
TRAINING OPTIONS FOR IMMIGRANTS FACING INDUSTRY 4.0 PROGRESS IN THE U.S.: ANALYSIS OF CALIFORNIA STATE

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Annotation. Industry 4.0 is changing the nature of work and shaping new requirements for employees, requiring them to perform new roles with new required skills, mostly connected with digitalization and IT. The US has one of the biggest number of industrial robots and immigrants in the world, and has developed immigration policies. In this article based we analyze what are current options for immigrants in California, the USA to get re-training or new work skills to prepare for new roles in workforce in anticipation of changes due to Industry 4.0 progress. Study is done using content analysis of training documents in California State.

Keywords: Immigrants; Industry 4.0; Training; U.S.

INTRODUCTION

As Industry 4.0 progresses through the World, there are different viewpoints among different groups of population on how it will affect current workforce and future jobs (Weber, 2016; Eberhard, *et al.*, 2017; Hirschi, 2018; David & Dorn, 2013). Many developed countries face high inflows of migrants, which become a part of their labor markets. Min *et al.* (2019) highlight that there will be significant changes among industries as Industry 4.0 will directly or not directly affect all levels of workforce. Therefore, migrants should be integrated into labor market and requirements risen by Industry 4.0. As Brown and Lauder (2006) stress out, policy-makers often shape neoliberal governance in response to the need to reform and thus improve education in order respond to rapid global change, and to secure a place in world labor market. Moreover, Kurki *et al.* (2018) analyzing a case of Finland revealed that migrants are involved in the integration process and participating in integration training programs to get educated and

employed but from other side they still stay “just immigrants” what harms society generally. Analyzing a case of Germany, which has the highest rate of immigrants in Europe, Thomsen *et al.* (2013) found out that assignments of immigrants to job search training and combined training programs are not efficient and should be reconsidered.

United States is the leading country of immigrants in the world, fulfilling its labor market with immigrants. In addition, according to CityLab, there are 29 mega-regions around the world that have populations of five million or more and generate economic output of more than \$300 billion. These mega-regions are the powerhouses of the global economy (Florida, 2019). Eight out of these mega-regions are located in the United States. Therefore, training possibilities are very important for immigrants that they could be full members of the society and could be integrated into the labor market. For the immigrants already settled in the United States, there are several major avenues that available in order to get a chance to obtain better paying jobs, qualify for the jobs that they were occupying in their home country or get training to qualify for new skilled jobs: government, state funded or organized programs, nonprofit or community based organizations, and on-job training, apprenticeship or union based programs. All these categories vastly differ depending on the State across the United States. Typically, they are more clustered in the regions where are more immigrants or immigrants tend to move to the places where infrastructure is more adapted to their needs. California has the biggest number of immigrants and two mega-regions; therefore, it was taken as example for study analyzing training possibilities for immigrants in the U.S.

