Exploring and Developing Hispanic STEM Education in West Texas

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ABSTRACT

Over the last six academic years (2005-2012), #### University (#####) has experienced a major increase in the number of first-time-in college, first-generation, Hispanic students from the Texas Panhandle choosing to major in the Science, Technology, Engineering, and Mathematics (STEM) fields. This underrepresented population of STEM majors at ###### has increased by 152% from 103 to 260 which is considerably higher than the overall increase in STEM students (56%) and the overall increase in the Hispanic student population at ###### (64%). This rapid growth greatly outpaces the increase in the regional K-12 Hispanic population, which is 20.13% since 2005. Because of the national need for a diverse STEM workforce and the rapidly growing Hispanic population of Texas as well as in the rest of the country, it is imperative that we understand what is occurring to spur this increase in Hispanic STEM student enrollment. The majority of the research conducted on factors that influence Hispanic student choice of institution and STEM major, and factors which influence their success has been conducted using sample student populations from primarily urban populations. Little research has investigated the rural Hispanic student population. The predominantly young Hispanic population is rapidly migrating across the country, including the rural U.S. and spurring population increases with high birth-to-death ratios. If, as the research indicates Hispanic students are choosing post-secondary institutions due to proximity to family, cost and size of the institution, then the impact of rural regional institutions will be substantial in the immediate future. The goal of this exploratory, two-phase, sequential mixed methods study is to develop testable hypotheses about the sources of the large recent increases in Hispanic student enrollments in STEM fields of the Texas Panhandle region as well to offer recommendations about how this growth can be supported and enhanced. In the first phase and primary focus of this proposal, the choice of STEM major and institution and elements influencing this choice will be initially explored using qualitative interviews to develop a grounded theory to explain the significant increase of Hispanic STEM students enrolled at ######. The results of the qualitative analysis will lead to a quantitative investigation that will develop and test a survey instrument designed to verify the initial qualitative results and measure the relationship between influences identified by the rural Hispanic students. Identification of the predominant influences on the growth of rural, first generation Hispanic students in STEM fields can transform the strategies used for the recruitment and retention nationwide. As Hispanic students continue to choose institutions that are close to home and family, the importance of regional institutions in expanding the STEM pipeline will grow. This exploratory study will lead to identification of current phenomena in the dramatic increase that has been elucidated in Texas and through dissemination to K-12 education, STEM education, and higher education administration, spur future research on Hispanic STEM student success and education.

INTRODUCTION

Hispanics are the largest and fastest growing minority group in the United States at 52 million and 16.5% of the total U.S. population. Together, Texas and California are home to 45% of the U.S. Hispanic population, where Hispanics are 38.1% of the total population in each state (U.S. Census Bureau, 2011). In 2010, Hispanics became the largest minority group at higher
education institutions, four-year and two-year combined (Fry & Lopez, 2011). As of fall 2011 nationwide Hispanic enrollment at four-year institutions reached 16.5%, and 25% at community colleges making Hispanic students the largest minority group at both types of institutions (Fry & Lopez, 2011). In public elementary schools nationwide, 24.7% of all students are Hispanic (Fry & Lopez, 2011). Thus, enrollment of Hispanics in four-year is reaching parity with the national population, and community college enrollment is near parity with K-12 enrollment. However, in the two states with the largest Hispanic population, Texas and California, Hispanic higher education enrollment is still far below the K-12 Hispanic population. In fall 2010 the K-12 population in Texas was 50.3% Hispanic, while only 36.4% of community college and 27.4% of the public university enrollment were Hispanic. Similarly, in California where 52.1% of the K-12 population was Hispanic, only 30.7% of student enrolled in institutions of higher education were Hispanic.

Despite the gains nationwide in college enrollment, STEM degree attainment for Hispanics lags. In the 2004 first time in college cohort, only 22.1% Hispanic STEM majors had a completed a STEM degree in five years as compared to 33% of white STEM students (Higher Education Research Institute, 2010). In 2006, Hispanic students obtained only 7.7% of the bachelor’s degrees awarded in Science and Engineering although the Hispanics were 14.4% of the population at that time (National Science Foundation, 2010). In addition, the male proportion of the Hispanic student population entering 4-year institutions declined substantially from 57.4% in 1975 to 39.2% in 2006 (Hurtado & Saenz, 2008).

