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A Value-Based Case Study To Increasing Community Mentoring In Stem For Hispanic Students

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A VALUE-BASED CASE STUDY TO INCREASING
COMMUNITY MENTORING IN STEM
FOR HISPANIC STUDENTS

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Doctoral Program in Educational Leadership and Administration

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2017

DEDICATION

This dedication is both a reflection and my attempt to show my gratitude to those special souls in my life. To my beautiful wife Teresa who partnered with me to complete my master's thesis at Notre Dame University and who forty one years later readily agreed to encourage and support completion of this doctoral challenge. To my wonderful children Ana, Gilbert, Robert, Andy, Eddie, Gloria and their spouses and beautiful grandchildren whom I trust will always cherish the lifelong opportunity to learn and discover regardless of their age. To my parents Beto and Mague Moreno who have always underscored the power of education and whose endless sacrifices have gotten me to this juncture. To all my extended family of *carnales*, *primos*, *tias* and *tios* – too many to name, so many to thank.

I have witnessed countless unsung heroes in the community who selflessly give of their time and energy to coach, mentor, and guide students in sports, academics, and service activities without seeking or receiving adulation, recognition, or trophies and awards. To those REAL community *empowerment agents* I dedicate this dissertation to honor their enrichment of our community.

Finally, I want to dedicate this study to one of the greatest role models in my life -- my maternal grandfather Antonio Tinajero. “Papa” was the most accomplished engineer, machinist, teacher, musician, innovator, inventor, multi-linguist, mentor, spiritualist, and community leader in our large extended family and his community. He did all this with only a second grade education in an accomplished “STEM” career with the Southern Pacific Railroads and Phelps Dodge Refinery. While he never had the opportunity to achieve engineering licensure, college degrees, national corporate recognition, community service awards, etc., he accomplished the impossible. This dissertation is as much his as it is mine – I dedicate this research to honor his legacy!

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COMMUNITY MENTORING IN STEM
FOR HISPANIC STUDENTS

by

GILBERTO MORENO, JR, M.S.M.E.

DISSERTATION

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To these two gentlemen and Dr. Teresa Cortez and Dr. Angus Mungal who collectively provided, as my Dissertation Committee, timely wisdom, substantive insights, and meaningful perspectives that enriched this dissertation treatise.

Without the sustained leadership and encouragement of the most accomplished STEM professional I know, my great friend Guillermo Silva’s role in the creation and implementation of the PASOS² mentoring pilot was vital. His focus on doing what is best and right for students is unmatched and contagious.

And finally, immense gratitude is due to those inspiring K-12 students, their parents, the school campus administrators and staff, the funders of the PASOS² Program, the EduGuide, Inc. principals and staff, and especially the community mentors who made the PASOS² pilot a reality!

ABSTRACT

This case study investigates the implementation of a unique community-driven mentoring pilot program (PASOS²) forging stronger community and K-12 partnerships. Focused on surfacing what matters most in engaging community mentors, this case study explores a civic organization's quest to impact, expand, and bring value via mentoring to Hispanic students' pursuit of post-secondary studies with emphasis in STEM careers. A major stumbling block faced by many underprivileged students is the lack of mentorship vital to expanding their social capital support system. This innovative mentoring approach provides students with critical access to STEM community *empowerment agents* supporting aspiring students' dreams.

Analytical methods and principles of case study research focus on how community mentor choices impact community mentorship value. The study examines whether or not a formal mentoring system with a value-driven mentoring curriculum matters in attracting, preparing, and sustaining community mentors to advocate for STEM careers to Hispanic students. A mentor value equation is introduced correlating mentor capacity to build student relationships, demystify STEM, deliver career guidance, and fortify student readiness.

A formal mentor development training program integrates a technology-based 'grit' software platform to enhance student awareness, understanding, and commitment to considering a STEM career. Through the investigation of a formal mentoring experience, the study reveals what best practices, tools, and techniques influence community mentor engagement.

The findings of this case study underscore the value in preparing community mentor capacity and competency. The very nature of the PASOS² project being civic community-based informs other communities on how their investments can fortify Hispanic student social capital in their successful pursuit of STEM careers.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	V
ABSTRACT.....	VI
TABLE OF CONTENTS.....	VII
LIST OF TABLES	IX
LIST OF FIGURES	X
CHAPTER 1: INTRODUCTION.....	1
1.1 INTRODUCTION OF THE TOPIC.....	1
1.2 OVERVIEW OF THE LITERATURE REVIEW	15
1.3 OVERVIEW OF THE RESEARCH METHODOLOGY	15
1.4 OVERVIEW OF KEY ANALYTICAL MODELS.....	16
1.5 THE RESEARCH PURPOSE AND QUESTION GUIDING THIS STUDY	18
1.6 THE SIGNIFICANCE OF THIS RESEARCH	20
1.7 HOW THE CHAPTERS ARE ORGANIZED	23
1.8 CHAPTER SUMMARY	25
CHAPTER 2: LITERATURE REVIEW	26
2.1 KEY LITERATURE REVIEW RELATED TO THE TOPIC	27
2.2 LITERATURE REVIEW RELATED TO PROBLEM AREAS.....	46
2.3 CHAPTER SUMMARY	52
CHAPTER 3: METHODOLOGY	54
3.1 CASE STUDY RESEARCH DESIGN METHODOLOGY	54
3.2 RESEARCH DESIGN COMPONENTS	68
3.3 RESEARCH PROCESS APPROACH.....	77
3.4 ANTICIPATED STUDY DATA AND RESULTS.....	91
3.5 CHAPTER SUMMARY	95
CHAPTER 4: DATA ANALYSIS AND RESULTS	97
4.1 THE PASOS ² PROJECT ROLLOUT EXPERIENCE.....	97
4.2 DATA GATHERING, MANAGEMENT AND ANALYSIS RESULTS	119
4.3 THE MENTOR OPPORTUNITY PIPELINE MODEL RESULTS	135
4.4 THE TRIANGULATION RESULTS.....	136
4.5 CHAPTER SUMMARY	140
CHAPTER 5: FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS	144
5.1 FINDINGS FROM THE DATA ANALYTICS	144
5.2 CONCLUSIONS.....	157
5.3 RECOMMENDATIONS	161
5.4 CHAPTER SUMMARY	177
REFERENCES	179
GLOSSARY	193

APPENDIX A -- CASE STUDY RESEARCH PROCESS APPROACH	194
APPENDIX B -- MENTOR PRE-TRAINING SURVEY	197
APPENDIX C -- POST-PILOT MENTOR INTERVIEW PROTOCOL	200
APPENDIX D -- EXAMPLE OF PAIRED SAMPLE T-TEST	202
APPENDIX E -- CLUSTERS OF SEMINAL QUOTES	203
APPENDIX F -- TRIANGULATION RESULTS SUMMARY	208
VITA	211

LIST OF TABLES

Table 3.1. The Triangulation Strategy Correlation Framework (Page 1 of 2).....	92
Table 3.1. The Triangulation Strategy Correlation Framework (Page 2 of 2).....	93
Table 4.1. Critical Success Factors for the PASOS ² Pilot Implementation Plan and Rollout....	108
Table 4.2. Pilot Program Implementation Journey	111
Table 4.3. THEME A Feedback: “PASOS ² – Value As A Mentoring Program”	129
Table 4.4. THEME B Feedback: Effectiveness of the ‘Meet & Greet’ Component.....	130
Table 4.5. THEME C Feedback: Effectiveness of the EduGuide Component.....	131
Table 4.6. Profile of Engagement Categories	132
Table 4.7. The Triangulation Strategy Correlation Results (Page 1 of 3)	141
Table 4.7. The Triangulation Strategy Correlation Results (Page 2 of 3)	142
Table 4.7. The Triangulation Strategy Correlation Results (Page 3 of 3)	143
Table 5.1. Conclusions From the Mentor Experience Cycle	146
Table 5.2. Contrasting Conclusions Regarding the Pilot Engagement.....	152
Table 5.3. The Triangulation Strategy Derivatives.....	156
Table 5.4. The Tactics of Collaboration in Effective Community Mentoring.....	161
Table 5.5. Recommendations to a Community Considering Community Mentoring	162
Table 5.6. Future Potential PASOS ² Strategic Initiatives	166
Table 5.7. Future Potential PASOS ² Strategic Initiatives	172
Table 5.8. Significance and Value Of Proposed Research Investigations (Page 1 of 2)	175
Table 5.8. Significance and Value Of Proposed Research Investigations (Page 2 of 2)	176

LIST OF FIGURES

Figure 1.1. The Profile of Mentoring Actors	10
Figure 1.2. The Value Chain Model for STEM Education Implementation	22
Figure 2.1. Literature Review Concept Mapping	26
Figure 2.2. EduGuide Software Components	39
Figure 2.3. CAS Mentoring Model	43
Figure 3.1. PASOS ² STEM Mentoring Capacity Logic Model	57
Figure 3.2. The PASOS ² Mentoring Research Objects Model	60
Figure 3.3. PASOS ² Student Cohort Groups	65
Figure 3.4. The PASOS ² Team Collaboration Research Framework	69
Figure 3.5. PASOS ² Implementation Plan Phases	70
Figure 3.6. PASOS ² Pilot Plan and Training Curriculum Outline	71
Figure 3.7. Mentoring Value Framework	76
Figure 3.8. Community Mentoring Opportunity Pipeline	78
Figure 3.9. Case Study Research Data Gathering Approach	90
Figure 4.1. Synopsis of PASOS ² Pilot Initiative	100
Figure 4.2. Student Messages to Community Mentors	101
Figure 4.3. Community Mentor Demographic Profile	103
Figure 4.4. Pilot Partners & Funders	105
Figure 4.5. PASOS ² Pilot Implementation Rollout	112
Figure 4.6. The Community Mentor Experience	116
Figure 4.7. Alignment of the Mentoring Value Equation Mentor Value Concepts	122
Figure 4.8. Pre- and Post- Workshop Survey Results	125
Figure 4.9. The “EduGuide Experience” – Post-Pilot Interview Summary	133
Figure 4.10. The “Meet & Greet Experience” – Post-Pilot Interview Summary	134
Figure 4.11. The “PASOS ² Program Experience” – Post-Pilot Interview Summary	135
Figure 4.12. The Community Mentor Opportunity Pipeline	137
Figure 5.1. Community Mentoring Top Ten Lessons Learned (1 of 2)	158
Figure 5.2. Community Mentoring Top Ten Lessons Learned (2 of 2)	159

CHAPTER 1: INTRODUCTION

1.1 Introduction of the Topic

“The delicate balance of mentoring someone is not creating them in your own image, but giving them the opportunity to create themselves.” (Spielberg, 2016, p. 1)

While the growing Hispanic demographic is recognized as a critical component and opportunity for strengthening America’s capacity for sustained 21st century global competitiveness, woefully low numbers of Hispanics are pursuing science, technology, engineering and mathematics (STEM) careers (NEA, 2010). The lack of meaningful STEM career awareness, exploration and preparation with viable learning opportunities – especially at the primary K-8 grade levels – inhibit building Hispanic student social capital necessary for building a viable college-going mindset. K-12 Hispanic students lack context and connection with relevant experiences that typically are not fortified by their network of parent, educator, and community *empowerment agents* (mentors) of influence (Stanton-Salazar, 2011). In this study, empowerment agents and community mentors are used interchangeably to refer to the principal mentoring actors. This reality warrants critical examination and rethinking of how community mentoring driven by a competent network of critical actors can impact STEM awareness at the primary grade levels, and how this may help address the growing Hispanic STEM career achievement gap.

In spite of their limited social capital challenges, many Hispanic students exhibit an unwavering human spirit of perseverance and drive to successfully navigate their pathway through college and completion of a STEM degree. This amazing journey is reflected in the high number of first-generation college graduates that is very common in Hispanic-rich communities like the Borderplex region. This historic region is composed of the three states and two nation communities: El Paso, Texas; Las Cruces, New Mexico; and, Ciudad Juarez, Chihuahua. The

value and role community mentors play in supporting students through this often stressful journey is both laudable and critical to a student's successful pursuit of a STEM career. Three anecdotes from STEM community mentors are presented below underscoring how community mentoring can significantly influence and change student lives.

One information technology STEM professional shared his experience in providing critical college transition resources with timely encouragement:

About seven years ago, my wife and I were fortunate enough to meet a wonderful lady to help keep our home in order. Her personality portrayed generosity and demonstrated a great work ethic that inspired confidence. We got to know her youngest son Adrian who was doing very well in school and had aspirations of getting a college education. Unfortunately, when time came for him to enroll in college his family ran in several crises and as a consequence Adrian had to work to help with family expenses.

One day Adrian and I had an opportunity to visit and he shared he still had dreams of college but could not afford it. He felt that since he had lost a year and a half already this dream would never occur.

He shared that he thought he could take one or two classes a semester. So I offered him a deal, "What if I spot you the money for two classes, you go to school and pay me back as you can". I explained to him that by repaying the loan he was going to provide an opportunity to the next student facing a similar situation. He was stunned, excited and speechless. He liked that idea a lot. Hesitantly, he accepted. He is now a sophomore in college preparing to help another young person down the road. By the way, he paid the debt and is now paying for most of his college expenses as an accounting major (Silva, 2016).

Yet another engineering STEM professional shared her experience with providing timely academic readiness and mentoring support:

Upon finishing a meeting at the El Paso Community College campus, I walked over to the Student Union Building to get a refreshment. I noticed a young girl uncontrollably sobbing at a table, her hands covering her papers and books. I felt compelled to find out if I could be of help and offered her a Kleenex. Suzie shared her disappointment at not being able to pass her college math exam in spite of her multiple efforts to understand the material. Her anxiety stemmed from having to work a full time job to support her toddler as a single parent. She was not able to receive any tutoring for math remediation. She wanted a degree and a career to provide something better for herself and her baby. Suzie's teary eyes reflected her desperate situation – I thought for sure we had another college dropout at hand.

Handing her my business card, I offered to help her with her math class by meeting with her at the college library at a convenient time. She took the card and thanked me. However, weeks went by without hearing from Suzie. To my surprise about 30 days later, I got a phone call from Suzie and we coordinated several weeks of tutoring at the college library covering her math assignments. She was excited to let me know at the end of the semester she passed her math class!

About a year later while shopping at a local Albertson's store, the cashier looked at me with familiar big eyes and a smile. Suzie reintroduced herself. To my delight, Suzie shared she was about to complete a degree as a vocational nurse. She exuded confidence and a sense of maturity and purpose. She let me know how passing that math class and my tutoring made a difference in her life! (Aguilar, 2016)

As a faculty member in the UTEP College of Engineering, I witnessed how students themselves can expand their mentoring experiences as 'near peer mentors' to help coach other students:

Finding ways to pay for college and transitioning to the workforce with an engineering career can often be an insurmountable challenge for many college engineering students. Having helped Juan Carlos as a sophomore mechanical engineering student obtain a summer internship with NASA, I was anxious as his faculty advisor to hear about his exploits at the NASA Johnson Space Center. His excitement with his project and how the internship brought new meaning to his college studies was formidable – as was his summer compensation to help his family and defray his college expenses.

As a designated NASA Scholar acting as a campus contact for NASA opportunities, Carlos wanted to explore creative ways to share his internship experience and opportunities with other students. I proposed to Juan Carlos the idea of creating an on-campus program series to have the most current engineering student interns share their internship testimonials with first and second year engineering students. The student-driven initiative titled "Internships – Connections To Your Future" was designed to emphasize the importance of pre-professional experiences among engineering students. Structured as a series of internship experiential presentations, ten engineering interns provided formal presentations promoting the ideals of academic and professional development, social and civic engagement, and technical innovation.

Included in the series was a "*sage to mentee*" follow-up program connecting experienced engineering interns with underclassman ready to provide mentoring internship guidance. Implemented by a team of engineering interns led by Juan Carlos, the series was wildly successful with an expanded pool of engineering students receiving internships to help address their college costs and future job employment. This initiative was voted the top student initiative for the entire university in its first year. Not surprising, Juan Carlos was recognized with the prestigious UTEP Top Ten Senior

Award highlighting his service, leadership, and academic contributions and accomplishments! (Moreno & Lopez, 2016)

These anecdotal accounts highlight the significant value a mentor can deliver in addressing the key challenges that may drive students away from pursuing their life's dreams. Each case surfaces the different needs for students ranging in academic, career, or life readiness in scope. What is vital is the access and awareness for the student too often not understood nor clearly defined potential solutions and resources. Herein lies the magic of community mentoring.

So what implication does community mentoring have for the STEM movement in the U.S.? The STEM movement is reaching a crescendo of focus and support from both industry and education sectors at the local, state and national levels in an effort to address America's ever-pressing need for STEM professionals. For the U.S., the challenge lies in more STEM jobs existing than there are qualified applicants. Data from the Bureau of Labor Statistics indicates there will be 2.7 million new jobs expected in STEM sectors by 2018 (Álvarez, 2012). However, the number of US students, not just Hispanics, graduating from related STEM fields is nowhere near what it should be, thus impacting both the economic and educational systems especially along the US / Mexico border region (Moreno, 2014a).

Today, five percent of the American workforce is employed in STEM-related jobs, yet only two percent of Hispanics are employed in these occupations (NEA, 2010). In the State of Texas, while women and minorities represent a very large portion of the population, they earn a small share of STEM degrees and certificates, with Hispanics earning only one in four STEM degrees even though they represent 40-plus percent of the college student population (Change The Equation, 2017). The U.S. Census Bureau reports that 39 percent of the population under the age of 18 is a racial or ethnic minority. However, in 2000, only 3.4 percent of the science and engineering jobs were held by Hispanics (NEA, 2010).

What will it take to satisfy America's insatiable appetite for talent ensuring Hispanic students and future professionals are prepared to enter the STEM career pipeline? One significant factor is addressing the social capital challenges Hispanic students face in guiding and supporting their exploratory and developmental journey through the educational pipeline leading to a post-secondary degree or certification (Stanton-Salazar, 2011). One critical facet of this opportunity which is key to expanding Hispanic student access and readiness for STEM careers is mentoring. What community talent can serve as the modern day Greek mentor to guide today's Telemachus into the STEM career battleground serving as a helpful "coach, teacher, guide, pathfinder, leader, pilot, advisor, caretaker, friend, etc." (Hansman, 2002)?

This research study describes the experiences in building community mentors' engagement and their intent and commitment to impact and influence Hispanic students' pursuit of STEM careers. Qualitative methods and principles of case study research were applied to focus on how choices by community mentor prospects can impact their value of mentorship. A *mentor value equation* is introduced in Section 1.4 as the basis for an effective mentor training program. This model is the basis for the curriculum framework designed and is intended to enhance the building of meaningful mentor: student relationships, demystifying STEM, providing STEM career planning, and fortifying student readiness.

Of particular interest are the effects on community mentoring competency through the integration of technology-based 'grit' software tools intended to enhance a mentor's connection with students. Key to this relationship building is enhancing student awareness, understanding, and commitment for a viable consideration of a STEM career. Through the investigation of the community mentoring training and engagement experiences, this case study reveals the best practices, tools, and techniques matter most to community mentors. The cycle of community

mentor recruitment, development, engagement, and sustainability varies by those individuals that produced strong mentor to student connections.

This case study centered on investigating and broadening the understanding of the dynamics in introducing a new, unique community mentoring approach. Sponsored and driven by a civic organization composed of Hispanic business and public-sector professional leaders in the El Paso area, this mentoring initiative has been endorsed and partially funded by the CommUNITY en Acción (CEA) civic organization as its primary STEM (Science, Technology, Engineering, and Math) strategic initiative for 2016 (CEA, 2016). Titled the PASOS² Project (*Partners Advocating STEM Opportunities for Student Success*), the CEA STEM Committee has undertaken a “value-driven” approach to enhancing empowerment agent (i.e., community mentor) capacity by making meaningful mentor: protégé connections with Hispanic students in the K-12 arena (Moreno & Silva, 2016).

Through the use of multiple case study techniques and analytical models, this case study characterizes a better understanding of what matters most to community mentors in their decision to commit and engage to mentoring students. This community-driven mentoring initiative is designed to make a ‘collective impact’ on future STEM professionals from the community by synergizing many often splintered STEM advocacy programs and efforts within the Borderplex region. The Borderplex region (formally known as the Paso del Norte region) is composed of the international communities of Ciudad Juarez, Chihuahua; El Paso, Texas; and Las Cruces, New Mexico (Borderplex, 2016; Kenia & Kramer, 2011; StriveTogether, Inc. 2013).

This research brings to other communities a better understanding of the nature of community mentoring. It helps to inform the planning, design, implementation, and continuous improvement of a structured model to growing a community mentoring network specifically

focused on addressing the disparate Hispanic student pursuit of STEM careers (U.S. Dept. of Education, 2014). The PASOS² initiative provides a timely opportunity to effectively address the key talent needs for the emergence of a new regional economy not only in the Borderplex region, but throughout the United States.

1.1.1 Introducing the PASOS² Mentorship Initiative

STEM has become a national priority striving to engage future talent that will drive U.S. global competitiveness through innovation and entrepreneurship. The Borderplex Region has an opportunity to focus its next generation, which is approximately 85% Hispanic, to pursue the largest career growth opportunity base needed in the U.S. and the world. Many other communities such as Austin, Texas and the State of New Mexico have embraced the STEM value proposition concept and are moving earnestly to weave STEM as one of the integral pistons of their future economic development engine. The Borderplex Region can certainly benefit from the same emphasis and investment. One key ingredient is the development of a robust network of *empowerment agents* (mentors) focused on advocating for STEM opportunities resulting in student success. Until the current time, the STEM focus has not been a collective Borderplex regional priority. It is hoped that the PASOS² collaborative will contribute to making it one.

So, how did the PASOS² initiative come about? The CEA STEM Committee of primarily engineering professionals commenced advocating for STEM careers with students in 2011. As the first initiative formally endorsed by the CEA civic organization, it has provided professional leadership and participation (including many non-STEM professionals) in a wide variety of forums ranging from K-16 events aimed at promoting STEM as a viable career option (Moreno & Silva, 2015). This included creating a very popular “Are You Smarter Than a 5th Grader”

active-learning game introducing and demystifying STEM to students and parents alike (Moreno, 2013).

Other CEA STEM Committee support services have included STEM advocacy efforts through school district-sponsored career days, the annual STEM Fiesta, Mother/Daughter conferences, Father/Son conferences, Parent Nights, and advisory board membership for campus-sponsored STEM Clubs and T-STEM Programs. What the CEA STEM Committee concluded from all this engagement is that it has neither the capacity nor the number of professionals or mentors to satisfy the ever-growing requests from the regional schools and student clubs for ‘STEM enlightenment.’ In 2015, the process of researching how to more effectively address this community need using alternative, innovative approaches (including the use of technology, for example) was spearheaded by Gilberto Moreno and Guillermo Silva. The PASOS² initiative is the culminating outcome of this research and planning (Moreno & Silva, 2016).

The collective impact of this PASOS² approach is to effectively leverage the energy of the many often splintered STEM efforts in the region. It brings focus to how new practices, resources, and community actors can achieve enhanced levels of collaboration through a value-based mentoring approach. As supported by substantial research in the education knowledge base, a major stumbling block faced by students from underprivileged environments wanting to pursue STEM careers is the lack of mentorship found in their social capital systems especially the lack of support from their family units. Hence, this PASOS² initiative provides students with valuable connections to *empowerment agents* working with parents, families, friends, etc. so that they too can become STEM “enablers” for their aspiring students.

Mentoring refers to how enablers via their encouragement, coaching, and guidance support individual's learning and development so they can build their competencies and readiness to pursue their dreams and realize their potential. How does this relate to both the PASOS² program purpose and the purpose of this research case study? The purpose of PASOS² program is to build a sustainable, formal mentoring initiative driven by community mentoring in the Borderplex region that establishes STEM as a regional imperative aligned with regional, state and national STEM movements. The purpose of this case study is to surface what matters most to community mentors in their decision to engage in the PASOS² mentoring program.

The STEM focus provides a resurging opportunity to effectively address the key talent needs required of a new regional economy defined for the Borderplex region. This also includes addressing the newly endorsed 60x30TX initiative introduced by the Texas Higher Education Coordinating Board (THECB) setting a state goal for 60% of 25 to 35 year olds completing post-secondary attainment by 2030 as vital to Texas statewide, as well as, regional prosperity (THECB, 2015).

This study of the PASOS² Program initiative characterizes and improves the best practice model for attracting and preparing community mentors. The design, implementation, and improvement of a structured approach with a community-based mentoring network impacts the increasing Hispanic student pursuit of STEM careers. This community-driven model builds community empowerment agent talent capacity and competency. The end game is for this CEA sponsored initiative to bring focus on increasing Hispanic student awareness, consideration, participation and achievement in STEM careers enriching the talent pool for the Borderplex region.

The pool of mentoring resources includes mentors from the home (parents and siblings), friends and extended family, schools, and the community at large. While parents and educators can be a key part of the mentoring equation for students, this study hones in on investigating the dynamics of how, why, and when community mentors engage in mentorship (See Figure 1.1). Community mentors are typically volunteers sourced from the business, professional, and non-profit communities. This pool includes individuals compelled to ‘give back’ to their community. They range from current college students serving as ‘near peer’ mentors to retirees anxious to share their experiences. Minimal knowledge base exists as reflected in the literature review on how best to leverage community sourced mentors for STEM advocacy to Hispanic students and families. The results of this literature review outlined in Section 2.1.5 surfaced the need to significantly expand the limited research regarding the confluence of community mentoring in the STEM arena for the Hispanic student population.

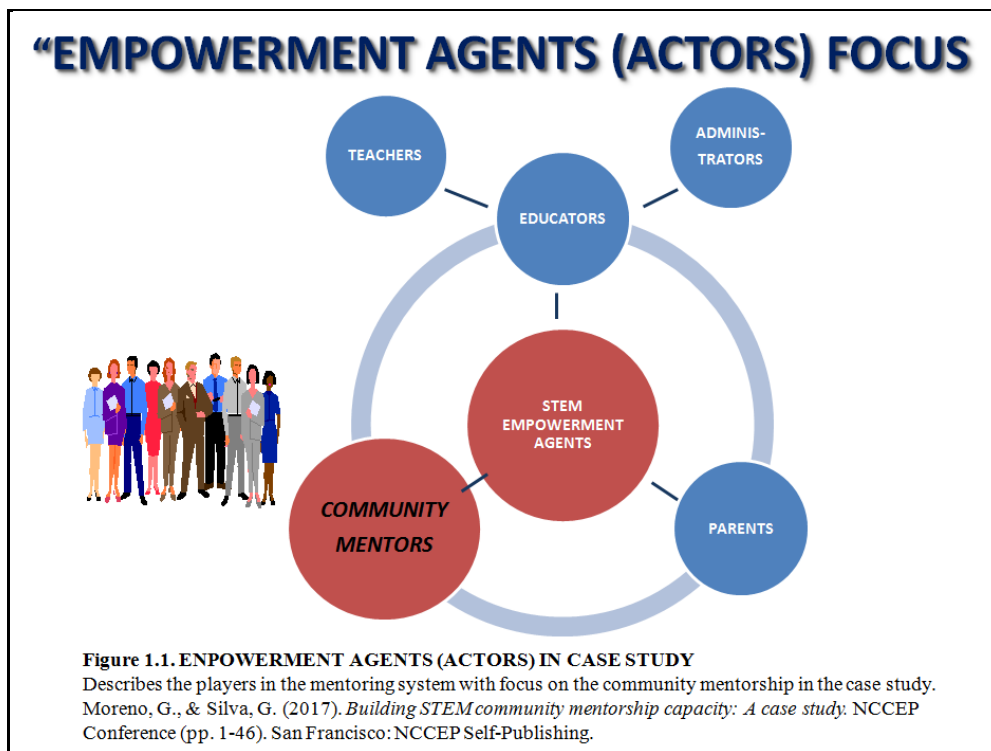


Figure 1.1. The Profile of Mentoring Actors

The PASOS² trained mentors provide STEM opportunities in the short-term for young people in the Borderplex region pursuing a STEM field of study; provide an educated and trained pool of talent from which regional businesses can draw to pursue their growth opportunities; and provide a prepared pool of STEM professionals serving as mentors bringing value to students and families. One of the central facets of this initiative is to help students and their families realize that a STEM career is neither beyond their reach nor their ability. It can effectively communicate the premise that with commitment and hard work on their behalf, they can achieve a successful STEM career. The key is access to resources available to help them achieve their STEM career aspirations.

Once the mentor training program was completed by the community mentors, they had two mechanisms with which to interface with the students during the PASOS² pilot: 1) use of the EduGuide application solution set for online mentoring; and 2) engagement in periodically scheduled “Meet & Greet” sessions on campus. The online nature of the EduGuide solution application allowed community mentors to select their own time and convenience using their technology of choice. Most mentors chose either their SMART phones or laptops to engage online with the students. The EduGuide software prompted the community mentors with which students had completed their activities or modules and were ready for mentor feedback. A predefined set of research-driven activities with non-cognitive topics was introduced online to students and mentors alike.

The community mentors were also invited to participate in a one hour visit to the cohort campuses to engage with students directly. At these volunteer “Meet & Greet” sessions they selected a classroom of students to dialogue using a preselected lesson. These lesson plans were

aligned to both the EduGuide activities and/ or preselected topics aligned with school academic topics. Examples of these lesson plan topics and objectives included:

1. “CHOOSE TO MATTER!!” -- OBJECTIVES: Leave students with the importance of discovering their authentic self and choosing to matter; and, encourage the young students to find the leader that exists in all of them, whatever their personality might be.
2. “Connecting PASSION with PURPOSE!!” -- OBJECTIVES: Leave students with the importance of developing a PASSION for something significant and meaningful; impress students that their education can enhance their PURPOSE and connect to their PASSION.
3. “Workplace Learning – Walking In My Workplace Shoes!!” -- OBJECTIVES: leave students with an exciting picture of what it is like to do a mentor’s job, and what kind of educational pathway they need to take to follow a career in their industry; connect to what students are learning in the classroom, demonstrate real-world challenges professionals have to wrestle with, and are fun and exciting.

1.1.2 The PASOS² Value Proposition

By design, the PASOS² initiative promotes collaboration among educators, the business community, the community at large and workforce development entities at all levels. Given the nature of this initiative, the collaborative effort has met with minimal resistance. The collaborative effort is specific to the Borderplex region launching new and innovative STEM proficiency with implementation practices and resources (including how best to leverage technology). It helps align STEM initiatives in the region all with the intent of creating a scalable model that can be used across the region, as well as, in other Hispanic communities in the U.S.

The strategic intent is to have the PASOS² drive a community commitment to STEM as an E4 regional imperative (i.e., education, economic development, employment, and entrepreneurship) aligned to the recently completed Borderplex regional economic plan (Borderplex, 2016). The value proposition for this PASOS² commitment is to deliver leadership, focus, direction and energy to a coordinated regional focus on STEM talent development. Where the initiative succeeds is in creating a scalable implementation model for STEM talent proficiency. Then PASOS² will have a positive effect on aspiring students not only within but outside the El Paso region.

What is the value proposed by the PASOS² initiative for introduction and expansion in the Borderplex community (Moreno & Silva, 2016)?

For the MENTOR....

- broadening the mentor's capacity to coach, advise, and influence future student leaders
- learning through a technology-driven system how best to deliver meaningful mentorship
- providing tangible tools and experiences to nurture student success
- accessing best practices through mentor training to optimize the mentoring experience
- guidance in nurturing and directing the mentor relationship with the student protégé
- enabling mentors to give back and experience a deep satisfaction in sharing and guiding
- reflecting on mentor success by sharing personal accomplishments

For the STUDENT....

- receiving personalized guidance through relationships with one or more mentors

- accessing professional knowledge and experiences key for the education to workforce transition
- obtaining timely counsel enriching student academic, college, career, and life readiness
- enhancing student grit, self-confidence, and readiness with a technology-based platform
- providing timely mentor advice, insights, and perspectives tied to student-specific interests/ needs
- expanding a student's personal network of contacts and empowerment agents
- modeling for students themselves how to play a future role as a mentor role-model

For the BORDERPLEX COMMUNITY....

- improving retention rates of participants at the STEM high school program and stem post-secondary level programs
- enhancing graduation rates in STEM related careers in the El Paso region at the post-secondary levels impacting the State of Texas 60 x 30 post-secondary completion target
- feeding the STEM degree “majors” opportunity pipeline at the college level with local talent
- formalizing a parent advocacy group in our community as leaders for the STEM advocacy program
- expanding a mentorship network of professionals ready to influence higher education, entrepreneurship, community service and regional pride; and,

- promoting the next generation of STEM leaders with a stronger economic base that would be willing and able to carry the region to the next level of prosperity.