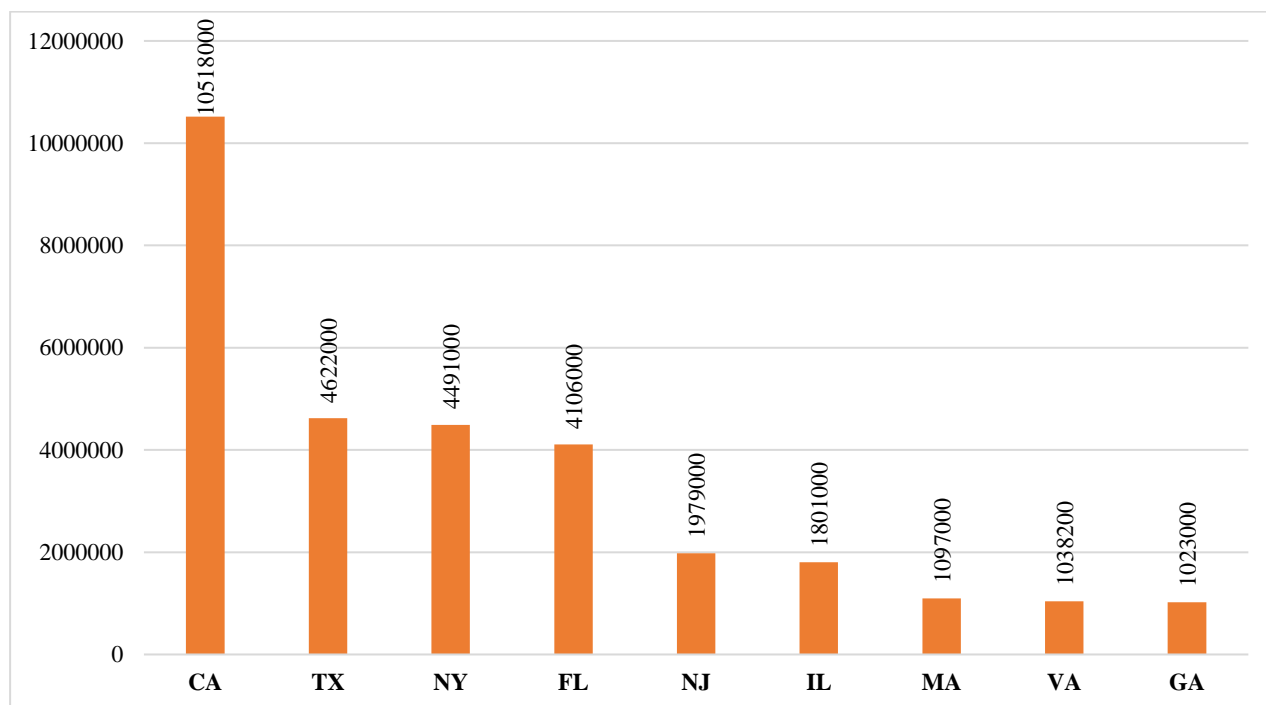
The aim of the article is to reveal training possibilities, existing for immigrants facing Industry 4.0 progress in California, the U.S.

Methods of the research. To reach the aim, content analysis of documents presenting training services in California was used.

MIGRATION OVERVIEW IN THE U.S.

The U.S. is a leading country of immigrants in the world. The term "immigrant" (or "foreign born") here refers to people residing in the United States who were not U.S. citizens at birth. This population includes naturalized citizens, lawful permanent residents (LPRs), certain legal nonimmigrants (e.g., persons or student on work visas), those admitted under refugee or asylum status, and persons illegally residing in the United States. Immigrants make up about one sixth of the United States' workforce (Bernstein & Vilter 2018).

According to Migration Policy Institute tabulation of data from the U.S. Census Bureau's pooled 2014-2018 American Community Survey, total Immigrant Population in the United States is 43,537,500 (U.S. Immigrant Population by state and county, 2018). Nine out of 52 States each houses more than a million immigrants. These states are California, Texas, New York, Florida, New Jersey, Illinois, Massachusetts, Virginia and Georgia (see Figure 1).



Source: U.S. Immigrant Population by state and county. *Migration Policy Institute*, 2018

Figure 1. States having immigrant population over 1 million in the U.S.

Based on estimates from American Immigration Council Staff, nearly 25 percent of college-educated immigrants (or around 2 million people) are either unemployed or are working in the jobs that don't require more than high school education (How Experts Are Addressing Immigrant Underemployment and Why it Matters, 2018); therefore, the concern for shortage of skilled workforce required for Industry 4.0 could be lessened by providing more accessible retraining or recertification for skilled immigrants. The main barriers to get better paying, skilled jobs for immigrants are limited English proficiency and lack of recognition for foreign education and training; therefore, difficulty transferring foreign credentials and job experiences into the US job markets (Bernstein & Vilter 2018).