Additionally, Hispanics are more likely to begin their higher education at community colleges than other racial and ethnic groups (Adelman, 2005; Adelman, Office of, & Adult Education, 2005; Gandara & University of California, 2012). Forty-six percent of Hispanic students enrolled in higher education institutions are choosing to begin their higher education experience in a community college rather than a 4-year institution, a rate 9% higher than young black students and 19% higher than white students (Fry, 2011). Hispanic students’ choice of institution is largely determined by cost of attendance and proximity to where they live (Santiago, 2008). Santiago indicates Hispanic students do not consciously choose a Hispanic Serving Institution (HSI) because of its status but rather create HSIs by selecting higher education institutions close to their home and family.

A great deal of research has been dedicated to identifying predictors of Hispanic students successfully completing a STEM degree (Cerna & Perez, 2007; Museus, Palmer, Davis, & Maramba, 2011). However, far less research has addressed the motivations of Hispanic students in choosing a STEM degree initially (Wang & University of Wisconsin-Madison, 2012). In their ethnographic study of 375 academically prepared STEM majors from seven different colleges and universities, Seymour and Hewett (1997) indicated that the most commonly reported factors among all students entering as a STEM major were: intrinsic interest in STEM; persuasion or influence of individuals such as parents, teachers, and mentors; desire for a high paying job or prestigious career; strong high school performance in math and science; family tradition; and recruitment. Closely related to self-motivation in STEM was a social commitment to specific career goals (Seymour, 1997). A 2000 report by the National Center for Educational Statistics found the racial gap that exists in STEM program enrollment between white or Asian and Hispanic students was eliminated when the following variables were controlled: enrollment in
advanced math and science courses in high school, self-motivation to study STEM, students with at least one parent with a college degree, parents who expected their child to obtain a college degree (Villarejo, 2008). In a survey of 713 ethnically diverse university freshman, Phinney, Dennis, and Osorio (2006) identified six factors influencing minority student decision to attend college. In addition to the factors mentioned above, this research identified helping their family and proving their worth as particularly important factors for lower income and minority students. After controlling for economic status, helping their family was a highly important reason for attending college among Hispanic students (Phinney et al., 2006).

The environment or region in which Hispanic students are located affects the decision making process regarding post-secondary education (Malcom, 2010; Padilla, 2007). In 2002, Castaneda noted that since the early 90s, researchers have been aware of the difference in student transfer rates between urban and rural community college students, but very little research has been done to investigate these differences (Castaneda, 2002). The majority of the research conducted on factors that influence Hispanic student choice of institution and STEM major, and factors which influence their success has been conducted using sample student populations from primarily urban populations. Little research has investigated the **rural** Hispanic student population.

In 1990 only 3.5% of the U.S. rural population was Hispanic. However, between 1980 and 2000, the rural Hispanic population more than doubled from 1.5 million to 3.2 million and had accounted for 26% of the rural U.S. population growth (Kandel & Cromartie, 2004). By 2006, the Hispanic share of rural population had grown to 5.4% and accounted for 44.4% of rural population growth. Between 1990 and 2000, the majority of the increases in regional Hispanic populations were due to migration. Since 2000, 53.4% of rural population gains due to natural increase are attributed to the Hispanic population and 37.8% of growth due to net migration is Hispanic migration. Between 2000 and 2005, 221 counties in the U.S. experienced population increases because Hispanic population increases outnumbered non-Hispanic decreases. In numerous counties across the central U.S. experiencing population declines for decades, gains in Hispanic population significantly decreased overall population losses. (K. M. Johnson, 2008; K. M. Johnson & Lichter, 2008).

