate's degree	3.5	2.5	3.1	-0.3	-9.1	1.3	3.0	2.8	1.5	111.3
Bachelor's degree	20.0	41.5	54.2	34.2	171.0	26.8	37.1	27.0	0.1	0.5
Graduate or professional degree	0.0	5.3	11.2	11.2	--	1.7	3.7	2.2	0.5	29.0
<i>Experience</i>										
0 to 2 years	6.2	3.6	5.8	-0.4	-6.3	9.1	16.5	17.3	8.2	90.3
3 to 5 years	4.2	1.0	1.4	-2.8	-66.9	18.4	29.5	20.4	2.0	10.9
6+ years	0.8	0.4	0.2	-0.6	-77.3	10.7	18.4	11.9	1.2	11.1
<i>Skill cluster</i>										
Administration	7.7	14.5	11.9	4.2	54.5	10.2	18.6	17.2	6.9	67.6
Agriculture	0.0	0.4	0.0	0.0	--	0.1	0.2	0.2	0.1	55.1
Analysis	7.7	13.1	12.9	5.2	68.2	4.9	9.4	9.4	4.5	93.3
Architecture	2.3	3.9	3.8	1.5	66.7	5.3	8.3	7.0	1.7	31.8
Business	16.2	25.1	33.0	16.9	104.5	24.2	44.3	39.1	14.8	61.1
Client relations	5.4	5.8	3.5	-1.9	-35.1	4.5	11.6	15.4	11.0	245.6
Design	5.8	2.8	3.1	-2.6	-45.5	1.4	1.8	1.4	0.0	0.8
Economics	4.2	1.8	7.7	3.5	81.8	2.4	2.9	2.2	-0.2	-7.6
Education and training	0.4	5.7	6.5	6.1	1581.8	3.4	7.6	5.8	2.4	69.2
Energy, utilities	7.7	9.5	11.5	3.8	50.0	9.3	18.8	14.0	4.7	50.6
Engineering	10.8	26.4	16.8	6.0	55.8	13.1	20.5	13.2	0.2	1.2
Environment	2.3	9.5	7.7	5.4	233.3	3.6	8.8	5.8	2.2	59.8
Finance	6.2	16.3	14.7	8.5	138.6	12.6	23.7	20.1	7.5	59.7
Health	0.8	6.0	1.9	1.2	150.0	1.8	3.6	3.0	1.1	62.1
Human resources	2.7	7.2	5.9	3.3	120.8	4.2	9.3	9.2	5.0	119.5
Industry knowledge	3.1	6.3	4.2	1.1	36.4	3.2	4.6	3.9	0.8	24.9
Information	23.1	42.1	44.8	21.7	93.9	21.2	41.2	32.3	11.1	52.6
Legal	0.4	3.1	2.8	2.4	627.3	2.4	6.2	4.6	2.2	90.5
Maintenance	3.1	7.7	6.8	3.7	121.6	5.7	14.2	14.8	9.1	158.8
Manufacturing	3.5	5.8	3.3	-0.1	-4.0	6.5	14.0	10.7	4.2	64.9
Marketing and PR	4.6	7.1	8.9	4.3	93.2	3.6	6.6	6.9	3.3	91.0
Media and writing	2.3	5.2	6.8	4.5	195.5	2.8	3.6	3.0	0.1	5.1
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.0	0.1	0.2	0.2	--	0.1	0.4	0.9	0.8	714.6
Public safety	1.9	1.7	1.7	-0.2	-9.1	1.5	3.1	2.6	1.1	70.7
Sales	3.1	3.8	5.9	2.9	93.2	6.7	12.2	12.1	5.4	81.2
Science and research	1.9	9.6	5.2	3.3	172.7	4.7	7.6	5.2	0.5	11.5
Supply chain	5.8	8.2	9.1	3.3	57.6	7.7	16.7	18.8	11.0	142.8

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 16. Other services industry skill growth, by year and internship status