1.2 Overview of the Literature Review

The literature review detailed in Chapter Two is outlined into the following two major categories:

1. The literature related to the topic and informing the research regarding the challenges, reality and driving forces of Hispanic participation in STEM careers. This includes the emerging edu:eco systems, the social capital challenges facing Hispanics, the US STEM educational policy reform forces, ‘grit’ as a dynamic shaping STEM readiness, and the nature of mentoring systems as it relates to those focused on community mentoring in STEM for Hispanic students.
2. The literature related to the discourse and/or controversy surfacing in the movement related to attracting more Hispanic participation in STEM careers. This includes the discourse of whether the STEM focus is necessary, as well as, whether the ‘grit’ focus is essential and viable for improving student achievement and enhancing the college-going mindset.

1.3 Overview of the Research Methodology

The case study research method is employed as the framework to investigate this unique community-based PASOS² pilot strategic initiative. Researcher Yin (2003) defines the case study research method as ideal to investigate a contemporary phenomenon within its real-life context. “In general, case studies are the preferred strategy when “how” or “why” questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context” (Yin, 2003, p. 1). The case study

approach has evolved as a mature, effective research approach in a variety of disciplines and settings including educational reform (Creswell, 2012; Soy, 1997; Tellis, 1997; Yin, 1994; Zainal, 2007).

The case study methodology was selected as the best approach to investigate and help inform what mentor experiences and innovative strategies can best build, expand, sustain, and optimize an effective community-wide network of empowerment agents or mentors (Yin, 1994). Given that the overarching intent is to significantly expand the pool of K-12 Hispanic students pursuing a STEM career, understanding the perspectives from community mentors (typically adult professionals, educators, and parents) is critical to this research study. As one of several key players driving the formation and development of this community-driven initiative, the author's insights regarding the planning, implementation, and evaluation of the PASOS² is further facilitated.

Soy's (1997) case study approach was selected as the framework for this dissertation study. It effectively integrates the pioneering work of Stake, Simons, and Yin to using case study as a research method and outlines six key steps (Soy, 1997). These process steps are described in Section 3.1 contrasting how these steps were aligned by this dissertation.

A comprehensive contrast highlighting Soy's key case study research design points and how this dissertation approach is compared and aligned to Soy's profile is presented in Chapter 3. In addition, a triangulation research strategy is also presented as part of the research methodology addressing research validity and garnering additional study insights.

1.4 Overview of Key Analytical Models

Several analytical models are introduced as part of the case study: the mentor value equation, the community mentor opportunity pipeline, a triangulation approach, and a "tactics of

collaboration” model. These tools assist in the analytical discussion of the results and findings of the case study.

The mentor value equation is represented as a mathematical expression of four key variables for effective mentoring of students pursuing a STEM career derived from my previous research (Moreno, 2015a). Feedback was provided from both UTEP Top Ten students who have successfully completed their course of study in engineering and those community mentors they identified who played a significant role in their journey. Four key elements or variables surfaced as critical to mentorship success including: 1) building sound mentor and mentee relationships; 2) demystifying college and STEM; 3) providing career guidance; and 4) contributing to the student’s academic, college transition, career, and life readiness portfolio. This mentor value equation model formed the basis for the creation of the PASOS² mentor curriculum, as well as, the community mentor feedback design for this research study conducted via surveys and interviews with community mentors in assessing what matters most to them.

The second analytical model, the *community mentor opportunity pipeline*, is an adaptation of the popular opportunity pipeline models used in the business sales funnels and customer relationship management (CRM) systems world. The pipeline is used in identifying suspects, prospects, buyers, and customers (Lawrence & Buttle, 2010). The version adapted for this study includes a community mentor opportunity pipeline model characterizing community players as mentoring suspects, prospective community mentors, adults committing to become mentors, and finally those engaging as PASOS² Program trained mentors. The community mentor opportunity pipeline model surfaces a continuum of mentor engagement stages from casual, informal mentoring profiles to value-focused STEM mentorship advocacy with capable and competent community mentors.

In addition, a *triangulation research strategy* is introduced in this study as part of the research methodology designed to strengthen the overall validity and credibility of the data collected and inferences reached. Triangulation means using more than one method to collect data on the mentoring topic through the use of multiple strategies for data collection. The purpose of triangulation is to inform the results and inferences from the use of different dimensions in the community mentoring cycle.

Finally, the “*tactics of collaboration*” model is introduced as a collaborative framework of stages to map the inferences and conclusions reached regarding the results of the community mentoring engagement (or lack thereof). Meaningful and substantive engagement of community mentors is predicated on this hierarchy of collaboration from community empowerment agents.

1.5 The Research Purpose and Question Guiding This Study

Woefully disproportionate low numbers of Hispanic students are pursuing STEM careers in the State of Texas (Change The Equation, 2017). For example, less than 22% of underrepresented minorities in Texas earn an engineering degree or certificate. In the author’s opinion, this is due primarily to the lack of student awareness, understanding, preparation, and readiness to pursue STEM career opportunities. Community mentors can play a critical role in demystifying and advocating for STEM careers to Hispanic students and families. Community-driven programs that enhance and sustain community mentorship capacity and competency are vital for the region to prosper.

This pilot study presupposes that preparing mentors with knowledge, best practices, tools, and a game plan for mentoring will build a supportive and sustainable relationship that has value and meaning in helping young people consider, pursue, and graduate with a STEM degree. The value for students, community mentors, and the community is outlined in Section 1.1.3. Note

that by definition most STEM careers require post-secondary credentials or degrees; therefore, advocating for STEM careers inherently is promoting a college going mindset (Change The Equation, 2014).

The following research purpose and key research question seeks to garner an insightful understanding of how to optimize a meaningful 2-way relationship among community mentors working with Hispanic students to encourage STEM careers:

Research Purpose: To surface what matters most to community mentors in their decision to engage and develop their competency and capacity to effectively serve as mentors to students considering STEM careers.

Research Question: How can a formal community mentoring system be beneficial in attracting, developing, and sustaining community mentoring talent?

Included in the critical inquiry of this case study is understanding the following related supplementary questions:

- a) What matters most to community mentors in enticing and preparing them to engage as mentors with students? Why do community mentors commit to mentoring students? What value do they propose to bring to students?
- b) What are the community mentor's expectations, apprehensions, and familiarity with the PASOS² program?
- c) How is addressing the readiness (capacity and competency) of community volunteers important for effective mentorship including advocating for STEM, fortifying student readiness, and using a technology-based platform?
- d) What factors do community mentors determine to be important in building strong mentoring relationships with students?

- e) Do community mentor participants believe the PASOS² program has value and how does it serve a useful purpose in furthering STEM advocacy to Hispanic students?
How is this manifested?

This case study surfaces the key issues, challenges, and opportunities in attracting, preparing, and sustaining STEM-focused community mentors. The introduction of a technology-based mechanism for interaction with their students is the EduGuide software described in Section 2.1.4. Its purpose is to impact the nurturing of a personal and professional value-driven perspective among mentors (Smith, 2013). The very nature of the PASOS² project being civic community-based will help inform and expand other community efforts to invest in building Hispanic student social capital.

1.6 The Significance of This Research

Communities across America are rethinking their economic competitiveness by focusing on how they can best develop the necessary workforce talent tied to their specific economic engines. In the 21st century, regional workforce development programs must include STEM employment opportunities (Change The Equation, 2017). Employers are weighing in what they are looking for in new college graduates by emphasizing career pathways are not just about choosing the "right" major and getting a good job, but that long-term professional success will depend far more on acquiring the right skills for a rapidly changing workplace (AACU, 2007).

Educators and employers alike recognize that future talent development in any community warrants the integration of both the demand (employer) and supply (education) sides with leadership in each willing to accept the challenges of educational achievement gaps especially for the STEM fields. Given that underrepresented minorities—blacks, Hispanics, and American Indians—are less likely than whites to attend college or to graduate (NSF, 2013), how

does a community increase the Hispanic college-going mindset and pursuit of STEM careers as part of its economic prosperity plan? The robust nature of its mentoring systems is key to any community-driven endeavor focused on building student readiness.

A helpful model to understand the ‘value chain’ for STEM proficiency with successful STEM education program implementation is outlined in Figure 1.2 constructed as an adaptation of Berman’s education policy implementation model (Berman, 1978). This Berman model adaptation includes both the stages and what key actors are influencing STEM talent proficiency from both the supply and demand sides. These actors are responsible for setting education policy that influences local adoption, local practice that eventually helps to build student STEM social capital. This value chain model is influenced by personal experiences with the implementation of multiple STEM related educational reform initiatives at the primary, secondary, and higher education levels over the course of 20 years (Moreno, 2014b).

There is a need to quantify, learn from, and address the lack of meaningful STEM career awareness, exploration and preparation learning opportunities in K-12 education.

Understanding the nature of these relevant relationships and experiences will fortify the school and home structure. This will enable the network of parent, teacher, and community empowerment agents to collectively and effectively promote and influence the pursuit of STEM careers by the next generation of students.

Further research and practice on mentoring relationships especially for the Hispanic student population in the context of STEM career advocacy is needed. This is best supported by Hansman’s (2002) argument for more educators and adults to be involved in the planning, study and implementation of mentoring relationships:

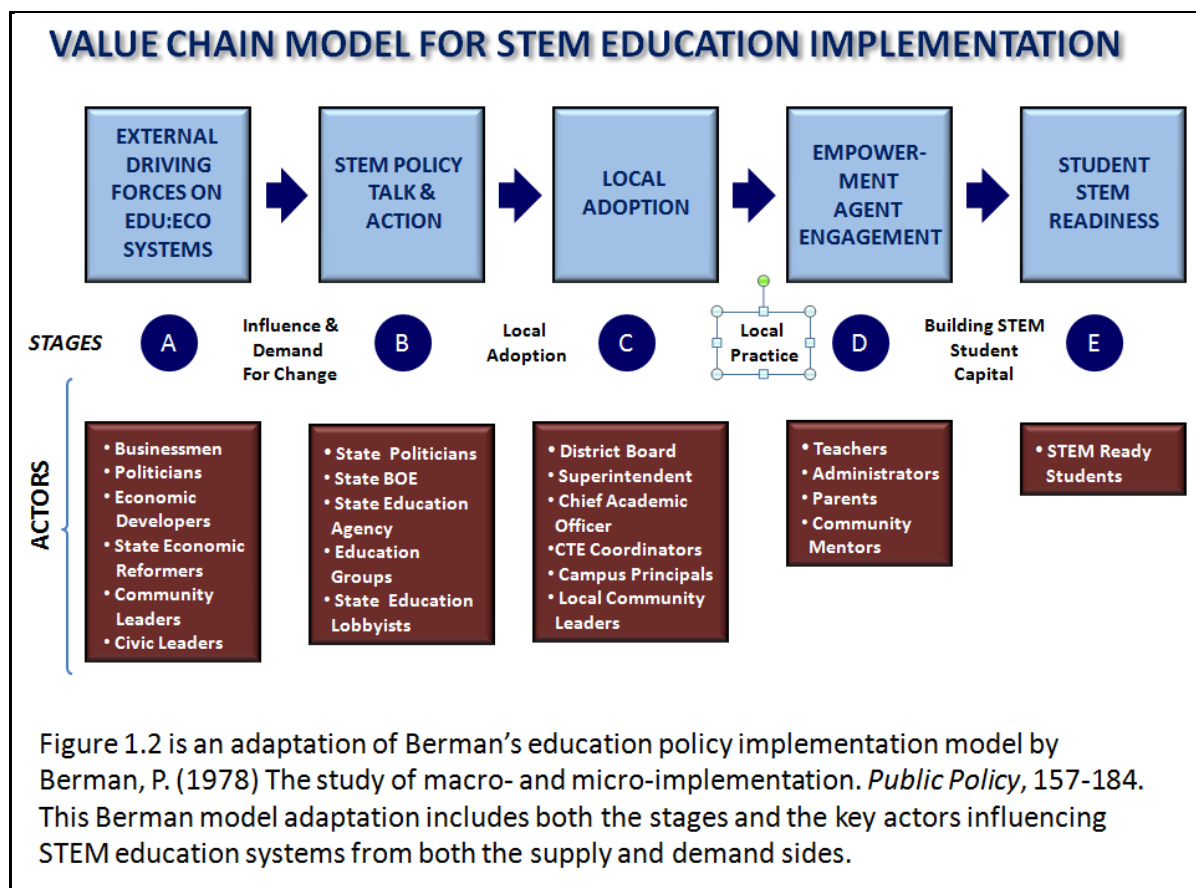


Figure 1.2. The Value Chain Model for STEM Education Implementation

I believe that mentoring relationships can be helpful for all involved – mentors, protégés, and sponsoring organizations and institutions. Mentoring relationships can be powerful and life-changing events in people’s lives. Practitioners should become active researchers concerning mentoring relationships and programs, adding to the research base as they work to improve mentoring practices. (p. 52)

This examination and rethinking of mentor and student relationships warrant changes in how community leadership can address the Hispanic STEM career achievement gap critical to this nation’s sustained innovation and competitiveness. The PASOS² mentoring initiative is designed to significantly increase this empowerment agent pool of community STEM savvy mentors.

The case study research methodology enables a researcher to go beyond the quantitative statistical results and understand the behavioral conditions through the actors’ perspectives. By

including both quantitative and qualitative data, the goal of a case study is to help explain both the community mentoring process and outcomes through complete observation, reconstruction and analysis of the case under investigation (Tellis, 1997). As a researcher playing a primary participant role in the implementation of the PASOS² mentoring initiative, the author's intentions from this case study are to:

- leverage his role as a civic leader and community insider by doing research in my own familiar community setting;
- generate usable, local knowledge through a community-based participatory process that contributes to impacting social justice and prosperity changes through mentoring;
- provide feedback of local knowledge to enrich the STEM talent pipeline in the Borderplex environment;
- create transferable scholarship to other communities with large Hispanic populations in the U.S. seeking to increase student participation in STEM careers;
- apply 30+ years' experience in continuous improvement initiatives and consulting expertise (i.e., Total Quality Management -TQM, Six Sigma, Continuous Process Improvement - CPI, Lean, Continuous Innovation or Continuous Improvement -- CI, etc.), to the education environment (ASQ, 2016)ac;
- deepen his own reflection as a practitioner towards problem-solving and professional development of self and others helping students in their pursuit of STEM; and,
- satisfy his '3rd career' professional passion to positively enrich the STEM talent pipeline in the Borderplex community.

1.7 How the Chapters Are Organized

This dissertation is organized into the following sections:

- **Chapter 1. Introduction** - The rationale and focus of this directed case study includes an introduction to the PASOS² Mentorship initiative, its genesis, purpose, and value propositions. An overview of the literature review, research methodology, analytical models and significance of the research is presented.
- **Chapter 2. Literature Review** - The key findings of the literature review inspiring and impacting this dissertation research is presented including research informing the investigation, as well as, related literature surfacing the movement of attracting more Hispanics to pursue STEM careers.
- **Chapter 3. The Methodology** - This chapter outlines the proposed research approach and methodology including the key actors in the pilot case study. The research approach, considerations, and analytical frameworks are also highlighted. The logic model framework and anticipated results are outlined.
- **Chapter 4. Data and Results** - The results of applying the research strategy includes the data collected, feedback provided, and analysis results of four data gathering tools used to understand the community mentor experience and what matters most to them in their decision to engage. This includes the opportunity pipeline and triangulation results.
- **Chapter 5. Findings, Conclusions, and Recommendations** - The final chapter highlights the findings and inferences from the results reported in the previous chapter. The observations lead to the conclusions of the case study including the lessons learned and recommendations to communities wishing to implement community mentoring. In addition, recommendations for future research studies are outlined.

- **References / Glossary / Appendix / Vita** - The bibliography and other supportive material are presented.

1.8 Chapter Summary

Three introductory anecdotal experiences introducing this chapter highlight the value of mentorship in the STEM arena. This chapter introduces the case study approach for the implementation of a unique community-driven mentoring program (PASOS²). This approach to community mentorship is a collaborative of a civic community and K-12 players in an effort to promote STEM careers among K-12 Hispanic students. Focused on what matters most to community mentors, this case study explores the *empowerment agent* (community mentors) quest to impact, influence, increase, and bring value to Hispanic students' pursuit of STEM careers. Given the minimal community mentorship committed to developing meaningful social capital support systems especially in Hispanic communities, this community mentoring initiative provides students with critical access to empowerment agents connecting STEM community “enablers” supporting aspiring students.

Case study analytical methods and principles are introduced to examine whether or not a formal mentoring system with a value-driven mentoring curriculum matters in attracting, preparing, and sustaining community mentors to advocate for STEM careers to Hispanic students. Analytical models such as the mentor value equation and the community mentor opportunity pipeline are introduced helping to correlate mentor capacity to building student relationships, demystifying STEM, delivering career guidance, and fortifying student readiness.

The chapter outlines the PASOS² program initiative, its value propositions, and an overview of the literature review approach, research methodology, as well as, the research purpose and question. The significance of this research study is underscored.

CHAPTER 2: LITERATURE REVIEW

“Never forget that your greatest potential value isn’t in your leadership; it’s in your ability to take people with leadership potential and help them become successful.”
(Maxwell, 2008, p. 253)

This chapter outlines the literature review that is categorized into two distinct themes as depicted in Figure 2.1.

1. Section 2.1 presents the literature related to the topic and informing the research regarding the challenges, reality and driving forces of Hispanic participation in STEM careers; and,
2. Section 2.2 summarizes the literature review related to the discourse and/or controversy surfacing in the movement related to attracting more Hispanic participation in STEM careers.

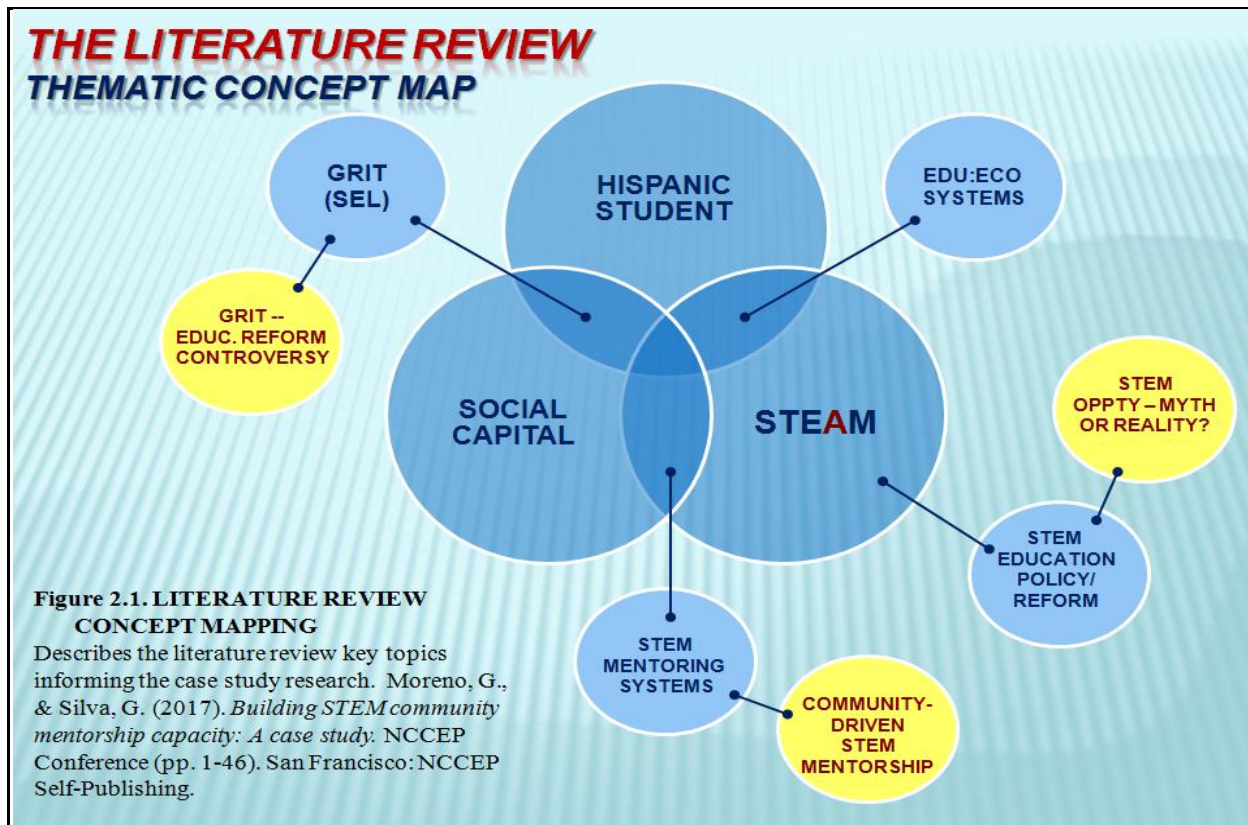


Figure 2.1. Literature Review Concept Mapping

2.1 Key Literature Review Related To the Topic

Understanding the community mentoring dynamic includes characterizing the mentoring process of how mentor enablers encourage and guide students in their learning and development. The importance of mentoring is producing regional talent with tangible competencies ready to pursue their career aspirations and realize their potential. The role of PASOS² as a sustainable, formal mentoring initiative is paramount to establishing STEM as a regional imperative aligned with regional, state and national STEM movements. The literature review surfaced the need to understand the following key drivers that impact Hispanic participation in STEM careers:

- a. the emerging community edu:eco (education:economy) bedfellows in STEM community advocacy;
- b. the social capital challenges for Hispanics pursuing STEM;
- c. the U.S. STEM educational policy and reform forces impacting students;
- d. ‘grit’ – the non-cognitive dynamic shaping education and reform and Hispanic STEM readiness; and,
- e. The building of community-driven STEM mentorship systems

The most significant articles shaping the development of both the “value mentor equation” and the proposed research framework are highlighted below. Be aware that Latino and Hispanic terms are used interchangeably in the literature.

2.1.1 Edu:Eco Literature

The symbiotic dynamic of education impacting economic development in a community, and vice versa, is growing exponentially with progressive communities forging integrated supply: demand initiatives in growing numbers across the U.S. (StriveTogether, Inc., 2013). Communities such as Dallas / Ft. Worth have defined a cradle to career (C2C) framework to

facilitate how empowerment agents can affect access by students to a continuum of pertinent K-16 educational experiences tied to their workforce development strategies and their local economy (Commit! To Dallas, 2014).

Alvarez presents a social justice framework argument for tapping the STEM potential of Latinos (Alvarez, 2012). It is centered on encouraging Latino students to enter STEM fields and preparing more educators to teach STEM subjects (Cohen & Manion, 1986). To do this a social justice advocacy model is presented by Alvarez as key to advocating for the rights of students and educators alike and presents the National Education Association (NEA) as an example of promoting education as a human and civil rights issue. If America's economic prosperity is tied to innovation (NCEE, 2007) , protecting social justice rights of Latino students as a critical mass of talent can optimally address the U.S. STEM challenge. Policy and investments in teacher preparation, mentor programs, and cultural diversity programs for all teachers is cited by Alvarez as essential. Alvarez applies this social justice framework to argue that if America seeks to retain its innovative edge, it will need to invest wisely to reap the rich potential of its Latino students.

Kania and Kramer (2011) argue that large scale social change requires a new approach to cross-sector coordination. As it relates to communities wanting to reform their educational systems tied to their economic prosperity goals, they argue that classical models of stakeholder collaboration produce *isolated impact* to solving social issues that are much more complex in nature. They argue that large-scale social change comes from better cross-sector coordination rather than from the isolated intervention of individual organizations – very common in the non-profit sector. Specifically, non-profits, governments, business, and the public must be brought together to create collective impact. This collective impact model involves a more centralized infrastructure, a dedicated staff, and a structured process that leads to a common agenda with

shared metrics, continuous communication and improvement. Their work does an excellent job of contrasting examples of both collaborative versus collective impact based initiatives.

Kania and Kramer (2011) outline the key ingredients to shifting from an isolated impact model to a collective impact model requiring a systemic approach to social impact that focuses on relationships between all organizations embracing shared objectives. This framework includes five conditions for collective success: common agenda, shared measurement systems, mutually reinforcing activities, continuous communications, and backbone support organizations. Kania and Kramer (2011) reinforce these conditions by presenting four practices fundamental to substantive social change: a) take responsibility for assembling the elements of a solution; b) create a movement for change; c) include solutions from outside the non-profit sector; and d) use actionable knowledge to influence behavior and improve performance. It is their hope that these collective impacts will fortify the approach communities take to realizing significant and large-scale change.

Alvarez (2012) highlights the challenge facing the United States where there are more STEM jobs than there are qualified applicants. Data from the Bureau of Labor Statistics indicates that there will be 2.7 million new jobs expected in STEM sectors by 2018. However, the number of U.S. students, not just Hispanics, graduating from related STEM fields is nowhere near what it should be thus impacting both the economic and educational systems including the U.S. / Mexico Borderplex region. The STEM movement in the United States is reaching a crescendo of focus and support from both the industry and education sectors at the local, state and national levels in an effort to address America's ever-growing need for STEM professionals. However, Hispanic students pursuing STEM is sorely lagging (Change The Equation, 2017).

The OECD (2010) study covering the Paso del Norte region (now referred to as the Borderplex region) provides a model for the role institutions of higher education (IHEs) can play in the development of human capital and an economy specific to this region. This 2010 study incorporating the cities of El Paso, Las Cruces and Ciudad Juarez as a region is an attempt to influence and mobilize higher education for the creation of innovation systems to impact the development of economic, social, and cultural capital for this unique international region. The central thesis is the move from historical low wages to a knowledge-based economy (OECD, 2010, p. 75) recognizing the potential and opportunity to provide a viable path to improved regional prosperity.

This publication explores a range of helpful policy measures and institutional reforms to mobilize higher education for regional development. To that end, the framework for regional development is structured around a human development model where the ability to fuel local growth is done by cultivating relevant skills as the best guarantee for a region to thrive in the future. This framework is based on the theory that a region that wants to be globally competitive needs to have a highly skilled workforce supporting knowledge-based economy. As such, the Borderplex Region must break out of its low wage equilibrium by improving the educational attainment levels that widen its access to higher education and other post-secondary achievement.

Keys to realizing this edu:eco framework include building a wider portfolio of robust student data and how lack of academic achievement impacts the regional economics (Rodriguez, 2014). In addition, a comprehensive strategic plan for regional human development throughout the education pipeline from primary to tertiary education and beyond is imperative. Increasing the enrollment and success of first generation students with limited financial resources is critical.

It is suggested that multi-stakeholder, public-private initiatives focused on higher education attainment are needed. Incentive structures to encourage local development and entrepreneurship are vital to a specific, cluster-developed economy. Local school districts, as well as institutions of higher learning can assist many more future STEM students to be prepared for full engagement and contributions to the social, cultural, and environmental development of the Borderplex region.

2.1.2 Hispanic Social Capital Literature

Of the five literature research areas presented above, the aspect of the social capital deficit for Hispanics pursuing STEM has played the most significant dimension in the development of this dissertation study. The interview protocol (described subsequently in Chapter 3) was heavily influenced by the social capital literature, particularly by those focused on the social capital challenges and reality for Hispanic students. It is important to note here that the preponderance of the limited knowledge base concerning Hispanics and the impact of social capital related to STEM is found exclusively in the higher education context.

Gonzalez' (2013) provides a critical investigation of the role social capital and school structure play on Latino student academic success. A robust literature review on previous explanations for the failures of Latinos in academic achievement is presented contrasting these same explanations as failing to explain the success of other Latino students able to navigate the school structure. Not surprising, the way students are tracked impacts their access to school agents and other successful peer students leading to relationships that facilitate increased college access and social capital.

Gonzalez' (2013) provides a theoretical framework combined from three previous scholars: the use of Bourdieu's theory to explain how students with limited socioeconomic

means have limited social capital due to their class status and habits; Stanton-Salazar's theory that change agents who took an interest in student's lives help break the cycle of social reproduction; and Conchas' theory that school structures dictate the failure and success of students by the classes they are placed.

In addition, Gonzalez (2013) provides insights into how the school structure impacts Latino student success. He uses this lens to introduce his research question of how do school structure and social capital influence access to college information and resources for Latino students. Gonzalez (2013) cites a significant body of research explaining why Latinos experience challenges in accessing higher education to achieve academic success. Gonzalez (2013) bridges this discussion with the role of social capital and then is fortified by his treatise on how school structure impacts student success and failure. This framework is used to argue that much more research and investment is needed to understand and ensure Latinos have access to agents and peers who can provide the necessary social capital to access and graduate from college.

Perhaps the most important work influencing this dissertation is Stanton-Salazar's (2011) article introducing the social capital framework for studying institutional agents and their role in the empowerment of Latino low-status students and youth. Stanton-Salazar offers a social capital framework that highlights two principal phenomena: a) adolescent participation in multiple socio-cultural worlds, and b) the role of nonfamily adult agents in the social development and educational attainment of young adults across class and racial strata. He then draws on empowerment theory in critical social work as his basis to introduce the concept of institutional agent. This institutional agent is central to this framework and defined as an individual who "occupies one or more hierarchical positions of relatively high status and authority" (Stanton-Salazar, 2011, p. 1067).

Stanton-Salazar (2011) then applies this framework to four key application areas. He provides a contemporary perspective on student socialization and involvement with a variety of agents across different social-cultural worlds and institutions. He also introduces a framework that focuses on the role of institutional agents and their impact on social development and educational attainment with critiques upon social capital theory. Thirdly, the motivational and ideological characteristic of institutional agents is explored within empowerment theory drawn from the field of critical social work. Lastly, the capacity of institutional agents to empower others is discussed mapped against criteria for evaluating structure, resourcefulness, and network orientations of the agents. It is Stanton-Salazar's discourse on nonfamily adult agents and the capacity of empowerment agents to make a difference that is most profound. Stanton-Salazar's model for enriching student's social capital portfolio has certainly provided a formative impetus for Moreno and Silva's conceiving the PASOS² initiative.

Stanton-Salazar applies his framework to distinguish between social capital and social structure. He asserts that social capital is "primarily a mechanism of privilege and domination, precisely because it is embedded in hierarchical, integrated, and reproductive social structures." He introduces the process of empowerment including the concept of "empowerment agent" which has five characteristics (Stanton-Salazar, 2011, p. 1089) including:

- awareness of the social structural forces within society
- success of low-status students is contingent on systematic institutional support
- willingness to NOT act on established rules of social structure
- responsible for advocating and providing support
- motivation and a willingness to be identified as an agent for low-status students

Empowerment is both an “ideological and a sociological construct” fundamental to the pursuit of social justice. This framework is vital to understanding the Hispanic STEM achievement gap.

The quantitative study of potential predictors of Hispanic students majoring in and earning a STEM degree at Hispanic Serving Institutions (HSI) by Crisp, Nora, and Taggart (Crisp, Nora, & Taggart, 2009) examined demographic, pre-college, environmental, and college factors. Given the underrepresentation of Hispanics in STEM careers as the impetus, this study surfaced that little research has been conducted specifically on factors or variables associated with STEM degree graduation outcomes. Specifically, the article outlined the research question of whether significant differences exist between White and Hispanic students at an HSI institution predictive of decisions to major in STEM and attain a degree.

Crisp, Nora, and Taggart’s (2009) literature review presents a theoretical framework centered on defining the predictor variables based on Nora’s Student/Institution Engagement Model. This model theorizes that student interaction between themselves and their chosen major is influenced by several student characteristics, behaviors, and experiences that ultimately produce a connection between the student and the institution. This connection theoretically impacts and leads to persistence and degree attainment.

Using this framework, Crisp, et.al. (2009) highlighted empirical findings from the STEM literature that were used to describe key demographic variables (e.g., gender), pre-college factors (e.g., math and college-prep courses in high school), environmental pull factors (e.g., full or part/time status), and college variables (e.g., math and science course achievement in college). Guided by the theoretical framework, twelve (12) variables were selected using a logistic model to perform regression analysis for both Hispanic and White populations. Their conclusions were tied to the literature and gaps in the research cited the need for more theoretical and quantitative

models for assessing student success, particularly in STEM. Given the recent discourse on affirmative action pushback and the narrowing of academic achievement gaps, Crisp, et.al. suggest that HSIs may be a growing, important access point for Hispanics pursuing STEM fields.

