

# Application of a Collective Impact Model for Latinx Students' Access to STEM Higher Education in Northeast Tennessee Region

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## Abstract

Latinx population is growing rapidly, however, they are falling behind in educational attainment. In Tennessee, 17% of Latinx adults have earned an associate degree or higher, compared to 32% of all adults. This study focuses on improving Latinx students' access to STEM higher education in the Northeast Tennessee region. A survey was conducted among Latinx students who identified legal, financial and social challenges as barriers in their journey to higher education in STEM fields. An innovative collective impact model is proposed as a solution for this socially complex problem. Early data shows positive effects of the initiative.

## Introduction

According to the United States Census Bureau, Latinx are the fastest growing minority group in the U.S. (US Census Bureau, 2017). More importantly, at this pace, 34% of all children under 18 are projected to be Latinx by 2060 (Colby & Ortman, 2014; Pew Research Center, 2014). Therefore, it is imperative now, more than ever, to educate and train this population group so that they can prepare for responsible citizenship and productive employment (Santiago & Callan, 2010). Current data shows Latinx children tend to drop out of high school more often than non-Latinx peers, have the lowest graduation rate and are less likely to attend a 4-year college compared to other groups (National Center for Education Statistics, 2018; KewalRamani, 2007). This achievement gap can lead to inequitable lifelong outcomes for Latinx students.

Educational attainment is one lever that can increase opportunity for Latinx students—especially in Science, Technology, Engineering, and Math (STEM). Unfortunately, Latinx students often perform poorly and fail high school STEM courses, which often time shut their opportunities to pursue STEM fields in college and later in professional careers. This can be problematic for the future of the nation as there are tremendous STEM career prospects in the U.S. According to the U.S. Bureau of Labor Statistics (2020), STEM jobs are projected to grow at 8.8% for the next 10 years with median salary twice the national average. STEM knowledge and skills are vital for the nation's businesses

to compete in today's world, and for bringing better jobs and greater prosperity to every region of the country. Currently, too many students and adults are training for jobs in which labor surpluses exist and demand is low, while high-demand jobs, particularly those in STEM fields, go unfilled (Young, Ortiz, & Young, 2017). Businesses large and small across the U.S. need adaptable STEM workers from all demographic groups, especially the increasing number of Latinx students, in order to maintain U.S. superiority in science and technology fields.

STEM job prospects attracted many Latinx students to enroll in college at higher rates. Between 2000 and 2015, the college-going rate among Latinx high school graduates grew from 22% to 37% (McFarland et al., 2017). However, Latinx represent 23% of students enrolling in STEM majors and only 16% of Latinx complete their STEM Bachelor's degree. This feeds into the lack of Latinx presence in the STEM workforce. Latinx comprise 16% of the U.S. workforce, but they represent only 7% of all STEM workers (National Science Foundation, 2015). Since most STEM jobs require a postsecondary degree, it becomes essential to identify and implement a collaborative solution that supports Latinx student success in higher education.

Numerous factors pose as barriers for Latinx students as they navigate through the education pipeline. These factors include language barriers, legal and financial issues, lack of adequate college preparation, state education policy, social discouragement, and a wide variety of social hurdles (Gloria, 2005; Borrero, 2011; Elfman, 2010; Stern, 2009; Hernandez, 2005; Garcia, 2010; Santiago & Galdeano, 2015). To support Latinx students attain educational success, various organizations such as National Hispanic Association, Hispanic Alliance for Career Advancement, Committee for Hispanic Families and Children etc. work with Latinx students and families to facilitate a path for education and gainful employment, but their efforts are fragmented and as a result, progress is slow (Kells, 2004; Lopez, 2009). This research therefore explores some of the issues highlighted by the previous research focusing on interconnections of barriers and identifies key players in order to effect meaningful progress for Latinx students' successes. There are two research questions for this study:

1. Are the barriers for Latinx students' access to higher education in Northeast Tennessee region different than the rest of the country?
2. What is the solution to overcome barriers in the first question in order to facilitate Latinx students' access to STEM fields in higher education in Northeast Tennessee?