For 2010-2011, Excelencia in Education listed 311 Hispanic Serving Institutions (HSIs). Eleven percent of these institutions are considered rural and another 11% classified as “Town” ("Hispanic-Serving Institutions (HSIs): 2010-11," 2011). Another 242 institutions were at the same time considered Emerging HSIs with Hispanic student populations between 15% and 24%. Of these 242 Emerging HSIs, 13% are considered rural and another 10% Town (Santiago, 2010). The predominantly young Hispanic population is rapidly migrating across the country, including the rural U.S. and spurring population increases with high birth-to-death ratios. *If, as the research indicates Hispanic students are choosing post-secondary institutions due to proximity to family, cost and size of the institution, then the impact of rural regional institutions will be substantial in the immediate future.*

##### is located in the Texas Panhandle, on the northern edge of a region encompassing Texas and New Mexico consisting of counties designated “established” by Kandel (2004) and Johnson (2008), with over 10% of the population Hispanic in both 1990 and 2000 (K. M. Johnson, 2008; Kandel & Cromartie, 2004). Over the last five years (2005-2011), ##### has experienced a
significant increase in Hispanic Science, Technology, Engineering, and Mathematics (STEM) majors. This underrepresented population of students at ###### has increased by 152% from 103 to 260, which is significantly higher than the overall increase in STEM students (56%) and the overall increase in the Hispanic student population at ###### (64%). The growth in enrollment is equally represented by both male and female Hispanic students, including a 163% increase in Hispanic males and 136% increase in Hispanic females. In addition, 73% of STEM Hispanic students at ###### are first generation college students. Analysis of student records indicates these students are coming to both higher education institutions from schools throughout the Texas Panhandle region. For both institutions the increase in Hispanic students in the STEM disciplines greatly outpace the increase in the regional K-12 Hispanic population, 20.2% increase since 2005 and 37.8% increase since 2000. While the Hispanic STEM enrollment at ###### is still not at parity with the K-12 population, the gap is closing (from 15% to 24% of all undergraduate STEM majors), and closing more rapidly than the non-STEM enrollment. The observed growth in Hispanic students majoring in the STEM disciplines is unexpected based on what the research seems to indicate. Minority students are more likely to develop a negative attitude about mathematics and science in junior high years and not see the relevance to everyday life. In addition, they have less access than white students to information about STEM careers (Huang, 2000). Students from small rural schools are more likely to be unprepared academically due to insufficient resources and poor access to qualified teachers (Museus et al., 2011; Seymour, 1997). The Hispanic student population of the Texas Panhandle spurring increases in STEM enrollment at ###### is predominantly from rural communities, and yet they have chosen STEM in contradiction to the research.

Table 1: Hispanic Enrollment by Gender at ###### Fall 2005 – Fall 2011

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2005</td>
<td>62</td>
<td>41</td>
<td>103</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>85</td>
<td>61</td>
<td>146</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>96</td>
<td>66</td>
<td>162</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>109</td>
<td>72</td>
<td>181</td>
</tr>
<tr>
<td>Fall 2009</td>
<td>125</td>
<td>77</td>
<td>202</td>
</tr>
<tr>
<td>Fall 2010</td>
<td>141</td>
<td>89</td>
<td>232</td>
</tr>
<tr>
<td>Fall 2011</td>
<td>163</td>
<td>97</td>
<td>260</td>
</tr>
</tbody>
</table>

By 2030, projections indicate the U.S. population to be 20.1% Hispanic. The percent of Hispanics in the 18-24 age group is expected to be even larger. Large numbers of Hispanic students choosing to enter the STEM fields will be needed to just retain the current percentage levels of enrollment. Because of the national need for a diverse STEM workforce and rapidly growing Hispanic student population, it is imperative that we understand motivations that spur increases in Hispanic STEM student enrollment.
STUDY OBJECTIVES

The goal of this project is to develop testable hypotheses about the sources of the large recent increases in Hispanic student enrollments in STEM fields of the Texas Panhandle region as well to offer recommendations about how educators can continue to support and enhance this growth.

The goal will be achieved by answering the following research questions:

1. What elements have influenced the choice of a STEM major among recent Hispanic high school graduates enrolled at #####?

2. What elements have influenced the choice of institution among these recent Hispanic high school graduates in pursuit of a STEM degree?

3. Are these influences on choice of STEM major and institution the same for both male and female Hispanic students?

LIMITATIONS

This pilot exploratory sequential investigation will be limited to #####, a regional 4-year institution of 8,000 students centrally located in the largely rural Texas Panhandle region. The study population will additionally be limited to Hispanic students who enrolled at the institution as a first-time-in college since this group has shown the largest increases in Hispanic STEM majors at both institutions. First-time college students were at least 70% of the ###### Hispanic STEM enrollment each year from fall 2005 to fall 2011. Differences in motivation for seeking a college degree have also been identified between traditional and returning students (Adelman et al., 2005). An initial qualitative phase consists of interviews with a purposeful sample of Hispanic students from the first-time-in-college population of both institutions. Once themes are determined, the follow-up quantitative investigation will utilize a developed survey instrument to be administered broadly to first-time-in-college Hispanic STEM majors at ######. This quantitative 2nd phase will investigate the prevalence of variables identified in the qualitative study with the first-time-in college population of ###### (Creswell, 2011).