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	0.5	6.8	18.4	18.0	3836.0	12.6	20.2	24.5	11.9	95.0
Associate's degree	0.1	1.7	1.3	1.2	883.0	2.3	3.2	4.0	1.8	77.6
Bachelor's degree	8.8	16.2	23.6	14.8	167.9	13.3	18.7	18.2	4.9	36.7
Graduate or professional degree	0.3	3.0	3.2	2.9	1050.3	1.4	2.6	1.8	0.4	26.3
<i>Experience</i>										
0 to 2 years	1.7	6.7	8.4	6.7	400.2	13.5	20.0	23.6	10.1	75.4
3 to 5 years	4.4	0.9	0.8	-3.6	-81.6	13.8	19.2	17.3	3.6	25.9
6+ years	3.7	0.1	0.1	-3.6	-97.6	4.9	5.5	4.4	-0.5	-10.6
<i>Skill cluster</i>										
Administration	2.3	24.5	20.3	18.0	768.0	9.3	21.0	19.8	10.4	111.6
Agriculture	0.0	0.5	2.1	2.0	4417.6	0.2	0.3	0.5	0.3	124.7
Analysis	2.3	4.7	7.2	4.8	206.1	2.6	4.2	5.0	2.3	89.0
Architecture	0.2	0.6	1.2	1.0	427.0	1.9	3.1	4.4	2.5	134.5
Business	8.7	24.2	26.6	17.9	207.3	13.7	29.6	25.8	12.1	87.7
Client relations	0.9	5.6	6.0	5.1	569.3	6.7	17.5	17.7	11.0	164.9
Design	3.3	6.1	9.1	5.7	170.7	1.3	2.1	1.6	0.3	24.3
Economics	0.4	3.9	3.2	2.9	806.7	0.4	0.9	0.7	0.3	72.8
Education and training	3.9	8.7	9.9	6.0	152.4	4.1	9.4	9.0	4.9	118.4
Energy, utilities	0.0	0.6	0.8	0.8	1656.8	0.7	1.3	1.5	0.7	102.0
Engineering	0.1	2.1	3.4	3.3	2615.1	2.2	3.6	4.2	2.0	87.4
Environment	0.2	4.3	4.2	3.9	1632.9	1.8	1.6	1.9	0.1	6.4
Finance	5.7	5.9	8.4	2.7	46.6	8.6	16.6	15.5	6.9	80.6
Health	0.3	17.2	14.4	14.1	4736.1	4.0	9.5	11.1	7.1	178.3
Human resources	0.2	2.6	5.2	5.0	2586.9	3.2	6.5	8.5	5.2	161.9
Industry knowledge	0.4	1.4	1.6	1.2	313.4	2.0	3.8	3.7	1.7	81.7
Information	7.6	42.9	46.5	38.9	508.1	14.9	25.5	24.5	9.6	64.1
Legal	0.1	6.6	2.2	2.0	1489.5	1.1	2.4	2.8	1.7	149.1
Maintenance	0.3	1.0	4.4	4.1	1386.5	5.2	10.8	14.7	9.5	184.4
Manufacturing	0.1	0.7	1.6	1.5	1000.4	2.5	5.4	6.6	4.1	161.7
Marketing and PR	1.7	31.8	29.6	27.9	1684.5	6.3	17.3	11.6	5.3	84.2
Media and writing	4.3	13.8	14.2	9.9	229.7	2.9	5.3	4.2	1.3	45.6
Ministry	0.0	0.1	1.7	1.7	--	0.1	0.2	0.1	0.0	-1.9
Personal care	0.0	0.8	1.3	1.3	--	0.6	5.1	2.9	2.4	428.2
Public safety	0.0	0.4	0.4	0.4	1531.3	0.6	2.7	2.3	1.6	257.6
Sales	2.1	4.7	7.9	5.8	272.4	7.8	18.7	16.0	8.3	106.0
Science and research	0.2	3.9	4.6	4.4	2116.9	1.1	1.9	1.7	0.6	56.8
Supply chain	0.5	5.4	5.8	5.3	978.7	4.3	10.6	11.0	6.8	159.1

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 17. Professional, scientific, and technical services industry skill growth, by year and internship status