## Latinx Students in Tennessee

Northeast Tennessee is located in the foothills of the Great Smokey Mountain National Park and culturally is part of rural Appalachia. Like the rest of the country, the Latinx population is the fastest growing demographic in Northeast Tennessee. However, in Tennessee, enrollment of Latinx students in college is less than 4% and graduation rates are 26% and 51% at two-year and four-year institutions, respectively (Tennessee Higher Education Commission, 2017). Compared to their non-minority local counterparts, Latinxs in Tennessee are younger, less educated, and less likely to pursue higher education (Zanolini, 2016). While 32% of Tennesseans in 2014 were found to hold a college degree, only 17% percent of Latinxs in Tennessee held a post-secondary title (National Center for Education Statistics, 2017). This shows Latinxs in Tennessee are falling behind.

In Tennessee, median Latino household income is in the lowest 25th percentile and the poverty rate for Latinos is more than double that of non-Latino Whites (Kaiser Family Foundation, 2018). Income strongly correlates with educational outcomes. If parental income is in the top 25 percent, a child has a 93 percent chance of graduating high school. This chance is only 69 percent when the parents' income is in the bottom 25 percent. Many Latinx children live in linguistic isolation. The Census Bureau (2000) defines a household to be in linguistic isolation when there are no persons 13 years or older who speak English "very well." According the American Community Survey (2018), 36 percent of all Hispanic children in Tennessee ages 5 to 9 live in linguistic isolation. When parents are not able to speak English at home, students may receive less help from their parents and they are less likely to assist in their child's education. This creates the potential for a multigenerational poverty trap, in which future generations of Latinxs are less educated, more likely to

hold low-skill, low-wage jobs. As a result, they experience greater risk of unemployment and are more dependent on social welfare programs. The long-term social costs of this may be quite large to Tennessee.

The factors that contribute to this sluggish progress in Latinx students' educational attainment, especially in STEM fields, are multi-faceted and socially complex. Not all of the problems these Latinx students are facing can be solved by an individual or an organization. That is why a collective impact initiative to help Latinx students' access to STEM education is necessary. "Collective impact arises when different organizations agree to solve a specific social complex problem working towards the same goal and uniting their efforts" (Kania & Kramer, 2011). This special type of collaboration initiatives involves a centralized infrastructure, a dedicated staff, and a structured process that leads to a common agenda, shared measurement, continuous communication, and mutually reinforcing activities among all participants (Preskill, Parkhurst, & Juster, 2012). Organizations such as Strive, in Cincinnati, OH; Home Again, in Worcester, MA; and Shape Up Somerville, in Somerville, MA demonstrate how adopting the collective impact model leads to a successful outcome. (Strive Partnership, 2017; Rothman & Baughman, 2009; Splansky Juster, 2013). There are many government, non-profits, industries and educational institutions in Northeast Tennessee offering various services and resources for education, and if they all come together and work towards the same goal, they will be able to make a significant impact in so many Latinx students' lives.

## Research Methodology

### Research Context

The first step of developing a collective impact model is to have a clear understanding of factors and their inter-connection surrounding the issue – in this case barriers to Latinx students' access to STEM higher education in Northeast Tennessee. A report by the American Council on Education identifies language barriers, pressing economic needs and legal status as educational barriers for young Latinx (Ryu, 2011). Latinx students face social inequities such as poverty, fewer resources in neighborhoods and communities, lack of role models, lack of qualified teachers, racism, segregation, poor high school counseling, low expectations and aspirations, which limit their ability to achieve educational success (Veronica & Sandra Florian, 2013). Other disadvantages Latinx students face often stem from parents' immigrant and socioeconomic status, a lack of knowledge about the U.S. education system and a weak relationship with their teachers (Gonzalez, 2012; Schneider, Martinez, & Ownes, 2006; Becerra, 2012). National polling results consistently show that Latinxs have higher aspirations for higher education than the population in general. However, their aspirations have not been realized. Recognizing these barriers and understand-

ing their effects are important initial steps in raising the educational attainment of the Latinx population (Esqueibel, 2013).