2.1.3 STEM Educational Policy and Reform Literature

Policy and practice factors influencing the representation of Hispanic students in STEM majors are the focus of the Crisp and Nora article (2012). While recognition is made to the growing body of STEM research to date focused on predicting persistence and degree attainment, Crisp and Nora (2012) present a theoretical framework centered on students' interest in and choice to major in STEM. This framework outlines the conceptual framework of key influential forces including: K-12 academic experiences; cognitive factors; and socio-cultural factors. These factors all influence Hispanic student decisions to pursue STEM degrees and careers. They use this framework highlighting the literature to underscore the factors influencing the retention of Hispanic students in STEM majors including gender, environmental pull, attitudinal, and institutional variables.

Crisp and Nora (2012) then used this framework to outline recommendations in two areas: further research and policy/ practice. Additional research, they argue, needs to center on the factors that predict Hispanic student interest with new theoretical frameworks needed to explain Hispanic student decisions to major and persist in STEM. Regarding policy and practice, Crisp and Nora (2012) recommend an examination of the salient factors and influence of Hispanic student interest in STEM careers and their policy implications for higher education seeking to increase minority participation. Strategies include setting policy and practice for the role of family and peer influence, the role of institutional agents, early intervention, Hispanic

student participation and achievement at all educational levels, the role of community colleges and HSI's, and institutional benchmarking.

Changing the course of Hispanic participation in STEM with substantive changes in policy and expanding best practices is the topic of the White House Initiative for Excellence in Education for Hispanics (WHIEEH) article (Placeholder3). Lack of STEM representation is prevalent in Hispanics given that less than 2 percent of the STEM workforce is Hispanic while almost 20% of the country's youth population is Hispanic. Given that the WHIEEH has named STEM as one of its key priorities working with the White House, the theoretical framework is centered on creating measured interests in STEM fields to create a significant opportunity. The article outlines the WHIEEH's theoretical framework of how to ensure Hispanic engagement in the 21st Century U.S. workforce by expanding interest in STEM fields, diversifying the workforce, and exposing Hispanic students to STEM-focused education and careers at an earlier age. To that goal, the article highlights how the WHIEEH seeks to identify leadership in Hispanic STEM education initiatives, highlight the importance and benefits in Hispanic role models from the community, and amplify mentorship and scholarship opportunities.

While the article outlines how they hope to align itself to the 5-Year Federal Strategic Plan, a national strategy for advocacy, preparation, readiness, and financial support needs to be defined to leverage the potential talent Hispanics represent for the STEM talent shortfalls.

2.1.4 'Grit' Literature

The emergence of grit has seen a significant renaissance most recently as a key ingredient to success in not just Hispanic, but in all students' lives, especially with a recent culture that is 'getting soft' (Duckworth, 2016). Thaler and Koval (2015) underscore 'grit' as the fundamental

to “perseverance, passion, and pluck” in taking one from ordinary to the extraordinary (Thaler & Koval, 2015, p. 11). They define it as:

Grit is about sweat, not swagger. Character, not charisma. Grit has been equated more with methodical stick-to-itiveness and survival than any secret ingredient to success. Which is too bad, because for so many, grit is the secret to success. Grit is the result of a hard-fought struggle, a willingness to take risks, a strong sense of determination, working relentlessly toward a goal, taking challenges in stride, and having the passion and perseverance to accomplish difficult things, even if you are wallowing in the most difficult circumstances. (p. 13)

Self-control and grit are two related but separable determinants of success as presented by Duckworth and Gross (2014). In studying why some people are more successful than others, talent and opportunity are often cited. However, what is lacking is an integrative framework for understanding the requirements that influence different kinds of success regardless of talent or opportunity. Duckworth and Gross (2014) present two related determinants of success: self-control and grit. To understand their similarities and differences they employ a theoretical framework of goal hierarchy drawing on contemporary goal theory. They suggest that understanding how goals are hierarchically organized clarifies how self-control and grit are related but distinct.

While not explicitly defined in the article, they use this hierarchical goal framework to introduce how self-control predicts many consequential outcomes in addition to other factors such as general intelligence or socioeconomic status. They refer to this as “willpower” as the psychological processes that underlie self-control. Likewise, they apply the framework to grit predicting the completion of challenging goals despite obstacles and setbacks. Within this theoretical goal framework, self-control refers to the successful resolution of a conflict between two action impulses. Using the same hierarchical goal framework, grit entails having a dominant super-ordinate goal that is pursued with passion and perseverance over many years. The

distinction of self-control is coupled with everyday success, whereas grit is coupled with exceptional achievement over a much longer period of time. They argue that this framework approach advances the understanding of the related but distinct psychological mechanisms that underlie these two determinants of success. Relevant literature is cited for current perspectives with future direction for new research using this model outlined by Duckworth & Gross (2014).

A key component of the PASOS² Mentoring Program is the introduction of the EduGuide solution set of ‘grit’ software (EduGuide, 2016). This technology-driven application is an evidence-based online training program aimed at strengthening non-cognitive, core learning skills for students from middle schools to college grade level. It is introduced in PASOS² as a communications mechanism to facilitate mentor: student connections.

Supported by Duckworth’s research, EduGuide asserts that a student's “level of grit — the measurable ability to focus on long term goals and overcome obstacles along the way — is a better predictor of success in school and careers than IQ (EduGuide, 2016, p. 3).” A 2016-2017 student survey revealed the following top impact areas based on 473 student responses (EduGuide, 2017) showing growth or positive impact:

- More self-motivated (73%)
- More confident to achieve (68%)
- More curious to learn new things (66%)
- Listen better to feedback (65%)
- Encourage and mentor others (63%)

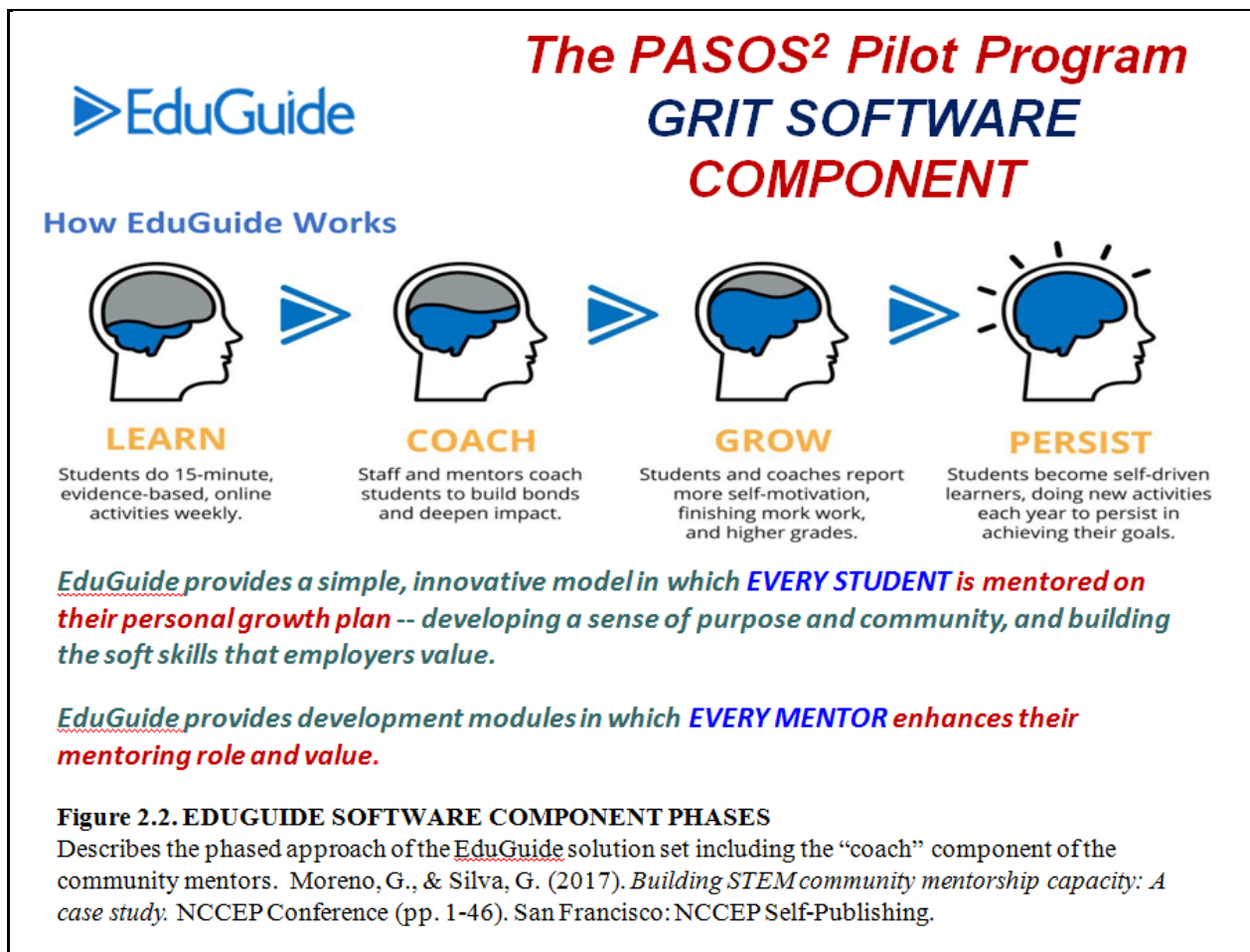


Figure 2.2. EduGuide Software Components

Students are presented EduGuide using SMART technology online activities for 15+ minutes weekly in class or advisory programs to help them engage, interact, grow, and persist in their learning and growth. Figure 2.2 provides that phases of EduGuide implementation focused on establishing strong student and mentor connections via non-cognitive online activities. Examples of these activities include introduction to topics such as passion vs. purpose, fixed vs. growth mindset, failure as an ingredient for success, dealing with change, and goal setting (EduGuide, 2016).

The EduGuide approach has students work with teachers and community mentors via an online virtual, asynchronous web-based application platform to develop their sense of purpose and passion, forging stronger bonds that make it easier for students to learn, explore, develop, and plan for success. The PASOS² premise is to use the EduGuide solution set to facilitate, structure, and expand the community mentor's influence in reaching out to more Hispanic students.

A more detailed discussion on the controversy addressing the use of 'grit' in the social emotional learning (SEL) in education can be found in Section 2.2.2 with the debate centered on whether grit can be developed and measured.

2.1.5 Mentorship and Mentoring Systems Literature

The knowledge base highlighting the benefits of mentorship and mentoring systems, in general, is ever expanding and underscores the potential value in creating and sustaining social capital for students during their educational journey (Jacobi, 1991). The research and discourse on the impact of mentoring on student success is centered primarily on academic achievement (especially at the higher education level) (Koskinen & Tossavainen, 2003; Beyene, Anglin, Sanchez, & Ballou, 2002; Girves, Zepeda, & Gwathmey, 2005; Philip & Hendry, 2000; Smith, 2004; Hansman, 2002; Stanton-Salazar, 2013). Studies primarily focus on the mentoring process and the mentor: student relationship pointing to the need to better understand the two-way expectations and dynamics of both roles in the mentoring relationship. The impact of social capital as a key ingredient for college success is presented as an opportunity to expand access for minority students. The predominant argument for mentorship value is encouragement of students to get to college, stay in college, and finish college.

Crisp's study (2010) on persistence at the community college level reveals how mentoring can significantly impact and influence the degree to which students become both socially and academically integrated into the educational pipeline. Crisp's (2010) research points to how student's intent to persist in their commitment to earn a college degree is indirectly influenced by mentorship.

Tinto's (1993) classic research on strategies to address student attrition calls for education institutional commitment for creating an inclusive environment in and out of the classroom addressing both academic and social life needs of underrepresented students. Tinto (1993) argues that in addition to a strong commitment to quality education by educational institutions, nurturing a strong sense of inclusiveness in the educational and social community on campus is key. This includes in Tinto's model not only strong classroom experiences but the development of learning communities to support mentorship at the campus level (Tinto, 1993).

Examining how students access and generate social capital during the mentoring process is important. Smith's (2009) mentoring system research is focused on access and retention issues at higher institutions. Smith's (2009) findings reveal that expectations from both mentors and mentees emerge from a belief that the mentoring relationship can provide or receive important access to key knowledge and resources during the mentoring process. This is significant for Hispanics seeking not only STEM careers, but any post-secondary education investment leading to a professional career.

Smith (2009) underscores that most mentoring systems use academic analytics to measure mentor program effectiveness; however, she contends that it is difficult to assess whether actual mentoring relationships versus academic support services, or a combination, are responsible for student achievement. A more rigorous evaluation process for mentoring programs

Smith (2009) argues is needed for designing a pre- and post-assessment of how much academic cultural capital and social capital students acquire through mentoring networks.

Researchers have provided insights for effective mentorship and supporting systems. An example, suggesting how a new lens might shape mentoring knowledge and practice is presented by Jones and Corner (2012). Their impression of the mentoring literature is that mentoring scholars often struggle to find a proper theoretical lens to explain the mentoring dynamics. Jones and Corner (2012) propose Complex Adaptive Systems (CAS) as a “potentially fruitful cross-disciplinary” perspective for mentoring. They introduce as their theoretical framework the key properties of systems theory and complexity science for arguing the CAS lens as relevant to mentoring research.

Jones and Corner introduce (2012) a useful CAS model as a lens in taking a new perspective for mentoring (see Figure 2.3) and as a way to configure the mentoring relationship between the mentor and the protégé in the context of organizational culture from each perspective. They apply this framework by presenting four specific benefits in applying a CAS lens approach. These benefits include: attention to the process of mentoring; the reconceptualization of context, the adoption of new methodologies, and fostering interdisciplinary conversation.

A rich discussion on potential research questions for mentoring using the CAS lens is presented highlighting CAS as a “natural fit with the mentoring relationship” (Jones & Corner, 2012, p. 392). For example, they argue the complex feedback loops between students, mentors, parents, and other professionals offer a mentoring systems view at CAS. They introduce complexity science as essentially that which limits knowledge in mentoring.

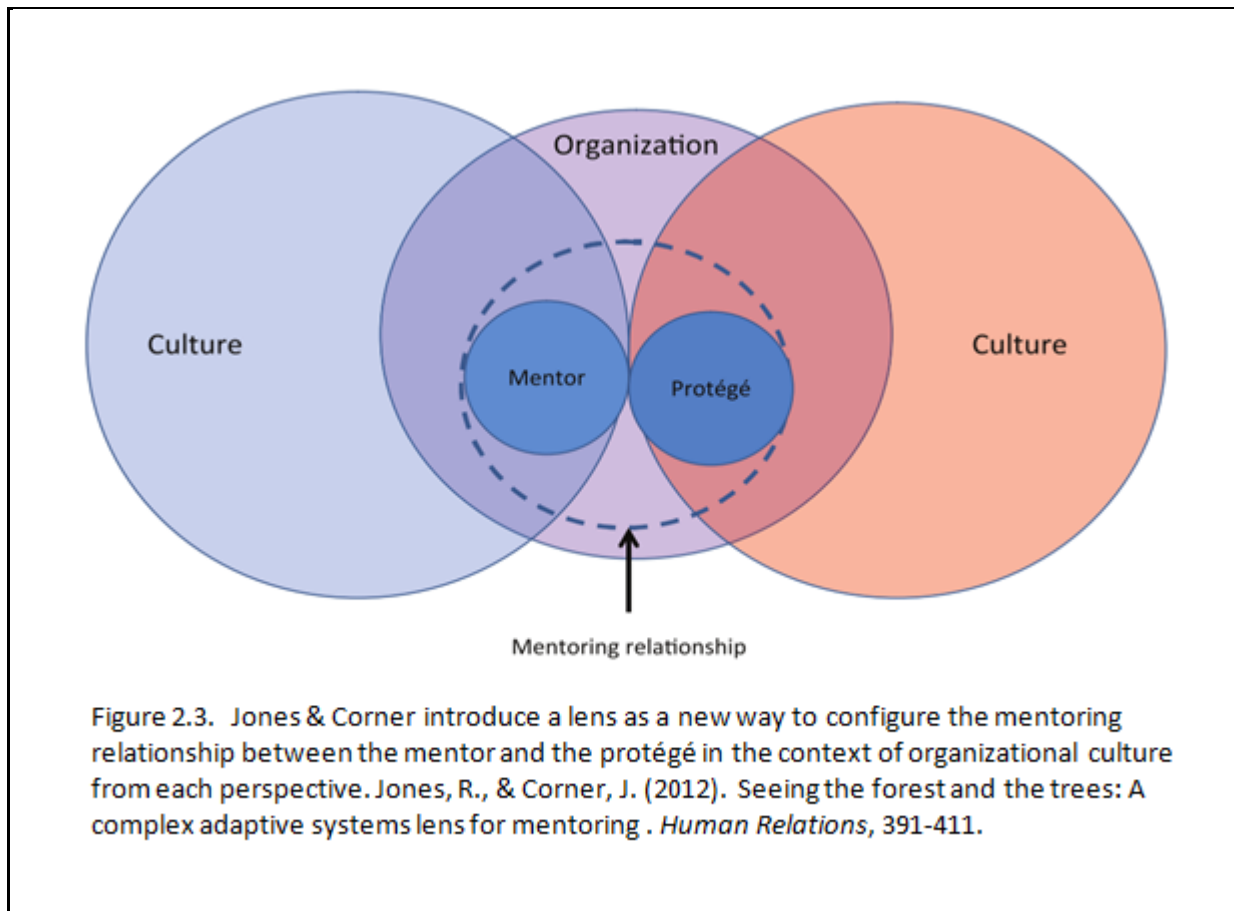


Figure 2.3. CAS Mentoring Model

The role of mentoring in college access and success is the focus of Coles' (2011) research. Given the people of color earning degrees at a rate much lower than other groups in the U.S., Cole's purpose is to distill and synthesize the scholarly research regarding mentoring with emphasis on the implications for practitioners. Mentoring is a valuable strategy in providing students with guidance and information whose aspirations are the pursuit of a college-going commitment. However, scholars continue to struggle to develop a common definition of the term "mentoring."

Coles' (2011) theoretical model centers on interpreting key research on mentoring systems that promote college access and success with an emphasis on providing practices that optimize the impacts of formal and informal mentoring. The theoretical model on effective

practices includes the dimensions of planning; mentor recruitment, training, and matching; service delivery; and program effectiveness.

Continued gaps in mentoring knowledge persist (U.S. Dept. of Education, 2014) especially as it specifically relates to Hispanics and STEM including: research on mentor's perspective and experience; the social capital functions of mentoring; and, the experience of mentoring over its lifespan (Jones & Corner, 2012). McHenry (1997) provided one of the first arguments for using mentoring as a tool for increasing minority participation in STEM.

The importance of cultural factors and Hispanic protégé expectations in mentoring relationships is the focus of Cox, Yang, and Dicke-Bohmann's (2014) article regarding mentorship systems. The reciprocal relationships between mentors and their protégés, particularly among minority students, are of prime interest. They proposed Kram's theoretical model of mentorship that included two key functions; psychosocial support and career support. They highlighted the importance of mentorship for Hispanic students and the effects of cultural factors for protégé expectations based on collectivism predicting wanting psychosocial support from mentors and collectivists also benefitting from psychosocial support. Their model explored whether Hispanic protégés' desire for particular mentoring behaviors moderates the effectiveness of these behaviors.

A hypothesized model relating protégé culture, mentorship expectations, mentorship behavior and protégé performance is presented testing quantitatively six (6) hypotheses for the desire for mentorship psychosocial support and role-modeling, power distance, mentor moderation, and protégé collectivism for psychosocial support and grades.

Zalaquett and Lopez (2007) present their review of stories from thirteen academically successful Latino undergraduate students and the role mentoring versus sponsorship played in

their lives. A qualitative analysis indicated that participants engaged in more informal mentoring experiences in which family members, teachers and counselors served as mentors. In contrast, sponsorship within the community provided primarily financial support and networking opportunities for the students. Mentoring and sponsorship both positively impacted the students' college endeavors.

Cox, Yang, and Dicke-Bohmann (2014) argue that mentoring programs for minority students struggle from sustainability. Long-term mentorship programs may benefit from exploring what types of mentorships the protégé desires and the protégé's expectations of the mentorship experience. They report the effects of dysfunctional mentorship and the importance of moderating the fit between mentor and protégé. Their theoretical model proposes that the effectiveness of mentorship systems depends on the protégé's desire for the mentor to provide such practices. They argue mentors should only provide role-modeling if the protégé desires it.

Mentoring system objectives and structures vary widely (Smith, 2009). There are a very limited number of existing mentoring programs that focus on STEM and the Hispanic population in the K-12 arena. For example, the HENAAC MentorNet program (ACM, 2015) is a social network for mentoring tailored specifically to college students pursuing degrees in STEM fields including computer science. However, this program is primarily focused on mentoring college students during the summer months and is designed only for a single one-to-one mentor: protégé relationship. It does not provide K-12 mentoring support as its focus for future STEM students. This is where the PASOS² differs in that it is intended to support students from elementary, middle, and high schools in their transition to college.

2.2 Literature Review Related To Problem Areas

Two areas of the literature search addressed further discourse related to this study: 1) whether the STEM focus is necessary, and 2) whether the ‘grit’ focus is essential and viable for improving student achievement and enhancing the college-going mindset.

2.2.1 STEM Opportunity Movement – Myth or Reality?

Some pros and cons regarding the STEM movement in the U.S. have surfaced in the media. This calls for a deeper understanding of what is driving the virtues of STEM advocacy at the national, state, and regional levels. What are the realistic opportunities for employment and entrepreneurship for the next generation? Is STEM a fad?

What is driving the growing call for STEM talent at the national level? The U.S. national STEM movement and focus on globalization have centered on the importance of sustaining U.S. global competitiveness driven by its technical legacy of innovation and creativity in STEM and especially in the field of engineering. Canton (Canton, 2006) best describes the new ‘innovation economy’ and how the workforce of the US is becoming more multicultural, more female, and more Hispanic (Canton, 2006). He underscores why the future US workforce must embrace innovation to sustain its global competitiveness. Finding the talent for high-tech STEM-skilled employees will be a continuous and great challenge in incorporating innovation as a key driver for future U.S. competitive advantage.

In its seminal “Tough Choices or Tough Times” report on the skills for the new American workforce of the future, the National Center on Education and the Economy (NCEE, 2007) highlighted the high level of preparation in reading, writing, speaking, literature, history, and the arts will be an indispensable foundation for the future workforce. The report underscores the competitive nature of pursuing talent where the “best employers the world over will be

looking for the most competent, most creative and most innovative people on the face of the earth and will be willing to pay them top dollar for their services. Those countries that produce the most products and services can capture a premium in world markets that will enable them to pay high wages to their citizens.”

What are the opportunities in STEM for the next generation including Hispanics? Given the driving forces outlined above, the reality is the U.S. is graduating fewer engineers despite the rising need necessitating a rethinking of STEM education and expanding student career awareness, exploration and preparation at all levels in the education pipeline. The Converge Magazine (Napier, Nichols, & Roscorla, 2009) surfaced that the number of engineers graduating from U.S. colleges is going down at a time of growing technological competition from the Pacific Rim and other countries. There is mounting concern for addressing problems involving energy, the environment, sustainability, and infrastructure requiring innovative engineering solutions. The magazine provides insights for what the “world will look 20 to 30 years in the future,” highlighting the World Future Society prediction of the following ten (10) breakthrough technologies that will transform life as we currently know it: alternative energy, desalinization, precision farming, biometrics, quantum computers, entertainment on demand, global access, distance learning, nanotechnology and smart robots.

In a parallel effort, the U.S. National Academy of Engineering (NAE) announced in 2008 *Fourteen Grand Challenges for Engineering In The 21st Century* (Adkins, 2008). A diverse committee of experts from around the world convened at the request of the U.S. National Science Foundation to reveal fourteen (14) challenges that, if met, would improve how we live. The final choices fall into four themes that are essential for humanity to flourish --sustainability, health, reducing vulnerability, and the joy of living. The challenges include how to make solar

energy affordable, provide energy from fusion, develop carbon sequestration methods, manage the nitrogen cycle, provide access to clean water, restore and improve urban infrastructure, advance health informatics, engineer better medicines, reverse-engineer the brain, prevent nuclear terror, secure cyberspace, enhance virtual reality, advance personalized learning, and, engineer the tools for scientific discovery.

Why the push for STEM in the State of Texas? Texas has become increasingly engaged in addressing growth of its global economy dependent on skilled and knowledgeable workers (THECB, 2015). The Texas Higher Education Coordinating Board (THECB) asserts that:

For Texas to solve problems and address public concerns now and in the future, the state must have a large workforce with the insight, skills, and knowledge to push it forward. This workforce must be educated and able to adapt and compete at the highest levels to maintain a strong state economy. All forms of postsecondary attainment will ultimately be critical to advancing the state's STEM-future success (THECB, 2015, p. 5).

The goals of the 60x30TX (THECB, 2015) higher education strategic plan rolled out in 2016 underscore that by 2030, Texas will need approximately 60 percent of its 25- to 34- year-old workforce to earn a postsecondary credential. Given that the state's 25-34 year olds are increasingly Hispanic, inclusion of underrepresented student populations in higher education will be critical to this plan's success.

At the state level, the STEM movement is taking a stronger hold in education policy and education legislation reform activity. Texas Education Agency's (TEA) House Bill 5 (HB5) passed in 2013 included a "STEM endorsement" option for high school students impacting how districts are providing (or getting ready to offer) STEM programs and academic services at all grade levels (TEA, 2014). Statewide interest groups such as Educate Texas (Educate Texas, 2014) are driving the growth of STEM academic programs primarily at the middle and high school levels (Educate Texas, 2014). District improvement teams (DITs) and campus

improvement teams (CITs) are starting to reflect STEM initiatives and must continue to engage educators, professional staff, parents, community, and business leaders per state site-based decision-making and/or local policy (TEA, 2010).

So what about the STEM push at a community regional level? A fascinating example of regional education and economic (edu:eco) forces is the Borderplex region composed of the tri-cities: El Paso, Texas; Las Cruces, New Mexico; and Ciudad Juarez, Chihuahua. The ever-increasing confluence of economic development entities led by the business sector and working with school districts offers new prospects for supply and demand side integration connecting regional education policy reform to meet employer needs. Several formal consulting studies in the past ten years have underscored the need for the development of a new regional economy that focus on driving high-tech, high-skills, and high-wages with focus on addressing the Hispanic cohort (Feser, 2011; NCHEMS, 2007; OECD, 2010). To drive this new economy, the Borderplex (Borderplex Alliance, 2013) and the CREEED organizations (Rodriguez, 2014) have been formally organized and offer greater opportunities for matching the future STEM workers with employment opportunities in support of its new regional and international economy. In fact, the CREEED 60x30EP Report introduced to the El Paso community calls for “quantum improvements in building academic, college transition, career, and life readiness skills” as business and economic inflection points for the new economy (CREEED, 2017).

With China gaining on the U.S. in the global economic leadership race, the United States economic engine, while still currently a global leader, is ever dependent on the development of its future talent. Thirty countries in fifty-six industries (covering business services, energy, financials, food and tobacco, health care industrials, materials, retail, technology, transportation,

and wholesalers) compose the late Global 500 with the U.S. having the most companies (134) and the most diverse mix. China is heavy in energy, utilities, and banks (DeCarlo & Rapp, 2016).

CEOs of major U.S. corporations echoed in a survey that the skills gap is real and is a significant problem. They assert that most open jobs will require STEM skills, but that those skills are in short supply (Change The Equation, 2014). Dr. Vince Bertram is President and CEO of Project Lead the Way (PLTW), a nonprofit organization that provides a transformative learning experience for K-12 students and teachers across the U.S. specifically in the STEM arena. His organization has experienced an exponential growth demand to serve teachers and students. He has testified before the U.S. House of Representatives the tremendous shortfall in American talent calling STEM a crisis in America (Bertram, 2014). Alvarez underscores the importance of tapping into the Hispanic talent pool to address the STEM needs (Alvarez, 2012).

2.2.2 Addressing Grit –The Controversy in Educational Reform

Duckworth's (2016) seminal West Point study of why some cadets managed to survive "beast barracks" while others just gave up, introduced a 'grit' metric predictive of who would make it through the grueling program (Duckworth, 2016). Duckworth (2016) proposed two big ideas: that grit, comprising a person's perseverance and passion, is among the most important predictors of success and inner grit can be self-developed. The popularity of this old-fashioned phenomenon has introduced rapid, wild-fire efforts to incorporate and integrate 'grit' into every facet of the education system, from curriculum development to personal development.

However, controversy is emerging regarding how 'grit' is being used and introduced to students at all grade levels. Key questions being debated on 'grit' are focused upon: 1) can 'grit' be realistically developed in students; 2) can 'grit' be measured; and 3) what is the research on growing 'grit' (Engber, 2016)?

The ‘church of grit’ has grown so rapidly in the past few years that even Duckworth has been calling for a pause. In Grit: The Power of Passion and Perseverance, Duckworth (2016) offers approaches to fostering grit at school, home, and in the workplace. However, Duckworth does admit there is lack of solid research in “growing grit.” Kamenetz (2016) cites two recent studies where they find that “grit has little predictive value of its own (as compared with conscientiousness or other personality factors). But the analyses reveal something else: while differences in grit can be explained in part by the students’ genes, they cannot be explained by shared environmental factors. In other words, there’s no evidence that the differences in how treating kids today—the standard range of parental styles and pedagogic modes—are doing much at all to grow (or shrink) their grit (Kamenetz, 2016).

Yet another new report suggests that we should all take a step back and chill. “Grit is only moderately correlated with performance and retention,” says Crede asserting that “grit as it is currently measured does not appear to be a particularly predictive of success and performance (Crede, Tynan, & Harms, 2016, p. 35). It is important to note that the EduGuide ‘grit’ software is a component of the tools introduced in the PASOS² Program. It is not the intent of this study to address or assess the viability of the EduGuide software in building or measuring grit. The software tool is presented as a mechanism for community mentors to interact with students as an online tool.

2.2.3 Implications to Community-Driven STEM Mentorship

There exists an expanding base of research addressing each topic highlighted in the literature search variables: edu:eco dynamics, social capital challenges for students of color, STEM policy and reform, ‘grit’ for student achievement, and mentoring systems. Specifically, the literature research underscores:

- a. the social capital deficit for Hispanics pursuing college or STEM is a major opportunity to address through mentoring;
- b. community education partnerships are emerging for joint STEM career advocacy key to driving talent for regional economic plans;
- c. the U.S. STEM educational focus surfaces as new opportunities for Hispanic students necessitating college readiness (ACT, 2013);
- d. technology-driven solutions are shaping the non-cognitive dynamic of addressing Hispanic college readiness; and,
- e. the building of community-driven STEM mentorship systems is a relatively new dynamic for Hispanic communities

However, the confluence incorporating these topics as integrated variables (e.g., understanding the role of mentorship in advocating STEM to Hispanics as an economic development strategy) is woefully missing in the literature. This represents real and significant opportunity for research and understanding of how these emerging and interrelated forces impact the development of the next generation of Hispanic student STEM talent. Understanding what role viable community mentorship capacity and competency within this multi-variate reality will be critical to ensuring the next generation of Hispanic students has the necessary social capital to pursue STEM careers. The economic prosperity of any region depends on this -- especially true for the Borderplex Region.

2.3 Chapter Summary

Two major categories of the literature review are presented in Chapter 2: a.) the literature related to the topic and informing the research regarding the challenges, reality and driving forces of Hispanic participation in STEM careers; and, b.) the literature related to the discourse

and/or controversy surfacing in the movement related to attracting more Hispanic participation in STEM careers.

The first category underscores the growing trends of edu:eco systems bringing the business and education community closer to addressing student readiness for 21st century competitiveness. Also presented is the reality of the social capital challenges facing Hispanic students and families. While STEM is on the K-12 education radar, the U.S. STEM educational policy reform faces many challenges including how STEM education does not have the curriculum, tools and competent STEM educators. More recently, ‘grit’ is a dynamic shaping student readiness as they transition towards their life endeavors. The building of STEM mentorship systems, or lack thereof, represents a critical resource for any community to invest.

The second category in the literature review highlights the discourse and/or controversy relevant to the movement of attracting more Hispanic participation in STEM careers. This includes the questions of whether STEM is necessary, as well as, whether the ‘grit’ focus is necessary and effective in improving student achievement and enhancing the college-going mindset. The overwhelming evidence is that STEM is critical for US and regional competitiveness and while measuring ‘grit’ education and its effects is difficult, it is a useful component of preparing students for their future success.

CHAPTER 3: METHODOLOGY

“A mentor empowers a person to see a possible future, and believe it can be obtained” (Hitchcock, 2015, p. 1).

The case study research methodology, design components, process approach, and anticipated study data and results are presented in this chapter. Included is a logic model tied to the research objects profile including a description of the setting and key players (actors) in the PASOS² initiative. The genesis of the PASOS² initiative is outlined including the pilot implementation phases. Connections to the two analytical models of the ‘mentor value equation’ and the ‘community mentor opportunity pipeline’ are described as mechanisms for a better understanding the community mentoring engagement dynamics.