Once the proposed pilot study has determined reasons for the rapid increase of Hispanic students majoring in STEM in the Texas Panhandle, an expansion study will be proposed to look at additional regional institutions identified as areas of Hispanic population migration by Johnson (2008) or institutions identified or on the verge of identification as HSIs. It is anticipated that this larger future study will employ an explanatory sequential design initiated by a large scale quantitative study utilizing the instrument developed and tested in the pilot study and followed by a discerning qualitative case study of selected individuals. The expanded study will determine if the phenomenon of rapid growth of Hispanic STEM majors is occurring at other regional institutions and test the hypotheses identified in the pilot as to why this is occurring or in some locations why not.
METHODOLOGY

As with all educational research, the choice of method must be driven by the research questions (R. B. Johnson & Onwuegbuzie, 2004). This study will explore the elements influencing the choice of STEM major and institution on the Hispanic student population in a largely rural setting with a two-phase, sequential exploratory strategy to investigate the cause of the recent increase in Hispanic student enrollments in STEM fields at #### as well as investigate reasons underlying the students’ choice of institution. Exploratory design is a mixed-methods approach to educational research that begins with a primary qualitative phase in which the findings are validated and/or generalized through a second quantitative phase. For this study, the researchers will use a sequential exploratory design (Figure 1). A sequential exploratory design involves a first phase of qualitative exploratory data which directs and is followed by a second phase of quantitative data collection that builds on the results of the first phase (Creswell, 2009). The majority of the weight is placed on the first phase and the data is mixed through connection between the qualitative data analysis and beginning of the quantitative data collection. This type of design is typically to initially explore an unexplained phenomenon (Morgan, 1998). In this mixed methods research design, researchers use this model to define what they think is happening. Therefore, this inductive process builds from the data to a broader theme that can be generalized to other settings in order to understand the phenomenon that is occurring and generate a theory and future research themes (Punch, 2005). The unexplained phenomenon at #### is the 150% increase in Hispanics in STEM education. The other settings that future research could be generalized to are other regional, predominately rural universities. Ultimately, this design is useful to the researchers to explore the phenomenon and expand the findings to a larger population.

A current trend in STEM educational research involves transforming qualitative outcomes into quantitative data for statistical analysis and generalization (Borrego, Douglas, & Amelink, 2009; Teddlie & Tashakkori, 2003). There are many examples of this in the field of engineering education literature (Borrego et al., 2009; Compton, 1995; Dabbagh & Menasce, 2006; Napp, 2004; Vanderburg & Khan, 1994). Researchers apply a framework of categorization to qualitative data such as open-ended focus group questions and then quantify the results based on repeatability of responses. Most of these are rudimentary attempts at mixed-methods studies mainly due to the quantitative and experimental background of engineering education researchers and their general lack of knowledge and/or comfort with qualitative studies. However, the qualitative component of this mixed-methods study is critical because researchers are attempting to answer the specific research questions detailed above and develop a grounded theory based on this induction. Borrego, et al. (2009) report in their review paper of research methods in engineering education, that when STEM researchers are trying to understand and conjecture as to why certain phenomena were observed, qualitative results were the key to understanding. They also note that qualitative research in STEM provides illustration of emerging results and can help flesh out learning and motivating mechanisms of students in STEM fields, specifically engineering.

This research will be conducted at ####, a 4-year regional institution that is centrally located in the largely rural Texas Panhandle region with #### the only 4-year institution within a 100 mile radius. The student population of #### is over 50% first-generation and 24% Hispanic. The
ASEE population of the STEM disciplines is 24% Hispanic and 32% female. Over 65% of the student population comes from the largely rural 26 counties of the Texas Panhandle.