### Participants

Three high schools in the Northeast Tennessee region with the highest number of Latinx student population (more than 50 in each school) were first identified and approached with this study. These high schools had a previous relationship with East Tennessee State University (ETSU) and its XCELL mentor program. XCELL (Expanding College Access to English Language Learners) Mentor Program predominantly serves Latinx students in regional high schools by providing information about higher education opportunities. XCELL staff usually meets with a large group of students with the hope of having individual meetings afterward. The staff provides useful information including, different post-secondary options (community college, private, college, public college, etc.), higher education opportunities, how to apply and pay for colleges and universities (ETSU Language and Culture Resource Center, 2017). Since minors were involved, an Institutional Review Board approval was secured (IRB No. c0817.12swd-ETSU).

### Instrument and Measures

Even though various barriers for Latinx students' access to STEM have been identified, it was hypothesized that such barriers could be different for Northeast Tennessee region due to its unique geographic settings, lack of diversity, various socio-economic and political factors. Furthermore, without clearly identifying root cause factors, finding solutions to improve Latinx students access to STEM fields in this region will be ineffective. To answer the first research question, an online survey was created. Several existing survey instruments from Pew Research Center, U.S. Department of Education and National Science Foundation were investigated (Funk & Parker, 2018; Hinojosa, Rapaport, Jaciw, & Zacamy, 2016). Based on these validated instruments, a customized survey was created which consisted of four parts. The first part focused on demographic data such as gender, age and grade. Part Two asked question about students' parents or guardian

and their educational background. Part Three focused on students' interest to pursue higher education specifically in STEM fields and barriers they might be currently facing. Part Four questions focused on students' engagements in different student organizations and with different mentors and support groups. It is anticipated that students who are more involved with support organizations particularly in leadership positions are better prepared and able to secure support to overcome obstacles in their journey to higher education. The survey was reviewed and approved by the respective school districts. Once necessary approvals were obtained, the survey was distributed electronically among the Latinx students.

## Survey Results

A total of 58 Latinx students who are currently in high school completed the survey, with a response rate of 32%. Among the respondents 48% were seniors, 31% were juniors, and the remaining were in other grades. Among the high school students, 80% of the students were considering attending college. Of the remaining 20% responses no one selected "Not planning for college", they all indicated that they "Do not know yet, but they would like to attend college" (Figure 1). This data resonates with the previous finding of Latinx students' high aspirations to pursue higher education, get a high paying job and make a positive impact in the society (Ryu, 2011). However, a significant percentage of students mentioned that financial (93%), legal (47%) and social (80%) issues as key barriers in their pursuit of higher education (Figure 1).

Data analysis also revealed that 80% of the parents of these Latinx students did not pursue any kind of post-secondary education, which put these Latinx students at a major disadvantage. It can be very challenging for parents to motivate and guide their children to college or university when they did not attend higher education and are unfamiliar with the general application process for college matriculation, or financial aid, and scholarship opportunities. Other comparable surveys reported similar findings (Bernhard & Friere, 1999; Chrispeels & Rivero, 2001; Ibanez, Kupenninc, Jurkovic, & Perilla, 2004). Our survey also finds that 90% of these students are not involved with any support organization or advocacy program. However, most students (60%) showed

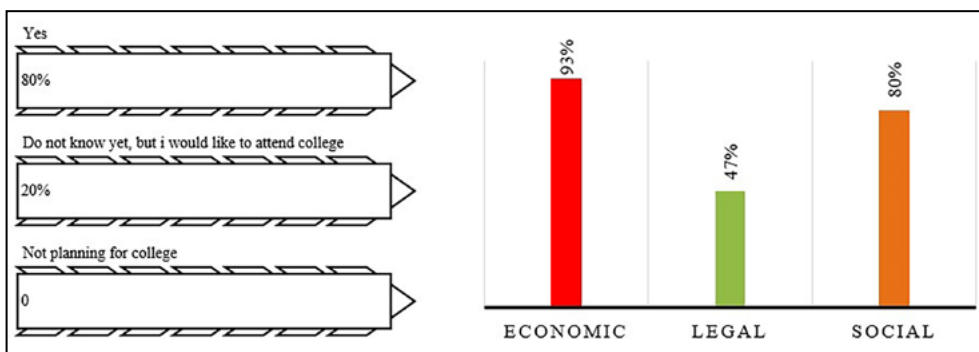


Figure 1. Distribution of Latinx students' desire to attend college but identified financial, legal and social as a key barrier