3.1 Case Study Research Design Methodology

This study was designed with a research approach to investigating both qualitative and quantitative data on the key issues, challenges, and opportunities in attracting, preparing, and sustaining STEM-focused community mentors. The findings of this study illuminate key mentor challenges and inhibitors that contribute to improving mentor capacity and competency development through viable community mentor development best practices and processes. Implementing strategies to continuously improve community mentorship allows the researcher to work with a group of people to learn and identify problems by gathering and analyzing data for subsequent improvements. Of particular interest in this study is what is significant in the minds and attitudes of community mentors’ tied to their impact, influence, and value to students considering and pursuing a STEM career.

From the vast variety of qualitative research methods, the case study research method is the most pertinent and applicable to illuminate the lessons derived from implementing the PASOS² initiative (Creswell, 2012; Soy, 1997; Tellis, 1997; Yin, 1994; Zainal, 2007). Yin

defines the case study research method as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used” (Yin, 1994, p. 23).

The case study research method informs what innovative strategies matter most to community mentors in how to best build, expand, sustain, and optimize an effective community-wide network of empowerment agents. Case study research is ideal for the process of looking, thinking, acting, and improving community-based initiatives such as PASOS² (Yin, 2003).

3.1.1 The STEM Mentoring Capacity Logic Model Framework

Anderson (2015) describes the theoretical aspects of qualitative research identified as the implicit theory of knowledge focused by a disciplinary orientation as the lens through which one is viewing the study. The logic model proposed here captures the view of the approach to a theory of planning, action, results, and value as to how case study principles are applied to create knowledge from the investigation and my participation in the PASOS² initiative.

All aspects of research design are affected by the logic model that is specific to the research and outlines what orientation or lens the researcher is taking to connect the body of literature to the study problem statement and eventually its explicit investigation and analysis (Creswell, 2012). The lack of a clear, concise logic model makes it impossible to bridge the study data, analyses, and its interpretation for a definitive continuous improvement plan of action inherent in the research cycle. The logic model is designed to outline the problem to be investigated and answer my specific research question from a community mentor specific point of view. What sense we make of the data is not only influenced by the body of knowledge but inherently identifies how the study shapes the existing action and the new body of knowledge derived from the study of this course of action. The researcher’s role in this study requires an

alignment of the proposed logic model framework (Green, 2013) with the proposed data collection strategies including the community mentor interview protocol.

Which definition of the logic model framework is being applied to this study?

Recognizing there is no definitive universal agreement among research scholars (Creswell, 2012; Green, 2013; Kitchel & Ball, 2014; Merriam, 1998; Sinclair, 2007) regarding the definition and application of conceptual frameworks or logic models, Merriam's (1998) approach to frameworks in qualitative research centered studies is most appropriate and applied here.

Merriam defines a conceptual/ logic model as the set of questions to be answered by the research problem. The literature review shapes this research problem – difficult to imagine a study without a conceptual logic model framework. The framework provides a lens to a researcher's disciplinary orientation generating the 'problem' of the study, specific research questions, data collection, analysis and interpretation. Merriam presents a simple, yet useful picture of three interlocking frames: the outermost being the body of literature (what is known, the disciplinary orientation, and the gaps in knowledge); the middle frame defining the problem to be addressed by the study; and the third frame defining the exact purpose of the study.

As a result of the project planning process and recommendations, a mentoring capacity and competency building logic model is introduced (See Figure 3.1) having as a center piece the formal mentor value-driven curriculum. The STEM Mentoring Capacity logic model presented in Figure 3.1 is used to establish a theory of action for the PASOS² mentoring initiative and identifies the process and components that are critical elements to achieving the goals and outcomes of the PASOS² program (Moreno, 2016). This logic model framework serves to connect the key relationships between the planning, acting, observing, and reflecting components inherent in the implementation cycle. It highlights the collaborative partnership of the 'Insiders'

(CEA STEM professionals) and the ‘Outsiders’ (the recruited and trained community mentors). Both partners are dedicated to deliver and improve the outcomes listed in the logic model as value propositions. This includes short-term and long-term expected outcomes from both a community mentor and a future STEM student perspective highlighted as value propositions in Section 1.1.3.

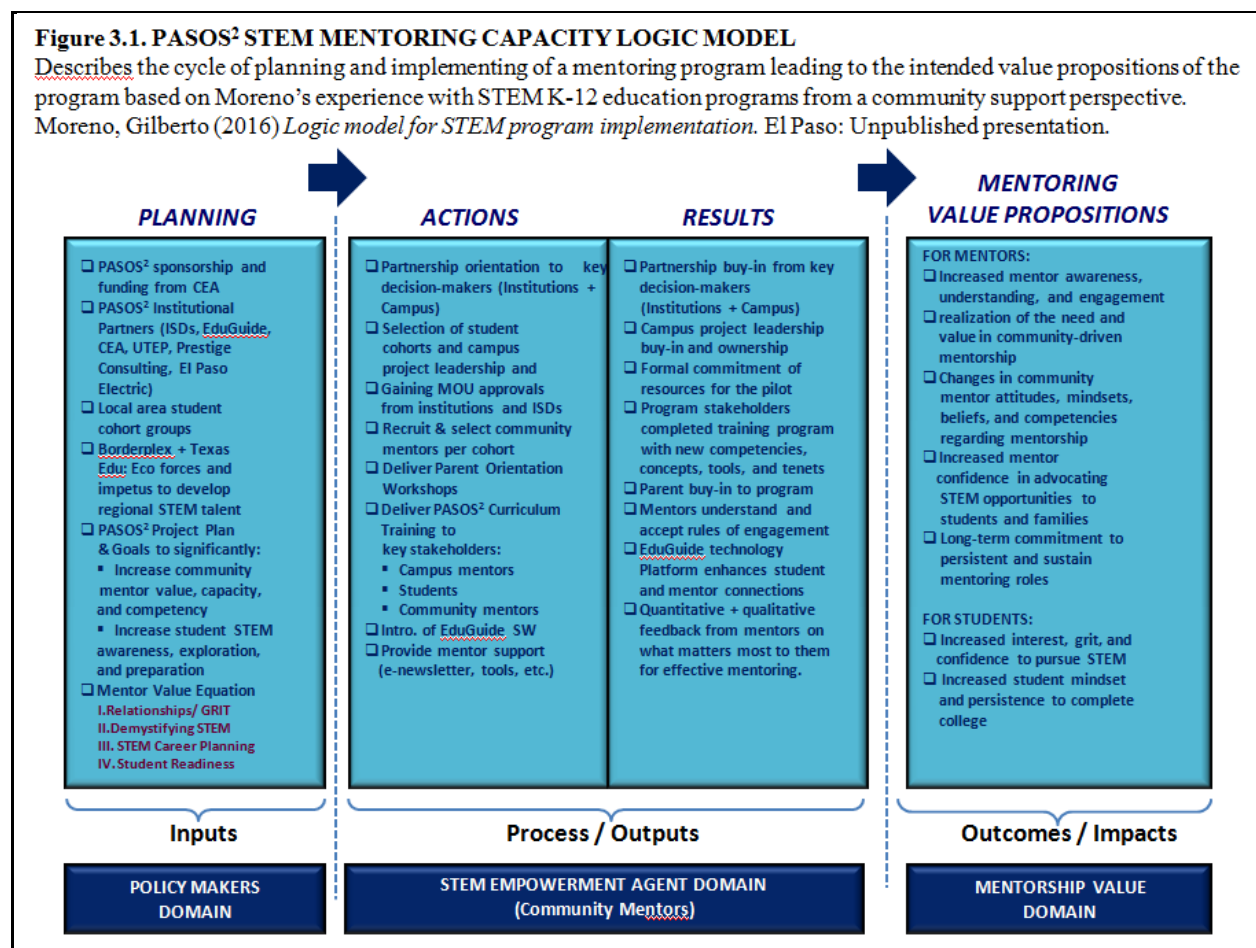


Figure 3.1. PASOS² STEM Mentoring Capacity Logic Model

While state and local policymakers drive STEM focus local district investment and resources, it is apparent that empowerment agent mentoring capacity will be needed to guide students. Community mentoring systems can and must have lasting impact on the attitudes, mindsets, beliefs, and proposed values for increasing Hispanic student engagement and social

capital enrichment. The outcomes of a sound mentoring program can best be measured by Hispanic student readiness with a larger pipeline commitment to pursue a STEM career.

3.1.2 The Case Study Research Objects Model

The genesis of the PASOS² initiative has evolved during the past 6-7 years from the CEA STEM Committee activity focused on making STEM a regional priority for the Borderplex region. Figure 3.2 (Moreno, 2017a) outlines the driving forces and research objects key to understanding the inherent role community mentors play (or must play) in transforming the Borderplex regional STEM talent pool. Starting at the bottom of Figure 3.2, the progression of the key driving forces include the following components:

- Regional Workforce Talent Needs – A series of studies in the region over the last decade echoed the need for the STEM push at a community regional level. Several formal consulting studies of the Borderplex region in the past ten years underscored the need for the development of a new regional economy that is focused on driving high-tech, high-skills, and high-wages with focus on addressing the Hispanic cohort (Bertram, 2014; Feser, 2011; NCHEMS, 2007; OECD, 2010). To drive this new economy, the Borderplex (Borderplex Alliance, 2013) and the CREEED organizations (Rodriguez, 2014) have been formally organized to offer greater opportunities for matching the future STEM workers with employment opportunities in support of its new regional and international economy .
- Regional Talent Opportunity -- A fascinating example of regional education and economic (edu:eco) forces in a unique international setting exists in the Borderplex region. The ever-increasing confluence of economic development entities led by the business sector (such as CREEED, CEA, the Borderplex Alliance, chambers of

commerce) and working with local school districts offers new prospects for ‘supply and demand side’ integration connecting regional education policy reform to meet employer talent needs. The young student talent in the region offers a great pool of talent for economic development. Five of six industry clusters in the Borderplex Economic Plan call for STEM certified and degreed talent (Borderplex, 2016).

- Empowerment Agent Capacity and Competency – Given the surging emphasis in creating high-tech, high-skill, and high-tech talent in the region, the need for community mentors working with educator mentors is growing exponentially. In addition, the Texas Education Agency’s (TEA) House Bill 5 (HB5) passing in 2013 included a “STEM endorsement” option for high school students impacting how districts are providing (or getting ready to offer) STEM programs and academic services at all grade levels (TEA, 2014).
- Mentorship System – The Texas Education Agency introduced the College and Career Readiness Standards (CCRS) (TEA, 2009) focused on specifying “what students must know and be able to do to succeed in entry-level courses” in post-secondary institutions. These set of CCRS standards reinforce the need for student preparation in the areas of academic, college, career, and life readiness and apply to the development of STEM readiness competencies necessary to pursue a successful STEM career. The demand for mentorship systems to support students with focus on STEM advocacy is ever-growing, given the number of STEM schools, programs, and campuses in the school districts citing STEM as an academic focus. The introduction of the PASOS² initiative with focus on building community mentoring is key to meeting the needs of the regional student population.

- Impact Value Propositions – The purpose of the PASOS² initiative is to transform the pool of the Borderplex STEM talent aligned with the needs of employers in the region. This case study underscores mentor motives and motivation to engage. The Borderplex strategic plan calls for the development of a ‘quality workforce’ aimed at increasing regional prosperity at all levels of the economy.

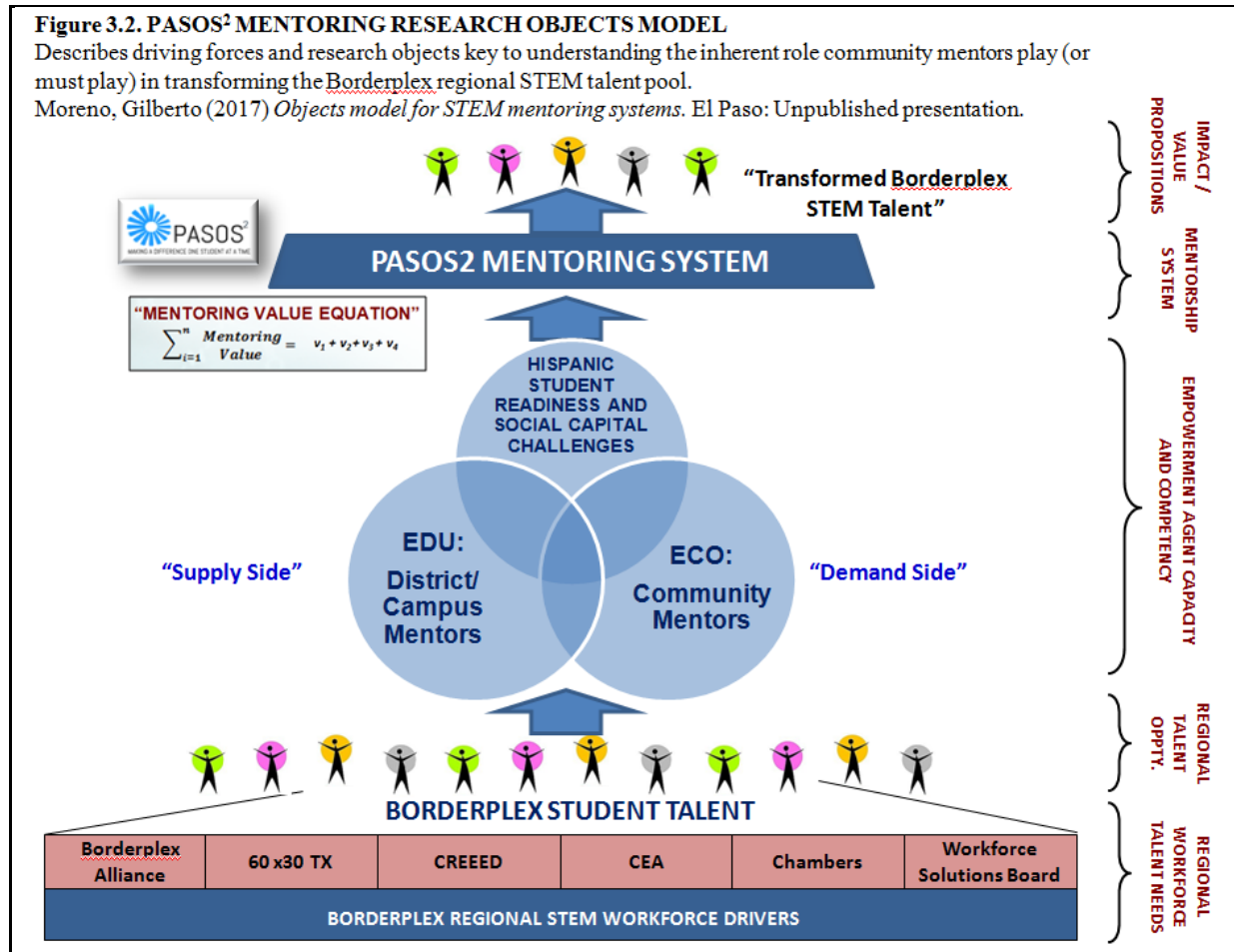


Figure 3.2. The PASOS² Mentoring Research Objects Model

3.1.3 The Case Study Research Design Rationale

The nature of research design and methods includes the common denominators of 1) emphasizing description of direct experiences, 2) specifying conceptual framing open to the ‘what and why’ of those experiences, and 3) presenting a nexus where theory and practice are

interactive (Preissle, 2006). As one of several CEA member players leading and driving the formation and development of the PASOS² community-driven initiative, the nature of the case study design leverages the first-hand access, knowledge and acquisition of skills and experiences as the greatest value for the mentorship scholarly knowledge base (Preissle, 2006).

The research design is a case study qualitative and quantitative method approach that explores the stages of PASOS² implementation outlined in Section 3.2.1. It surfaces the impact of community mentor capacity-building PASOS² model's adoption, practice, advocacy and roles are played by key empowerment agents (namely community mentors). It characterizes how empowerment agents' roles are defined, shared, understood and embraced at the onset of the introduction of a PASOS² mentoring program. Why is this important? The growing gap of Hispanic students pursuing a STEM career is argued as a missed opportunity for American competitiveness interests (Change The Equation, 2017).

Consistent with the Berman-type model discussed in Chapter 1, this study explores what policy issues will surface and evolve and what decisions are needed to effectively integrate community mentor support into a STEM program enrichment framework. This influences the determinants and decision points of those involved in STEM advocacy programmatic policy decision-making in a community that must be aligned with the best interests of the students in mind. This case study employs different methods of quantitative and qualitative data collection in its design. These characteristics should be seen “as points in a continuum rather than opposites” with the choice “fitting the approach to your audience and relating the approach to your experience” (Creswell, 2012, p. 26). The data collection tools include a group reflection on the value of mentoring, followed by two pre-training and similar post-training quantitative survey instruments (described below). Finally, a multivariate, multi-dimensional data

framework based on the mentor value equation is used for a follow-up qualitative method interview with empowerment agents for further interpretation of mentoring experience. The pre-training quantitative survey is conducted to assess empowerment agent attitudes, concerns, and expectations, prior to completing the PASOS² mentoring curriculum. Upon completion of the PASOS² training curriculum, a similar post-training survey is conducted to make a comparative study against pre-training data results of the empowerment agent attitudes, mindset and disposition to engage in STEM career advocacy and mentorship with students.

A basic research assumption for this study based on over seven (7) years of STEM implementation and support experience with school districts at the primary and secondary education level, is that most potential STEM empowerment agents (including educators) are ill-equipped, mal-informed, or just unaware of the opportunity and value helping Hispanic students pursue STEM careers as a rewarding career choice. The use of qualitative and quantitative methods makes sense for the experimental results by contrasting the community mentors as actors and their motivation and capacity to engage and advocate for STEM careers at the primary and secondary school level. The follow-up interviews and documented analysis were designed to further explain the results of the training focused on assessing agent PASOS² mentoring experiences regarding building student STEM career readiness requirements, providing resources available, and expanding student learning opportunities.

Today, little is known about how preparation and training affect the attitudes, psyche, and willingness of community mentors to advocate for STEM career pursuit to Hispanic students (Change The Equation, 2017). The experimental findings in the quantitative phases guided the interview protocol components of the qualitative phase with empowerment agent interviews explaining and extending the findings of the PASOS² curriculum and support services.

Research Setting

PASOS² is a volunteer program focused on building community-driven mentor capacity by leveraging technology to enhance student grit, self-efficacy and self-determination in the students' pursuit of college and STEM studies. The program used an outreach strategy to attract energetic, giving community individuals willing to share their wisdom, expertise, and support with the next generation of future STEM professionals and community leaders. This included introductory presentations at companies, civic organizational meetings, one-on-one selling of the idea, and presentations to university student organizations. A sign-in sheet from these presentations of the mentoring "suspects" was used to invite individuals via emails to the scheduled community mentoring training workshops. A specific effort was made to attract professionals from the private and public sectors conversant in STEM and who are female. Outreach to the El Paso Electric Company and other engineering firms through the contacts in CEA resulted in attracting a cross-section of mentors including a majority who were females. A synopsis of the actual outreach activities are outlined in Table 4.2. The resultant demographics of the community mentor profile of those who volunteered are outlined in Figure 4.3.

Through an introductory set of topics, community mentors who signed up for the training were asked to complete a five (5) module curriculum that outlined the rules of engagement, key background information, program value propositions, mentoring best practices, and directions on how to register with the 'grit software' online system used to interact with engaging students. The research was conducted with the community mentors at the training workshops conducted onsite or later captured online for the website training option offered in the spring. El Paso Electric Company training facilities were used for the workshop training. The mentors agreed to a code of conduct and rules of engagement as part of volunteering process. Any community





mentor that expressed interest, whether they were STEM proficient or not, were accepted into the program.

Two schools of student cohort groups were presented for the community mentor to volunteer to deliver their magic of mentoring. This included the new Young Women's Leadership Academy (YWLA) of 7th graders in the Ysleta Independent School District and 6th through 8th graders from the Henderson Middle School Chess Club in the El Paso Independent School District. These schools were selected from an original list of seven prospects based on the assessment criteria of levels of district support, principal leadership, ties to STEM, and a willingness to support the mentoring concept and program. These two schools constituted 148 students trained in the EduGuide software and participated in the "meet & greet" sessions. The YWLA campus is a new campus in the Ysleta Independent School District opened in 2016 to a girls' only cohort focused on building an academic learning experience in STEM and student leadership proficiency.

The Henderson MS Chess Club had both genders represented as part of this very successful after school program producing national chess champions. This campus was of particular interest due to its location in a low economic sector of the community, but with a recent history of student achievement and success in the world of chess. The obvious connections of playing chess to the mathematical and scientific readiness needed in STEM was apparent and intriguing to the project team.

The primary actors including the sources of mentors are listed in Figure 3.3. The community mentor could select one or more cohort groups he/she wished to support as a mentor.

MAKING THE MENTOR: STUDENT PILOT CONNECTIONS

STUDENT COHORT	STUDENT COHORT SIZE	PRIMARY MENTOR COHORT SOURCE
 YISD – Young Women’s Leadership Academy (7 th Grade)	100 Students	 EPE Employees
 EPISD – Henderson Middle School Chess Club (6 th , 7 th , & 8 th Grades)	48 Students	 Community Mentors

Mentor Coverage Target: 1 Mentor To 9-10 Students

Figure 3.3. PASOS² STUDENT COHORTS AND MENTORING SOURCES

Describes the student group profiles and the primary targeted sources of community mentors.
Moreno, G., & Silva, G. (2017). *Building STEM community mentorship capacity: A case study*. NCCEP Conference (pp. 1-46). San Francisco: NCCEP Self-Publishing.

Figure 3.3. PASOS² Student Cohort Groups

3.1.4 Key Players in the PASOS² Case Study Research

The key players in this case study formed a collaborative team in support of the PASOS² pilot. While many empowerment agents can possibly play a mentoring role for any student, the focus of this case study is the community mentor. This confluence of actors is described below:

- **Community mentors** – volunteers from the community who are professionals in the workforce and interested in sharing their time, expertise, and wisdom with students. They range from STEM professionals such as engineers, scientists, technicians, college students, civic leaders, members of CEA, and STEM educators. This group is the primary focus of this case research study. These are the community empowerment agents who volunteer as mentors and complete the PASOS² Mentor training curriculum. In an effort to recruit STEM female professionals, the mentor recruitment centered on the El Paso Electric Company engineering and scientific technical

community of professionals and the UTEP student engineering organizations with high female participation. Interestingly, the outreach at the El Paso Electric Company attracted mentors from all functional areas including many non-STEM professionals who made excellent mentors. Their STEM knowledge was augmented by the STEM modules in the mentoring curriculum they completed. In addition, timely assistance from Dr. Peter Golding, Director of the CREATE Center for Research in Engineering and Technology Education, was paramount in successfully recruiting UTEP female engineering students.

- **Cohort K-12 Students (mentees)** – for this study, students from two campuses agreed to participate in the PASOS² pilot initiative: 6th through 8th grade students from EPISD’s Henderson Middle School Chess Club; and, 7th graders from YISD’s Young Women’s Leadership Academy, a new startup campus focused on STEM career advocacy and readiness. Both sets of student cohorts were trained and registered for use of the EduGuide software. A third cohort group, the Ysleta Education Foundation, originally defined for the pilot, did not participate due to changes in the organizational leadership with new priorities. The decision was made to reconsider possible participation next year.
- **Campus mentors** – These are the campus administrators, teachers, counselors, academic coaches, and librarians, who manage the student cohort groups and have responsibility and authority for campus decisions regarding the mentoring program. Appropriate campus personnel have been trained and registered for use of the EduGuide software. This group of mentors is not part of this case study investigation, only the community mentors.

- **CEA STEM Committee** – This committee is CEA’s internal sponsoring arm for the PASOS² pilot initiative and is composed of 9+ STEM professionals from a variety of engineering, utility, and consulting firms in the El Paso area. Their function for this pilot initiative was primarily advisory in nature for the pilot progress and subsequent programmatic expansion with updates provided in periodic committee meetings.
- **PASOS² Project Team** – the project implementation team composed of four seasoned STEM professionals with decades of community mentoring experience bringing a unique and rare perspective to the project and this research study. Their primary function for this initiative is described below.

Kemmis & McTaggart (2000) introduce a ‘collaborative model’ for research study focused on understanding what is achieved through the critically examined action of individual group members. They introduce the nature of the ‘insider/ outsider’ roles as part of a continuum of positionality where Stage 3 identifies insider(s) working in collaboration with outsider(s). For this study, the proposed insider/ outsider research teams driving the collaborative component is composed of an insider team of (9) CEA STEM Committee Members representing a cross-section of the STEM professional community and the CEA PASOS² Project Team of four which includes the researcher as an active participant. The outsider team members are the community mentors who are formally trained and incorporated into the mentoring system with specific assignments to student cohorts. By investigating with community mentors their perspectives, attitudes, and opinions regarding their mentoring experiences, this case study seeks to understand what model and processes matter most to mentors in optimizing their mentoring value to students (McTaggart, 1991).

The major roles and decision-making power and authority of the key insider/ outsider actors are profiled as follows:

- CEA STEM Committee (9+ Members)
 - Pilot funding
 - Pilot sponsorship
- PASOS² Project Team (4 Members)
 - Selection of pilot partners, players, cohort groups
 - Pilot program advocacy
 - Mentor recruitment and sponsorship
 - Planning, design, and review of drafts/ final products including mentoring instruments, tools, and deliverables
 - Facilitation of training and community mentor support instruments
 - Ongoing refinement of same products and deliverables
 - Formative and summative community mentor feedback and analysis

The PASOS² Team Collaboration Research Framework is depicted in Figure 3.4.

3.2 Research Design Components

This section outlines the research design components applied to the PASOS² implementation model including the planned phase approach. Two analytical models are introduced as part of the case study: the *mentor value equation* and the *community mentor opportunity pipeline*.

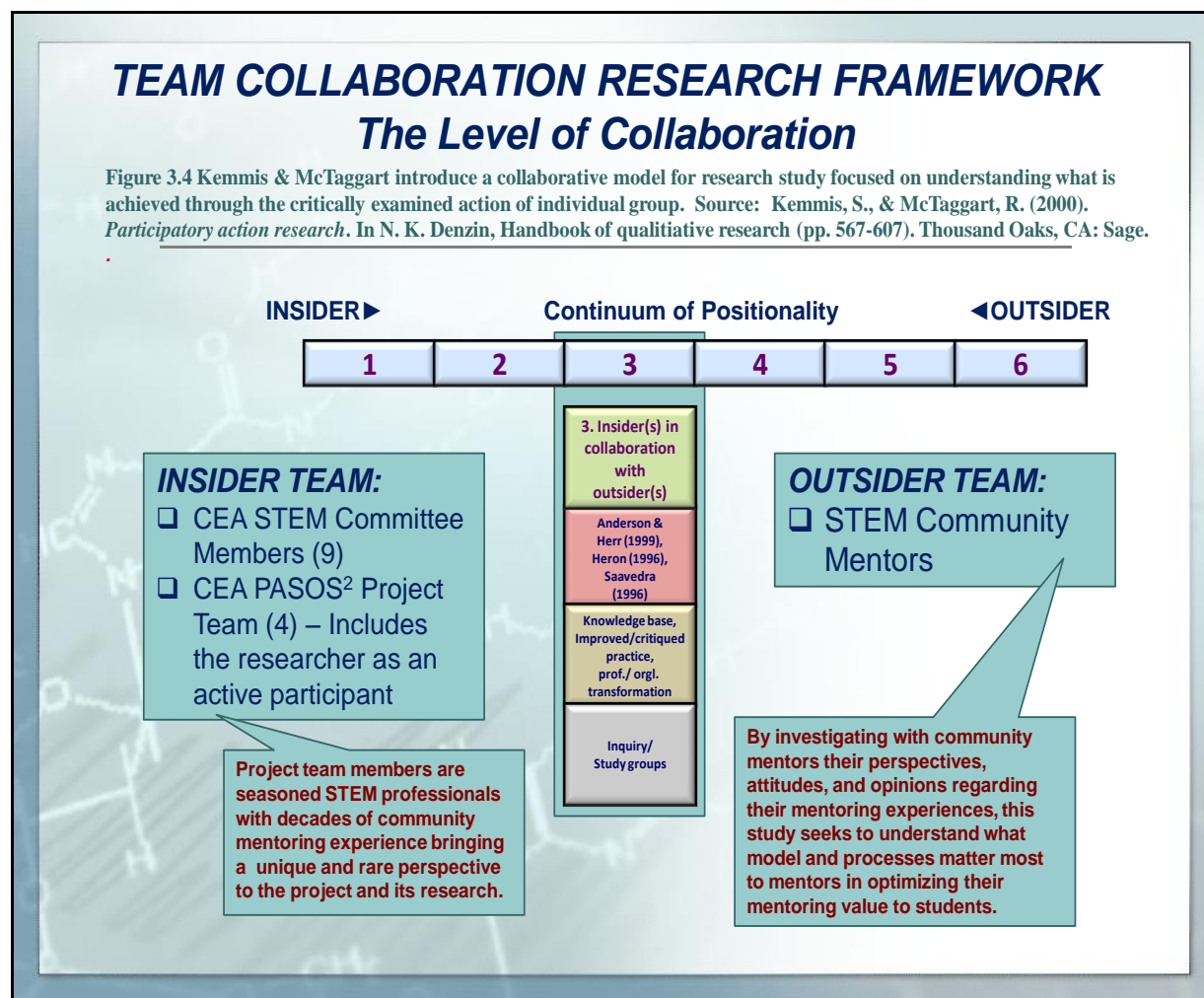


Figure 3.4. The PASOS² Team Collaboration Research Framework

3.2.1 The PASOS² Implementation Planning Model

The PASOS² Implementation Plan was developed as a pilot initiative for the 2016-2017 school year. This pilot was intended to learn how best to introduce a community-driven mentor capacity leveraging technology to enhance student grit, self-efficacy and self-determination in their pursuit of college and STEM studies. The pilot implementation approach included a phasing plan (See Figure 3.5) that guided the project team.