SHANDRA 52

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	5.0	8.7	6.1	1.1	22.4	5.5	9.3	13.6	8.1	148.2
Associate's degree	2.2	2.2	2.1	-0.1	-3.9	2.2	3.6	3.9	1.6	73.3
Bachelor's degree	23.2	26.7	45.2	22.0	94.8	29.6	40.0	40.0	10.4	35.3
Graduate or professional degree	2.8	3.3	4.6	1.8	64.8	2.9	5.1	2.7	-0.1	-5.0
<i>Experience</i>										
0 to 2 years	12.8	9.4	8.2	-4.7	-36.4	12.6	17.7	19.5	6.9	54.6
3 to 5 years	5.0	1.9	1.7	-3.4	-66.9	22.2	29.6	26.8	4.6	20.8
6+ years	1.8	0.4	0.2	-1.7	-91.7	10.7	16.1	14.2	3.5	32.8
<i>Skill cluster</i>										
Administration	6.2	14.5	15.1	8.9	141.9	9.7	16.7	20.0	10.2	105.5
Agriculture	0.2	0.4	0.7	0.5	300.8	0.1	0.2	0.2	0.1	56.1
Analysis	4.8	9.6	15.8	11.0	226.9	7.4	13.5	12.4	4.9	66.5
Architecture	3.2	3.8	7.1	3.9	119.7	2.8	4.4	4.1	1.4	49.4
Business	16.2	25.5	38.4	22.2	136.6	27.0	45.6	46.5	19.5	72.2
Client relations	3.5	6.5	8.2	4.7	135.6	9.0	16.5	19.0	10.0	110.7
Design	6.9	15.5	12.0	5.1	73.4	4.2	6.1	5.7	1.6	37.4
Economics	0.9	2.5	4.8	3.9	439.4	0.9	1.8	1.9	1.0	105.1
Education and training	2.0	3.8	4.8	2.8	137.9	3.8	7.9	7.6	3.8	100.0
Energy, utilities	0.4	1.6	1.9	1.6	438.5	0.8	1.6	1.1	0.3	32.4
Engineering	11.4	11.2	22.4	11.0	96.3	7.0	9.8	8.3	1.3	19.1
Environment	1.8	2.6	3.9	2.1	117.7	1.4	2.2	1.6	0.1	9.5
Finance	6.3	9.0	12.0	5.7	89.8	13.3	21.1	22.1	8.8	66.0
Health	1.6	3.4	4.9	3.4	216.6	4.6	9.1	11.3	6.7	144.1
Human resources	1.1	3.2	5.0	3.9	349.4	3.2	6.5	10.0	6.8	214.4
Industry knowledge	3.2	4.1	5.3	2.1	65.8	8.0	7.9	8.9	0.9	11.7
Information	28.1	46.8	56.6	28.4	100.9	34.8	54.3	56.8	21.9	62.9
Legal	1.2	2.2	2.6	1.4	117.1	3.1	6.6	5.3	2.3	73.5
Maintenance	1.7	1.9	3.2	1.5	87.1	3.2	4.7	5.4	2.2	68.7
Manufacturing	2.5	3.9	6.1	3.7	148.4	5.1	8.1	8.4	3.3	63.8
Marketing and PR	10.0	28.1	21.5	11.6	116.0	8.1	15.0	17.2	9.2	113.7
Media and writing	7.5	13.6	11.3	3.8	49.9	6.5	8.7	8.2	1.8	27.1
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.3	0.5	0.6	0.2	74.6	0.3	0.8	3.3	3.0	1000.4
Public safety	0.2	0.7	1.0	0.8	442.7	0.6	1.7	2.0	1.4	222.7
Sales	7.4	11.6	11.5	4.2	56.8	12.5	20.2	23.1	10.6	84.9
Science and research	4.2	4.5	9.4	5.2	126.4	4.4	6.8	6.2	1.8	40.2
Supply chain	3.3	4.5	5.7	2.4	74.4	7.1	9.5	10.8	3.7	52.3

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 18. Public administration industry skill growth, by year and internship status

SHANDRA 53

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	3.1	14.3	34.2	31.1	1017.5	11.1	18.8	25.0	13.8	124.6
Associate's degree	0.7	2.7	1.6	0.9	134.3	1.8	4.6	5.0	3.2	177.2
Bachelor's degree	6.7	24.6	24.1	17.4	259.2	10.5	22.8	24.7	14.2	135.2
Graduate or professional degree	41.2	7.3	4.2	-37.0	-89.8	2.3	8.5	7.3	5.0	215.7
<i>Experience</i>										
0 to 2 years	4.7	12.6	11.4	6.7	142.3	12.9	33.1	29.4	16.5	128.3
3 to 5 years	1.4	6.0	2.3	0.9	66.6	9.4	19.3	19.9	10.4	110.2
6+ years	2.2	0.5	0.2	-2.0	-90.7	4.1	6.1	6.7	2.7	65.5
<i>Skill cluster</i>										
Administration	4.5	27.6	37.1	32.6	730.1	8.4	28.8	27.6	19.3	230.7
Agriculture	0.4	0.8	1.3	0.9	234.1	0.2	1.1	1.5	1.3	645.5
Analysis	1.5	12.6	15.6	14.2	965.9	2.6	9.2	10.2	7.5	284.3
Architecture	1.5	4.1	4.7	3.3	222.5	1.7	5.5	6.0	4.3	255.8
Business	45.5	29.8	40.7	-4.7	-10.4	12.2	41.3	39.8	27.6	226.3
Client relations	0.7	6.9	7.2	6.5	923.2	3.3	10.5	12.4	9.1	271.5
Design	1.0	6.7	5.6	4.6	453.1	0.8	1.8	1.8	1.0	132.4
Economics	1.0	8.4	7.6	6.6	644.6	1.1	3.9	4.1	3.0	281.6
Education and training	1.0	10.6	12.2	11.3	1179.2	4.5	17.8	17.5	13.0	287.3
Energy, utilities	0.4	3.0	1.9	1.6	406.0	0.5	1.9	1.9	1.4	281.5
Engineering	3.0	11.3	12.8	9.8	326.5	3.3	7.2	7.8	4.5	137.4
Environment	1.2	8.1	9.0	7.8	646.1	1.3	5.0	5.9	4.6	355.6
Finance	2.8	17.9	17.5	14.7	523.6	6.4	20.7	19.0	12.5	195.5
Health	41.8	12.4	11.0	-30.8	-73.6	7.5	28.1	26.6	19.1	254.9
Human resources	0.6	7.4	8.7	8.1	1414.7	2.6	9.9	10.3	7.8	302.7
Industry knowledge	0.6	2.6	5.6	5.0	782.1	1.3	3.8	3.7	2.4	177.3
Information	7.0	41.5	41.6	34.6	493.1	10.7	28.8	30.1	19.4	181.8
Legal	1.5	8.4	7.0	5.5	375.7	2.6	8.5	8.6	6.0	229.0
Maintenance	0.4	3.4	5.8	5.4	1413.1	2.6	8.9	10.7	8.1	309.1
Manufacturing	0.3	2.3	3.1	2.7	862.3	2.0	4.8	5.3	3.3	160.7
Marketing and PR	41.8	14.8	11.4	-30.4	-72.7	1.7	5.3	6.0	4.3	249.7
Media and writing	1.5	11.7	8.3	6.8	465.3	2.2	5.6	6.0	3.8	178.0
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.3	0.5	1.5	1.2	369.7	0.9	2.4	3.5	2.6	282.9
Public safety	0.4	2.8	2.8	2.4	639.8	1.7	4.5	5.6	4.0	237.8
Sales	0.6	3.5	3.4	2.8	435.6	2.2	4.7	5.9	3.7	166.0
Science and research	1.2	9.6	12.1	10.9	896.3	1.9	6.6	7.3	5.4	281.5
Supply chain	1.2	6.8	8.8	7.6	625.0	4.2	12.8	13.1	8.9	211.2