interest to be involved with organizations that can assist them in their pursuit of higher education in STEM areas. The most important finding of the survey was that 87% of these Latinx students believe that they would benefit from having a path to STEM education, which could eliminate or minimize the legal, financial and social challenges that they face every day. This is extremely important since these young growing Latinx students and their families will be able to access these resources, which will increase their access to higher education in STEM fields.

## Collective Impact Model

The survey results in the previous section identified three major barriers – legal, social and economic issues – for Latinx students in Northeast Tennessee in their pursuit to higher education. Fixing one point on the educational continuum would not make much difference unless all parts of the continuum improved at the same time. Many non-profit organizations operating in the USA are trying to invent independent solutions to many social problems and made remarkable achievement that deserve praise, but even with the success of these isolated initiatives, as data show, there is still much work to be done to close the achievement gap and reach economic and educational parity among different racial and ethnic groups. As a result, a shifting trend emerged from isolated impact to collective impact initiatives.

For collective impact initiatives to be effective and generate powerful results, five conditions must be met: a common agenda, shared measurement systems, mutually reinforcing activities, continuous communication, and backbone support organizations. Collective impact requires all parties to have a shared understanding of the problem, to abandon their individual agendas and to adopt a joint approach to solve the problem through agreed upon actions. This does not mean that each party has to agree with every other participant on all aspects of the problem. However, all participants must agree on the primary goals for the collective impact initiative as a whole (Kania & Kramer, 2011).

In order to assess progress/change, measurement is an essential task in a collective impact mode. A collective impact model requires a shared measurement of an agreed upon list of indicators. Data collection and analysis should be a continuous effort at the community level and across all participating organizations to ensure that objectives and efforts remain aligned, and to hold each other accountable and to learn from each other's successes and failures. Collective impact initiatives depend on a diverse group of stakeholders working together. This does not imply that all participants need to do the same thing; instead it encourages each participant to undertake the specific set of activities at which it excels in a way that supports and is coordinated with the actions of others.

Developing trust is essential among participating

organizations. This requires social interaction and regular meetings to build up enough experience with each other to recognize and appreciate the common motivation behind their different efforts. Organizations need time to see that their own interests will be treated fairly, and that decisions will be made on the basis of objective evidence and the best possible solution to the problem, not in favor of the priorities of one organization over another. One of the main reasons why many collaborative efforts fail while collective impact initiatives triumph is because collaborative efforts lack a supporting backbone organization (Turner, Merchant, Kania, & Martin, 2013). A backbone organization supports the initiative through ongoing facilitation, technology and communications support, data collection and reporting, and by handling the myriad logistical and administrative details needed for the initiative to function smoothly.

In order to increase Latinx students' access to STEM education, it is envisioned that a collective impact model will be beneficial for the Northeast Tennessee region. After completing the survey, local non-profit organizations, educational institutions, and industries, as well as the State Education Department, were identified and approached with the concept of the collective impact model. A team comprised of representatives from these groups and a first meeting was organized at East Tennessee State University. Figure 2 illustrates participating partners of this initiative.