We separated nine states that has the most immigrants. Simultaneously, the same eight states (excluding Virginia) have economic output over \$300 Billion (see Table 1).

Table 1. Mega-regions in the U.S.

Mega-region	Cities	States	Population	Economic Output
1. Bos-Wash	New York, Washington D.C., Boston	NY, DC, MA, NJ	47.6M	\$3,650B
3. Chi-Pitts	Chicago, Detroit, Cleveland, Pittsburgh	IL, MI, OH, PA	32.9M	\$2,130B
5. SoCal	Los Angeles, San Diego	CA	22M	\$1,424B
7. Texas Triangle	Dallas, Houston, San Antonio, Austin	TX	18.4M	\$1,227B
11.NorCal	San Francisco, San Jose	CA	10.8M	\$925B
15.Char-Lanta	Charlotte, Atlanta	NC, GA	10.5M	\$656B
16.Cascadia	Seattle, Portland	OR, WA	8.8M	\$627B
23.So-Flo	Miami, Tampa	FL	9.1M	\$470B

Source: Florida, R. The real powerhouses that drive the Word's economy. *Citylab*, 2019

Therefore, implementation of Industry 4.0 will affect the majority of immigrants in these states. To prepare for work in the Industry 4.0, immigrants have to find a way to re-train for the jobs that would be accepted in the Industry 4.0. As the state, California has the most immigrants and hosts two economic mega-regions; therefore, it is taken for analysis in this paper.

IMMIGRANTS IN CALIFORNIA

In 2018, the most current year of data, 27% of California's population was foreign born, more than double the percentage in the rest of the country (How Experts Are Addressing Immigrant Underemployment and Why it Matters, 2018). Foreign-born residents represented at least one-third of the population in five California counties: Santa Clara (39%), San Francisco (36%), San Mateo (35%), Los Angeles (34%), and Alameda (33%) (Johnson, Sanchez, 2020). Based on American Immigration Council analysis of U.S. Census Bureau's 2017 American Community Survey, 24.7% of immigrants in California has college degree or higher, 18.6% has some college education, 19.6% high school diploma only and 34.4% did not finish high school (Immigrants in California, 2017).

Based on information from American Immigration Council (2017), 6.6 million immigrants made up 33.9% of labor force in California in 2015. The industry that the most immigrants were occupied in was manufacturing. 930,261 (45.6% of all workers) were immigrants in that industry. Looking at occupation, 53.3% of production workers were immigrants, 43.0% - of construction and extraction, 41.3% - computer and mathematical science in California in 2017 (Immigrants in California, 2017).

Even though California is the most populated state by immigrants, it is not leading in automation of manufacturing among the other USA states in total count of robots. According

to Tuttle (2017), California is in the fourth place among the states by total count of robots at 17,844. However, the population is so huge it has in average only 1.2 robot per 1000 workers. The robots are concentrated only in several areas of California (see Table 2).

Table 2. Number of robots per 1000 workers in California State (Liu, 2019)

Place in the U.S.	Region	Number of robots per 1000 workers
1	Los Angeles - Long Beach - Santa Ana	6.91
8	San Jose - Sunnyvale - Santa Clara	1.438
15	Riverside - San Bernardino - Ontario	1.042
18	San Diego - Carlsbad - San Marcos region	0.95

Source: Tuttle, B. Half of America's Robot Workforce Is Located in Just 10 States. *Money*, 2017

These regions are most susceptible to automation and artificial intelligence effect on workforce. However, latest Brookings Institute report indicates that by 2030 in Los Angeles - Long Beach - Santa Ana region's 45.6% of share of tasks of all occupations will be affected by machines; San Jose - Sunnyvale - Santa Clara region - 40.4%; Riverside - San Bernardino - Ontario region - 47.6%; San Diego - Carlsbad - San Marcos region - 45.0% (Muro, Maxin, & Whiton, 2019). It demonstrates importance of growing robotization. Therefore, it is important to analyze what choices immigrants have to retrain, improve their qualifications and skills in anticipation of upcoming changes in workforce demands.

