

Cost-Benefit Analysis of Studying Spanish and Construction in Tandem

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Does Spanish bilingualism have measurable fiscal value in the U.S. construction industry? Studying and becoming proficient in Spanish is feasible, affordable, and can be accomplished at Cal Poly in conjunction with a Construction Management major. In a dynamic industry that values versatile employees, where communication is key to success, the capability of speaking Spanish is a substantial value-add in the workforce. Using qualitative and quantitative data analysis, it is concluded that individuals who possess English and Spanish-speaking abilities in the U.S. construction industry can expect a 3 percent wage premium when compared to English-only speakers. This study weighs the costs associated with acquiring a Spanish minor and the requisite increase in salary. Additionally, this paper highlights the industry's growing need for Spanish-speaking construction managers as it pertains to safety, communication, and efficiency.

Key Words: Spanish, Construction, Salary, College, Value-Add

Introduction

Technological advancements in building materials, innovative engineering solutions, and reimagined project delivery systems have transformed the construction industry over the last few generations. Projects around the world are being constructed in an efficient and timely manner on job-sites that are safer than ever before. Over time, construction has evolved into a safer and more forward-thinking industry. This can be attributed to a paradigm shift in the importance of safety in the workplace, as well as revolutionary innovations in means and methodology. Still, it remains one of the most dangerous fields of work in the United States. While the construction industry accounts for 7.03% of the United States workforce, it accounted for 20.3% of all occupational deaths in the year 2012 (Brunette, 2004). Additionally, U.S. construction workers experience disproportionately-high rates of sickness when compared to other industries and other developed countries.

Occupational studies done worldwide have produced similar findings, illustrating the danger of the construction industry and its risk factors. After all, the sheer nature of construction presents hazardous situations, no matter where or what the project might be. Delivering a construction project includes erecting an advanced and cohesive structure in the fastest and most inexpensive manner, all the while adhering to exceptionally stringent codes and guidelines. In a system with so many moving parts and areas for potential failure, there is no perfect solution. In order to mitigate these anticipated hazards, construction professionals should look to improve communication on their job-sites.

In California's construction industry, one factor has remained constant over the last 100 years. The percentage of Spanish-Speaking construction professionals is rising year over year (U.S. Bureau of Labor Statistics, 2003). The market's need for these professionals has never been greater than now. Today, almost one-half (1/2) of all laborers on construction job-sites communicate in Spanish natively and utilize English as a second language. Meanwhile, the number of Spanish-speaking professionals employed in construction management positions is disproportionately-low when compared to other ethnic groups (Cigularov et. al., 2013). A considerable misalignment lies between the perception of the construction market's demand and the reality of construction's economy. The next generation of construction project management – young adults currently studying construction – are not cognizant of the added benefits that learning Spanish may present. Employing Spanish-speaking individuals can be a great asset to prime contractors and subcontractors, and employers are acting on this notion. As written (New American Economy, 2017, p. 26), “between 2010 to 2015, the share of online job listings targeting bilingual employees rose by 15.7%, while the raw number of bilingual job postings more than doubled.” Even among industries that experience a much lower concentration of bilingual workers, employers are beginning to realize the value that communicating in multiple languages can add to the workplace. The next trend in the construction industry will be a shift to more Spanish-

speaking individuals in management positions, leading to a decrease in instances of miscommunication and increases in project efficiency and job-site safety.

Supply and Demand of Spanish-speaking Construction Professionals

The construction industry is growing. As shown (Bureau of Labor Statistics, 2019), the projected job growth is faster than average for construction managers, at 111% for the next ten years. This job growth is being supplemented by a growing number of students majoring in construction-related fields. The Construction Management (CM) major continues to expand at California Polytechnic State University in San Luis Obispo. Similarly, construction programs at colleges across the United States continue to evolve and succeed. While these students learn important construction management principles such as scheduling, estimating, and project management, a key component in ensuring a project's success – communication – is missing. As indicated (New American Economy, 2017), language and cultural misunderstandings account for losses in excess of \$2 billion in the U.S. workforce alone.

Construction Management students recognize the industry's immediate demand for Spanish-speaking individuals but lack the requisite desire to pursue a minor in Spanish. In a survey distributed to all students studying Construction Management at California Polytechnic State University-San Luis Obispo (Cal Poly), 96.6% of respondents agreed that the ability to speak Spanish makes an individual a more well-rounded candidate in the construction industry (Appendix A). Furthermore, 81.4% of respondents believed that the ability to speak and understand Spanish is either "very useful" or "extremely useful" in the construction industry (Figure 1). With CM students recognizing the market's demands, some desire to learn to communicate in Spanish would be expected. However, this is not the case.

