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The causes of underrepresentation of Latin@s in computer science and STEM fields

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Abstract

The purpose for writing this research paper is to inform readers and give them a new perspective on the low population of Latin@s in computer science and other STEM (science, technology, engineering, math) related fields. This research project shows the underrepresentation of Latin@s in high tech jobs, and some of the possible causes behind this phenomenon. This paper will look toward the statistics showing that there is an absence of Latin@s in computer science and STEM across the nation, and through those statistics attempt to give the reader a comprehensive understanding of the current situation in the computer science and STEM workforces involving Latin@s in the United States. Most of the information used was found in peer reviewed scholarly journals and information from the U.S. American Community Survey. The timeframe for data used in this research paper was restricted to all findings after the year 2000.

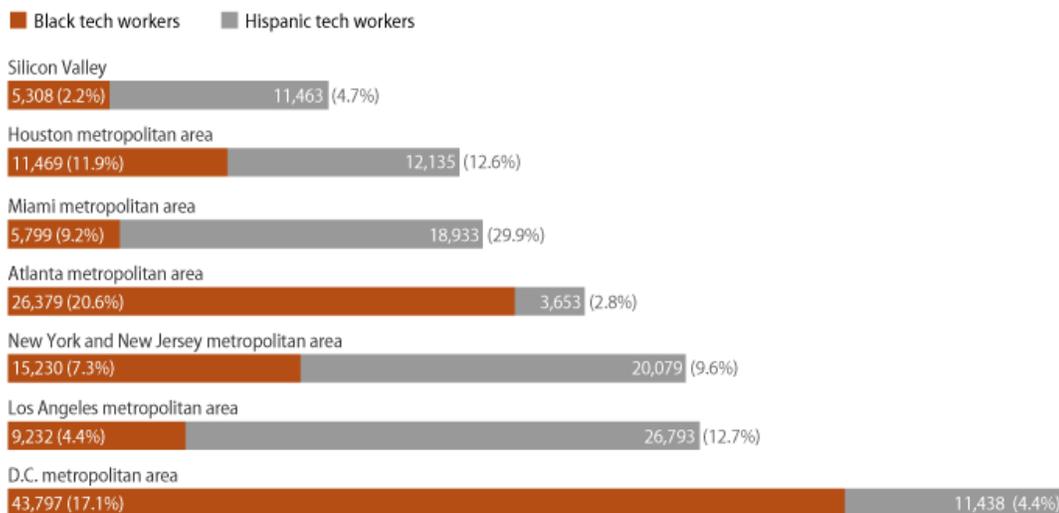*Keywords:* STEM, computer science, Latin@s

The causes of underrepresentation of Latin@s in computer science and STEM fields

    With the ever-increasing usage of technology in the modern workforce and our daily lives, the United states is becoming increasingly dependent on science and technology. STEM (science, technology, engineering, mathematics) jobs are also in turn becoming increasingly important, and are a large driving force for the US economy. Ideally, this means that every cultural or sociological group would participate in having STEM careers, but there are noticeable differences in the representation of some of these groups relative to their presence in the total US workforce. This paper will be going over the underrepresentation of Latin@s in STEM careers, with a primary focus on technology, as well as possible reasons and solutions to this underrepresentation.

FIGURE 1

How does Silicon Valley compare to other tech hubs?

Black and Hispanic tech workers in major metropolitan areas

■ Black tech workers   ■ Hispanic tech workers

Silicon Valley
5,308 (2.2%) 11,463 (4.7%)

Houston metropolitan area
11,469 (11.9%) 12,135 (12.6%)

Miami metropolitan area
5,799 (9.2%) 18,933 (29.9%)

Atlanta metropolitan area
26,379 (20.6%) 3,653 (2.8%)

New York and New Jersey metropolitan area
15,230 (7.3%) 20,079 (9.6%)

Los Angeles metropolitan area
9,232 (4.4%) 26,793 (12.7%)

D.C. metropolitan area
43,797 (17.1%) 11,438 (4.4%)

Note: The following occupational categories were included: computer and information systems managers, computer and information research scientists, computer systems analysts, information security analysts, computer programmers, software developers, web developers, computer support specialists, database administrators, network and computer systems administrators, computer network architects, all other computer occupations, operations research analysts, aerospace engineers, computer hardware engineers, electrical and electronics engineers.

Source: Author's calculations based on data from the U.S. Census Bureau, "The American Community Survey," available at http://dataferrett.census.gov (last accessed October 2016).

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Latin@s make up 13.6% of the United States' total workforce population, according to a document released by the U.S. Equal Employment Opportunity Commission in

https://www.americanprogress.org/issues/race/reports/2017/03/29/429424/supply-diverse-workers-tech-silicon-valley-lacking-diversity/

May of 2016. According to the American Community Survey by the US Census Bureau as of October 2016, the percentage of Latin@ workers in Silicon Valley is only 4.7%, and a mere 2.8% in Atlanta. On average, Latin@s make up an average of 8% of the workforce in high tech industries. This can have unintended consequences and effect the workforce itself, since it can mean one less genius in the workplace, and possibly could affect the perspective of the workers and cause a small bottleneck in work efficiency.

<div align="center">Findings about student interest in STEM</div>

The findings of Dismantling Stereotypes About Latinos in STEM by D. Hernandez talked about a lot of different reasons that Latinos will be drawn away from computer science and stem careers, and how that can be changed (Hernandez et al., 2017). The purpose of this article was to find potential causes behind the disinterest of Latin@ students to study for a STEM career. This article tells of research they conducted, where they separated 4 groups of Latin@ students, and tested the students asking them about their motivation to work a STEM career.