CALIFORNIA STATE TRAINING OPPORTUNITIES

Governmental programs

The main program for immigrants is called Find Jobs & Training (California Immigrant Guide)¹. It is dedicated for newly arrived immigrants to find job and training and helps with legal immigration advice. Employment Development Department State of California agency (EDD)² offers a variety of training services and programs at no cost, designed to benefit job seekers and individuals, employers and businesses, and workforce partners (Employment Development Department State of California)³. EDD centers are located very conveniently in every major city of California and offers no cost interview training, workshops and job placements assistance. However, as of now, it is not designed to assist high skilled workers with obtaining higher skilled work or compete for high paying job.

¹ <https://immigrantguide.ca.gov/en/FindJobsAndTrainin-g>

² https://www.edd.ca.gov/Jobs_and_Training/Training_I-nformation.htm

³ https://www.edd.ca.gov/Jobs_and_Training/Training_I-nformation.htm

As California has many rural areas with seasonal workers that mostly are immigrants, state agency La Cooperativa offers education and employment services in rural areas through its member organizations. Their programs help farm workers with job readiness and training programs. La Cooperativa and its members implement the National Farmworker Jobs Program in California (La Cooperativa Compesina de California)⁴. Because seasonal workers' earnings belong on the length of the season and climate change, La Cooperativa offers training and opportunities for farm workers to obtain jobs that are not seasonal assuring earning throughout the year. As seasonal workers tend to have less education and less English proficiency, the training is provided for entry level jobs and ESL classes. In addition, La Cooperativa offers bilingual training and serves people who are not English speakers.

Several factors limit immigrant ability to be enrolled into these programs. The most important is that majority of immigrants have limited English proficiency (Bernstein & Vilter, 2018; Skills and Training for New Americans: Creating a Thriving Economy that Works for All of Us, 2016; English Innovations, 2019). Most of English proficiency adult education programs are fully funded by the federal or local government; however, currently there are not enough Adult Education centers to meet the needs of all interested. The limited English proficiency also limits immigrants' options to apply to job training or re-training programs due to lack of understanding of job-related terminology.

To help with the search of Adult Education, there is a state website <https://caladulted.org/>. All users can find an adult school or community college in their area; learn about adult education programs and student supports, access program guidance and updates. However, the most affordable adult education is provided by Adult Schools⁵. Through a vast array of programs and courses, most of them offered free or at very low cost, California Adult Schools assist all adults—including parents, older adults, disabled adults, and recent immigrants—deal with the complexities of life in California. The system of nearly 400 schools makes it convenient and affordable for all students to reach their educational, training, career and personal goals (California Adult Schools: Learning for Life)⁶. As many federal and state programs, adult schools are very helpful step to get newly arrived immigrant to settle and get a first-time job in the United States; however, adult schools are not offering training required for

⁴ <http://www.lacooperativa.org/services-offered/>

⁵ <https://caladulted.org/>

⁶ <https://caladulted.org/>

high skill jobs. Therefore, they are not helpful when looking for training or certification for high skilled and high paying job.

One of the affordable and useful organizations to help with English as a second language learning and variety of short-term training courses are community colleges (Lowe & Casner-Lotto, 2014). The best way to find nearest community college is to search in California Community Colleges website. Community colleges are educational institutions unique to United States that are located very conveniently and widely in the US. Community colleges not only offer two-year college degrees and secondary/high school graduation certification, but also English as a Second Language classes and many technical and vocational training that helps immigrants to re-train or learn new job skills to better position themselves in the job markets (Lowe & Casner-Lotto, 2014).

The California Community Colleges is the largest system of higher education in the nation, with 2.1 million students attending 113 colleges (California Community Colleges) ⁷. The draw back here is the cost. Even though community college has comparably lower cost for residents of the region, the cost might be too high for newly arrived and not adapted yet immigrants. Nevertheless, community colleges offer courses that are transferable to Universities and, because of the much lower education cost than in Universities, could be a good start to obtain bachelor's degree for higher reaching immigrants to compete for high skilled and high pay job.