Q5 How useful is speaking and understanding Spanish in the construction industry?

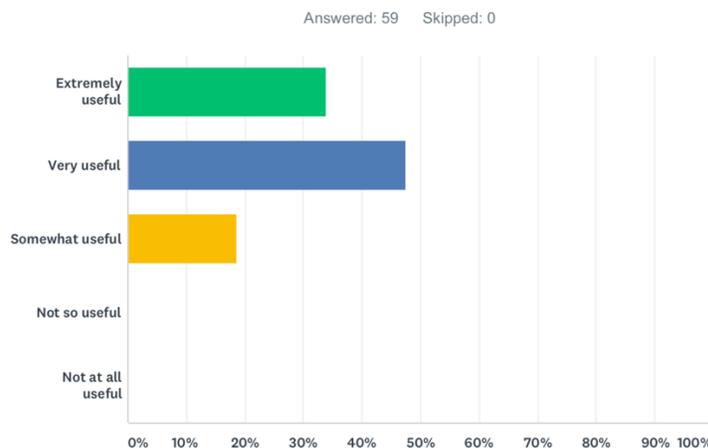


Figure 1: How useful is speaking and understanding Spanish in the construction industry?

When asked about their willingness to slightly delay their graduation date in order to obtain a minor in Spanish, only 30.5% of the survey's respondents indicated "interest" or "extreme interest," with the large majority of students opting out of this idea. Whether it is a fear of learning a new vehicle for communication, additional funds required for tuition, or valuable time that is added to education, most CM students agree that a bachelor's degree on its own will offer enough opportunities towards a successful career in the industry. Students' perceptions lie in the idea that career advancement opportunities do not outweigh the additional cost and time associated with acquiring a minor in Spanish. Labor trends for all industries, especially construction indicate otherwise.

As the demand for Spanish-speaking professionals in the industry soars year after year, the supply of these individuals remains stagnant. While employers are adapting to the ever-changing needs of the industry, they are experiencing difficulty in finding suitable candidates with the ability to communicate in Spanish. Until students turn recognition of this shortage into action, the industry will continue to be in a constant deficiency of Spanish-speaking

professionals. While these individuals are in high-demand, rationalizing additional coursework and tuition has never been clearer.

Language Barriers and Safety on Job-sites

Despite the ample data that demonstrates the dangers of the construction industry, project management teams prioritize safety on their job-sites. Contractors that allocate resources to safety and instill a risk-free culture on their job-sites experience fewer incidents and job-related deaths than their competitors. Not only does this attract more clients to their construction services, but it also reduces liability-related expenses which can be an advantage over competing companies. When construction companies purchase insurance for a project, their monthly premium is calculated with a multiplier or an EMR. An EMR, or experience modification rate, is a calculation made by insurance companies to account for past or potential future injuries on a job-site. Usually between 0 and 2, a favorable EMR can mean the difference between a reasonable insurance premium and an exorbitant one.

Creating an effective safety plan is multi-faceted and is not accomplished solely with clear communication. Guidelines and rules must be actively enforced on construction sites. Most laborers have abundant experience in their trades which often leads to complacent attitudes. When erecting structures that defy the principles of statics and stretch human achievement to its limit, the stakes are very high. Therefore, it is essential to create an environment where both communication and enforcement of these guidelines are easily-understandable. In a survey distributed to all students studying Construction Management at Cal Poly, 94.9% of respondents felt that safety on job-sites is impacted by the ability to communicate in Spanish (Appendix A).

The law says that “[employers have] the responsibility to provide a workplace that is free from hazards” (Occupational Safety and Health Administration). It is especially important when considering that nearly one-half (1/2) of these workers do not speak English natively. To illustrate, 27.3% of adult Latinos living within the United States have less than a ninth-grade level education (U.S. Census Bureau).

Upper-level management in the construction industry understands the obstacles that the English-Spanish language barrier presents. In a survey sent to executives, vice presidents, project managers, and assistant project managers, 95.4% of respondents indicated that a language barrier exists, with 65.0% of respondents indicating that this problem is worsening over time (Figure 2, Mowery, 2017). The data supports these responses, as Spanish-speaking workers experience abnormally-high rates of injury and death in the construction industry. As described (Brunette, 2004), “the fatality rate for Hispanics in all industries – 5.2 deaths per 100,000 workers – is about 20% higher than the rates for white and black workers, which are 4.4 and 4.1 deaths per 100,000 respectively” (Bureau of Labor Statistics, 2017). Additionally, the inclination that this problem is worsening turns out to be true. The U.S. Bureau of Labor Statistics reports that fatalities among Latinos increased by a factor of 166% over just eight years (Tinajero, 2005). The idea that it is inherently more dangerous to be Hispanic on a construction job-site should never be accepted.