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 19. Real estate and rental and leasing industry skill growth, by year and internship status

SHANDRA 54

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	2.0	6.1	7.3	5.3	264.5	12.4	28.6	25.8	13.3	107.2
Associate's degree	0.9	1.1	0.9	0.0	-0.1	1.8	4.3	3.5	1.7	96.8
Bachelor's degree	6.9	27.2	35.7	28.7	413.3	14.7	17.3	19.4	4.7	32.0
Graduate or professional degree	4.6	1.6	2.3	-2.3	-50.6	1.4	1.6	0.8	-0.6	-40.0
<i>Experience</i>										
0 to 2 years	4.2	23.0	16.8	12.6	299.3	19.4	27.6	24.2	4.8	24.5
3 to 5 years	2.0	4.3	15.6	13.6	675.6	14.3	19.3	19.1	4.9	34.3
6+ years	0.5	0.1	1.7	1.1	205.2	3.6	4.2	4.9	1.4	38.0
<i>Skill cluster</i>										
Administration	8.6	13.5	12.1	3.6	41.4	11.5	17.4	21.7	10.3	89.4
Agriculture	0.0	0.0	0.2	0.2	--	0.1	0.4	0.3	0.2	193.4
Analysis	3.7	3.6	5.6	1.9	51.9	1.7	3.9	4.1	2.5	148.6
Architecture	1.1	1.7	3.6	2.5	223.7	2.4	4.6	8.3	6.0	250.5
Business	8.6	19.4	26.1	17.5	203.4	23.0	39.3	41.9	18.9	82.2
Client relations	3.1	9.6	12.1	9.0	290.9	10.3	28.7	25.1	14.8	143.4
Design	2.6	5.0	2.8	0.3	11.0	0.8	1.4	1.8	1.0	115.6
Economics	3.3	1.5	2.8	-0.5	-15.2	0.6	0.8	0.9	0.3	52.4
Education and training	1.3	1.7	1.8	0.5	38.7	1.8	3.1	6.4	4.6	261.5
Energy, utilities	0.2	0.4	0.2	0.0	24.9	0.4	0.9	1.6	1.3	363.8
Engineering	1.6	1.9	3.9	2.3	137.4	1.4	2.0	1.9	0.5	37.5
Environment	0.4	1.1	0.7	0.3	94.2	0.7	1.0	1.3	0.6	98.0
Finance	7.3	10.9	19.2	11.9	162.5	16.6	22.3	25.2	8.6	52.1
Health	0.5	0.7	0.7	0.2	29.5	1.1	1.8	2.7	1.6	152.4
Human resources	0.4	1.7	2.1	1.7	475.7	2.5	7.1	6.5	4.0	161.3
Industry knowledge	2.2	2.0	7.1	4.9	223.7	2.6	3.5	4.5	1.9	74.5
Information	20.3	28.6	37.3	17.0	83.7	15.5	29.1	31.3	15.8	101.5
Legal	1.3	1.1	0.9	-0.3	-26.7	1.9	3.3	3.4	1.5	79.7
Maintenance	0.9	1.5	2.6	1.6	180.2	4.1	8.9	12.9	8.7	210.4
Manufacturing	1.5	0.9	0.8	-0.7	-46.2	1.3	3.1	4.7	3.4	257.9
Marketing and PR	9.3	16.2	15.4	6.1	65.4	4.7	9.2	12.2	7.5	159.7
Media and writing	3.1	5.4	3.5	0.4	11.8	1.4	2.1	2.3	0.9	62.1
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.2	1.1	0.5	0.3	191.3	0.3	0.5	0.6	0.3	95.4
Public safety	0.0	0.4	0.6	0.6	--	0.9	7.5	0.9	-0.1	-6.7
Sales	5.9	15.4	20.6	14.8	252.9	16.4	30.4	26.1	9.7	59.0
Science and research	0.5	0.4	1.2	0.6	117.3	0.4	0.6	0.5	0.1	29.1
Supply chain	4.4	2.7	7.5	3.1	71.7	6.1	10.5	13.8	7.7	125.8