The primary task of the team was to create a vision

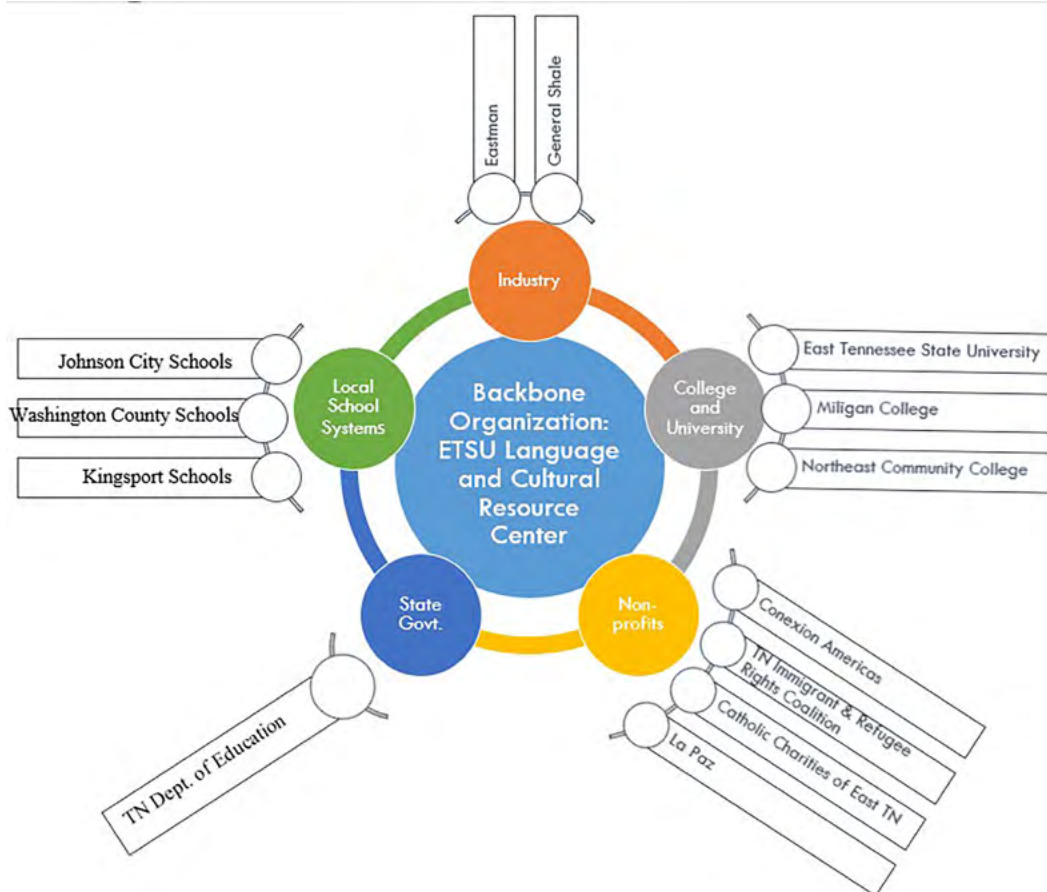
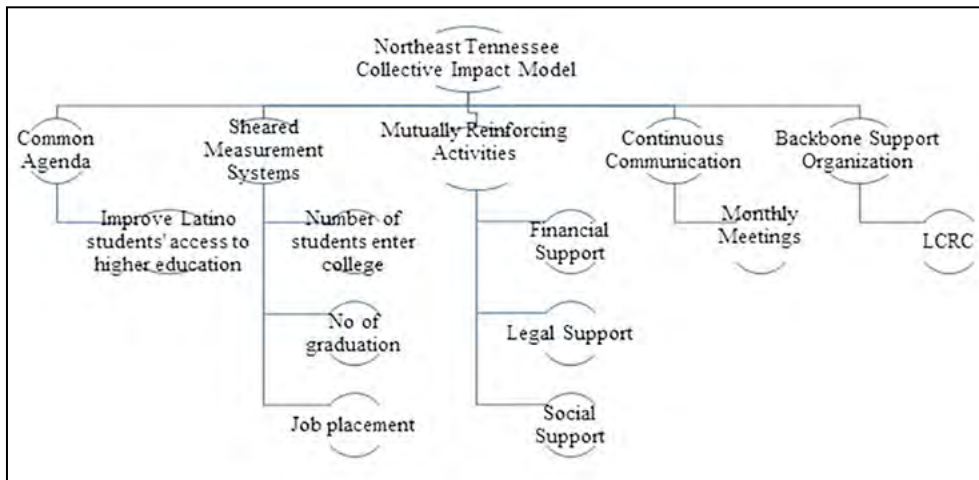