Q. No.	Question Summary	Answer	Result (people)	Result (percent)
5	Does English-Spanish Language Barrier exist?	Yes	62	95.4%
		No	3	4.6%
6	Is it getting better or worse?	Better	21	35.0%
		Worse	39	65.0%

Figure 2: Selected survey question results considering all 65 participants (Mowery, Casey)

Language Barriers Hinder Productivity

The ability to achieve a high level of productivity on a construction project separates an exemplary contractor from a failing contractor. Managing and building projects can seem straightforward while in reality, many companies fail before achieving any success. With so many moving parts and working relationships, it’s especially difficult to control and increase productivity on a job-site. Fortunately, evaluating productivity on a job-site is not as

challenging. Talented upper-level management has the capability to assess the main factors leading to losses in productivity and use this data to correct future mistakes.

In the survey sent to executives, vice presidents, project managers, and assistant project managers, all respondents agreed that loss of productivity and efficiency on job-sites is a major consequence of the English-Spanish language barrier (Mowery, 2017). These construction managers shared that the inability to read and understand plans written in English can greatly hinder productivity. Another reason for productivity loss can be attributed to repeated explanations of simple tasks that are not initially understood due to the language barrier.

Correcting these issues is entirely possible, and many contractors have devised inventive solutions that they employ on their jobs today. One U.S. construction company chooses to distinguish their bilingual employees with blue-colored hardhats so that they will be easily identifiable on the job-site. As written (Vázquez and Stalnaker, 2004), “they translate or enable communication with Spanish and English-speaking employees, which facilitates safe job performance and minimizes misunderstandings. The employer provides a monetary incentive for those in this program.” A growing number of companies in the industry agree that valuable human capital fosters the most successful workplaces.

Some construction companies are taking this idea a step further by facilitating classes along with “Bilingual Testing Programs” (BTP) for their employees. As explained (Vázquez and Stalnaker, 2004), bilingual testing programs involve passing a series of tests in four concentrations: safety, human resources, general, and customer service. In order to successfully pass this course, the participant must be able to communicate on a verbal level with sufficient vocabulary and grammar skills. Certain companies offer these programs to their employees free of charge and even award them \$1,000 if they are successful.

Spanish-speakers in Management Positions

Although Spanish-speakers account for nearly one-fifth (1/5) of the U.S. construction workforce and one-half (1/2) of California’s construction workforce, employees in management positions are largely underrepresented. As shown (Mowery, Figure 3), laborers, carpenters, and painters alone account for almost 50% of Spanish-speaking professionals on construction job-sites while only 6% work as managers. This discrepancy is an indicator of the construction industry’s lack of qualified Spanish-speaking construction managers. In a position where communication and delegation of responsibilities are at the forefront of importance, most managers do not possess the requisite communication skills that could lead to the highest productivity on a project. In reality, excessive time and money are spent in a need to communicate instructions multiple times and translate vital information in an understandable manner.

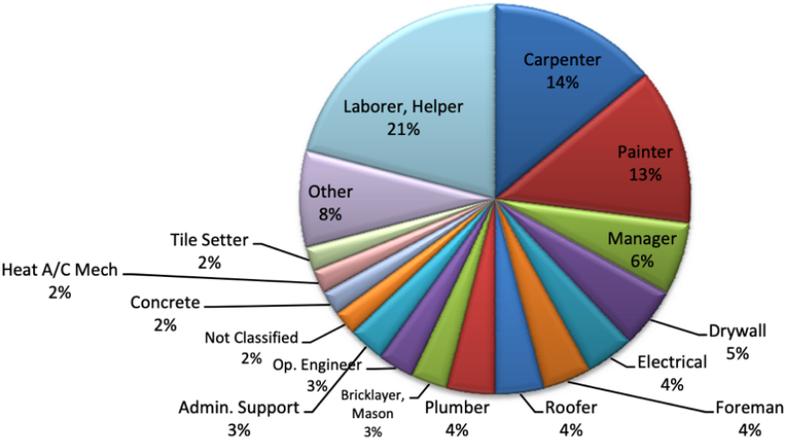


Figure 3: Distribution of Hispanic Construction Workers

Bilingual management is in high demand, and for good reasons. The interactions and decisions made on micro and macro-levels that impact the future of a business are directly influenced by their management staff. Managers set the

standard for the quality of work product and their actions have a ripple effect on the rest of the company. As illustrated (New American Economy, 2017), the job title of “Manager” generated the 8th largest share of bilingual job listings worldwide. As it turns out, many successful businesses in our global economy value the ability to speak and understand an additional language like Spanish.