For the qualitative portion of this study, the interviewees were randomly selected from a purposeful sample of students from Table 1. The population of students at this institution will satisfy the following criteria 1) Hispanic student majoring in a STEM field; 2) a first-time-in-college student at the institution; 3) enrolled at the institution the following fall after high school graduation. A list of students who satisfy these criteria was supplied by the Offices of Institutional Research along with contact information, demographic data, field of study, and high school attended. Approximately 20 students from and 20 students from AC were selected for the face-to-face interviews. Students from each population were randomly selected using a random number generator until each subgroup defined in Table 1 had at least two randomly selected individuals. The variables for stratification in the sampling procedure shown in Table 1 are: 1) type of STEM major as classified by engineering, mathematics, computer science, life science or physical science; 2) size of high school; 3) sex.

The sample student population was stratified by the variable of sex particularly to address research question 3. This study selected students from both large and small high schools based on the potential impact of school size in prior research. High schools in the region vary from a graduating class of 20 to a class of over 400. The MIDFIELD study found there are differences in retention in engineering that correlate to high school size (Chen & Ohland, 2012; Orr, Ramirez, & Ohland, 2011). In addition, high school STEM course offerings vary by school size; the smallest schools offer only the state requirements in mathematics and science, while the larger schools offer advanced math and science electives. Huang (2000) found a statistically significant difference in the availability of Advanced Placement (AP) or college level courses in Physics and Chemistry for Hispanic high school students in comparison to white and Asian students. There are also teacher differences; in a small high school, students are likely to have the same mathematics or science teacher for several courses. High school size is divided into two categories for this study. A small high school (HS) is classified as one with an enrollment of 1,004 or fewer students in grades 9-12, and the large high school classification has over 1,005 students enrolled in grades 9-12.

<table>
<thead>
<tr>
<th>Table 2. Variables for Participant Selection</th>
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<tbody>
<tr>
<td>Major and HS Size Variables</td>
</tr>
<tr>
<td>Math Small HS</td>
</tr>
<tr>
<td>Male WT</td>
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<tr>
<td>Female WT</td>
</tr>
</tbody>
</table>

In order to insure the broadest respondent field (Babbie, 1990) and reduce bias induced by interviewees not representing the entire Hispanic STEM population, an interviewee was selected from each of the following major classifications: mathematics, computer science, engineering,
life science, and physical science. All interview questions have undergone a field pre-test with a focus group of six Hispanic STEM majors at ##### to verify that question interpretation and response is that desired by the research team.

The interviews consisted of a few structured yet open-ended questions to elicit views of the participants. All interviews followed an interview protocol, were audio taped using the SpeakWrite software, and then transcribed via the same application. An interview log was kept for each interview that includes a single page with heading of demographic information (time, place, and date) and divided in the middle for descriptive notes (portraits of the participants, physical description of the setting, and accounts of particular events) and reflective notes (researcher’s personal thoughts, speculations, problems, ideas, hunches, impressions, and prejudices). The interview protocol contained a brief script explaining the purpose of the study to the interviewee. There were standard procedures for the interviewer to maintain consistency including an ice breaker question followed by five to six open-ended questions, and a question like, “Who can I talk to about some of the questions I’ve asked you today? ” Because of the inductive nature of this study, additional questions based on the responses of the interviewee occurred.

Sample Interview Questions:
1. Tell me about why you chose to attend #####.
2. What were your goals in choosing a STEM major at #####?
3. Who or what influenced you most to attend #####?
4. Who or what influenced you to choose to study in the STEM fields?
5. What do you enjoy most about ##### and your STEM studies?
6. What would you like to tell future Hispanic students about college, STEM majors, what works, what is hard, or what you like and don’t like about ##### and being a STEM major?

The data and emerging themes are being correlated to existing data and research on why Hispanic students select a major in STEM (Museus et. al., 2011)(Seymour, 1997). The themes discovered in this study will lead to new knowledge on how rural universities and colleges can boost and promote Hispanic enrollment and success within their institutions. Figure 1 describes the analytical process of the information gathered from the recorded interviews.

Figure 1. Interview Analysis
RESULTS AND DISCUSSION

A sampling of Hispanic students at ###### have been interviewed but there are still students scheduled for interviews over the next few weeks. It is imperative that the researchers take advantage of the overwhelmingly positive student response to this qualitative study and not conclude the interviews while there are still students who are eager to participate. Because of this, the emerging themes presented here are considered preliminary. After all of the interviews have occurred, the researchers will independently review the transcriptions, code and analyze the data to discover the emerging themes of why there is a phenomenon of Hispanic STEM major increases at ######.