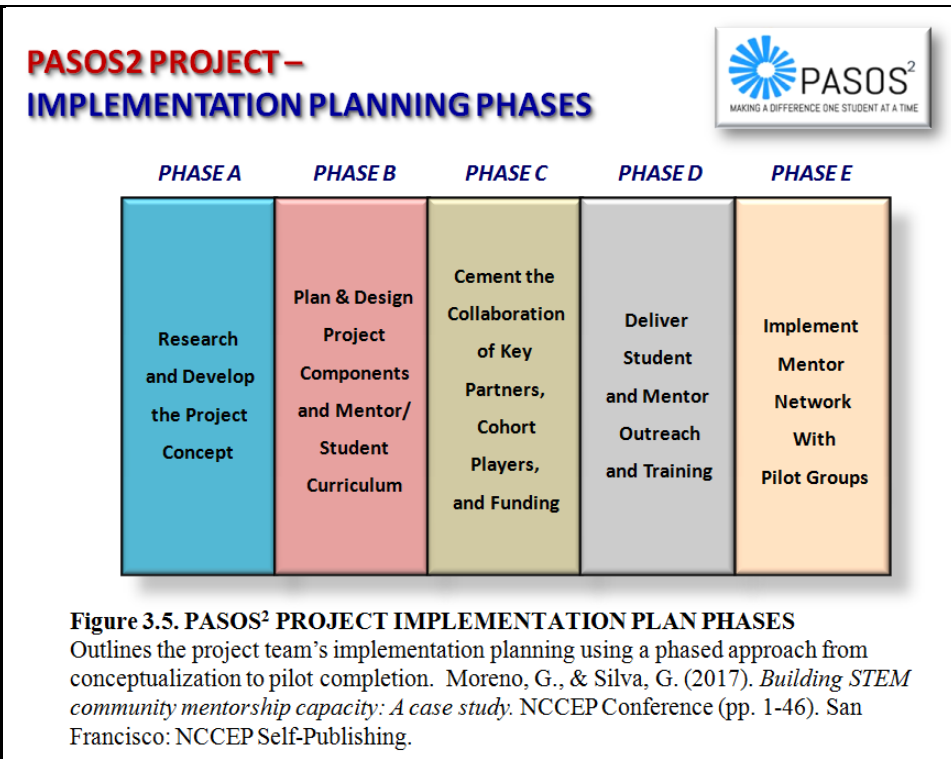


Figure 3.5. PASOS² Implementation Plan Phases

The implementation planning and project implementation management included:

- PHASE A – research the pertinent mentoring data and develop the project premise, goals, resources required, and funding.
- PHASE B – plan and design the project components including the design of the PASOS² Community Mentor Development Curriculum (See Figure 3.6) for the training of community and campus mentors, including the following key topics:
 - introducing the need (Dungy, 2010) and value of mentoring for the Borderplex region;
 - outlining the best practice principles using the Center of Hope mentoring research (Center of Hope, 2015);
 - outlining the PASOS² Program expectations, rules of engagement, value propositions, and support systems and players;

- introducing EduGuide’s GRIT software to expand mentor footprint + student connections;
 - providing a portfolio of academic, college, career and life readiness resources/ links/ and information including an introduction to STEM;
 - creating a checklist to help in the transition to college or post-secondary pursuits; and,
 - incorporating an evaluation and continuous improvement assessment of the value-based community mentor model and what matters to the empowerment agents.
- PHASE C -- gain CEA endorsement of the project as a 2016-17 school year pilot initiative including funding and resources; cement PASOS² Partners:

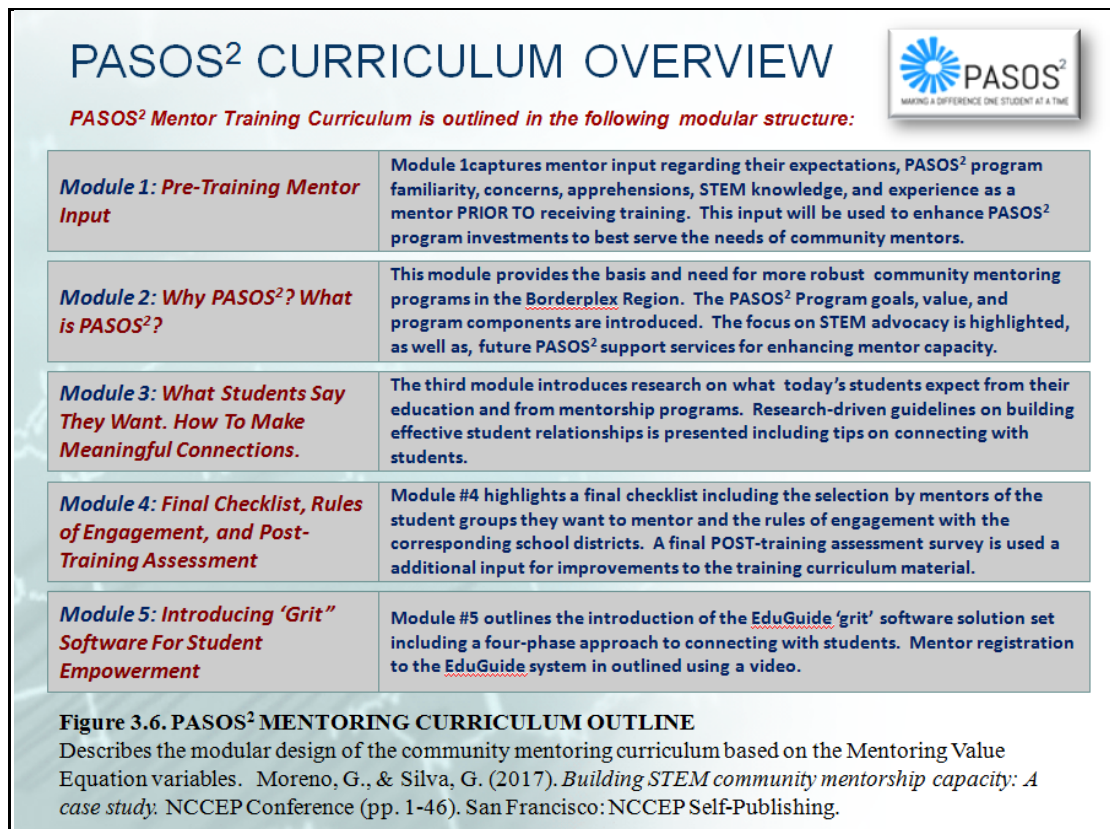


Figure 3.6. PASOS² Pilot Plan and Training Curriculum Outline

CEA, EduGuide, El Paso Electric, UTEP CREATE Research Center, Prestige Consulting, Ysleta Education Foundation, Ysleta ISD, and El Paso ISD. This included project and funding endorsement from CEA. It also included MOU endorsement from the school districts, as well as, the selling of the project at the school board, district, and campus levels. In addition, selling the project to the El Paso Electric Company mentoring program was critical.

- PHASE D – deliver the student and community mentor outreach and training including registration of the students and campus mentors to the EduGuide software solution set.
- PHASE E – introducing and implementing the community mentoring network with the student pilot cohort groups.

In the early summer of 2016, the PASOS² project planning team composed of CEA STEM Committee members and several hired interns focused on the following key components for pilot project success. These were identified as necessary for the successful introduction and implementation of the pilot program, including the need to:

- properly define a set of programmatic implementation goals and objectives that are S.M.A.R.T. (specific, measurable, attainable, reasonable, and time activated) tied to a succinctly defined set of program value propositions;
- garner pilot program sponsorship, endorsement, and funding from key community and school district players;
- research, design, and deliver a mentoring curriculum fortifying the community mentoring skills, competency, and capacity to provide mentoring value;

- learning the intricacies of the ‘grit’ software solution central to the mentoring support mechanism provided by the program;
- clearly outline of the community mentor roles and their inherent competencies to be developed through training and actual mentoring experiences;
- define strategies to attract a sufficient pool of community mentor volunteers willing and ready to meet program rules of engagement, to be trained to in delivering mentoring wisdom, and to commit to the effort to engage with pilot student cohort groups;
- coordinate with school district campus leadership to introduce and train the campus sponsors, mentors, and students with the EduGuide software system; and,
- develop a research model to investigate and surface the key lessons learned during the pilot introduction and completion.

Specific to the PASOS² programmatic implementation, the PASOS² project support team initially reflected on multiple aspects of the program in its planning (Moreno, Silva, & Coronado, 2016) on several fronts, including:

- “To what degree will the campus education teams promote and embrace the diligent use of the EduGuide software technology to forge relationships with the mentors?”
- “How well will the software help make meaningful connections with the students and their assigned mentors?”
- “What is needed to effectively and practically provide technical and program support for the entire mentoring program, especially the software support structure?”
- “What stakeholder groups need to have a role in the successful implementation of the pilot?”

- “Will the stakeholders see the value of our ways and means to effectively expand the mentoring footprint be attracting community professionals willing and able to use the software technology?”
- “Who at the campus level can we realistically depend on to champion the mentoring program and be faithful to the agreed to components in the memorandum of understanding (MOU)?”

As it related to the community mentoring strategy, the planning team was very curious about several aspects of building community mentoring capacity:

- “How effectively can we attract, prepare, and sustain community mentors to make meaningful connections with the students?”
- “Does the volunteer nature of community mentoring introduce a higher risk for dependability and sustainability for the program than we anticipate?”
- “How will we know what works best in attracting and sustaining meaningful community mentor engagement?”
- “What are the real motives and motivations for community mentors to commit to and deliver on their commitments to the students?”
- “What is the appropriate level of expected mentor activity with the software and the “meet and greet” sessions so as to not burden the community mentors with their precious time and energy?”
- “What makes some mentors commit and deliver and some not to contribute?”
- “Can we determine which mentors are really student-centric vs. self-indulged?”

3.2.2 Establishing the *Mentor Value Framework*

The creation of the *mentor value equation* resulted from previous research conducted on defining a profile of the key ingredients necessary for value-driven mentoring for students pursuing a STEM career (Moreno, 2015a). The equation was developed from interview feedback provided by both UTEP Top Ten students who have successfully their course of study in engineering and from community mentors the students identified as key to their success. Four key elements surfaced as critical to mentorship success: building sound mentor and mentee relationships; demystifying college and STEM; providing career guidance; and, contributing to the student's academic, college transition, career, and life readiness portfolio. These *mentor value equation* variables form the basis for the creation of the PASOS² mentor curriculum, as well as, the community mentor feedback design for this research study. The themes form the basis for defining a “*mentoring value equation*” and framework (See Figure 3.7):

1. v_1 = establishing 2-way mentor: student relationships (making the meaningful connection) focused on building student STEM ‘grit’
2. v_2 = demystifying the college and STEM opportunity to all students and their advocates and influentials
3. v_3 = providing career guidance planning including a pathway to a STEM career
4. v_4 = fortifying student readiness (academic, college, career, and life) for a successful career sharing solid experiences and perspectives

The literature search was used as the basis for developing the interview protocol. The interview protocol outlined five areas including the social capital discourse outlined above, my interview protocol focused on identifying the need for strong student and mentor connections; addressing the mentor recruitment challenges; profiling mentor competencies and capacity;

surfacing mentor best practices and tools; and assessing how best to measure mentor impact and effectiveness.

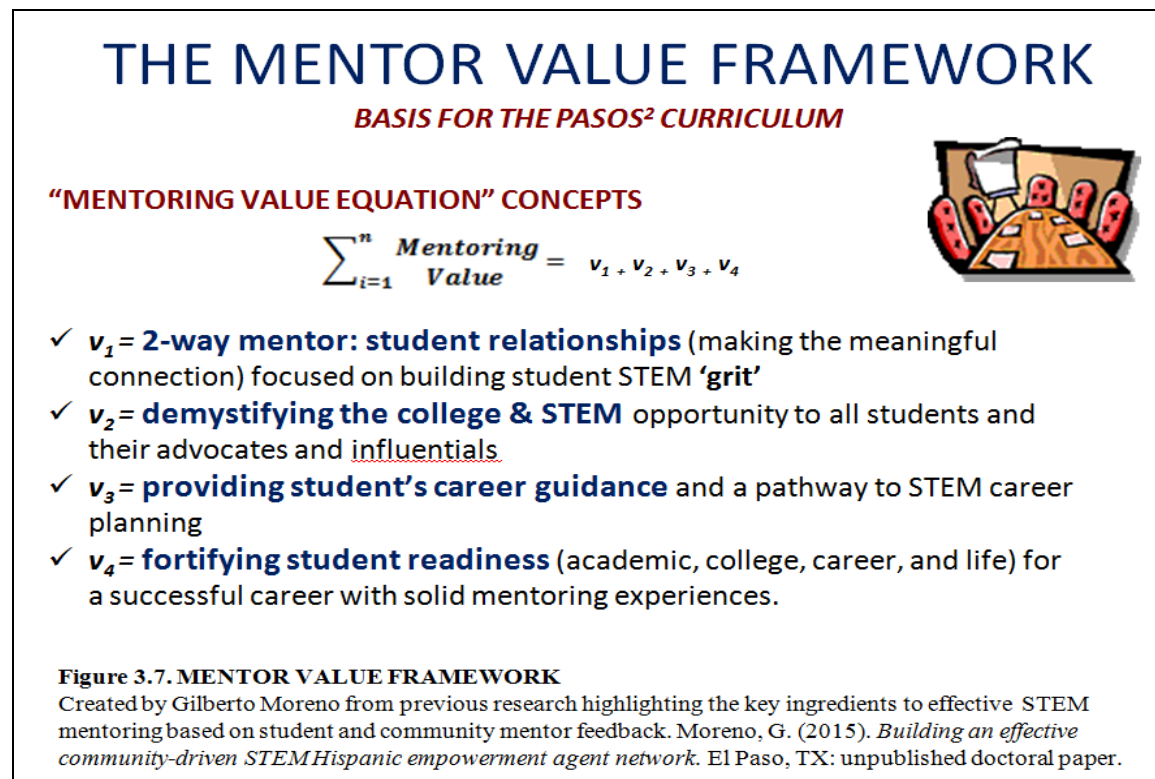


Figure 3.7. Mentoring Value Framework

. Key interview questions include: 1) what is the basis for building a strong empowerment agent network? 2) what motivates individuals to invest in a mentoring role? 3) what makes for an ideal STEM mentor? 4) what tools, technology or practices can enrich mentor capacity and effectiveness? 5) how do we know we have an effective student: mentor connection?

Some additional questions informing the surveys and interview protocols as outlined for this study, including the following:

- How does the lack of a support network of empowerment agents inhibit Hispanic students from exploring and preparing for the STEM profession at the K-12 level?

- What are the empowerment agents' attitudes, motivations, and behaviors and values that influence their decision to engage with Hispanic students?
- What is the empowerment agent role in building the right school and home structure vital to the pursuit of future STEM academic and career success?

As it relates to this study, the mentoring value framework presents a consensus for expanding the STEM community mentor base with a structured mentor curricula and management system to be driven by community players. The literature review consistently calls for new research to inform the opportunity to dramatically expand Hispanic student participation in STEM, including addressing the well-documented gender shortfalls.

3.2.3 Establishing the Community Mentor Opportunity Pipeline

The creation of a pool of competent and willing community mentor is a numbers game – i.e., the vast need from students requires a growing number of mentors. Adapting the popular opportunity pipeline models used in the business sales and marketing world, the *Community Mentor Opportunity Pipeline* model characterizes the pool of community players as mentoring suspects, prospective community mentors, adults committing to mentor, and finally PASOS² Program trained mentors (See Figure 3.8).

The pipeline helps to characterize the pipeline flow of mentors profiling the stages of mentor engagement from casual, informal mentoring profiles to value-focused STEM mentorship advocacy with capable and competent community mentors.

3.3 Research Process Approach

This section details the case study process approach is detailed including the data gathering cycle. Finally, the triangulation research strategy is presented.

3.3.1 The Case Study Process Approach

Given the overarching intent of this research is to significantly contribute to how communities' can expand the pool of K-12 Hispanic students pursuing a STEM career, understanding the perspectives of what matters from mentors (typically adult professionals, educators, and parents) and the mentees (students) is critical to this research study. A case-study research methodology provides a lens to the interaction between pedagogy (mentor curricula) and student learning, in this case mentor capacity (Keiner & Ahuna, 2014).

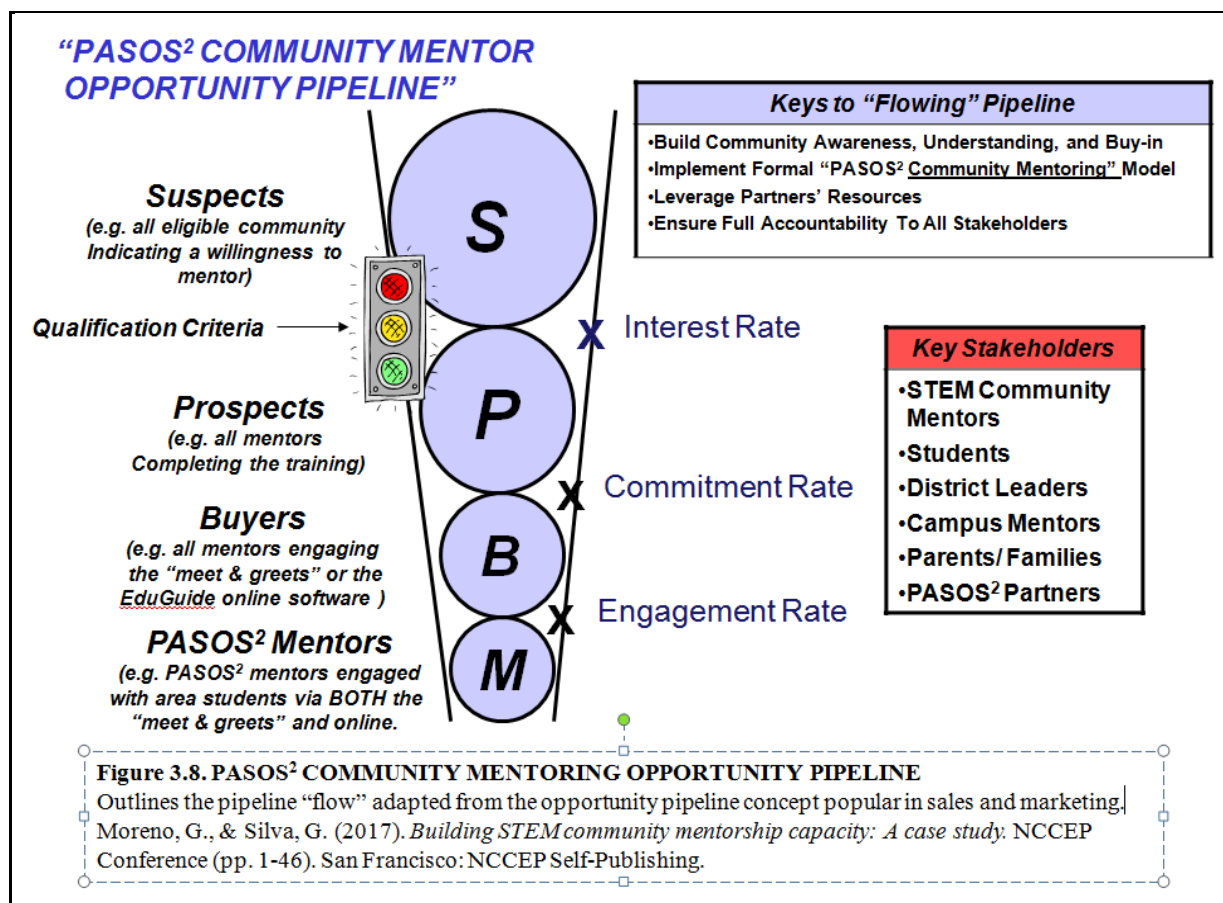


Figure 3.8. Community Mentoring Opportunity Pipeline

Soy's (1997) case study approach selected as the model for this study integrates the pioneering work of Stake, Simons, and Yin in using case study as a research method by proposing six major steps. These steps include the following key components:

1. Determine and define the research questions
2. Select the cases and determine data gathering and analysis techniques
3. Prepare to collect the data
4. Collect data in the field
5. Evaluate and analyze the data
6. Prepare the report

Soy's approach outlines what to look for and identifies the research 'recipe' for meaningful investigation of this case study. A comprehensive contrast highlighting Soy's key case study research design points and how this dissertation approach is aligned to Soy's profile is presented in Section 3.3.

The comprehensive dissertation approach used in this study is detailed in Appendix A. It contrasts "Moreno's dissertation approach" against Soy's six key case study research design points listed above. Please note that the chapter numbers used in this dissertation corresponds to Soy's component as noted in column one. The integrity and fidelity to Soy's approach is maintained in the research process approach used in this study. A detailed discussion of each of the six steps used in this study is presented below.

STEP 1. Determination and Definition of the Research Questions

Identifying the research needs. Driven by 'subject matter input' from both students recently graduating from STEM majors and STEM professionals alike, the *mentor value framework* served as the foundation for exploring the impact on what matters most to mentors in building mentor capacity and competency. The PASOS² implementation sought to explore the nature of 1) mentor: mentee relationships, 2) the demystification of STEM as an opportunity for

Hispanic students, 3) STEM career pathway planning, and 4) enhancing student readiness for a STEM career with meaningful experiences.

Formulating research questions. As outlined in Section 1.5, the principal research purpose and question focused on the impact on community mentors' attitudes and behaviors driving their decision to engage by completing a mentor development program and transitioning to building a 'value-based' mentorship relationship encouraging Hispanic students to explore STEM careers. The research questions were aligned with the *mentor value equation* components focused on building the mentors confidence, capacity, and competence. The data gathered addressed the following key research components:

- The **research object** is the community mentor engaging with the PASOS² Mentoring Program.
- **Problem/ Issue:** Given the social capital challenges for Hispanic students, the issue is how best to establish community: education partnerships and leadership to advocate for STEM career pursuit by Hispanic students.
- **Research Question:** How can a formal community mentoring system be beneficial in attracting, developing, and sustaining community mentoring talent?
- **Purpose:** To surface what matters most to community mentors in enhancing their decision, competency and capacity to engage as mentors informing any program changes necessary to gel with their expectations.
- **The potential audiences** for the final report are communities wishing to influence the Hispanic youth to enrich the STEM talent pipeline critical to regional economic systems.

STEP 2. Selection of the Case(s) and Determination of the Data Gathering and Analysis

Techniques

A single real life case includes studying the collective pool of community mentors who volunteered to serve in the PASOS² Mentoring Program pilot. This pilot was introduced in school year 2016-2017 supporting identified K-12 cohort student groups. The unique parameters included the introduction of an innovative “value-based” mentoring curriculum, ‘grit’ software tools, and mentor: student rules of engagement.

While campus mentors (teachers, administrators, counselors, etc.) are included in the PASOS² system, the study boundaries centered on investigating the community mentors volunteering for the pilot study. These volunteer community mentors are sourced from the region including the El Paso Electric Company, the CEA membership organizations, college student ‘near peer’ mentors, and CEA sourced volunteers, both individuals and those representing other organizations in the community. They represent from college-age students to retired STEM professionals with decades of professional experience.

Four sources of data gathering methods and protocol were designed to produce evidence including: 1) a community mentor group value reflection exercise; 2) an individual pre- training survey; 3) an individual post- training survey; and, 4) an open-ended summative interview for selected community mentors participating in the PASOS² training program. A sample of the pre-training, post- training survey, and interview protocol for the mentor summative interview is outlined in Appendix B and Appendix C respectively. The specific questions in the pre- and post-surveys that were analyzed included for the pre-survey Questions #6, 7, 8, 9, 12, 13, 14, and 17. The corresponding questions in the post- survey included Questions #1, 2, 3, 4, 7, 8, 9, and 10. These are correlated and detailed in Section 4.2.2 in Chapter 4. The pre- and post- survey

approach was used in this case study lends itself to a statistical analysis comparing the related samples of two groups to draw inferences as to whether they are different from each other (Gravetter & Wallnau, 2013). The comparison of these two means that are both obtained from the same group of community mentor individuals is known as the *repeated-measures t-test* (ExcelFunctions.net, 2017) . This hypothesis testing evaluated the mean difference between the two sets of pre- and post-workshop test scores per individual mentor.

All of these methods are aligned with the *mentor value equation* profile of variables introduced as keys to effective mentoring systems. An aggregate, within-case analysis technique of a systemic gathering of quantitative and qualitative data will produce the evidence tied to the purpose and answer the research question defined above. Validity and reliability factors are addressed by the study design with a four-step data gathering process that is repeatable.

The data gathered specifically addressed the key research questions outlined in Section 1.5.

STEP 3. Preparation for the Collection of Data

The community mentor training program offered in a workshop format, as well as, eventually in an online format included the delivery of 5-module curricula. This curriculum is outlined in Figure 3.6. For use during the PASOS² mentoring training program, the following data gathering tools (see Appendix B and C) presented in STEP 2 were designed and produced as part of the workshop training packet:

- **Tool #1:** The **group reflection exercise** regarding the value of mentorship
- **Tool #2:** The **pre-training community mentor profile and survey** questions regarding mentor mindset and expectations prior to the training
- **Tool #3:** The **post-training mentor survey** questions regarding the impact and readiness to mentor as a result of completing the mentor training program.

- For use after 6-8 weeks after the mentoring experience has started or at completion of the pilot program, **Tool #4 Mentor Interview Protocol** was designed as an interview of open-ended questions assessing what influences most the community mentors and their decision to engage in the PASOS² mentor program for building community mentor capacity and competency.

The data collection approach includes the following:

- a. Community mentors were asked to participate in a group reflection exercise focused on defining their perspective of the value propositions derived from their experience of mentoring or being mentored. This feedback was mapped against the results of the *mentor value equation* profile.
- b. Two initial cohorts mentor groups were asked to complete the PASOS² Mentor Training Curriculum during the workshop where a *pre-training and post-training* survey aligned to the mentor value equation. The nature of the survey inquiry is outlined in STEP 2 above.
- c. In addition, a *post-implementation summative interview* was conducted with mentors who both engaged or did not engage to assess what influenced their engagement. In addition, this interview investigated the mentor's feedback, attitude, experiences, knowledge, and recommendations to improving the PASOS² training program and was administered after a period of 2-3 months for those mentors who completed the training and orientation or upon completion of the pilot. The data gathering cyclic approach is described in the next section below.

The pilot training deliverables included the mentor feedback regarding their perceived value of mentoring (Tool #1), the pre- and post- work surveys (Tool #2 and #3), signed program

engagement agreements, and other recommendations offered by the trainees. These were reviewed with the PASOS² Program Committee to make adjustments and refinements to the mentor curriculum training and data gathering tools. The PASOS² Program was introduced by the PASOS² Program Committee to prospective community mentors from different organizations soliciting individuals who were willing to volunteer as mentors. They were then scheduled to complete the PASOS² Mentoring Training Program via an approximately 1.5 hour workshop. Key contact information was assembled with the program intent and confidentiality of the data gathering explained including the detailed purpose of the pilot case study and the value of the mentor training.

STEP 4. Data Collection in the Field

Selecting the setting. Learning what is impactful to the mentors includes the mentor's state of mind prior to receiving the training, after the training and applying the training. Therefore, the setting includes the formal pre- and post- qualitative testing of mentors as part of the PASOS² introductory mentor training program, as well as, their reflection of the program value conducted with an interview some period of time after the training (say 6-8 weeks of upon completion of the pilot).

Determining the participants. – given the nature of the research questions focus on the mentor experiences with the training and technology use with mentors, the community mentors are the primary participants in this study. These community mentors were sourced from the different partnerships forged by the PASOS² planning team. They represent near-peer mentors (i.e., college students), non-educator professionals in the workplace, professional educators, and other adult volunteers. Notwithstanding, the input from students, school administrators, parents, and interns was noted.

The data collection approach in the field included the following steps:

- Scheduled, organized, and conducted multiple **PASOS² Mentoring Training Program Workshops** to deliver the mentorship curriculum and recorded the following field data from community mentors using the following tools:
 - **Tool #1:** The **group reflection exercise**
 - **Tool #2:** The **pre-training community mentor profile and survey**
 - **Tool #3:** The **post-training mentor survey**
- Selected a subset of community mentors 6-8 weeks after the mentoring experience has started (or upon completion of the pilot) to conduct **Tool #4 Mentor Interview Protocol** of open-ended questions.
- After each workshop the group reflection input and each pre- and post- survey results were recorded in a data base.
- After each workshop it was determined whether reformulation of any of the tools was necessary.
- Any feedback, surprises, hunches, testimonials, etc. from the mentors was annotated.
- Each mentor summative interview was collected, stored, and documented for coding and analysis. After each interview it was assessed whether reformulation was necessary.

STEP 5. Evaluation and Analysis of the Data

The approach was to collect quantitative data and perform a comparative analysis together with identifying extreme cases or anomalies and surface the right themes to explore in the qualitative interview process (Creswell, 2012). The data analysis procedures (Tesch, 1990) included statistical analysis of survey response rates for all community mentors completing the training, checking for response bias with descriptive analysis of the response questions.

Specifically, for the quantitative analysis of a group comparison calls for a statistical analysis comparing the related samples of two groups to draw inferences as to whether they are different from each other. The comparison of these two means obtained from the same community mentor individual is known as the *repeated-measures t-test*. In its simplest form, the *repeated-measures t-test* provides a statistical test of whether or not the means of several groups are equal, and therefore generalizes the t-test to two groups. This approach was applied to both pre- and post-survey results. The hypothesis testing evaluated the mean difference between the two sets of pre- and post-workshop test scores per individual mentor. The repeated-measures design uses only one related sample with the same mentor participating in both treatments (i.e., a pre- and post-workshop treatment). Preselected specific questions in the pre- and post-surveys were analyzed and included for statistical analysis of whether the mentor training had an impact or made a difference in the preparation of mentors.

Specifically, the pre- and post- workshop survey addressed community mentor assessment with inquiry of the eight (8) key mentoring dynamics. For the qualitative summative interview process, a step-by-step approach for qualitative analysis of interview data was applied (Lofgren, 2013). This process included steps to formally translate the transcripts identifying relevant thematic coding to surface relevant theories or concepts that provide empowerment agent insights into their capacity and willingness to engage in STEM advocacy. This coding process identified the proper hierarchy of categories to explore in the interview process and how they connected to the policy decision making process.

The evaluation strategy includes building an concept mapping array from the group reflection statements (Tool #1) regarding the group reflections of the value of mentoring categorized and correlated to the mentor value equation components of effective mentoring,

noting any new value components. The next step is to analyze all community mentor individual pre-training (Tool #2) and post-training survey results (Tool #3) including the open-ended supplementary questions from the survey.

Subsequently, the interview data was entered and coded (Tool #4) from the summative mentor interviews to identify patterns, similarities, and differences among community mentor groups compared to the mentor value equation profile. Finally, the triangulation strategy (See Section 3.2.7) was applied for assessing the “value propositions” from the group reflection, the surveys, and the interviews.

The final step was to identify the “lessons learned” in rolling out and implementing the PASOS² pilot program including the community mentors’ perspective. When necessary, follow-up interviews were conducted to confirm or correct initial data (both for surveys and interviews). In analyzing the data, the focus was on identifying recommendations for subsequent program expansion.

STEP 6. Preparation of the Report

The implications of this data comes in surfacing what matters most to community mentors in their decision to engage as effective mentors in support K-12 STEM programs and campuses. These factors include building the proper awareness, understanding and buy-in strategies for empowerment agent engagement throughout the implementation process. Robert (1998) underscores two key lessons for bringing meaningful organizational improvement: i.) “people don’t implement properly what they don’t understand”, and ii.) “people don’t implement what they are not committed to.” Robert (1998) is emphatic that the viable “future direction of a [school] is not strategic planning, but rather strategic thinking” (p. 47). This

strategic thought is tied to defining the right policies best reflected in the proposed value statements for this community mentoring endeavor.

The preparation of the report included highlighting the following:

- Describing the issues that surfaced in investigating the research question, problem, and purpose for the PASOS² Program implementation.
- Describing the roles of participants, explain the data gathering process, the analysis techniques used, and the conclusions and answers to the research questions.
- Providing a narrative by retelling specific stories related to the community mentoring implementation process illuminating issues and keys to the research questions
- Pointing out the results from the triangulation analysis.
- Correlating the findings using the two analytical models: the *Mentor Value Equation* and the *Community Mentor Opportunity Pipeline* model.
- Determining applicability to other situations or localities and future research.
- Providing conclusions from the research using the “*stages of collaboration*” model making assertions and provide suggestions for further research. Recommending a new plan for PASOS² expansion with refinements and improvements for subsequent cohort groups for the practice of preparing mentors by building on what we have found.

3.3.2 The Case Study Data Gathering Approach

The information gathering instruments developed during the study included the following components applied in all the six steps of the research study:

- a. Project journaling
- b. OUTLOOK calendar

- c. Trail of emails to/from stakeholders including:
 - CommUNITY en Acción Board (CEA)
 - CEA STEM Committee
 - ISDs (district + campus)
 - EduGuide
 - El Paso Electric
 - Prestige Consulting Services
- d. Data collection components
 - Program deliverables (from outreach, partnering, training, etc.)
 - Meeting agendas and minutes
 - Project implementation plans and management
 - Advocacy presentations, flyers, handouts, etc.
 - Memorandums of Understanding (MOUs)
 - Curriculum training deliverables (tools, videos, forms, handouts, etc.)
 - Assessment Plan deliverables (surveys, interview protocols, etc.)

The 4P profile highlighted in Figure 3.9 describes the data gathering cycle phases: planning, acting, observing, and reflecting key to having the right programmatic people, policies, processes, and plans. The data gathering points throughout the pilot are highlighted in the diagram as well as the data sets and information used. Data triangulation meant using more than one method to collect data on the same topic as a way of assuring the validity of research. Through the use of a variety of methods to collect data on the same topic, it involved different types of data collection methods. The purpose of triangulation is not necessarily to cross-validate data but rather to capture different dimensions of the same phenomenon with different methods.

One purpose of triangulation in educational and social science research is to increase the credibility and validity of the results. Several authors have aimed to define triangulation giving rise to the real purpose of triangulation. Cohen and Manion (1986) define triangulation as an “attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint.” Altrichter et al. (1996) contend that triangulation “gives a more detailed and balanced picture of the situation” (p. 196). O’Donoghue and Punch (2003) characterize triangulation as a “method of cross-checking data from multiple sources to search for regularities in the research data”(p. 17).