Methodology

In order to gather the most accurate and relevant dataset, this case study uses a mixture of quantitative and qualitative data research and analysis. One of the primary sources of data are the responses gathered from a survey distributed to all Construction Management students at Cal Poly. This survey features eleven questions ranging from the respondent’s grade level to their willingness to delay graduation in order to achieve fluency in Spanish. The questions are sequenced like a funnel – starting broad and eventually becoming narrower throughout the survey.

From survey responses and past peer-reviewed case studies, the qualitative data alone suffice in illustrating the benefits of studying construction and Spanish in tandem. In order to weigh these benefits with the cost and time required, a quantitative analysis is required. The majority of the employment data utilized in this case study can be found publicly, provided by government entities. These entities include the United States Census Bureau and the United States Bureau of Labor Statistics. Additional quantitative analysis was performed using data from the New American Economy, Penn State University, and The Manchester School.

The objectives of this case study are the following:

- Ascertain the construction industry’s growing demand for Spanish-speaking construction professionals.
- Highlight disparities in regard to safety for Spanish-speaking construction professionals.
- Assess the necessary time and cost of learning Spanish whilst obtaining a Bachelor of Science degree.
- Evaluate potential employment-related benefits of studying Spanish and Construction in tandem.
- Provide students with sufficient information to make an informed decision that is backed by qualitative and quantitative data.

Results

With an effective curriculum and regular use, learning Spanish for professional applications is far from an impossible task. In fact, CM students at Cal Poly have a unique opportunity to accomplish a minor in just one extra quarter. When factoring in Cal Poly’s relatively low tuition costs, studying construction and Spanish in tandem appears to be an easy decision. The following sections will rationalize this “easy decision” from a logistical and economic perspective.

Background

In order to accurately forecast changes to a candidate’s salary, the observer must compare extremely similar individuals. For instance, two individuals that are bilingual in English and Spanish may have received radically different grade point averages during their time in university. Other factors such as age, race, marital status, experience, and parental upbringing influence this study. Quadratic functions of these influencing factors are built into an equation, effectively mitigating their impact on the data and the results. Harvard research students Albert Saiz and Elena Zoido created an equation to monitor expected returns of a second language. It is shown below in Figure 4.

$$\begin{aligned}
 E(w_s - w_{ns}) &= E(w|SL = 1) - E(w|SL = 0) = \\
 &= [V_u + A - \beta C_L] - \left[\frac{(1-p)\alpha}{1-\alpha p} \cdot (A - \beta C_L) + \frac{(1-\alpha)}{1-\alpha p} \cdot (A - \beta C_H) \right] = \\
 &= V_u + \frac{\beta(1-\alpha)}{(1-\alpha p)} \cdot [C_H - C_L] > V_u > pV_u
 \end{aligned}$$

Figure 4: Expected Returns of a Second Language

Implementation

To obtain a Bachelor of Science in Construction Management at Cal Poly, a student must receive 189 credits in general education, support, and major courses. Assuming that the student has zero college credit entering the program, 189 units over four years (12 quarters) averages to 15.75 units per quarter. Considering that a full workload is often considered to be a minimum of 12-16 units, a degree is reasonably obtainable within four years of study. Many CM students are able to graduate within four years despite their Individualized Change of Major Agreement, or ICMA.

Obtaining a minor in Spanish at Cal Poly entails receiving 24 credits in Spanish-related curriculum. When combining the Construction Management and Spanish minor flowcharts, there are a total of 213 units. If a student chooses to concurrently study these topics over 13 quarters, they will experience an average workload of 16.38 units per quarter. This average workload is slightly increased when compared to the Construction Management degree alone, but the marginal increase of .57 units per quarter is justified when weighing the benefits.