Figure 2. Backbone organization and partners for Northeast Tennessee Collective Impact Model to increase Latinx students' access to STEM higher education



**Figure 3. Northeast Tennessee Collective Impact Model to increase Latinx students' access to higher education**

plan for this collective impact model. The team identified the common agenda: Improve Latinx Students' Access to STEM Education in Northeast Tennessee. Next, the team tackled establishing a backbone organization. The team was challenged by how to put together a backbone organization with dedicated staff and resources. Different ideas such as applying for a grant and seeking industry support were proposed. However, there were concerns: what if the

grant wasn't funded, even if the funds are available what would happen when the grant support ended, what if industry partners could not continue the support, who hosts the backbone organization, who will manage and maintain it. The ETSU delegation proposed ETSU's Language and Cultural Resource Center (LCRC) to be considered as the backbone organization for this initiative because it meets the criteria of a backbone organization. The vision

of the LCRC is to expand community partnerships and to bridge boundaries between the non-English-speaking and English-speaking communities in East Tennessee. The goal of the LCRC is to create paths across different languages and cultures, and close the gap between individuals with different stories, backgrounds, and cultures. The center has

- 1) dedicated staffs – director, support staff, faculty, graduate students and mentors.
- 2) It is located in ETSU's campus center building which is designated as a safe place (where everyone is welcome).
- 3) It operates the Expanding College Access to English Language Learners Program (XCELL) and Latinx Student Day event. XCELL is a year-long program in which LCRC staffs and mentors visit local high schools with the purpose of promoting higher education to Latinx students. They offer information about degree programs, job prospects, financial aid and scholarship opportunities, college application processes, and more. The Latinx Student Day is a day-long event in which Latinx students from various high schools in the Northeast Tennessee area visit ETSU campus. They learn about different degree programs, financial aid and scholarships, admission

process, visit the department of their choice, listen to testimonials from other Latinx students.

4) It houses Latinx Research office which promotes collaboration and engagement in research and scholarly projects related to the Latinx population, and

5) LCRC offers a \$1,000 scholarship for bilingual students.

All these services and characteristics made LCRC a perfect candidate for a backbone organization. The team unanimously approved the Language and Cultural Resource Center as the backbone organization for this initiative. LCRC was also given the responsibility to facilitate continuous communication among partners and it will host monthly meetings. The team brainstormed and identified three initial shared measurement indicators: number of Latinx students entered into college, number of Latinx students graduated from college, and job placement (Figure 3). The team agreed to identify more shared measurement indicators as needed in order to measure the success of this initiative. The last piece of this collective impact model was to identify mutu-

<b>Mutually Reinforcing Activities</b>		
<b>Legal Support</b>	<b>Financial Support</b>	<b>Social Support</b>
<b>Catholic Charities of East TN (Immigration Services)</b>	<b>Eastman (Scholarship and internship)</b>	<b>"East Tennessee State University" Language and Cultural Resource Center (Latino Student Day)</b>
<b>Tennessee Immigrant &amp; Refugee Rights Coalition (Immigrant Integration &amp; Citizenship Program, DACA application assistance, know your rights, consulate, citizenship assistance)</b>	<b>General Shale (Scholarship and internship)</b>	<b>Johnson City Schools Washington County Schools Kingsport Schools (Advising and Counseling)</b>
<b>Conexion Americas (Immigration Advocacy: documented and undocumented students)</b>	<b>"East Tennessee State University" Language and Cultural Resource Center (scholarship)</b>	<b>Conexion Americas (ESL classes)</b>
<b>La Paz (Citizenship workshop)</b>	<b>Conexion Americas (Economic integration, help with taxes, homeownership and starting your business)</b>	<b>Catholic Charities of East TN (ESL Classes, Pregnancy Services, post-secondary education workshops)</b>
	<b>La Paz (Employment services &amp; workshop)</b>	<b>La Paz (ESL classes, community leaders, Latino health fair)</b>
	<b>TN Educational Equity Coalition (Interactive Map with Undocumented-Friendly Schools in TN)</b>	<b>TN Department of Education (policy, counseling, after school services)</b>