Currently there are some expected themes that emerged from the interviews. When participants were asked about why they chose to attend college at ######, most responded that the decision was based on family. Students often talked about cultural influences and many stated that their cultural background has influenced choice of college. Because family is a major commitment in the Hispanic community, the students expressed that they needed to stay close to home. Due to the rapidly growing Hispanic community in the rural plains of the Texas panhandle, ###### has become a first choice for these students. Also, they expressed that the scholarships being offered for them from ###### greatly influenced their decision to attend. Again, students expressed the need to not be a burden on their family and so financial aid was very important in their decision-making. Another finding is that living on campus while still being close to home appeals to Hispanic students. It provides a solution for staying close to home while enjoying a quality college experience. The participants that commuted to college did not have a great experience because they often had to balance home responsibilities such as caring for younger siblings and homework.

When asked about their choice for majoring in a STEM field and overall goal for the degree, students expressed their desire to have a steady, high-paying job that will provide for them and their families including their own parents and siblings. Several of the students have had a very motivating high school science or mathematics teacher that encouraged them to pursue STEM studies in college. Students also conveyed that their parents helped them choose a STEM field.

When asked what they enjoy most about their college experience, students indicated that they liked the sense of community in the STEM fields at ###### developed through learning communities and student professional groups as well as in study groups for specific classes. They indicated that small class sizes and access to professors who care about them as people is important for their success. Several of the students are part of a student support group provided through the university for children of migrant workers. Researchers are currently learning more about this group and the support that they provide for these students. Several of the students are also part of learning communities created through scholarship programs at ######. They indicated that the money received through these programs and the relationships developed were a very important part of their overall experience.

As previously stated, when all interviews are complete, responses will be re-coded and re-evaluated. These early emerging themes provide researchers with a scaffold for development of successful recruiting and retention programs in STEM for Hispanic students at ######.
FUTURE WORK

After all of the qualitative interviews are complete and emerging themes are developed and correlated with current research, phase two of this study will begin. The quantitative segment of this exploratory sequential study will attempt to generalize the themes identified in the qualitative phase to the larger first-time-in college Hispanic STEM population (Creswell, 2011). A survey instrument will be developed based on themes identified in the qualitative study. All undergraduate Hispanic STEM majors who were first-time-in college will then be invited to participate in completed survey. This design will allow the research team to assess if the themes identified in the qualitative investigation generalize to the broader regional population. The survey design will consist of demographic information and person variables such as gender, age, community college or 4-year student, generation status in college, generation status in country, socioeconomic status, size of high school attended, and STEM major. Additional items will reflect themes identified in the qualitative portion of the study. Themes which may appear based on prior research on motivations for Hispanic students choosing to attend college are: encouragement from others, pressure due to expectations of others, inherent interest in STEM, humanitarian (long term goal of aiding society with a specific STEM career), materialism (desire for a high-paying job or prestigious career), helping family, proving oneself, confidence in math and science due to high school preparation (Phinney et al., 2006; Seymour, 1997). The survey design will expand upon prior research by seeking a more detailed portrayal of student motivations. Prior research on Hispanic student choice of institution indicate cost to attend, proximity to family, and confidence in math and science may appear as themes in the qualitative investigation into institutional choice. Survey questions will initially be drafted by the research team. Multiple question items with Likert-type scales will be used to address each theme identified in the qualitative portion of the study. The research team will review and consider for inclusion indices from survey instruments in the educational psychology and STEM education literatures with published reliability (Phinney et al., 2006; Trenor, Yu, Waight, Zerda, & Ting, 2008).

The survey instrument developed in this study will be administered to a sample of Hispanic STEM majors at the rural institutions recruited by investigation leadership to participate in the study. This expansion exploration will provide broadly applicable information that can be used by high schools, community colleges, and rural-serving universities seeking to grow the number of Hispanic students in STEM. Overall, both the qualitative and quantitative portions of this work seek to identify the influences that have spurred dramatic enrollment increases in the STEM fields by rural first-generation Hispanic students. Once identified these elements have the potential to transform Hispanic student recruitment strategies nationwide.

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