Denzin (1970) identifies four types of triangulation including: *data triangulation* (gathering data through different sampling strategies, so that parts of data are collected at different times and social situations); *investigator triangulation* (using more than one researcher

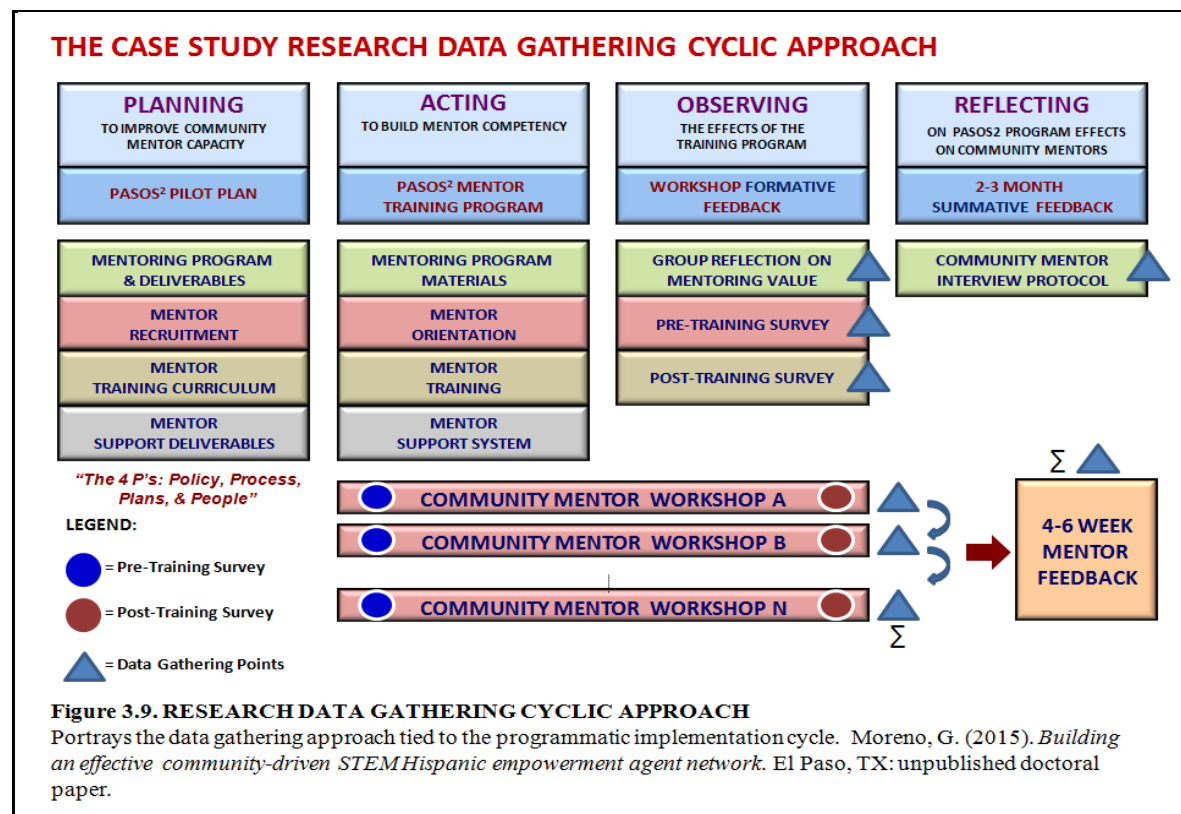


Figure 3.9. Case Study Research Data Gathering Approach

in the field to gather and interpret data); *theoretical triangulation* (using more than one theoretical position in interpreting data); and, *methodological triangulation* (using more than one method for gathering data). The fourth kind of triangulation is the kind that is the most related and selected for the process of triangulation in this educational research study.

The supplementary critical inquiry defined in Section 1.5 for this study is used as the basis for the triangulation strategy encompassing the four data gathering tools defined in the previous section in this chapter. Table 3.1 identifies the triangulation strategy correlation framework for this study incorporating the multiple methods of data gathering. Of significance is the mapping of the five supplementary questions introduced in Section 1.5 to the four TOOLS used for data collection in the study. This mapping is designed to bring a high level of congruency in ensuring the “value-based” approach founded in the mentor value equation is fully integrated in all data collection instruments.

3.4 Anticipated Study Data and Results

In educational reform settings, Ralph and Dwyer (1988) highlight four types of possible claims: academic achievement, improvements in teacher attitudes and behaviors, improvements in student attitudes and behaviors, and instructional or pedagogical improvements. In this study, the plans are to discover claims specific to community mentor attitudinal and behavioral dynamics for mentoring engagement and how best to get mentors ready to deliver on the key elements defined in the mentor value equation previously described. The formative and summative data gathering will specifically address the research question of what influences, impacts and matters most to community mentors in delivering value-driven mentorship.

Specifically, as outlined in the logic model in the previous section, this included investigating and understanding the following key indicators observed and analyzed:

Table 3.1. The Triangulation Strategy Correlation Framework (Page 1 of 2)

Supplementary Research Questions	Group Value Reflection Question	Pre-Training Survey Question(s)	Post-Training Survey Question(s)	Community Mentor Experience Interview Question(s)
a) What matters most to community mentors in enticing and preparing them to engage as mentors with students? Why do community mentors commit to mentoring students? What value do they propose to bring to students?	Based on your experience as a mentor or mentee, what VALUE does mentoring deliver?	20. How would you answer: “The greatest VALUE I can give students as their mentor is:”	10. To what extent are you comfortable providing advice and direction to students to get them ready for their life’s dreams?	1. What do you see as the greatest value of the mentoring program using software as a mentoring mechanism?
b) What are the community mentor’s expectations, apprehensions, familiarity, and mindset regarding the PASOS² program?		6. To what extent are you familiar with the purpose of the PASOS ² Mentoring Project? 7. To what extent are you comfortable with the expected role of a mentor in the PASOS ² Program? 10. What are your concerns or apprehensions, if any, in engaging as a PASOS ² mentor?	1. To what extent are you NOW familiar with the purpose of the PASOS ² Mentoring Project? 2. To what extent are you NOW comfortable with the expected role of a mentor in the PASOS ² Program?	2. To what extent did you find the 2 YEAR commitment to mentoring student(s) to be reasonable 4. Do you plan to participate as a mentor in the future?
c) How is addressing the readiness (capacity and competency) of community volunteers important for effective mentorship including advocating for STEM , fortifying student readiness , and using a technology -based platform?		15. What special competencies, skills, or experiences can you bring to students that are of value and why? 9. To what extent are you aware and comfortable with the expected behaviors and code of conduct for a mentor in the PASOS ² Program? 12. To what extent are YOU familiar with the term ‘STEM’ and its growing focus and movement in American schools, as well as, our local Borderplex economy? 13. To what extent are you comfortable with advocating STEM and providing career guidance and planning to students to pursue a STEM career? 14. To what extent are you familiar and comfortable with the use of a technology-based platform to interact with students?	7. To what extent are YOU MORE familiar with the term ‘STEM’ and its growing focus and movement in American schools, as well as, our local Borderplex economy? 8. To what extent are you MORE comfortable with advocating STEM and providing career guidance and planning to students to pursue a STEM career? 9. To what extent are you NOW MORE familiar and comfortable with the use of a technology-based platform (EduGuide) to interact and guide with students?	10. To what extent did you have an opportunity to interface with the students using the online EduGuide software application? 11. How would you describe your “EduGuide” experience(s)? How easy was it to use? 12. Explain which were the contributing factors to your ability (or inability) to engage with the “EduGuide” sessions (select all that apply). 13. What, if anything, would you like to see different regarding the “EduGuide” application?

Table 3.1. The Triangulation Strategy Correlation Framework (Page 2 of 2)

Supplementary Questions	Group Value Reflection Question	Pre-Training Survey Question(s)	Post-Training Survey Question(s)	Community Mentor Experience Interview Question(s)
d) What factors do community mentors determine to be important in building strong mentoring relationships with students?		8. To what extent are you experienced in building meaningful 2-way relationships with students as a mentor? 17. To what extent are you comfortable providing advice and direction to students to get them ready for their life's dreams?	3. To what extent are you NOW MORE COMFORTABLE in building meaningful 2-way relationships with students as a mentor? 4. To what extent are you NOW aware and comfortable with the expected behaviors and code of conduct for a mentor in the PASOS ² Program?	6. To what extent did you have an opportunity to interface with the students in the “meet and greet” sessions scheduled at the campuses? 7. How would you describe your “meet and greet” experience(s)? How easy was it to engage? 8. Explain which are the contributing factors to your ability (or inability) to engage with the “meet and greet” sessions (select all that apply). 9. What, if anything, would you like to see different regarding the “meet and greet” sessions with student mentees?
e) Do community mentor participants believe the PASOS² program has value and how does it serve a useful purpose in furthering STEM advocacy to Hispanic students? How?		11. What are your expectations of the PASOS ² Mentoring Training Workshop?	11. What did you like BEST about the PASOS ² training? Why? 12. What did you like LEAST about the PASOS ² training? Why?	3. To what extent did you share the mentoring opportunity with any of your friends or family? 5. Any other comments you would like to share to make the program better?

- partnership buy-in from key decision-makers (institutions + campus)
- campus project leadership buy-in and ownership
- formal and timely commitment of resources for the pilot from all partners
- program stakeholders completion of the training program with new competencies, concepts, tools, and tenets developed
- mentors understanding and accepting of the expectations and rules of engagement
- feedback on use and effectiveness of the EduGuide technology platform enhancing the mentors ability to connect with students. Is the technology necessary, easy to use, and effective in making connections?
- formative and summative feedback from community mentors on what matters most to them for engagement in effective mentoring.

This study demonstrated what we can learn, analyze and improve from mentor experiences driven by a technology-based mentorship framework influencing their decision for meaningful interaction with their students. It defined the key issues, challenges, inhibitors and opportunities in attracting, preparing, and sustaining STEM-focused community mentors. More importantly, it can inform the local community (and other similar ones throughout the U.S.) as to how a competent set of community mentors can make a difference in the STEM talent creation equation for Hispanics.

The “Tactics of Collaboration” model is introduced as the collaborative framework to present the conclusions reached about the community mentoring engagement motivation and experiences in this case study (Wright, 2017). The meaningful and substantive engagement of community mentors is predicated on the hierarchy of collaboration from community empowerment agents. Wright asserts that “effective collaboration depends on effective relationships between humans.” This is especially true of both mentors and students willingly

working together to nurture meaningful relationships (whether it is accomplished with technology or directly).

The building of effective community mentoring is not just about developing mentoring proficiency and competency, but also about advancing through key stages of “moral development, where we learn to weigh personal benefit against collective benefit” (Wright, 2017, p. 2). The four stages of this development, as Wright sees them, include:

Stage 1: Commitment

Stage 2: Partnership

Stage 3: Vulnerability

Stage 4: Emergence

This “Tactics of Collaboration” model serves as a viable framework to reflect, rethink, and refine the approach, tactics, and tools for better recruitment, preparation, and interaction of community mentors to deliver the value sought and needed by the next generation of professional STEM talent.

3.5 Chapter Summary

Chapter 3 presents the overall case study methodology approach. This includes the case study research design model, the research objects key to the study, and the key players (actors) in the PASOS² initiative. The genesis of the PASOS² initiative is outlined including the pilot implementation phases – future model considerations are also outlined. The introduction of the two analytical models in the *mentor value equation* and the *community mentor opportunity pipeline* are highlighted as mechanisms for better understanding the community mentoring phenomena. In addition, the “*tactics of collaboration*” model is introduced as the framework to present conclusions derived from the community mentoring engagement experiences in this case study.

The case study process approach along with the data gathering strategy is presented including a triangulation strategy to enhance the results of the study. A logic model framework is presented with a reflection of the initial, anticipated study results and their significance.

CHAPTER 4: DATA ANALYSIS AND RESULTS

“Our chief want in life is somebody who will make us do what we can.”

(Emerson, 2017, p. 1)

The PASOS² Project rollout experience is outlined in this chapter including the cycle of community mentor recruitment, training, and engagement results. The results from the application of the four data gathering tools coupled with the results of applying the analytical models are presented.

4.1 The PASOS² Project Rollout Experience

The PASOS² mentoring initiative was driven by the desire of a few dedicated individuals to significantly expand the mentoring footprint and sphere of influence to encourage students to become future STEM professionals. This implementation did not have previous insights or other community examples with similar demographics from which to customize a community-driven mentoring initiative. In addition, the experience of using software as a mechanism for community engagement was perceived as a novel idea by EduGuide President & CEO Bryan Taylor (2016). Nonetheless, the PASOS² pilot endeavor was sold, funded, and committed with high expectations for learning how best to attract, prepare, and retain community mentors. The issue is how best to increase community mentoring capacity and competency with expanded spheres of influence.

4.1.1 The PASOS² Program Strategic Intent

Reflecting on CommUNITY en Acción’s 6+ year efforts to reach out to more students as part of its STEM Committee advocacy, CEA STEM Committee Chair Willie Silva said, “We are victims of our own success in connecting with students in a variety of settings. The demand for our engagement in our schools is ever-increasing and sometimes overwhelming. Nonetheless, it is a sign that we do not have enough adult professionals willing and prepared to satisfy the

growing demands to mentor students. We have got to find alternative ways to reach more kids with more adults” (Silva, 2016). Requests for career days, mother-daughter programs, father-son events, science fairs, T-STEM clubs, STEM fairs, after school programs, parent nights, college nights, field trips, and in-class presentations are ever-increasing. So the genesis of the PASOS² mentoring initiative was driven by this demand for more mentors engaging with students via the school districts. In addition, the following driving forces impacted the drive to explore new, creative options to leverage the limited adult mentoring community assets connecting with the students:

- CEA’s long-term community partnerships with a variety of school programs surfaced significant gaps in meaningful community engagement, both in number and quality;
- Texas House Bill 5 STEM pathway endorsements accelerating the need for STEM advocacy and building STEM proficiency;
- the need for new innovative ways to attract and connect more STEM professionals with students considering a STEM career option was apparent;
- the need for continuity and sustainability of ongoing student support throughout their academic development from pre-k through high school for true college readiness is critical;
- focus in building and expanding community partnerships with public education STEM initiatives is warranted; and,
- support for satisfying the insatiable appetite for community mentoring specific to career interests in STEM is paramount for regional talent development.

Therefore, the project name PASOS² was selected to represent a focus on increasing “Partners Advocating STEM Opportunities for Student Success.” The strategic intent of the initiative is to implement an innovative, collaborative approach to enhancing opportunities in the

community through a community-driven network of empowerment agents focused on increasing student STEM career awareness, exploration, and preparation. The PASOS² Project was introduced as a formal strategic initiative of CEA's STEM Committee augmenting its education focus. What makes it different or unique? The strategic initiative introduced an innovative technology-driven solution set building community mentor capacity focused on nurturing student grit, self-efficacy and self-determination in their pursuit of their post-secondary dreams with emphasis on college and STEM studies.

The pilot proposed value propositions for both students and mentors outlined in Section 1.1.2 are aligned with the major goals of the initiative, namely to:

- improve retention rates of students at high school and post-secondary levels;
- feed the regional STEM degree majors talent pipeline;
- enhance graduation rates at the post-secondary levels impacting the 60x30EP Plan (CREEED, 2017); and,
- expand a mentorship network of professionals ready to influence students to pursue higher education, entrepreneurship, community service, and regional pride.

Figure 4.1 represents the synopsis of the program outlining its strategic intent. This synopsis is an example of the outreach material that was developed to introduce the program to the community and school stakeholders alike.

4.1.2 The Resulting PASOS² Stakeholders (The Actors)

It is key to understand the resulting stakeholder profile that showed an interest in or concern for the community mentoring process. These stakeholders demonstrated a vested interest in the success or outcomes of the community mentoring process aligned with the stated value propositions described in Section 1.1.2. This included all 'actors' that directly or indirectly

PASOS² Strategic Mentoring Initiative

“What Is It?”

MAJOR GOALS OF PASOS²

- ❑ Improve retention rates of students at high school and post-secondary levels.
- ❑ Feed the regional STEM degree “majors” talent pipeline.
- ❑ Enhance graduation rates at the post-secondary levels impacting the 60 x 30 EP goals.
- ❑ Expand a mentorship network of professionals ready to influence students to pursue higher education, entrepreneurship, community service and regional pride.



This innovative Community En Accion (CEA) education initiative focuses on building stronger community-driven mentor capacity. Technology is integrated to enhance a mentor’s impact in building student self-confidence, self-efficacy and self-determination. The students’ pursuit of post-secondary careers in STEM is a major area of emphasis.

Why PASOS²?

The El Paso region experiences lower averages compared to the rest of the State of Texas in areas such as:

- * High school graduation rates
- * College readiness
- * Dual credit completion
- * Students pursuing STEM careers.
- * Percent of students taking and passing AP exams

With the introduction of the 60x30TX statewide initiative, El Paso’s contributions to post-secondary graduation levels of its students (currently at 27%) need to increase dramatically. PASOS² is focused on increasing student completion of a postsecondary degree/ certificate and by the year 2030 at a 60% level throughout the region.

Figure 4.1. Synopsis of PASOS² Pilot

Outlines the program purpose and goals including the program objectives for building mentoring capacity. Moreno, G., & Silva, G. (2017). *Building STEM community mentorship capacity: A case study*. NCCEP Conference (pp. 1-46). San Francisco: NCCEP Self-Publishing.

Figure 4.1. Synopsis of PASOS² Pilot Initiative

affected or were affected by the success or failure of the mentoring program. The nature of each player, their role, and how they engaged in the pilot are highlighted below.

4.1.2.1 The PASOS² Direct Players

The actors that had a direct impact on the implementation and outcomes of the PASOS² pilot included students, community mentors, campus mentors, project team players, and the EduGuide support team as described in Section 3.1.4. It is important to reiterate that the deliberate effort made to attract professional and near peer mentors studying in college who pursued or were pursuing a STEM degree, particularly an engineering or scientific course of study was significant outcome on mentor demographics described below. All comers who indicated an interest in the mentoring program were welcomed regardless of their previous experience in mentoring. The nature of their resulting engagement and roles are outlined below.

As a reminder, the PASOS² Pilot project team selected two campuses (YISD's Young Women's Leadership Academy and Henderson Middle School Chess Club) from a list of seven potential campus sites based on the criteria including the campus STEM focus, level of district/campus support and interest, proximity to UTEP and central El Paso to facilitate mentor engagement, and campus innovative learning models. The students represented 6th through 8th grades forming six (6) cohort classes of 148 students from two campuses.

Students at both campuses were asked to complete the assigned EduGuide modules or activities online on a periodic basis and engage in the periodic "meet and greet" sessions with the mentors scheduled in their respective campuses. The students were asked to provide a message of welcome to their future mentors before the program started and they outlined their great anticipation of the forthcoming mentorship (See Figure 4.2).

STUDENTS' MESSAGE TO MENTORS

"What do you want to tell your future mentors?"

- ***"we are smart"***
- ***"we are ready to change the world"***
- ***"we want to partner with you"***
- ***"we are awesome and amazing students/ people"***
- ***"we want to create a legacy"***
- ***"we won't give up – we will work hard"***
- ***"we are excited"***
- ***"we are passionate"***
- ***"we are ready to reach our dreams with their help!"***



Figure 4.2. Highlights student messages sent to the community mentors in anticipation of the mentoring kick-off. Moreno, G., & Silva, G. (2017). *Building STEM community mentorship capacity: A case study*. NCCEP Conference (pp. 1-46). San Francisco: NCCEP Self-Publishing.

Figure 4.2. Student Messages to Community Mentors

Community mentors represented volunteers from the community-at-large including STEM and non-STEM professionals in business and industry, college students majoring in both STEM and non-STEM degrees, selected volunteers from CEA and other non-profits or civic organizations, and individual citizen volunteers including retirees. Their role was to provide, upon initial completion of the PASOS² training curriculum, direct mentoring connections with students using both the EduGuide software application and engagement directly with the students in the periodic “meet and greet” sessions.

The resulting demographic profile of the community mentors is presented in Figure 4.3 including the following highlights:

- 67% were female mentors
- 36% were ‘near peer’ mentors as college students
- 52% were STEM professionals
- 9% were educators in the STEM fields
- 55% were STEM degreed or pursuing a STEM degree
- 40% were 25 years old or younger
- 41% were older than 41 years old
- 24% were STEM career employed (mostly in engineering)

Campus mentors included lead teachers, club advisors, counselors, administrative leadership, and other staff members assigned to the pilot project. Their role was to provide campus oversight and guidance to their students ensuring student engagement with both the software, as well as, the periodic “meet and greet” sessions. The staff also provided feedback during the entire mentoring experience from both the students and the campus staff perspective.

Playing an important sponsorship role, the campus leadership (i.e., campus principals, assistant principals, campus chief academic officers, IT specialists, and assigned staff leadership)

Community Mentor Demographics

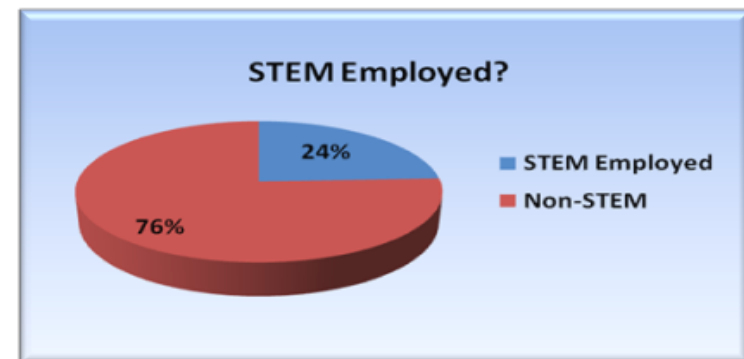
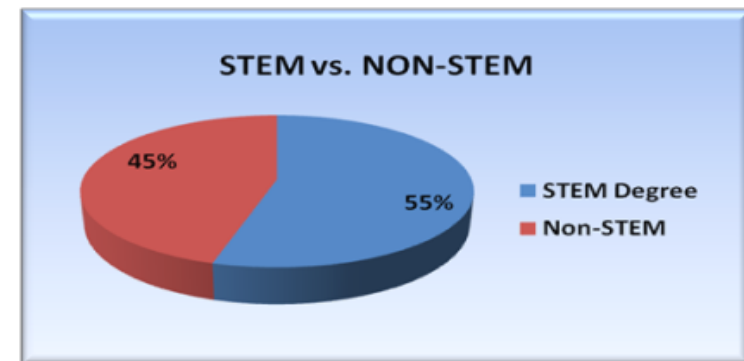
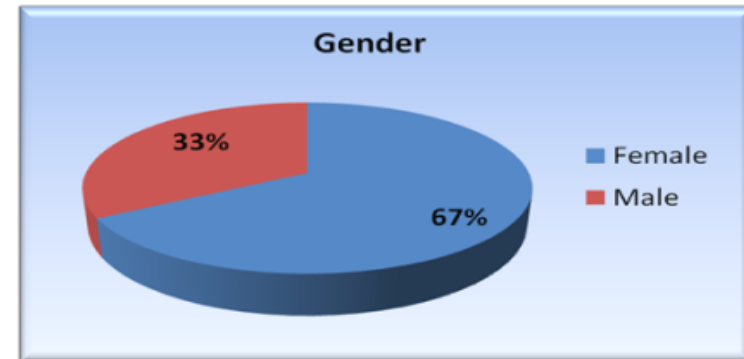
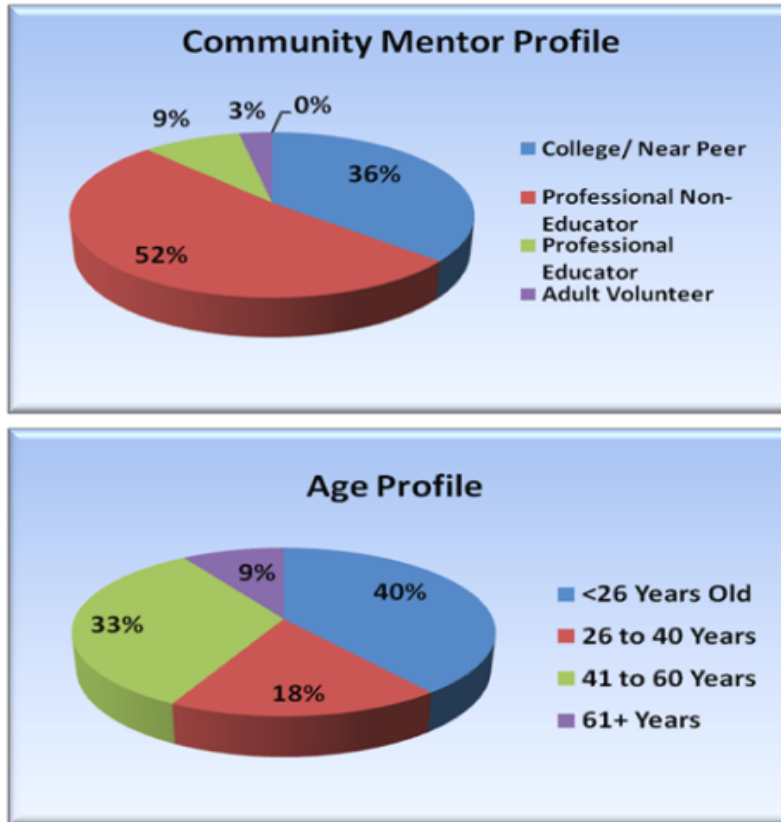


Figure 4.3. Community Mentor Demographic Profile. Highlights the mentor profile demographics. Moreno, G., & Silva, G. (2017). *Building STEM community mentorship capacity: A case study*. NCCEP Conference (pp. 1-46). San Francisco: NCCEP Self-Publishing.

Figure 4.3. Community Mentor Demographic Profile

facilitated resources and logistics assistance for the completion of all PASOS² activities at their respective campus. The primary players on an ongoing basis were the student cohort or classroom sponsors or lead teachers for the groups of student divided into approximately 25 students per cohort group.

Overseeing the pilot implementation was the PASOS² Project Team consisting of CEA STEM Committee members led by PASOS² Project Leaders Gilberto Moreno and Guillermo Silva, and two interns assigned to the project (UTEP engineering major and one Prestige Consulting employee). Their role was to build an awareness, understanding, and commitment of the necessary time, resources, and energy to implement the pilot. This included conducting periodic meetings with the key stakeholders enumerated in this section via face-to-face meetings, conference calls, emails, and project progress reports.

From their Lansing, Michigan headquarters, the EduGuide team (2016) was instrumental in providing a support plan for the pilot delivered by EduGuide program and technical support staff. Their primary role was to provide the EduGuide software support to students and community mentors to maximize their connections through software engagement. Periodic evaluation of project progress and user activity by the community mentors were reported to the PASOS² Project Team players.

4.1.2.2 The PASOS² Indirect Players

The actors that had an indirect impact on the implementation and outcomes of the PASOS² pilot included the CEA civic organization, school district central office leadership, funders, and the UTEP CREATE Research Center. The nature of their engagement and roles are outlined below.

Pilot funders included CEA with specific monetary gifts provided by Bravo Cadillac, Castro Enterprises, El Paso Electric, and Prestige Consulting Services. UTEP CREATE and

Prestige Consulting Services provide internship funding with Prestige also providing in-kind administrative support, graphics, design, documentation management, and program evaluation and assessment resources. Figure 4.4 highlights the pilot partners and funders.



Figure 4.4. Pilot Partners & Funders

Also playing an indirect role were the stream of superintendents, district academic support personnel, district board of directors, legal support, and CTE coordinators from both the El Paso Independent and Ysleta Independent School Districts who endorsed the mentoring program and authorized the memorandums of understanding outlining the roles of all the parties involved. These staffs were also instrumental in outlining each school district's requirements for the integration of community partners into their schools by outlining the process and rules for volunteers to interact with their students. The community mentors were required to complete the

online applications for community volunteers that included a background check and rules for onsite campus registration.

The UTEP CREATE Research Center provided guidance and assistance in the development of the evaluation model for the PASOS² pilot program, as well as, access to potential near peer students willing to engage as mentors in the program.

4.1.2.3 Setting the Community Mentor Commitment Expectations

The community mentors who engaged in completing the PASOS² Mentor Training Program were provided an outline of the expectations for engagement in the program including a minimum of a two-year commitment to mentor. The expectations from the community mentors included the following:

- complete PASOS² Mentor Training Program
- review and sign “rules of engagement” documents
- comply with school district volunteer requirements
- commit to an average of 15-20 minutes per week on EduGuide
- engage with students on campus for scheduled events
- review periodic material forwarded by CEA PASOS² team on enhancing the mentoring experience
- provide periodic informal and formal feedback on the mentoring experience

4.1.2.4 Attracting Near Peer Mentors

The benefits of near peer mentoring of students, especially in the advocacy of STEM technical fields, has received much press in recent mentoring discourse (Saucier & Martens, 2015; Orem, 2015; Tenenbaum, 2014). Attracting 36% of the community mentors who were ‘near peer’ college students was paramount in broadening the base of mentors provided to the middle school students. This included a successfully orchestrated campaign in recruiting UTEP

engineering students many of whom were female students. A major part of building this partnership was a reciprocal commitment to partner with these college students to enrich their resumes with the PASOS² mentoring experience. Included in this partnership was a commitment by PASOS² leaders and players to:

- build stronger college student resumes via tangible mentoring experiences;
- provide faculty letters of recommendation (future internships, scholarships, coops, jobs, etc.) based on individual college student needs;
- offer timely career guidance from other STEM professionals valuable to students on the verge of graduation;
- broaden their network to community mentors for future career opportunities; and,
- deliver opportunities to engage and co-publish exciting research with UTEP faculty (CREATE Center) as undergraduates students.

4.1.3 The PASOS² Program Implementation Dynamics

The PASOS² Pilot program implementation endeavor was a journey full of experiences revealing both anticipated results coupled with unexpected challenges. The unanticipated results formed the basis for the “Community Mentoring Top Ten Lessons Learned” outlined in Section 5.2.2 with subsequent recommendations in Section 5.3. Given the purpose of the PASOS² pilot was to gain insights as to the viability of effectively introducing a community-driven mentoring program, the pilot surfaced key programmatic factors in the areas of policy, planning, processes, and people (the 4 P’s). This case study provided a deeper understanding of the dynamics in building community stakeholder awareness, understanding, and engagement to a mentoring program with key ‘takeaways’ or lessons learned.

4.1.3.1 Refinements to the Implementation Planning

Included in the implementation planning process subsequent to the initial were multiple refinements of the plan supporting key project strategic areas (Moreno, Silva, & Coronado, 2016) with the corresponding critical success factors refined as outlined in Table 4.1. These critical success factors were deemed as necessary for the successful refinement to the implementation of the pilot program.

Table 4.1. Critical Success Factors for the PASOS² Pilot Implementation Plan and Rollout

Critical Success Factor	Project Plan Strategic Areas
A.1. We must profile the current El Paso Area STEM pipeline data of students choosing a STEM post-secondary course of study in order to benchmark our current STEM pipeline and help students with their career decisions.	Accountability System
B.1. We must cement the partners (<i>i.e.</i> , CEA, EduGuide, YISD, EPISD (WS), CREATE, CREEED, etc.) to successfully implement the pilot in the 2016-2017 in order to learn what works and doesn't in our PASOS ² model.	Resource Management
C.1. We must design, plan, and deliver a mentor curriculum and training program in order to have the mentors ready and encouraged to serve the pilot schools.	Products/ Services
D.1. We must gain commitments for the student cohort groups (YISD STEM Leadership Academy, Henderson MS Chess Club) in order to test the value of our mentoring capacity building program and levels of resource commitments.	Organizational Management
A.2. We must create a periodic evaluation and assessment model for 1) the pilot, and 2) the ongoing PASOS ² program in order to assess: <ul style="list-style-type: none"> • The quality of the mentor training • The quality of the mentor: mentee relationship • The value of the connections made to the readiness profile • The impact of the approaches, methods, tools, etc. developed within the PASOS² project 	Accountability System
E.1. We must define a plan to administer the entire EduGuide system including an MOU to include: <ul style="list-style-type: none"> i. Mentor assignments (how many per student) ii. Which mentees enrolled and assigned iii. The online technical support from EduGuide (or local) iv. Reporting of progress and deliverables v. The administrative point of contacts and duties 	Information Systems Administration

<p>B.2. We must recruit sufficient mentors for each cohort group in order to assign trained mentors in the early fall and set the right expectations, level of time commitment, etc.</p> <table border="1" data-bbox="253 323 1062 432"> <tr> <th><i>Cohort</i></th><th><i>Primary Target Mentors</i></th></tr> <tr> <td>YISD YWLA</td><td>El Paso Electric, UTEP</td></tr> <tr> <td>Henderson MS Chess Club</td><td>CEA + Contacts, UTEP</td></tr> </table>	<i>Cohort</i>	<i>Primary Target Mentors</i>	YISD YWLA	El Paso Electric, UTEP	Henderson MS Chess Club	CEA + Contacts, UTEP	<p><i>Resource Management</i></p>
<i>Cohort</i>	<i>Primary Target Mentors</i>						
YISD YWLA	El Paso Electric, UTEP						
Henderson MS Chess Club	CEA + Contacts, UTEP						
<p>E.2. We must define and design the PASOS² data base system for both mentors and the cohort of students in order to manage the use of our talent & resources and facilitate the assessment of success and value of PASOS².</p>	<p><i>Information Systems Administration</i></p>						
<p>B.3. We must cement CEA's financial commitment to support the PASOS² project.</p>	<p><i>Accountability System</i></p>						

4.1.3.2 The Pilot Program Implementation Components

Specifically, PASOS² introduced a mentoring curriculum, a mentor management system, a grit information technology toolset, a structure to connect prepared mentors with students/parents, with a systemic evaluation model. PASOS² aims to grow by seeking partnerships with businesses, civic organizations, foundations, and other sources to fund student access to EduGuide's online applications. The PASOS² target for EduGuide software tool access is 2,500 El Paso area K-12 students in the next five years.