Moreover, there are 15 California Community Colleges that participate in pilot program that started in 2017-2018 year and offers specialized Bachelor's Degrees (Santa Rosa Junior College) ⁸. These degrees are not offered in any UC (University of California) ⁹ or CSU (California State University) ¹⁰. Degrees like Biomanufacturing in Mira Costa¹¹ and Solano¹² colleges, Industrial Automation in Bakersfield¹³ college or Interaction Design in Santa Monica¹⁴ college. With new roles immerging during Industry 4.0 implementation, Community

⁷ <https://www.cccco.edu/>

⁸ <https://transfer.santarosa.edu/ca-community-colleges-offering-bachelors-degrees>

⁹ <https://www.universityofcalifornia.edu/>

¹⁰ <https://www2.calstate.edu/>

¹¹ <http://www.miracosta.edu/>

¹² <http://www.solano.edu/>

¹³ <https://www.bakersfieldcollege.edu/>

¹⁴ <http://www.smc.edu/Pages/Home.aspx>

Colleges might become affordable and conveniently located educational institutions for existing immigrants to re-train for a high skilled jobs.

Assistance of Nonprofit Organizations

Nonprofit organizations in California are playing huge role in new immigrants' ability to orient themselves in host country's infrastructure. There are variety of nonprofit organizations that organize English learning courses and vocational training for immigrants for no or low cost. For example, The Immigrant Learning Center¹⁵, Upwardly Global¹⁶, Canal Alliance¹⁷, Center for Employment Training¹⁸, Mission Language and Vocational School Inc.¹⁹, and many others. However, the variety of nonprofit organizations help mostly newly arrived immigrant to adjust to the new country, get basic training and find entry jobs. Their main concern is to assist low income, low skilled immigrants with their settlement in new country. They are not concerned about existing immigrants obtaining better paying jobs in the evolving highly competitive Industry 4.0 job market.

Many religion-based groups offer assistance for immigrants with English language skills and vocational development as well. For example, Catholic Family Center²⁰, Catholic Charities²¹, Jewish Vocational Services²², and others. However, as with nonprofit organizations, the training would concentrate on entry level jobs and adjustments to new kind of living in the host country.

The main focus of ethnicity-based communities is to preserve national identity, culture and language while immigrants strive to adapt in the host country. The irony is that, when new arrivals come to the US, first they get in touch with their ethnic community to find some common ground at the beginning of their not easy journey in adaptation to the new culture, new customs, new infrastructure, and sometimes new language. The ethnic community might help with providing new arrivals with low-skilled job opportunities to help them survive at the beginning, but there is no organized help from the community in providing information or guidance about availability of English language or vocational training resources in the

¹⁵ <https://www.ilctr.org/programs>

¹⁶ <https://www.upwardlyglobal.org/>

¹⁷ <https://canalalliance.org/>

¹⁸ <https://cetweb.edu/>

¹⁹ <https://www.mlvschool.org/mission-statement>

²⁰ <https://www.cfcrochester.org/our-services/welcoming-refugees-and-immigrants/>

²¹ <https://www.catholiccharitiesusa.org/our-ministry/immigration-refugee-services/>

²² <https://www.jvs.org/>

immediate area. Therefore, there is tendency for new immigrants, especially who is not English language proficient, to stay among their ethnic groups for too long and become reluctant to get adapted to the new culture. These people rather work low-skilled jobs than face the challenge to find the available resources for training.