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 20. Retail trade industry skill growth, by year and internship status

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	1.7	3.2	13.4	11.7	676.9	11.3	26.5	33.6	22.3	197.2
Associate's degree	0.7	1.5	1.4	0.6	86.1	1.2	2.2	2.9	1.7	142.6
Bachelor's degree	11.1	18.0	26.0	14.9	134.0	11.3	13.2	8.7	-2.5	-22.6
Graduate or professional degree	2.7	4.6	5.1	2.3	84.5	2.3	1.6	1.1	-1.1	-49.7
<i>Experience</i>										
0 to 2 years	5.8	3.7	9.6	3.8	64.5	15.0	22.5	27.6	12.6	83.7
3 to 5 years	2.8	1.6	2.1	-0.7	-24.0	11.6	13.4	9.7	-1.9	-16.6
6+ years	1.4	0.1	0.3	-1.1	-80.0	2.8	3.4	2.4	-0.4	-13.9
<i>Skill cluster</i>										
Administration	4.1	11.4	17.5	13.4	325.9	8.7	16.9	22.2	13.5	155.0
Agriculture	0.0	0.0	0.1	0.0	76.3	0.1	0.1	0.1	0.0	23.2
Analysis	3.3	5.9	10.0	6.7	203.5	3.9	9.5	11.4	7.5	192.7
Architecture	1.1	7.1	4.2	3.0	265.1	1.4	2.0	1.9	0.4	31.2
Business	16.6	21.1	36.7	20.1	121.4	19.4	34.0	31.9	12.5	64.2
Client relations	3.9	9.7	16.1	12.3	317.9	13.0	32.5	40.8	27.8	213.8
Design	1.8	5.4	5.5	3.7	198.7	1.2	2.0	1.0	-0.2	-15.3
Economics	0.7	1.4	2.0	1.4	208.5	0.3	0.4	0.3	0.0	5.9
Education and training	1.2	3.2	3.2	2.0	161.5	3.1	5.8	5.8	2.8	90.7
Energy, utilities	0.0	0.1	0.3	0.3	693.2	0.3	0.4	0.3	0.0	1.8
Engineering	4.7	3.2	7.1	2.4	50.4	1.4	1.8	2.0	0.6	41.2
Environment	0.9	0.2	0.6	-0.2	-27.6	0.3	0.7	1.2	0.9	302.4
Finance	5.5	6.7	15.5	10.0	183.8	9.3	13.1	11.9	2.6	27.3
Health	1.1	6.8	6.8	5.6	490.9	2.6	4.4	5.2	2.6	101.8
Human resources	2.0	3.6	6.4	4.4	220.6	2.9	6.5	6.3	3.4	119.1
Industry knowledge	3.0	2.4	7.2	4.2	137.0	2.1	2.7	2.4	0.3	15.7
Information	14.3	27.5	31.5	17.3	121.0	11.8	18.9	14.3	2.5	21.0
Legal	1.6	2.4	7.4	5.8	353.3	1.2	2.8	3.4	2.2	179.2
Maintenance	0.2	7.5	6.0	5.8	3546.4	3.0	7.3	9.4	6.4	212.8
Manufacturing	1.6	3.8	4.2	2.6	161.6	3.2	4.4	5.0	1.8	56.6
Marketing and PR	7.1	13.1	14.4	7.3	103.9	5.8	9.9	15.0	9.2	158.0
Media and writing	1.7	6.4	5.7	4.0	229.4	1.9	2.3	2.6	0.7	38.6
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	-36.0
Personal care	0.0	0.2	4.9	4.9	--	0.5	2.7	4.1	3.7	798.2
Public safety	0.5	1.7	4.9	4.5	995.6	2.8	10.6	9.5	6.7	244.2
Sales	13.4	26.8	35.4	22.0	163.8	22.0	46.8	53.4	31.4	142.8
Science and research	0.7	1.3	1.2	0.5	79.0	0.4	0.9	0.5	0.1	29.2
Supply chain	3.5	11.6	17.6	14.1	404.7	9.7	20.2	24.0	14.2	146.2

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 21. Transportation and warehousing industry skill growth, by year and internship status