The tuition cost to attend Cal Poly primarily depends on residency status and degree level. Construction Management is offered solely as a Bachelor of Science degree, so costs are relatively consistent among California residents. According to Cal Poly's "Enrollment Undergraduate Profile," 85% of undergraduate students were California residents in the year 2016. Therefore, for the purpose of this study, in-state tuition costs will be used. The most recently listed price for "Total Tuition and Fees" (2018/2019) on Cal Poly's Cost of Attendance show a yearly price of \$9,351.00, or an average of \$3,117.00 per quarter.

Econometric Analysis

The cost of supplementing a Bachelor of Science in Construction Management with Spanish does not come solely from tuition expenses. When an individual chooses to further education and forego employment opportunities, they are relinquishing suppositious salary associated with their occupation. In the case of Construction Management graduates specifically, they may be relinquishing a substantial amount. According to Cal Poly's Graduate Status Report, a self-reported collection of data regarding employment for graduates, the median salary for Construction Management graduates in the year 2017 was \$71,000.00. This salary yields a weekly (pre-tax) income of \$1365.48, or \$15,019.23 over eleven weeks – the length of one academic quarter. To generate the complete fiscal cost of supplementing a Construction Management major with a Spanish minor, the price of additional tuition fees and the relinquished salary associated with employment must be added together. The total fiscal cost is \$18,136.23. At first, an investment of almost \$20,000.00 seems excessive and unjustifiable. Nonetheless, quantitative research and econometric analysis show otherwise.

Two individual studies aiming to quantify the value of bilingualism in the workplace concluded that there is a measurable increase in salary for bilingual employees. This increase, of course, depends heavily on the language being studied and the industry the employee works in. Higher concentrations of a foreign-speaking workforce can present more opportunities to utilize an additional language and improve productivity for the company. This can be seen in Wales, where a study was conducted to determine the average salary increase for workers who speak Welsh and English. As stated (Henley and Jones, 2005), "approximately 20 percent of the population are bilingual, speaking both English and Welsh..." In a region or industry with a need for bilingualism and a high concentration of foreign-speaking employees, the ability to speak an additional language can be tremendously valuable. This particular study found "a positive raw differential of 8 to 10 percent depending on definition of linguistic proficiency" (Henley and Jones, 2005).

Simply extrapolating and applying this exact logic to Spanish bilingualism in the construction industry would be wildly inaccurate. The value of bilingualism and the ensuing positive impact it can have on a company's performance can vary broadly. Albert Saiz and Elena Zoido concluded that a "foreign language coefficient implies a 2.8 percent wage premium associated with speaking a foreign language for the average individual" (Saiz and Zoido, 2002). For Spanish in particular, these researchers determined that English-Spanish bilingualism creates a 1.5 percent wage premium in the U.S. workforce. Despite accounting for several factors such as age, gender, experience, and race, this empirical study did not distinguish wage premiums across different industries.

Using both independent studies, one can make a reasonable assumption that the wage premium of Spanish bilingualism in the construction industry falls between the cited figures of 1.5 and 10 percent. Increases as high as 8 to 10 percent can occur on individual bases, but usually constitute as outliers rather than averages. On the other hand, increases as low as 1.5 percent do not accurately account for the industry’s unusually high concentration of Spanish-speaking individuals. Within a reasonable degree of uncertainty, an individual can expect a 3 percent wage premium in the construction industry for Spanish bilingualism.

Over the course of a career, a seemingly insignificant 3 percent increase in wages accumulates to a substantial fortune. To accurately calculate the return on investment, one must also consider that a construction manager’s median salary of \$71,000.00 (Graduate Status Report, 2017) experiences a 3.8 percent year-over-year wage growth (Figure 5, Bureau of Labor Statistics, 2017). The initial investment of \$18,136.23 associated with acquiring a minor in Spanish at Cal Poly and the additional wages received in the years following are represented in Figure 5 below. After 8 years of employment, one can expect to have earned all relinquished salary and additional tuition expenses incurred. Following this, an individual will begin to accumulate additional income for the remainder of their career.