On-job Training, Apprenticeship or Trade Union based programs

On the other hand, more and more young immigrants come to US to find their new future - they strive to go into the world to learn new things and to acquire new skills that would help them to get high paid jobs. Besides government offered, nonprofit or community-based programs, these people can also benefit from on-job training, apprenticeship or Trade Union based programs. On-job training helps immigrants grow in the business. Usually, employees start from the lowest position in the company at the base salary and with the provided on-job training works their way up to higher-skilled jobs with better pay. This type of training is beneficial to both employee and employer as employee gains necessary skills for advancement in his/her career and employer retains the employee who has the right training for the particular job in the company (Bleich, 2019; Tismal, Awais, and Shoaib, 2016). This type of training might be very beneficial when company or industry adjust immerging new roles for Industry 4.0. If company strategically plans to retain its current workforce when the roles shift adjusting to Industry 4.0 requirements, company's HR or training departments can develop on-job training programs to offer existing employees, if they are willing, to re-train for the continuous employment in the Industry 4.0 company.

Another program sponsored by State of California Department of Industrial Relations is Apprenticeship. Apprenticeship is an industry-driven, high-quality career pathway where employers can develop and prepare their future workforce, and individuals can obtain paid work experience, classroom instructions, and a portable, nationally recognized credential (Apprenticeship Program Information)²³. Apprenticeship is a worker-training model that combines on-job training with classroom instructions. This type of training is not very widely popular in the US, but is recognized as one of beneficial training tools for both employee and employer (Steinberg & Schwartz, 2014).

²³ https://www.dir.ca.gov/databases/das/results_aiglist.asp?varCounty=%25&varType=%25&Submit=Search

According to Department of Industrial Relation (Apprenticeship Program Information), there are 660 apprenticeship programs in the state of California. The programs train for such professions as Avionics Technician, CNC Machine Operator, Cyber Security Machinist, Engineer Technician - Robotic/Automation and several more that would benefit employers when new Industry 4.0 roles become available. Immigrants here has opportunities to learn high-level skills and advance in their career while working and getting class education at the same time. While most of the apprenticeship programs are being organized by the company, some of them are created by labor unions. Apprenticeship is also one of the opportunities for companies or industries to prepare work force for emerging Industry 4.0 roles as well as existing immigrants to take advantage of getting training while working.

There are new models emerging for developing the employment skills of immigrants through contextualized English language programs that build vocabulary specific to an industry or employer, as well as integrated education and training programs, which can combine adult education and technical skills training so that immigrants could build both sets of skills concurrently (Skills and Training for New Americans: Creating a Thriving Economy that Works for All of Us, 2016; English Innovations, 2019). This training path would fit more to new immigrants or the immigrants who has training and experience but limited English proficiency to be able to apply their knowledge and experience in the US job markets.

CONCLUSIONS

As having the most immigrants in the world, the US has history of integrating them into its workforce and lifestyle. We could conclude that there are many avenues for immigrants to seek education and training to acquire new skills for changing workforce. There is no doubt that new training programs will immerge, or existing programs will adjust in preparation to new roles required to work in Industry 4.0.

To analyze what training and leaning is available for immigrants, it needs to be noted that in the United States, if you are legally living in the country, there are no restrictions to attend training or learning programs for any legal resident of the US. However, the difficulties that immigrants face when looking for the programs or participating in them are English language proficiency, lack of information on how to find these programs, and lack of understanding what re-training or educational gaps needs to be filled in order to meet United States' licensing for skilled workers (Morse & Chanda, 2018).

At the moment, California has much to offer to immigrants who wants to get education or re-training to acquire new skills for existing jobs. However, not all immigrants are either willing or can afford to explore these opportunities; on the other hand, most affordable training/education programs are very high in demand and cannot accommodate all who wants to attend. There is a need for more and understandable information to reach immigrants and more affordable programs/education for immigrants to be able to participate in the competitive workforce of California, what could be highlighted as further research direction. In addition, comparing to many home countries, the existing immigrants are already earning more and their life quality is much better in the United States; therefore, many immigrants have no desire to reach for the better paying, high skilled jobs if it will require additional educational or/and financial input.

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