SHANDRA 56

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	7.8	7.2	14.2	6.4	81.8	17.5	16.8	8.6	-8.9	-51.0
Associate's degree	3.3	1.7	1.2	-2.0	-62.2	1.6	1.5	0.6	-1.1	-65.3
Bachelor's degree	14.0	20.7	35.6	21.5	153.8	13.4	13.9	4.8	-8.6	-64.0
Graduate or professional degree	1.3	2.4	5.5	4.2	312.4	0.8	0.7	0.2	-0.6	-77.8
<i>Experience</i>										
0 to 2 years	17.8	4.4	7.6	-10.1	-57.1	19.6	28.1	31.7	12.1	61.7
3 to 5 years	3.3	1.6	3.0	-0.3	-8.3	12.6	17.1	10.1	-2.6	-20.3
6+ years	1.2	0.5	2.7	1.5	123.3	5.2	5.4	2.7	-2.5	-48.2
<i>Skill cluster</i>										
Administration	8.2	17.8	20.8	12.6	154.5	9.4	15.3	6.5	-2.9	-31.2
Agriculture	0.7	0.2	0.3	-0.5	-62.5	0.2	0.2	0.1	-0.1	-44.9
Analysis	8.6	11.5	17.7	9.0	104.6	3.0	5.1	2.2	-0.8	-25.6
Architecture	1.5	3.0	2.3	0.8	55.8	3.1	3.1	1.3	-1.8	-57.6
Business	14.0	26.5	41.0	27.0	193.0	15.2	21.0	7.7	-7.5	-49.2
Client relations	3.8	6.8	11.1	7.3	194.3	7.5	10.4	4.9	-2.6	-34.6
Design	2.4	7.1	7.0	4.6	188.3	1.1	1.3	0.4	-0.8	-68.8
Economics	1.5	2.8	8.7	7.3	497.3	0.6	0.7	0.2	-0.3	-60.8
Education and training	1.3	4.1	6.7	5.3	397.4	2.3	3.9	1.5	-0.8	-36.6
Energy, utilities	0.4	0.8	1.0	0.7	182.8	0.6	1.2	0.3	-0.3	-54.8
Engineering	8.2	11.6	15.0	6.8	83.7	4.2	4.3	1.3	-2.9	-68.5
Environment	1.3	2.2	2.7	1.3	99.9	1.4	3.5	1.1	-0.3	-23.2
Finance	8.8	9.7	15.6	6.9	78.2	7.9	10.7	4.2	-3.7	-47.2
Health	1.3	2.7	3.4	2.1	153.4	1.6	2.2	1.1	-0.6	-35.2
Human resources	1.0	4.3	8.6	7.6	778.7	2.8	5.3	2.4	-0.3	-12.7
Industry knowledge	1.8	7.2	11.3	9.5	517.5	2.8	4.5	1.9	-1.0	-34.3
Information	21.2	43.3	58.1	36.9	174.1	15.4	21.4	7.8	-7.6	-49.3
Legal	0.6	1.6	4.7	4.1	672.2	1.3	2.8	1.0	-0.3	-20.7
Maintenance	1.3	2.7	2.4	1.1	81.0	3.9	6.2	3.0	-0.9	-23.6
Manufacturing	1.7	2.6	4.4	2.7	160.9	3.2	4.7	1.6	-1.7	-51.2
Marketing and PR	6.7	16.8	16.4	9.7	145.5	5.0	7.3	3.0	-2.0	-39.6
Media and writing	2.7	9.4	9.0	6.3	236.8	1.8	2.1	0.7	-1.1	-60.8
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.0	0.3	0.3	0.3	--	0.4	0.5	0.3	-0.1	-14.7
Public safety	0.2	0.2	0.8	0.6	237.6	0.5	1.0	0.4	0.0	-8.5
Sales	9.0	10.5	13.7	4.7	52.5	8.2	10.5	4.2	-4.0	-48.9
Science and research	2.9	2.5	2.6	-0.4	-12.7	1.1	1.1	0.3	-0.8	-72.5
Supply chain	9.0	12.8	25.2	16.2	179.4	11.8	18.4	8.0	-3.8	-32.0

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 22. Utilities industry skill growth, by year and internship status