Hernandez had 2 variables that were added to the groups. These variables introduced to the students were a self-affirmation test meant to boost the confidence of the students, and a Latin@ role model speaking to the students and motivating them to study in a STEM field. The control group was tested with neither of these variables. One group received only the self-affirmation text, another group received only a visit from a role model, and finally the last group was presented with both. The data was conclusive, as the students showed a significant increase in interest towards STEM careers when either variable was present, and interest was further increased if both were present. However, the difference between the group of students only given the self-affirmation test and those that were only shown the role model was significant. It's possible that there is a serious lack of Latin@ STEM teachers, which in itself creates the issue of

students not having a role model to relate to, and can create a self-perpetuating problem where because there are no Latin@ STEM teachers, none of the students want to become Latin@ STEM teachers. I attempted to research this topic, but unfortunately was able to find little to no info on whether this phenomenon exists, but it's likelihood is fairly plausible and should be taken into consideration.

There are many possible conclusions that we can draw from this, but the most likely seems that students may not be interested in STEM or computer science careers because they are not shown the potential of learning in the first place. The motivation to pursue a STEM career may also be stronger when a student can see a successful worker that shares in the traits of the student, making any goals they may have seem much more realistic. For example, a Latin@ student would be able to see a Latin@ STEM worker and recognize that they could also become a STEM worker if they wanted to. There are also other factors that may play into this, such as the fact that a role model is much more relatable to a student than a paper test would be.

<div align="center">The digital divide, and technology accessibility</div>

According to the scholarly article "Transnational Computer Use in Urban Latino Immigrant Communities: Implications for Schooling In the United States," researchers Chakraborty & Bosman claim that, "access to computers and Internet usage can be examined across socioeconomic status, ethnicity, and age. Households with a yearly income of US$75,000 or higher, have a home computer ownership rate of 88%; at the US$15,000-US$24,999 level, home computer ownership drops to 33%; a yearly income of less than US$15,000 yields only a 23% home computer ownership rate (Chakraborty & Bosman, 2002). These findings point to economic disparity as possibly the most salient factor in determining which U.S. households have access to computer technology." (Sanchez et al., 2011).

What this essentially means is that as a household has less annual income, the access to home computers, and likely technology in the home altogether decreases. With a lack of accessibility to technology at home, students can hardly be expected to be familiar or comfortable with modern technology, which makes pursuing a STEM career an unfamiliar and likely uncomfortable experience. While these students may still pursue a STEM career, they will face much more challenges than students who have grown up in an environment that allows the use and exploration of technology for their schoolwork or otherwise.

What needs to change? What are some possible solutions?

If we want to increase the number of Latin@s in technology or STEM careers as a whole, it is crucial we find the largest possible causes of the issue. To address the elephant in the room of possible discrimination in the hiring process, it's very possible that it exists and can't entirely be ruled out. If there is discrimination in a workplace, the proper steps should be taken to allow equal opportunity for workers regardless of their background, no matter what. I'm not entirely convinced this is the primary reason behind the lack of Latin@s in high technology jobs though. Silicon Valley is generally considered a much more tolerant region than an area like Houston, and yet statistics show that Houston has a much higher percentage of Latin@ workers.

While we need to take the way we handle discrimination on a case by case basis seriously, we should mostly be mindful and taking action towards encouraging students to find opportunities in STEM and providing the means for them to comfortably do so. This means possibly changing school curriculum or school structure such as faculty, and the availability of technology for the students. Ideally, if students are not able to provide themselves with a means of computer access at home, the school could possibly be able to provide a cheap solution for primarily low-income families. While some high schools already do this, there a lot of ways that

individual schools can work around these needs to tailor to an individual student's needs. If this isn't a possibility for a school to make this change, then perhaps school budgets or funding should be addressed. At the bare minimum, schools need to be providing free access for any student, so they can use what they may need for their schooling. This can possibly be provided with computer labs or computer workshops, and could potentially have more creative access for students to explore what they can do with technology, such as music, photo, or video editing software on these computers. In allowing these, students may find a passion in a computer based field that they didn't know they were interested in.

Computer science courses are rapidly becoming more popular for high schools to list as a graduation requirement, and this should be made unanimous. Programming can be a highly valuable skill that can save a significant amount of time that would otherwise be spent doing a task less efficiently, like using a calculator an unreasonable number of times to solve a problem that a program may be able to solve in less than a second. Students will also need to learn how to make their work look professional with technology, such as formatting documents correctly and having neat, organized structures to their work, as this is commonly expected in the workforce. Not only is it simply unreasonable for schools to not adequately give students the skills they need for the frequent use of technology in their daily adult lives, but it also makes any students that might have had an interest in STEM fields now much more restricted in their options when entering college.

A mentorship program is also a possibility to give students a role model figure to relate to. Allowing college students in STEM to mentor high school students would be another way to create role models for students, and create interest in STEM through young high school students interacting with college students that can promote higher education in a STEM field. This would

also be an inexpensive action to take, leaving less financial burden on individual schools. Western Washington University already has a similar program called Compass 2 Campus.

Conclusion

The underrepresentation of Latin@s in high tech careers is an issue that may be significantly hindering the United States economically. While discrimination may be a cause for a lack of Latin@s in these workplaces, it's also reasonable to believe that Latin@s don't feel that they are welcomed or have a place in STEM, or are completely unable to learn about STEM jobs due to their living or schooling conditions. By taking action and creating solutions in schools for this problem, we may not only find that more Latin@s may be interested in STEM, but also more interested in higher education.

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