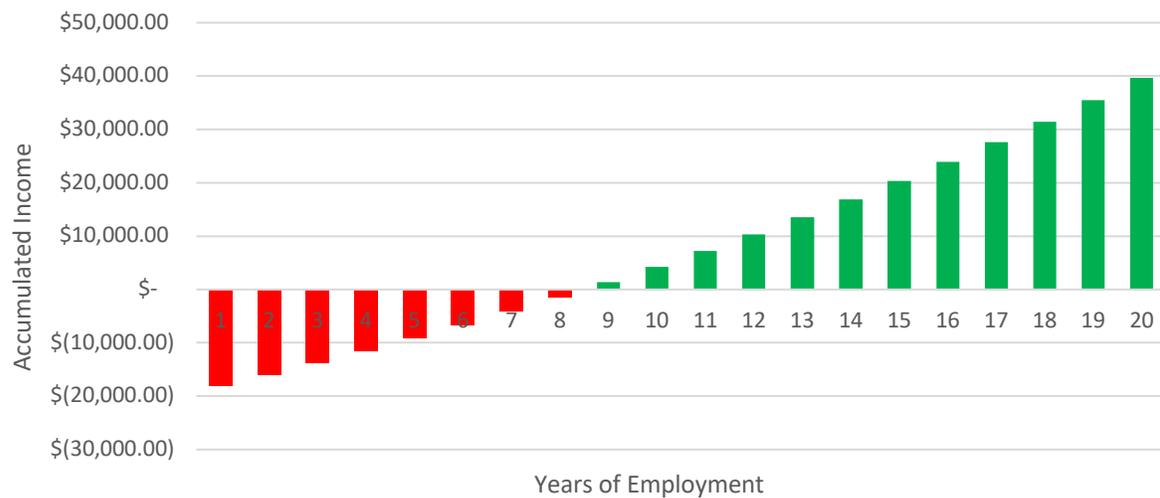


Figure 5: Return on Investment of Spanish Bilingualism

Conclusion

As the construction industry faces a demonstrable shortage of Spanish-speaking management, individuals with bilingual capability come with an increasingly high premium. All signs point to a lack of bilingual construction managers and a market that heavily demands them. In a business where margins can be razor thin and where excellent communication is required to achieve high productivity, countless jobs will be available for those that possess this valuable capability. This shift towards a more global and world-centric economy can be seen in most industries, as bilingual job listings continue to increase at breakneck speeds worldwide. Our workplaces are more diverse than ever before, and collaboration must remain effective despite language and cultural barriers.

Studying Spanish and construction in tandem is beneficial for both employers and employees. Construction companies can reach their full potentials from productivity, safety, and efficiency standpoints. Employees have the opportunity to fill an important gap in a management role while earning a marked premium on their wages. Qualitatively, executives of various construction companies agree that productivity is hindered as a result of language barriers, and this problem is worsening. Quantitatively, employers have offered higher wages to bilingual employees. Considering the manageable curriculum that comprises the Spanish minor and the marginal extra quarter required to attain it, I recommend that all CM students strongly consider implementing Spanish into their college curriculum. Students have a unique opportunity to raise their own human capital and develop valuable skills while gaining economic rewards throughout their careers.

References

- Brunette, M. J. (2004, August 1). *Construction safety research in the United States: targeting the Hispanic workforce* [WWW document]. URL <http://injuryprevention.bmj.com/content/10/4/244>
- Bureau of Labor Statistics (2016). *Occupational Outlook Handbook, Construction Managers* [WWW document]. URL <https://www.bls.gov/ooh/management/construction-managers.htm>
- California Polytechnic State University (2017). *Graduate Status Report – Construction Management* [WWW document]. URL <https://careerservices.calpoly.edu/gsr-tableau>
- Cigularov et. al. (2013, April). Safety Science. *Measurement equivalence of a safety climate measure among Hispanic and White Non-Hispanic construction workers* [WWW document]. URL <http://linkinghub.elsevier.com/retrieve/pii/S0925753512002718>
- Henley, A. and Eleri Jones, R. (2005, June). *Earnings and Linguistic Proficiency in a Bilingual Economy* [WWW document]. URL <http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=17101248&site=ehost-live>
- Mowery, C. (2017). *Consequences of the English-Spanish Language Barrier in the Construction Industry* [WWW document]. URL https://www.engr.psu.edu/ae/thesis/portfolios/2008/cam459/SPRING/Posting/Mowery_Casey_9-Analysis%20Consequences%20of%20the%20English-Spanish%20Language%20Barrier.pdf
- New American Economy (2017, March). *The Growing Importance of Foreign Language Skills in the U.S. Job Market* [WWW document]. URL http://www.newamericaneconomy.org/wp-content/uploads/2017/03/NAE_Bilingual_V9.pdf
- Saiz, A. and Zoido, E. (2002, October). Federal Reserve Bank of Philadelphia. *The Returns to Speaking a Second Language* [WWW document]. URL <https://www.phil.frb.org/-/media/research-and-data/publications/working-papers/2002/wp02-16.pdf>