The purpose of the PASOS² 2016-2017 pilot program was to assess the best practices in engaging and building community mentors to enhance student grit, self-efficacy and self-determination in their pursuit of college and STEM studies. Included in the implementation were the following key components of the pilot program:

- introduction of a formal community mentor training curriculum to build mentor capacity including STEM proficiency, mentoring practices, and rules of engagement;
- integration of the EduGuide software platform to expand mentor and student connections with the selected student cohort groups utilizing both campus and community mentors;

- providing the community mentors of a selected set of mentoring “best practice” resources/ tools;
- implementation of a series of mentor: student “meet and greet” workshops to facilitate on-campus mentor to student connections; and,
- structuring of an evaluation & continuous improvement process.

4.1.3.3 The Actual Implementation Process

The implementation phases as described in Section 3.2.1 included the following:

PHASE A – Research and develop the project concept;

PHASE B – Plan and design the project components and the mentor/ curriculum;

PHASE C – Cement the collaboration of key partners, cohort schools, and funding;

PHASE D – Deliver student and mentor outreach and training; and,

PHASE E – Implement the mentor network with the pilot groups.

Table 4.2 describes the extent of the actual implementation journey that included upwards of 27 formal PASOS² presentations building program awareness and support ranging from civic groups, companies, school boards, superintendents, and campus leadership. In addition, various formal training workshops were conducted training 26 campus mentors, 149 students, and 37 community mentors. Seven (7) community mentoring workshops were hosted by and conducted at the El Paso Electric Company training facilities. In all, 212 players were trained and registered to use the EduGuide software modules for the pilot with licenses sponsored by CEA and EduGuide at no cost to the districts, students, mentors, or volunteers.

The actual pilot program rollout reflecting the changes to the project implementation plan are reflected in Figure 4.5. Several adjustments and refinements to the plan had to be made to

Table 4.2. Pilot Program Implementation Journey

<i>The PASOS² Pilot Program Implementation Journey</i>			
AREA	ACTIVITY	COMPONENTS	TOTAL
OUTREACH	PASOS ² PROGRAM PRESENTATIONS	<ul style="list-style-type: none"> • EPISD (Supt., Area Supts., Henderson MS (HMS) Campus) = 5 • YISD (Supt., Area Supts., YWLA Campus/Staff, YISD Board, YWLA Parents, YWLA Students) = 8 • CEA (Board, STEM Committee) = 3 • El Paso Electric (Mentoring Committee) = 3 • Ysleta Education Foundation Board = 2 • EduGuide, Inc. = 4 • CREATE UTEP = 1 • UTEP MAES / SHPE Student Orgn. = 1 	27 Presentations
TRAINING	CAMPUS MENTORS TRAINING WORKSHOPS	<ul style="list-style-type: none"> • YWLA = 14 • HMS = 12 	26 Campus Mentors
	STUDENT MENTEES WORKSHOPS	<ul style="list-style-type: none"> • YWLA = 97 • HMS = 52 	149 Students
	COMMUNITY MENTORS WORKSHOPS	<ul style="list-style-type: none"> • EPE = 24 • OTHER = 13 	37 Community Mentors
PROGRAM DELIVERABLES	DESIGN, PRODUCTION, & IMPLEMENTATION	<ul style="list-style-type: none"> • Project Plan • MOUs • YEF STEM Degree Analysis • Code of Conduct • Participant Agreement • Evaluation Strategy • Pre-Training, Post-Training Surveys • PASOS² Flyers • PASOS² Curriculum (5 Modules) Presentations • PASOS² Online Curriculum & Registration Software Design and Build • EduGuide Registration Videos 	
SOFTWARE ACCESS	EDUGUIDE LICENSE REGISTRATION	<ul style="list-style-type: none"> • Students • Campus Mentors • Community Mentors 	212 Players

Table 4.2. Pilot Program Implementation Journey. Summary of the actual journey of program outreach, training, deliverables, and software registration. Moreno, G., & Silva, G. (2017). *Building STEM community mentorship capacity: A case study*. NCCEP Conference (pp. 1-46). San Francisco: NCCEP Self-Publishing.

adjust to new training schedules, additional technology registrations, campus changes in schedules, and changes to the on campus “meet & greet” activities.

4.1.4 The PASOS² Community Mentor Engagement Experience

“I really believe it is a great initiative, especially because it is open to mentors with different professional and educational backgrounds.”

(An engaged UTEP Doctoral STEM candidate)

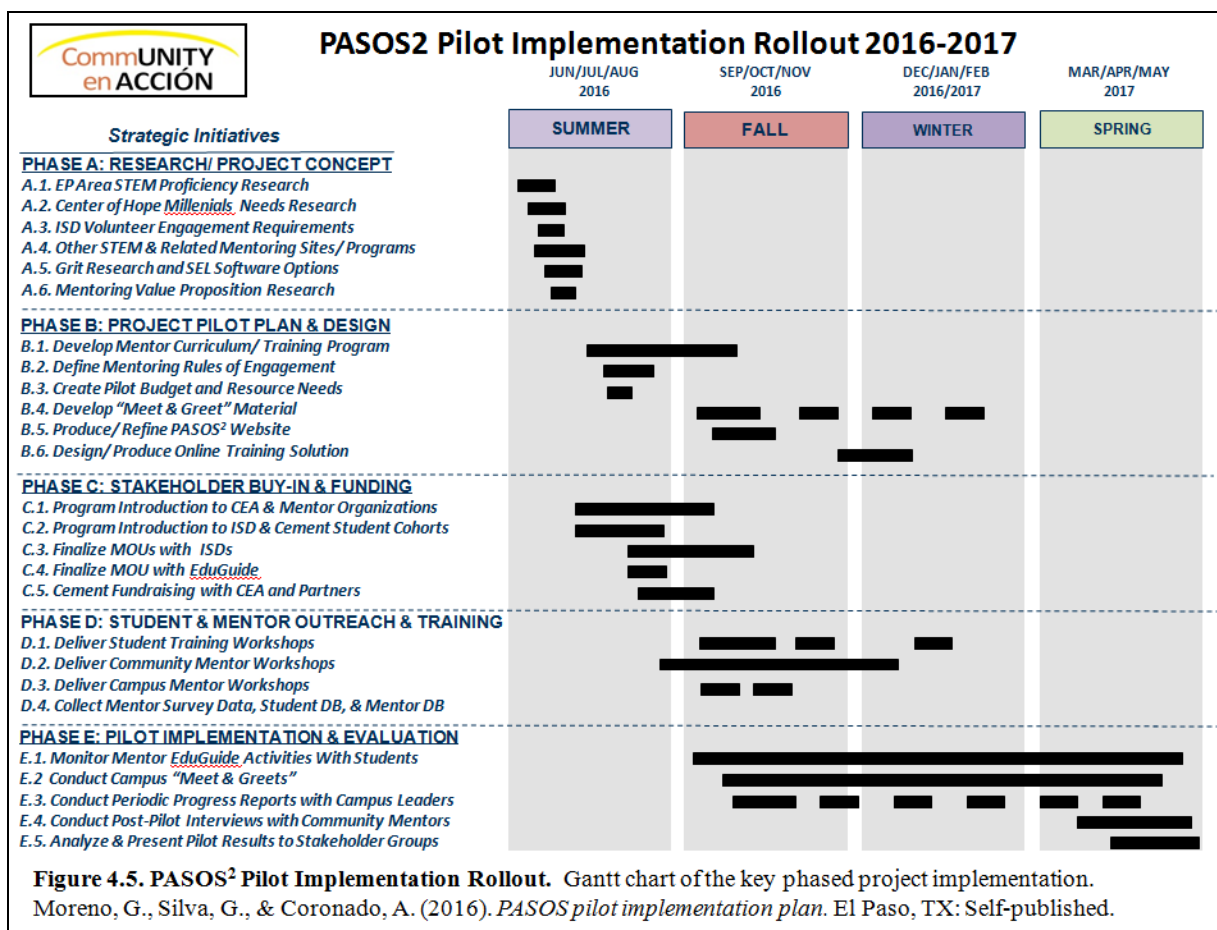


Figure 4.5. PASOS² Pilot Implementation Rollout

“EduGuide was very friendly. But it was a bit overwhelming that we were not assigned just one or two students but instead had to choose between all students’ responses.”

(A non-STEM professional with very limited mentoring engagement)

“It was easy to engage and the scheduled [“meet & greet”] topics helped us to engage students and helped me have a direction when meeting with the students.”

(An engaged newly graduated UTEP engineering major)

“[EduGuide] was easy to use, but seemed time consuming (each session may be limited, but for it to be effective, you really need to have the time to monitor and engage with the students).” (A STEM professional who had no software engagement with students)

“The EduGuide platform is very easy to use and has a user interface that allows the user to succeed in providing an effective mentorship! The tutorial videos are not too long, the instructions are clear, and the experience is enjoyable much like that of a video game.”
(An engaged UTEP junior engineering major)

As highlighted above, the community mentor PASOS² training experience and feedback varied and was a direct function of their engagement with the students, either through the use of the software platform and/or participating in campus workshops with the students. Their experience with the PASOS² program had four stages: recruitment, training, student engagements, and mentor post-pilot program feedback.

Most of the community mentors were recruited via a presentation outlining the program genesis and goals, demonstrating the EduGuide software application, and inviting them to engage by a) registering as mentors in the software, and b) completing the PASOS² curriculum. The PASOS² training program and curriculum was first offered in a 1 to 1.5 hour workshop format in the fall semester and then eventually offered in an online format in the winter and spring for mentor convenience. The training included directions for the mentors to select a cohort of choice and follow-up instructions on how to register as volunteers with the appropriate school district. The mentors were presented with the rules of engagement for them to electronically sign and endorse.

As outlined in Section 1.1.1, the community mentors had two mechanisms with which to interface with the students during the PASOS² pilot: 1) online access to student responses to EduGuide activities in a variety of topics online mentoring; and 2) engagement in periodically

scheduled “Meet & Greet” sessions on campus. Once the mentors were registered with the software, they were prompted to engage online with students who had completed modules or activities. Multiple mentors were assigned to multiple groups of students based on EduGuide recommendations to offer multiple perspectives with this arrangement. The community mentors were on their own to decide, select, and engage in the online mentoring responses to students who had completed their assigned activities. In addition, invitations to periodically scheduled “Meet & Greet” sessions at the campuses were offered to the community mentors on a voluntary basis. Some community mentors chose to only do their online activity and some only to engage in the “meet & greet” workshops interfacing with students directly.

The online nature of the EduGuide solution application allowed community mentors at their own convenience to use the SMART technology of their choice. Once the EduGuide software prompted the community mentors, the mentors responded to individual student feedback to completed activities or modules. This mentor feedback was topic specific and generally included statements of encouragement, inquiry, or further reflection to the students. Community mentors responded to a predefined set of research-driven activities completed by the students with no quotas or targets for mentor completion-- they did as many as they desired and were able to complete. Student groups had access to multiple mentors to expand the quantity and quality of mentorship from multiple mentors. This interaction is highlighted as the second stage (“coach”) of EduGuide engagement by the mentors in its four phase model to building student self-efficacy and self-determination (See Figure 2.2).

EduGuide provided periodic traffic volumes regarding the number of student, school staff, and community mentor completed activities. For the mentors, the number of completed comments in response to student EduGuide activity was used as a metric for assessing community mentor engagement. No pressure was ever put on mentors to engage based on their

activity – engagement was strictly based on self-initiation and self-management. The levels of the EduGuide online activity by the community mentors is reported in Section 4.1.4 as reflected in the mentor opportunity pipeline dynamics.

The community mentors also volunteered to participate in a typically one hour on campus visit to engage with students directly. At these volunteer “Meet & Greet” sessions they selected a classroom of students to dialogue using a preselected lesson aligned to both the EduGuide activities and/ or preselected topics aligned with school academic topics. The levels of the “Meet & Greet” online activity by the community mentors is reported in Section 4.1.4 also reflected in the mentor opportunity pipeline dynamics.

Periodic updates of both student and mentor (both campus and community) activity were reported to the campus administrative teams. This afforded the campus teams a way to provide feedback from the students and staff. A formal interview protocol regarding the pilot program was afforded to a subset of the community mentors who engaged or failed to engage. Figure 4.6 encapsulates throughout the pilot project the community mentoring experience for the four stages and included the following results:

- The outreach and selling of the PASOS² concept was a relatively easy sell with potential community mentors readily expressing interest in engaging. Since the focus of the outreach was the female STEM professional community and female engineering college students, this resulted in nearly two-thirds of the 67 potential mentors being female in expressing interest in the mentoring program.
- As part of the face-to-face training workshops, the mentors who took the next step to get trained a total of 38 mentors were registered on the EduGuide system as ‘coaches’ and assigned to student groups. Those who took the online course were registered by the pilot project interns.

- Of those indicating interest in the program, a total of 33 mentors completed the curriculum training via the scheduled workshops or using the online curriculum that was developed over the Christmas holiday and introduced in January of 2017.
- A total of 27 mentors engaged in the “meet & greet” campus workshops with the middle school students of which 17 strictly participated in the “meet & greet” sessions without getting involved with the EduGuide software.
- It became apparent that the older the mentor the more likely he/she had problems with the software or opted not to use it.
- Conversely, of those who were registered in the software, 17 engaged online with the cohort students. Interestingly enough 7 community mentors chose to only engage

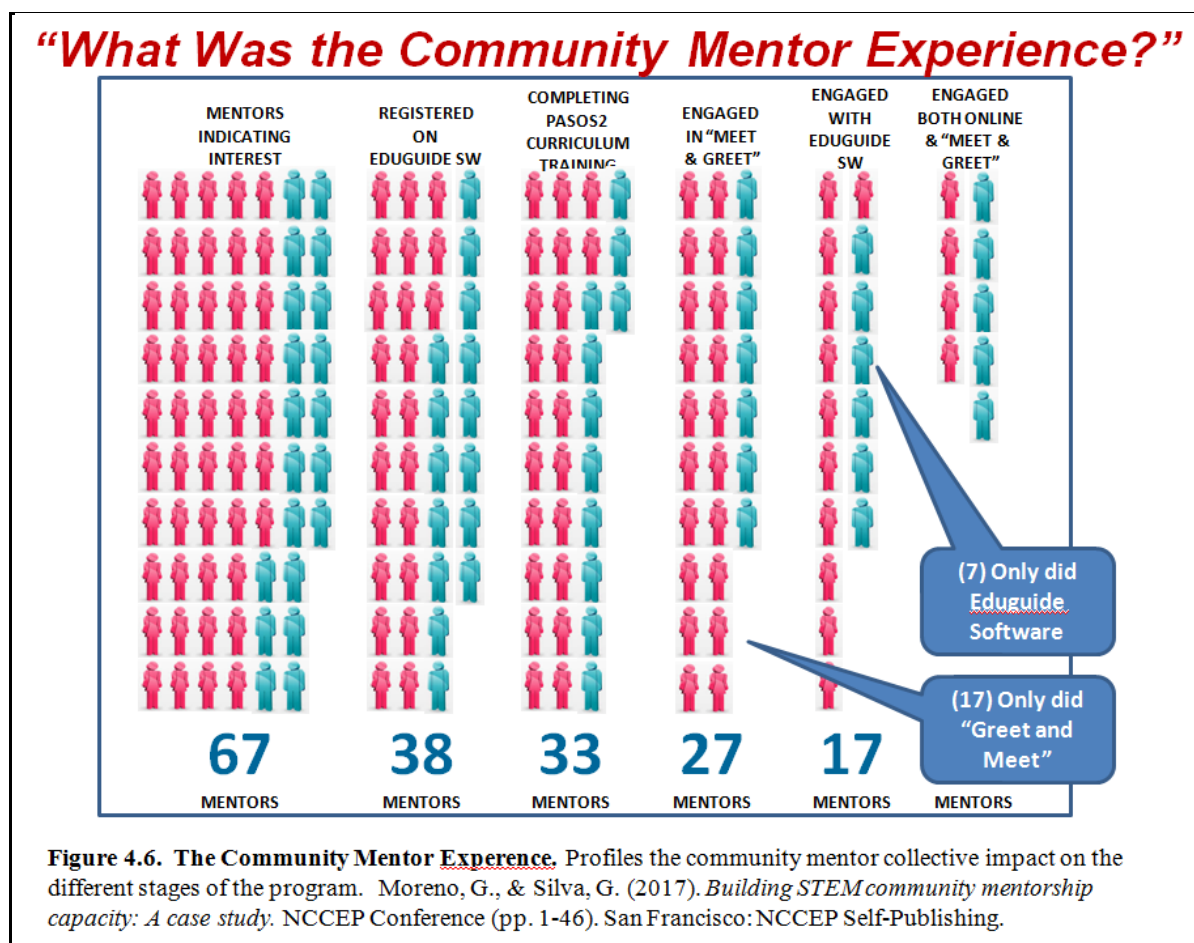


Figure 4.6. The Community Mentor Experience

online via the EduGuide software with the students. Three of these mentors were located remote to El Paso and could only interface online.

- The ultimate “master mentors” included 9 individuals that engaged in both the online and “meet & greet” sessions bringing balance to their mentoring contributions and the sharing of their wisdom and expertise.

4.1.5 Key Initial Implementation Lessons Learned

In retrospect, the PASOS² project implementation plan developed in the spring and early summer of 2016 was practical albeit an aggressive plan from a time perspective to complete the five (5) project phases of research, project design, advocacy and funding, outreach and training, and network implementation. The following are some key lessons learned from the initial implementation of the pilot program starting in the fall of 2016 that requires attention for subsequent program expansion:

- The effort and the amount of time needed to gain stakeholder awareness, understanding, and buy-in was substantial. One school district necessitated eight (8) presentations to district and campus administrators over the course of over two (2) months to finally garner Board of Trustee endorsement of the project. This is not to mention the multiple revisions of the MOU by district lawyers. This was for a mentoring program provided at no cost to the district bringing much needed community mentorship to the schools. The district bureaucracy, while considered by the project team, was not reflected in the project plan.
- While professionals readily expressed interest in engaging in the mentoring program, many stated that the training workshops scheduled during the work day were not convenient. Given the need for a training setup with online technology available, it was decided over the Christmas holiday to migrate the mentoring curriculum to an

online website version thus requiring more planning and design effort and project funding. In retrospect, the number of additional professional mentors using the online version at their convenience was not significant. However, future expansion of the program makes this online option a more viable way to sell the program to potential community mentors.

- Not included in the original project plan, the need to structure and develop a “meet & greet” curriculum for mentors engaging at the campus was made apparent early in the fall. Community mentors committing their time and effort are more effective when a theme and tools are provided to them with lead mentors helping them engage with the students. A series of topics for the “meet & greet” sessions was developed using a framework focused on a thematic framework aligned with the EduGuide activities or modules.
- The ability to dramatically expand the footprint of a single mentor covering more students using the EduGuide software was a primary requisite test of the PASOS² pilot approach. The ability to do “40 in 40! – or complete comments to forty students in forty minutes” was proved viable as tested by Gilberto Moreno and Willie Silva after having served as online mentors for a period of two months. Given that community mentors are generally assigned to 10-12 students, this capability is critical to leveraging the finite mentoring capacity per student group, i.e., more mentors covering more students.
- There is a need to structure and maintain a continuous stream of communications to all mentors, but especially community mentors to keep the mentoring program on their radar. The need to develop a self-imposed discipline to make and commit the time to engage, especially to respond online to students completing their EduGuide

modules, is paramount to effective mentoring. It was surprising to hear from so many mentors who indicated interest but did not engage that they were waiting direction or the next steps from the PASOS² project team. The key to any mentoring is self-initiative – this was lost in many potential community mentors.

- It was revealing that some community mentors favor either the online technology or the on campus “meet & greet” mentoring alternatives but not necessarily both. The younger the mentor, the more likelihood the online technology will be used with a much faster learning curve. Conversely, most of the technical problems with using the software came from inexperienced, older community mentors.
- It is possible for the students to “take off” in using the EduGuide application on their own without much campus mentor intervention or encouragement. The ‘texting’ nature of the software is a natural graphic user interface for millennials.

4.2 Data Gathering, Management and Analysis Results

This section describes the results of the data gathering, management, and analysis using the approach described in Section 3.2.5 for the following four (4) assessment tools that were designed to address the research question and include the following:

- Tool #1: Community Mentor Value Profile vs. “Mentor Value Equation” concept mapping
- Tool #2: Pre-Workshop Community Mentor Survey
- Tool #3: Post-Workshop Community Mentor Survey
- Tool #4: Post-Pilot Summative Interview

4.2.1 Tool #1: The Mentoring Value Concept Mapping Results

As introduced in Section 3.2.32, the ‘mentor value framework equation’ resulted from previous research from interviews of key players accomplished in STEM studies and careers.

This included feedback from adult mentors who pursued and accomplished a successful STEM career in business or education, as well as, feedback from recent graduates with STEM degrees (Moreno, 2015b). These students were among the most accomplished at UTEP having been recognized as UTEP Top Ten Seniors, the most prestigious recognition given to UTEP students for their academic, service, and leadership achievements as undergraduate students. The interview protocol focused on investigating their experiences with mentoring and/ or mentors who influenced their careers, including reflection on:

1. What is the basis for building a strong empowerment agent network?
2. What motivates individuals to invest in a mentoring role?
3. What makes for an ideal STEM mentor?
4. What tools or practices can enrich mentor capacity and effectiveness?
5. How do we know we have an effective student: mentor connection?

The resultant mentor value equation framework formed the basis for the development of the PASOS² curriculum including the following key variables:

v_1 = 2-way mentor: student relationships (making the meaningful connection) focused on building student STEM ‘grit’

v_2 = demystifying the college & STEM opportunity to all students and their advocates and influentials

v_3 = providing student’s direction and a pathway with career planning

v_4 = fortifying student readiness (academic, college transition, career, and life) for a successful career with solid mentoring experiences

The components of these four (4) key variables were used as the foundation and pedagogical framework for the development of the PASOS² community mentor training curriculum.

In addition, as part of the introductory component of the community mentoring training, the community mentors as a group were asked to reflect on what they perceive to be the true value of mentoring by answering the question, “What do you value in mentors?” The top ten concepts or themes that emerged included the following listed in the order of most cited by the community mentors:

1. giving advice & guidance / sharing of knowledge & experience (15)
2. willingness to invest in others (12)
3. networking / relationship building (11)
4. role modeling / leadership (8)
5. a source for motivating, inspiring (7)
6. exploring / opening eyes to new possibilities including STEM / lifelong learning (7)
7. uncompromising focus on setting high career expectations (5)
8. being an advocate/ cheerleader for mentees (5)
9. acceptance of failure as path to success (4)
10. risk-taking, self-reflection (4)

These ten major themes (represented by the outer circle in Figure 4.7) were contrasted against the mentor value equation concept map (represented by the inner circle in Figure 4.7). The alignment of the mentoring value equation concept map with the ten community mentor value concepts as captured using Tool #1 were 100% mapped to each other. Consequently, this brings into focus the recognition that the variables in the mentor value equation (i.e., relationship building, demystifying college and STEM, providing direction and career guidance, and building student readiness) are the same mentoring factors perceived and valued by community mentors.

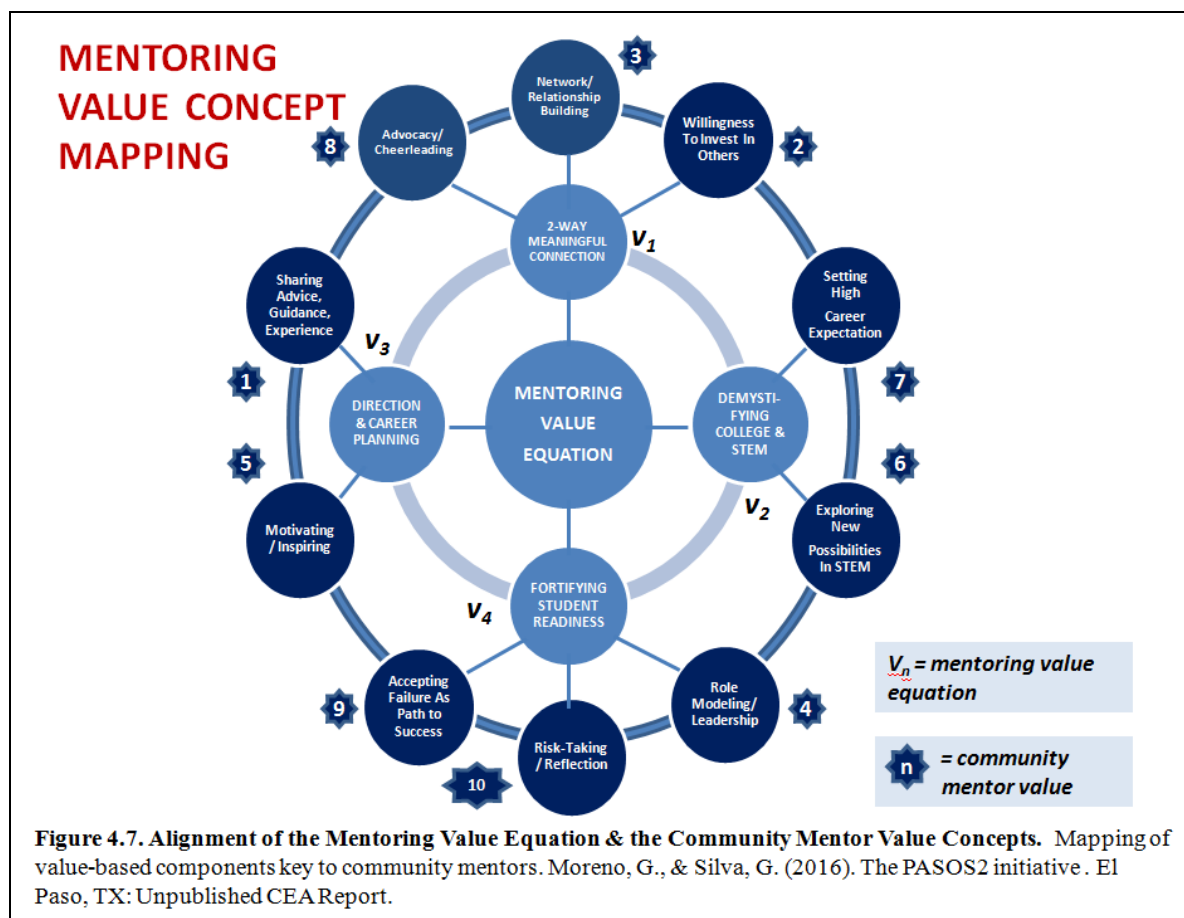


Figure 4.7. Alignment of the Mentoring Value Equation Mentor Value Concepts

4.2.2 Tools #2 & #3: Pre- & Post- Workshop Survey Results

The mentor value equation profile formed the basis for the creation of the PASOS² mentor curriculum, as well as, the community mentor feedback design mechanisms for this research study. Feedback via pre- and post- workshop surveys as outlined in Appendix B were used with community mentors to assess the effectiveness, impact, and attitudes of mentors and what matters most to them as they decide to engage with students. Figure 3.6 outlines the modular approach to the PASOS² mentor curriculum that was delivered in workshop format and eventually offered in an online version to community mentors.

The Tool #2 pre-workshop survey was administered as part of the first introductory Module #1 focused on capturing community mentor expectations, PASOS² program familiarity,

concerns, STEM knowledge, and experience in mentoring PRIOR to the any training. Module #2 outlined the program strategic intent, basis for the mentoring approach, and future mentoring support services. In addition, research and topics including how best to make connections with millennial students was introduced in Module #3. The Tool #3 post-workshop survey was introduced at the end of the training in Module #4 to gage the effectiveness of the training curriculum, program, and next steps for the mentors to engage.

The specific questions in the pre- and post-surveys that were analyzed included for the pre- survey Questions #6, 7, 8, 9, 12, 13, 14, and 17 as outlined in Appendix B. The corresponding questions in the post- survey included Questions #1, 2, 3, 4, 7, 8, 9, and 10. Specifically, the pre- and post- workshop survey addressed community mentor assessment with inquiry of the following key mentoring dynamics:

- familiarity with PASOS² program purpose
- comfort with expected mentor role in PASOS²
- experience in building 2-way relationships
- comfort with expected behaviors + conduct
- comfort with familiarity of STEM concepts
- comfort in advocating stem to students
- comfort in the use of mentoring software
- familiarity with building student life readiness

Each of the eight mentoring dynamics listed above were tested with a sample size of the thirty-three (33), i.e., those participants that completed the mentoring workshop face-to-face or online. Appendix D shows a sample t-test with paired samples for one of the eight dynamics, namely Dynamic #1: Familiarity with the PASOS² Program. A similar table for the rest of the eight total functions was developed. The difference in the pre- and post- workshop values

represents the participants' answers that best reflects their opinion using the following rubric for the pre- and post- survey responses:

5 = To a great extent

4 = To some extent

3 = To a very little extent

2 = To no extent

1 = Don't know/Does not apply

Demonstrating the statistical analysis using the first dynamic (i.e., familiarity with the PASOS² Program) let x be the difference in the mentor response for each mentoring dynamic prior to the training and after the training. The null hypothesis is: $H_0: \mu = 0$; i.e., the differences in the impact of the curriculum is due to chance. Using the type1 TTEST to perform the statistical analysis, the resultant p value using an $\alpha = .05$ for a paired sample and a one tail test:

$$\text{p-value} = \text{TTEST}(B2:B34, C2:C34, 1, 1) = 7.75261\text{E-}12 < .05 = \alpha,$$

and so we reject the null hypothesis.

Similarly a two-tail t-test for the same mentoring dynamic (in fact, all eight mentoring dynamics) resulted in $p = 1.55052\text{E-}11$ in scientific notation, thus also rejecting the null hypothesis. The resultant t-test for all eight (8) mentoring dynamics is highlighted in Figure 4.8. All eight p values $< .05$, thus the null hypothesis was rejected for all of them, i.e., the mean differences was significant and not due to chance. The training did have a significant impact. Incidentally, the pre- and post- workshop surveys also solicited feedback from the community mentors to qualitative questions with responses used in the triangulation analysis in Section 4.4 in this chapter.

The primary advantage of this repeated-measures study is the use of the same 'actors' in all treatment conditions with no risk of bias being introduced due to changes in the participants.