SHANDRA 57

	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	5.2	8.4	9.5	4.4	84.7	10.6	18.6	27.3	16.7	157.9
Associate's degree	0.4	2.4	2.2	1.9	531.7	2.0	3.8	4.7	2.7	132.2
Bachelor's degree	11.0	43.1	49.6	38.6	350.8	22.9	42.3	39.0	16.1	70.3
Graduate or professional degree	0.2	4.5	4.3	4.1	2325.9	1.4	3.0	2.0	0.6	38.7
<i>Experience</i>										
0 to 2 years	4.8	6.4	2.9	-1.9	-39.2	8.4	15.7	21.9	13.4	159.2
3 to 5 years	0.7	6.2	2.9	2.2	310.6	17.0	30.5	28.0	11.0	64.6
6+ years	0.0	0.1	0.1	0.1	--	8.8	17.6	15.2	6.4	72.4
<i>Skill cluster</i>										
Administration	2.7	16.8	19.7	17.1	641.2	10.4	23.4	26.7	16.3	156.7
Agriculture	0.0	0.1	0.3	0.3	--	0.2	0.4	0.5	0.4	198.4
Analysis	2.0	11.7	17.8	15.9	812.0	4.3	10.3	11.4	7.1	164.4
Architecture	1.4	4.5	6.1	4.7	329.6	4.0	10.3	12.3	8.3	208.4
Business	6.7	39.4	38.4	31.6	468.6	22.3	48.6	50.2	27.9	124.9
Client relations	1.6	6.9	11.4	9.8	610.3	5.9	13.7	19.6	13.7	231.8
Design	0.4	2.8	3.2	2.8	797.1	1.0	2.7	2.0	1.0	105.8
Economics	1.1	6.6	7.4	6.3	590.7	1.7	3.6	3.9	2.2	135.3
Education and training	0.4	3.4	4.7	4.3	1214.0	3.6	9.5	11.4	7.8	214.8
Energy, utilities	2.8	15.5	21.8	19.0	667.6	8.0	23.3	23.0	15.0	188.6
Engineering	9.8	25.0	28.4	18.6	190.8	10.3	21.1	18.7	8.4	82.2
Environment	1.6	6.6	9.1	7.5	470.0	6.2	10.4	11.4	5.3	85.0
Finance	3.4	15.5	19.5	16.1	478.5	13.8	29.6	30.6	16.8	121.4
Health	1.1	3.6	3.6	2.5	236.9	2.3	5.4	7.7	5.4	235.5
Human resources	0.4	7.0	7.5	7.1	1997.4	4.6	12.2	13.7	9.1	197.9
Industry knowledge	1.2	4.3	4.2	3.0	239.3	3.4	7.4	9.8	6.3	184.8
Information	16.3	56.4	57.5	41.2	251.8	21.3	45.7	46.2	25.0	117.4
Legal	1.2	4.5	3.5	2.3	185.2	2.3	6.5	6.1	3.8	163.2
Maintenance	1.6	8.0	7.5	5.9	366.1	7.5	18.2	23.8	16.3	218.5
Manufacturing	1.2	3.2	4.1	2.9	232.1	6.1	12.8	12.8	6.6	108.7
Marketing and PR	1.6	8.7	11.7	10.1	630.0	3.9	9.3	12.1	8.2	209.6
Media and writing	0.9	5.8	5.1	4.2	471.1	2.2	5.0	4.4	2.2	98.0
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.0	0.0	0.0	0.0	--	0.3	1.3	3.2	2.9	1077.3
Public safety	0.0	0.5	1.1	1.1	--	0.8	2.0	2.1	1.3	171.3
Sales	1.4	3.2	5.2	3.7	263.2	6.6	14.2	17.9	11.3	170.1
Science and research	1.1	7.4	6.5	5.4	506.5	3.1	6.9	6.8	3.7	119.8
Supply chain	2.5	6.6	9.0	6.5	261.0	7.1	15.4	19.0	11.9	167.1

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Table 23. Wholesale trade industry skill growth, by year and internship status

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	Internships					Non-internships				
	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016	2007	2012	2016	% point Δ, 2007-2016	% Δ, 2007-2016
<i>Education</i>										
High school or vocational training	3.0	4.3	13.1	10.2	341.0	13.1	39.0	43.5	30.4	232.6
Associate's degree	0.7	3.9	2.3	1.5	203.7	2.1	3.0	2.7	0.5	25.1
Bachelor's degree	21.8	42.8	41.4	19.6	89.8	17.5	29.0	26.7	9.2	52.5
Graduate or professional degree	3.7	8.9	6.7	3.0	81.1	1.1	1.9	1.2	0.1	8.7
<i>Experience</i>										
0 to 2 years	4.5	8.0	7.9	3.4	76.2	14.4	27.9	29.0	14.6	101.4
3 to 5 years	2.5	1.4	2.5	0.0	-0.1	14.8	24.1	23.4	8.6	57.9
6+ years	0.0	0.2	0.0	0.0	--	4.8	9.9	7.7	2.8	59.1
<i>Skill cluster</i>										
Administration	7.7	17.0	17.4	9.7	126.7	10.0	33.8	32.3	22.3	223.3
Agriculture	0.0	4.3	9.6	9.6	--	0.0	0.8	1.1	1.0	2389.3
Analysis	4.7	11.5	15.2	10.5	221.8	4.1	12.4	12.5	8.4	202.5
Architecture	1.2	1.7	1.9	0.6	50.7	1.1	4.1	3.4	2.3	213.3
Business	19.4	35.1	38.1	18.8	97.0	19.9	53.4	47.1	27.2	136.5
Client relations	5.2	9.7	11.3	6.0	116.1	11.1	29.2	33.0	21.9	197.3
Design	2.0	5.1	5.4	3.4	171.6	1.4	3.2	2.1	0.6	43.5
Economics	1.5	2.3	3.3	1.9	124.9	0.5	1.0	1.2	0.6	121.2
Education and training	1.0	2.7	4.0	3.0	298.6	2.9	7.2	6.9	4.1	141.9
Energy, utilities	0.0	0.8	1.0	1.0	--	0.6	1.7	1.4	0.8	130.4
Engineering	6.5	16.6	10.4	4.0	61.7	2.8	7.8	4.0	1.2	40.7
Environment	0.2	4.9	4.7	4.4	1774.8	0.8	1.9	2.9	2.1	252.4
Finance	9.7	13.6	18.1	8.5	87.3	12.0	20.6	23.4	11.5	95.7
Health	2.2	6.0	7.6	5.3	238.8	3.6	4.9	7.9	4.3	120.5
Human resources	2.0	4.7	11.0	9.1	456.3	3.5	12.3	11.9	8.4	238.3
Industry knowledge	1.7	7.3	7.9	6.2	355.6	3.5	7.3	8.4	4.9	138.8
Information	30.8	56.0	57.0	26.3	85.4	20.2	50.4	46.2	25.9	128.0
Legal	0.2	2.6	2.8	2.5	1021.4	1.7	3.6	3.6	1.9	113.1
Maintenance	1.2	4.7	5.8	4.6	369.6	4.5	14.9	13.4	9.0	201.3
Manufacturing	4.2	12.7	8.2	4.0	94.8	4.7	12.8	9.4	4.7	101.0
Marketing and PR	11.7	19.3	23.1	11.4	98.0	6.9	17.7	20.8	13.9	202.2
Media and writing	3.0	6.6	8.8	5.8	194.9	2.0	3.5	2.8	0.8	37.6
Ministry	0.0	0.0	0.0	0.0	--	0.0	0.0	0.0	0.0	--
Personal care	0.2	1.5	1.6	1.3	530.8	0.2	7.2	5.9	5.7	2542.3
Public safety	0.0	0.4	0.4	0.4	--	0.8	1.4	2.4	1.6	187.7
Sales	10.7	20.8	25.4	14.7	138.0	18.1	43.6	46.1	28.0	154.3
Science and research	2.2	6.7	5.7	3.5	157.0	1.6	5.1	3.4	1.8	114.0
Supply chain	3.5	15.8	22.5	19.0	548.3	9.7	24.6	30.7	21.0	216.3