**Table 1. List of Mutually Reinforcing Activities for Northeast Tennessee Collective Impact Model to increase Latinx students' access to higher education**

ally reinforcing activities which can help Latinx students to overcome existing barriers and increase their access to higher education in STEM fields. Participating organizations agreed to offer services and supports based on their resources and expertise. Educational organizations offered to provide mentoring, college prep services, financial aid and scholarships opportunities. Industry partners committed to financial support, internship and job placement, and non-profit organizations committed to legal support such as DACA application assistance, immigrant integration and immigration services and social support such as ESL classes, Latinx family and community outreach, and a Latinx health fair. Table 1 shows mutually reinforcing activities among participating organization.

## Impact of the Initiative

The collective impact initiative at Northeast Tennessee is at its early stage and it will take few years before its impact on Latinx students' access to STEM education can be fully realized. Early positive results are evident, as shown in the following case studies: Rafael, a Mexican descendent DACA student and Angelica, a Colombian student who was born here in USA to an undocumented parent. In order to secure privacy of the students, pseudo names were used.

Rafael (personal communication, June 20, 2019) still remembers the first time he was on the institution campus on Latinx day. He was very excited to learn about different degree programs, financial aid and scholarship opportunities, admission process, and visited the department of engineering and technology, because he has always dreamt to be an engineer. However, when he let his parents know that he wanted to go to college, they were not that excited. His immigration status and college expenses became major barriers in his pursuit to higher education, but he was persistent. He reached LCRC and they introduced him with the entities in the collective impact model. Conexion Americas provided him immigration assistance. With the help of LCRC, he applied for many scholarships and he was awarded one, and now he is a first-generation college student. As he mentioned "if it were up to my parents, I would be helping them in farms instead of pursuing a bachelor's degree in construction engineering technology."

When Angelica (personal communication, June 20, 2019) decided to attend a local community college to pursue advanced manufacturing program, her parents told her not to apply for any financial assistance because they were undocumented and did not want to expose themselves. She had to work many jobs to pay out of state tuition at the community college. Once she completed the community college, she was inspired to complete two more years to earn a bachelor degree in manufacturing and contacted LCRC for help. Because of her good grades and associate degree in advanced manufacturing, one of

the industry partners in the collective impact model offered her a scholarship to complete her education and promised her a summer internship opportunity in order to gain work experience. She mentioned "I am grateful to LCRC, they got me connected to all these support organizations. Without their help, I won't be able to pursue my higher education dream."

Currently, LCRC treats each Latinx student as an individual case and learns from each student's unique situation. For LCRC, managing communications with the all various support organizations and keeping them aligned with goals is challenging. Nonetheless, as the backbone organization, LCRC evaluates the lessons learned from the cases and related issues, and then develops integrated programs (with support organizations) for broader impact on Latinx students and their successes.

## Conclusion

A collective impact model to increase Latinx students' access to STEM higher education is presented in this paper. Early data shows that the initiative has started to contribute to Latinx students in Northeast Tennessee region who aspire to pursue higher education in STEM fields. To be effective, a collective impact model requires a backbone organization with dedicated staffs and resources. However, establishing and maintaining a backbone organization requires significant funding and resource commitment which many regions lack. Research shows many universities and colleges have a center or department focusing on culture, diversity and inclusion. Since these centers are already staffed and have resources, using these facilities as a backbone organization to facilitate collaboration will result in more collective impact initiatives around the country and generate powerful results. The model presented here can be used as a prototype to increase access to and improve education in many regions around the country. This model can be applied to other minority groups as well. Authors believe that a continuing effort to implement such a collaborative model will make a positive impact to Latinx students' lives and contribute to the Northeast Tennessee region and to the country as a whole.

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