Source: Burning Glass Technologies. Select years presented for brevity.

Appendix Figure 1: Internship and non-internship trends by industry - Accommodation

SHANDRA 59

Figure 1a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 1b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 1c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 2: Internship and non-internship trends by industry - Administration

SHANDRA 60

Figure 2a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 2b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 2c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 3: Internship and non-internship trends by industry – Agriculture

SHANDRA 61

Figure 3a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 3b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 3c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 4: Internship and non-internship trends by industry – Arts

SHANDRA 62

Figure 4a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 4b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 4c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 5: Internship and non-internship trends by industry - Construction

Figure 5a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 5b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 5c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 6: Internship and non-internship trends by industry – Education

SHANDRA 64

Figure 6a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 6b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 6c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 7: Internship and non-internship trends by industry – Finance

Figure 7a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 7b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 7c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 8: Internship and non-internship trends by industry – Health care

SHANDRA 66

Figure 8a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 8b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 8c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 9: Internship and non-internship trends by industry – Information

SHANDRA 67

Figure 9a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 9b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 9c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 10: Internship and non-internship trends by industry – Management

SHANDRA 68

Figure 10a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education
Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 10b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience
Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 10c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills
Source: Burning Glass Technologies.

Appendix Figure 11: Internship and non-internship trends by industry – Manufacturing

SHANDRA 69

Figure 11a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education
Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 11b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience
Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 11c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills
Source: Burning Glass Technologies.

Appendix Figure 12: Internship and non-internship trends by industry – Mining

SHANDRA 70

Figure 12a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 12b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 12c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.

Appendix Figure 13: Internship and non-internship trends by industry – Other services

SHANDRA 71

Figure 13a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education
Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 13b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience
Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 13c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills
Source: Burning Glass Technologies.

Appendix Figure 14: Internship and non-internship trends by industry – Professional

SHANDRA 72

Figure 14a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education
Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 14b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience
Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 14c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills
Source: Burning Glass Technologies.

Appendix Figure 15: Internship and non-internship trends by industry – Public administration

SHANDRA 73

Figure 15a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education
Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 15b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience
Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 15c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills
Source: Burning Glass Technologies.

Appendix Figure 16: Internship and non-internship trends by industry – Real estate

SHANDRA 74

Figure 16a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education
Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 16b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience
Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 16c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills
Source: Burning Glass Technologies.

Appendix Figure 17: Internship and non-internship trends by industry – Retail trade

SHANDRA 75

Figure 17a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education
Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 17b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience
Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 17c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills
Source: Burning Glass Technologies.

SHANDRA 76

Appendix Figure 18: Internship and non-internship trends by industry – Transportation

Figure 18a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education
Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 18b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience
Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 18c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills
Source: Burning Glass Technologies.

SHANDRA 77

Appendix Figure 19: Internship and non-internship trends by industry – Utilities

Figure 19a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education
Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 19b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience
Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 19c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills
Source: Burning Glass Technologies.

Appendix Figure 20: Internship and non-internship trends by industry – Wholesale trade

SHANDRA.78

Figure 20a. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring education

Source: Burning Glass Technologies. Percentage of vacancies requiring no education not shown.

Figure 20b. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring experience

Source: Burning Glass Technologies. Percentage of vacancies requiring no experience not shown.

Figure 20c. Percentage of internship (Panel A) and non-internship (Panel B) vacancies requiring skills

Source: Burning Glass Technologies.