The treatment condition assumptions are that the population data is normally distributed and that the variances of the population are equal. Since there are two samples for the same mentor, the repeated-measures t-test is more efficient because the same individual is measured on both treatments. When there are more than three samples, the ANOVA statistical test is recommended (Taylor, 2014). The other advantage is that the repeated-measure design captures

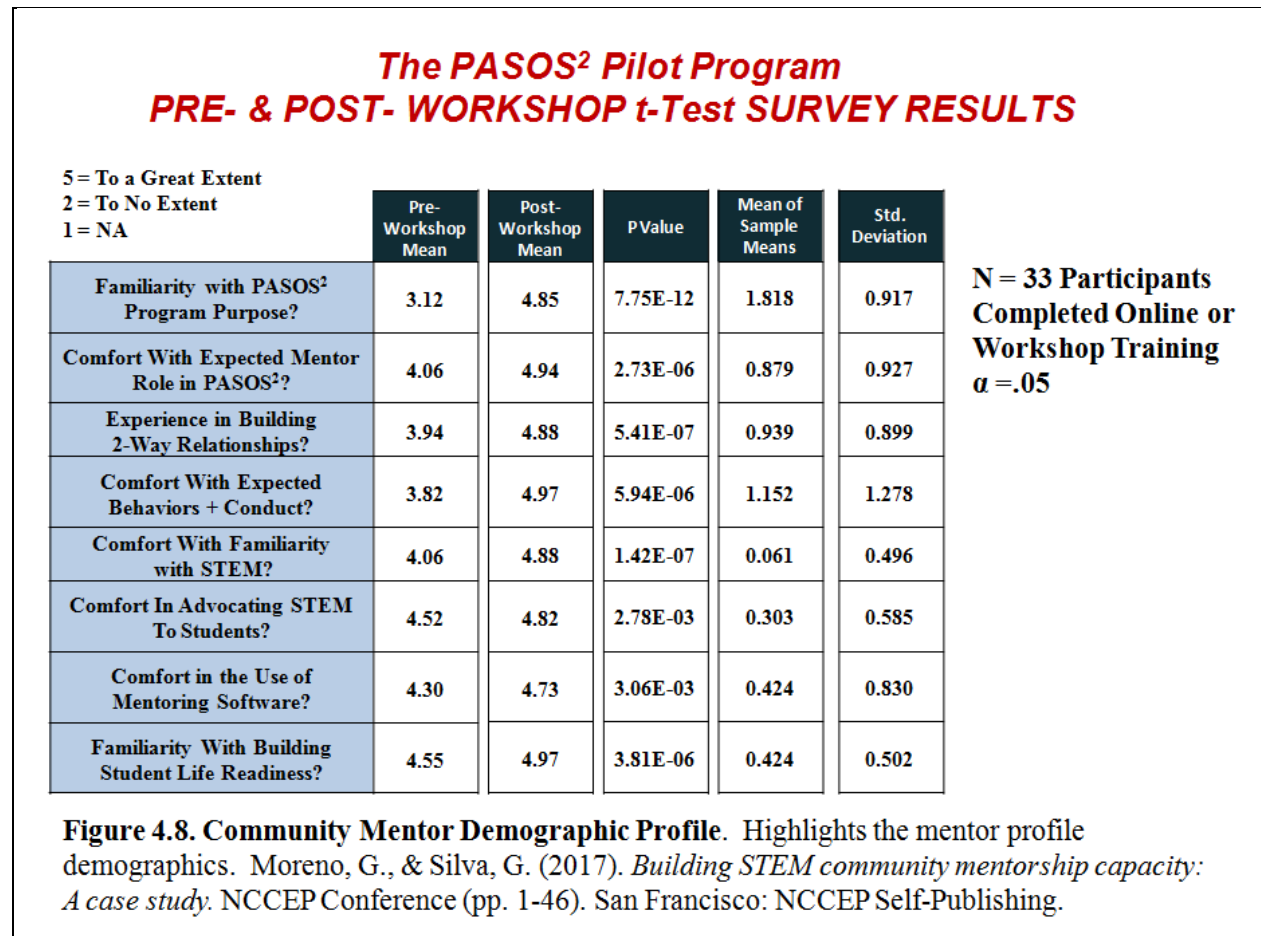


Figure 4.8. Pre- and Post- Workshop Survey Results

the immediate net effect of the curriculum over the course of the training time. Also, individual differences inherent from individual to individual mentor are eliminated since the same participant takes the pre- and post- workshop sample data.

In addition, it is necessary to note that both treatments (i.e., the pre- and post- workshop surveys) included open-ended questions to gather input used in the triangulation research process outlined in Section 3.2.7.

4.2.3 Tool #4: Mentor Post Pilot Summative Interview Results

It became apparent early in the PASOS² pilot program during the community mentor recruitment, training, and engagement cycle that the level and extent of engagement would vary tremendously from community mentor to mentor. Some mentors readily sought out opportunities to engage with students by voluntarily applying the EduGuide software and/or participating in the “meet & greet” scheduled events on school campuses. Understanding both the motivation and basis for their engagement, as well as, the reasons for non-engagement is equally as important in assessing the major contributing factors for the motivation for engagement as empowerment agents.

4.2.3.1. The Interview Protocol and Criteria for Selection

This section describes the coding and analysis of the interview data from the summative mentor interviews identifying patterns, similarities, and differences among community mentor groups. Two groups of community mentors who engaged (or did not) were selected to provide a contrasting feedback mechanism from which to draw inferences from their mentoring experience and perspectives. The Tool #4 Mentor Post-Pilot Summative interview protocol was forwarded online to fifteen (15) community mentors that ‘significantly’ engaged and fifteen (15) other mentors that chose not to engage based on the selection criteria described below. The interview protocol of open-ended questions assessed what most influenced community mentors experiences and engagement in building community mentor capacity and competency.

For purposes of comparison, a “++MENTOR” represented 15 engaged community mentors selected. They were chosen based on an arbitrary criteria of those mentors who engaged

and positively contributed to the pilot program with either “significant” engagement of at least two (2) or more “meet & greet” campus visits and/ or meaningful EduGuide system interaction interfacing online with at least 10 students during the pilot. At least nine (9) mentors contributed significantly to both categories with eight (8) of them being professionals and the balance being “near peer” college mentors from the. Nine of the fifteen ++MENTORS were female with all the age groups represented in the sample of fifteen.

Conversely, fifteen “- -MENTOR” interviewees who failed to contribute to the pilot program were selected to be interviewed to gain and understand their perspective. These individuals did invest in the program by completing the training but neither engaged in at least two or more “meet & greet” campus visits nor had meaningful EduGuide system interaction online with at least 10 students. Interestingly, 12 of the 15 --MENTOR interviewees were professional mentors with three “near peer” mentors making up the balance. Ten of the fifteen --MENTORS were female.

The interview protocol outlined as Appendix C focused on garnering feedback tied to their level and motivation of engagement. The investigation focused on their experience and the challenges or obstacles to engaging with the three major PASOS² program components: a) the overall PASOS² mentoring program; b) the “meet & greet” campus sessions; and c) the EduGuide software mechanism. Key interview questions included: 1) What do you see as the greatest value of the mentoring program using the EduGuide software as a mentoring mechanism?; 2) How would you describe your “meet and greet” experience(s)? How easy was it to engage?; 3) To what extent did you have an opportunity to interface with the students using the online EduGuide software application?

4.2.3.2. The Coding and Analytics Process

Saldana's (2009) work on coding was most helpful. "Coding is the transitional process between data collection and more extensive data analysis" (Saldana, 2009, p. 4). Coding is an iterative process and is an art not a science—coding is a refinement process from which categories evolve to further produce clusters of major themes. The entire "process and products of creating data about the data in the form of codes, analytic memos, and graphical summaries" are 'metadata activities' (MacQueen & Guest, 2008, p. 23).

Each interview for both the "++MENTOR" and the "- -MENTOR" sample groups was transcribed into MS Word. Subsequently creating a *coding interview transcript profile* facilitated the documenting of the raw data, preliminary coding (first cycle), and final coding (second cycle) with analytic memo annotations captured from the transcriptions and entered during the coding and analysis process. Liamputtong & Ezzy's (2005) coding format was adapted for the creation of preliminary codes or jottings and for the second pass or 'final code' applying the MS Word Comment function for analytic memos, notes, or comments. Follow-up calls with the interviewees as necessary were made for clarification and further edification of responses. Finally, the interview transcript profiles were analyzed to derive the codes to category framework model. The codes to category framework was analyzed to derive major themes and concepts for the three PASOS² program components investigated helping inform the final conclusions and recommendations for this study including recommendations for PASOS² program continuous improvement and expansion.

This section provides an overview of the findings from both interviewed groups. It includes seminal quotes supporting major themes, as well as, a summary of their significant feedback, recommendations, and discovery. As part of the pre-coding, highlighted were "rich or significant participant quotes or passages" as 'codable moments' worthy of attention (Layder,

1998, p. 7). These ‘seminal quotes’ are important as evidence to support this case study’s assertions, theory, or propositions and serve as illustrative examples of the significant findings. These preliminary jottings also served as prompts for consideration of further analysis and future research.

4.2.3.3. Clusters of Seminal Quotes – Key TOOL#4 Interviewee Input

The following are representative quotes (see Tables 4.3, 4.4, and 4.5) were derived from the interviews tied to the three major investigatory themes highlighting participant common ground, perspectives, and/ or valuable insights from both the ++MENTOR and the –MENTOR interviewees. They represent the ‘polar opposite’ viewpoints for the three major themes between those mentors that engaged (++MENTORS) and those that did not (--MENTORS). Other significant quotes gathered from the interviewee input are outlined in Appendix E as well in addition to the ones listed below.

Table 4.3. THEME A Feedback: “PASOS² – Value As A Mentoring Program”
(Moreno & Silva, 2017)

++MENTORS	<p>“In my opinion, the greatest value of the mentoring program in general is the opportunity that it provides connecting students and their mentors in the common journey towards the set goals. I really believe that both groups learn in this process.” Female College Student Participant #3</p> <p>“Providing mentorship alongside my peers was the greatest value for me; seeing them be proactive on the platform motivated me to be proactive as well.” Male College Student Mentor Participant #7</p> <p>“The key to enhanced community engagement is having adults see the value in investing time and energy to make a realistic difference in the lives of our students – they need and want our guidance and wisdom.” Male Professional Mentor Participant #12</p> <p>“Students were so impressive along with educators. Very rewarding project!” Female Professional Mentor Participant #9</p>
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-MENTORS	<p>“The [program] starts the conversation between the mentor and the student. You don’t go through that awkward period of, what should I say? What should I ask? During our training session, we had very little time to really learn how to use the software. If possible, can you spend more time on it?” Female College Student Mentor Prospect #19</p> <p>“I would like to participate in the future if my work demands/ schedule permits.” Female Professional Mentor Prospect #22</p> <p>“The idea that the program was virtual was very appealing in that it allows mentors who are not available at specified times to participate in a meaningful way.” Female Professional Mentor Prospect #18</p>
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Table 4.4. THEME B Feedback: Effectiveness of the ‘Meet & Greet’ Component (Moreno & Silva, 2017)

++MENTORS	<p>“I do see the value of meeting students in person. Communicating with students face to face is important in building a strong relationship between both mentee and mentor.” Male College Student Mentor Participant #4</p> <p>“It was easy to engage and the scheduled topics helped us to engage students and helped me have a direction when meeting with the students.” Female College Student Mentor Participant #5</p> <p>“Meet and greet was a wonderful experience ☺.” Male Professional Mentor Participant #8</p> <p>“Fantastic! Very easy to engage with students because both the mentor and the students could relate to the EduGuide modules to keep conversations going. Developed themes for the meet and greet was very helpful.” Male Professional Mentor Participant #14</p>
-MENTORS	<p>““I was only able to attend the initial meeting, but did not make it to any of the meet and greet sessions. The demands of my job did not afford me the time to engage.” Female Professional Mentor Prospect #22</p> <p>“I was only able to attend the initial meet and greet session with the students. It was a good opportunity to understand the purpose of the program. The students and teachers are very welcoming and excited to be part of this program.” Female Professional Mentor Prospect #23</p> <p>“Unfortunately, the time conflicted with my schedule.” Female Professional Mentor Prospect #24</p>

Table 4.5. THEME C Feedback: Effectiveness of the EduGuide Component
(Moreno & Silva, 2017)

++ MENTORS	<p>“I used it often to ask questions of the students throughout their path activities and get them to express themselves more in depth. Very easy to go through the modules and mentor students.” Female College Student Mentor Participant #6</p> <p>“Extensively, every day was an opportunity! The EduGuide platform is very easy to use and has a user interface that allows the user to succeed in providing an effective mentorship! The tutorial videos are not too long, the instructions are clear, and the experience is enjoyable much like that of a video game.” Male College Student Mentor Participant #7</p> <p>“The EduGuide software was very great. It was very easy to use once the students were actually using the software.” Female College Student Mentor Participant #13</p> <p>“Very involved with the EduGuide application. Being able to use the application on my phone was very helpful. Once you get over the short learning curve, it is very, very easy to use. The platform is easy to navigate.” Male Professional Mentor Participant #15</p>
- MENTORS	<p>“The system was a bit difficult to understand without someone walking me through it....simply make it easy as possible to participate and I’ll make it work! Female Professional Mentor Prospect #18</p> <p>“I proceeded independently to use the software (I was waiting for further directions from the PASOS² training team.” Female Professional Mentor Prospect #18</p> <p>“It was easy to use, but seemed time consuming (each session may be limited, but for it to be effective, you really need to have the time to monitor and engage with the students.” Female Professional Mentor Prospect #21</p> <p>“I did not interact with any students – had very little exposure to [the] portal but it seemed user friendly.” Female Professional Mentor Prospect #22</p>

4.2.3.4. Interviewee Data Analysis Component Results

Using the interview transcriptions, a coding framework was completed including two coding cycles with analytic memos totaling five (5) pages per participant. The next step in the analysis was to assess for different types of patterns (Hatch, 2002) including: similarity, differences (especially between mentors and mentees), frequency, sequence, correspondence (in

relation to other activities or events), and causation (one appears to cause another). From these subcategories eventually twelve categories were created that subsequently were used to derive the major themes and concepts from the engagement category profile (See Table 4.6).

The interviews resulted in highlighting the community mentor experience and the challenges or obstacles to engaging with the three major PASOS² program components. Figure 4.9 highlights the “*EduGuide Experience*” contrasting the top contributing factors to mentors’ inability and ability to engage with the EduGuide software tool set. Most interesting is the

Table 4.6. Profile of Engagement Categories

Engagement categories derived from the coding and subcategories.
Category A: Finding Value In Mentoring
Category B: Understanding the Ingredients Necessary For Effective Mentoring
Category C: Recognizing the Commitments & Expectations Necessary in Mentoring
Category D: Embracing the Importance of Collaboration and Advocacy for Mentoring
Category E: The Willingness vs. Ability Factor To Mentor
Category F: Nurturing Strong Mentor: Student Relationships
Category G: Level of Interaction with Students Via “Meet & Greet” Mechanisms
Category H: Contributing Factors Influencing the Ability to Engage with Students (both on campus and via the EduGuide technology)
Category I: Leveraging the Use of Software Technology In Mentoring Effectiveness
Category J: Personal or Professional Demands Affecting Engagement As Mentors
Category K: Building Capacity and Competencies As a Mentor
Category L: Effective Communications Among Stakeholders

contrasting arguments from what the --MENTORS found to be inhibiting were exactly what the ++MENTORS found as contributors to a positive mentoring experience. For example, --MENTORS complained about the difficulty in using the software, while ++MENTORS found it easy to access, use, and mentor. While --MENTORS found it difficult to finish the EduGuide training or get access the students, ++MENTORS found the deliverables and tools easy to navigate apply in their mentoring experiences.

Similarly, the top contrasting “*Meet & Greet Experience*” contributing factors are highlighted in Figure 4.10 for both the mentors’ INABILITY and ABILITY to engage in the

campus sessions with the students. Whereas the --MENTORS found it difficult in scheduling and engaging in the “meet & greet” sessions, the ++MENTORS found the schedule, logistics, themes, and interaction with the students both invigorating and impactful. Interestingly, many of the --MENTORS overstated the number of sessions they participated in when compared to the actual sign-in attendance records for mentors.

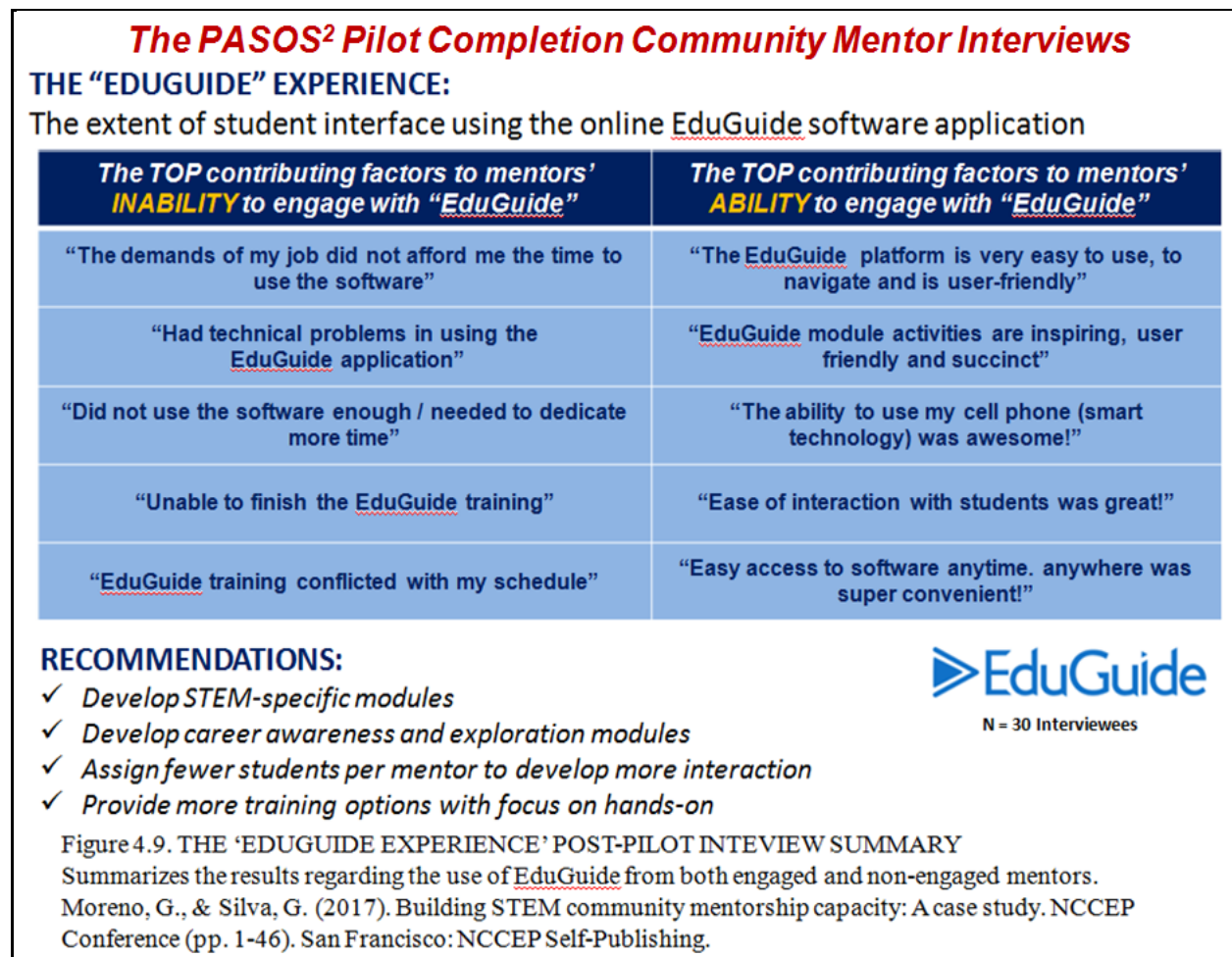


Figure 4.9. The “EduGuide Experience” – Post-Pilot Interview Summary

Regarding the overall PASOS² mentoring program and the overall experience from both sets of mentors, key input was solicited regarding mentor commitment, the sharing of the program, and whether they intended to have future participation in the program. Figure 4.11 outlines a surprising 90% agreement with a 2 year commitment from both the --MENTORS and

the ++MENTORs, a 70% sharing of the program with friends and family, and a 95% commitment from all mentors to engage in next year's program. Whether they participated or not, the nature and value of the PASOS² program was seen as a “resounding project”!

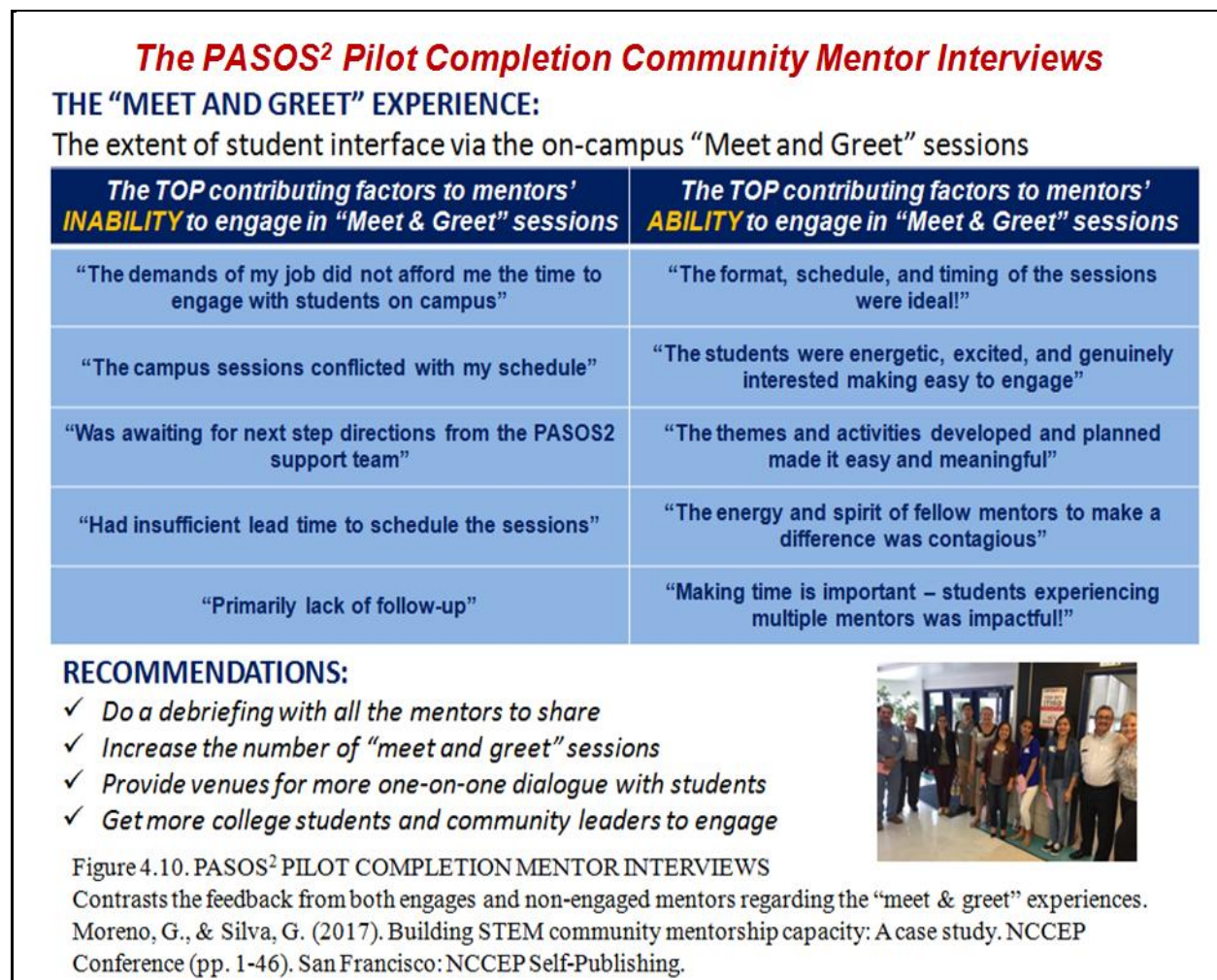


Figure 4.10. The “Meet & Greet Experience” – Post-Pilot Interview Summary

Whether it came from the adult mentors that engaged or did not, most individual values, attitudes, and their belief systems were consistent in the patterns when contrasted from interview to interview. Of particular note is the congruency of thought from the comments surfacing the significant themes or attributes for building individual community-driven mentor capacity and a willingness to engage.

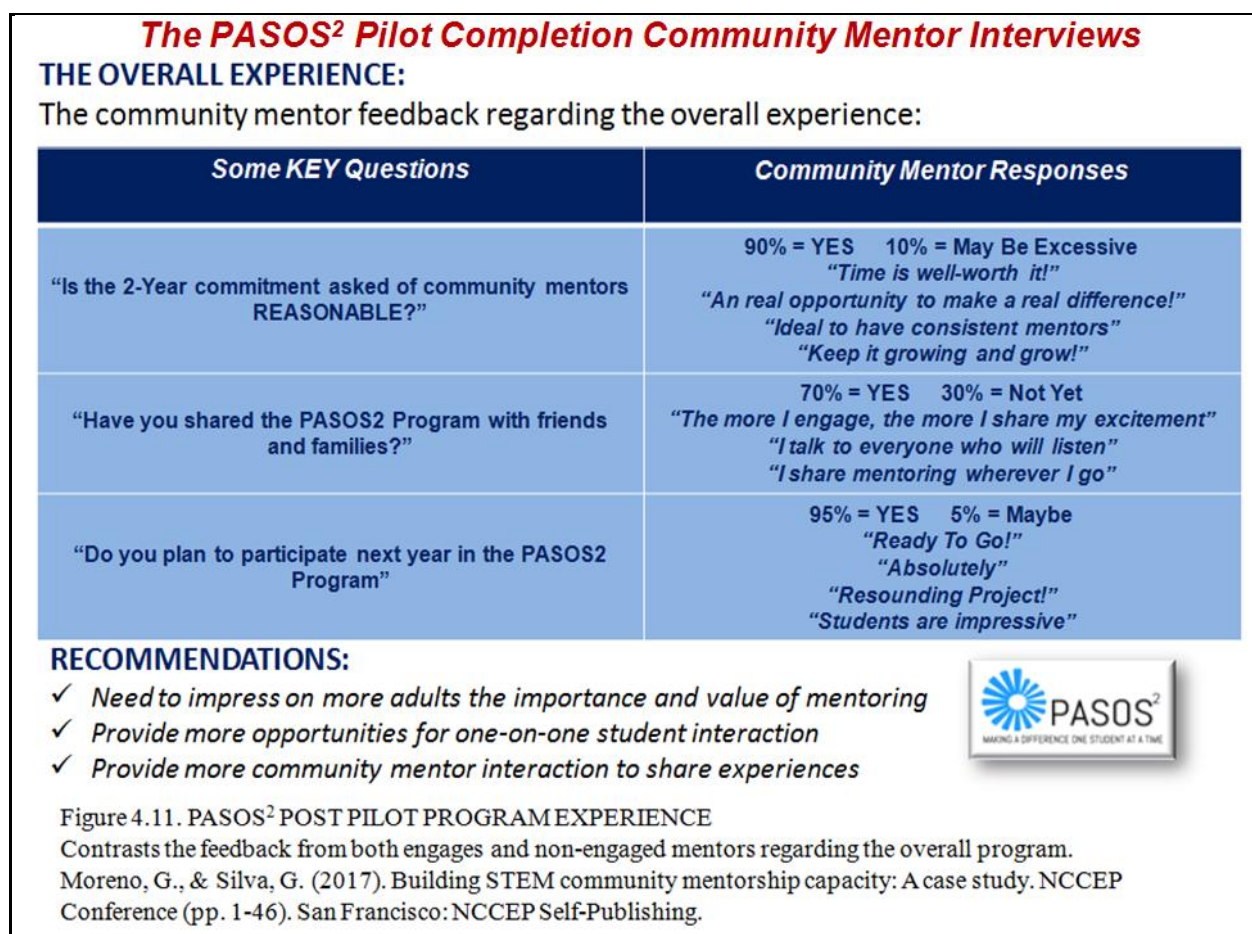


Figure 4.11. The “PASOS² Program Experience” – Post-Pilot Interview Summary

4.3 The Mentor Opportunity Pipeline Model Results

As described in Section 3.2.4, the *Community Mentor Opportunity Pipeline* model is an adaptation of the popular sales and marketing model introduced here to describe the emergence of the pool of community of mentors. This analytical tool characterizes the stages of community engagement as mentoring suspects, prospective community mentors prospects, adults committing to mentor (engaged), and finally PASOS² Program (seasoned) trained mentors (See Figure 4.12). The pipeline helps to profile the stages of mentor engagement from casual, informal mentoring to value-focused STEM mentorship advocacy with capable and competent community mentors.

Included in this opportunity pipeline model are three “control valves” indicating the rate of community mentor development and emergence including the coverage rate, engagement rate, and the win rate (Moreno, 2017b). The coverage rate describes the rate at which suspect mentors (those indicating an interest in the PASOS² mentoring program) are qualified and ready to commit, train, and engage. This qualification process is represented by the three signal lights.

The engagement rate valve describes those trained community mentors who consistently engage in either the “meet & greet” or the “EduGuide” component. Finally, the “win rate” valve describes the community mentors who are effective and efficient users of the software AND engage in the “meet & greet” workshops with the students. The target is to expand an individual’s community mentors sphere of influence through the use of face-to-face and online connections with students.

The resultant pipeline flow highlighted in Figure 4.12 surfaces a 6:3:2:1 “flow rate” given the experience with the 2016-2017 pilot program. In other words, it takes attracting six (6) interested community mentors to develop a “seasoned” community mentor. Out of every six (6) persons indicating interest, three actually committed to invest and complete the training and agree to the rules of engagement. Additionally, it takes attracting three (3) interested players to get two to engage in the program in some fashion and eventually one to become a seasoned community mentor.

4.4 The Triangulation Results

The triangulation research strategy described in Section 3.2.7 complements the research methodology applied in this study contributing to the research validity and the garnering of additional study insights (CrowdSource, 2017; Flick, 2009; Kulkarni, 2013; Todd, 1979).

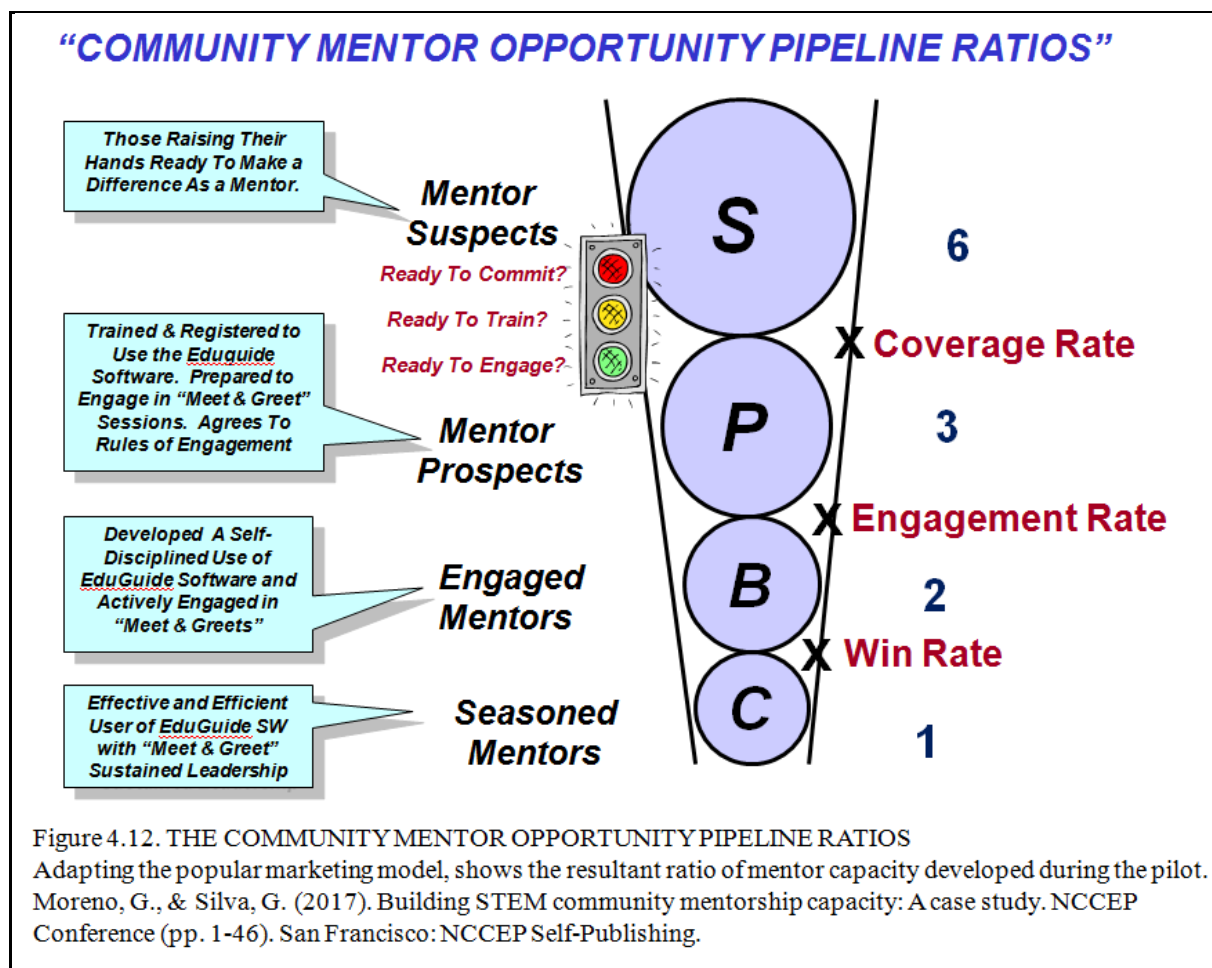


Figure 4.12. The Community Mentor Opportunity Pipeline

Triangulation underscores the level of congruency and alignment through the use of a variety of multiple methods to collect data on the same topic. The purpose of triangulation is not necessarily to cross-validate data but rather to capture data differently from the same experience. Cohen and Manion’s (1986) definition of triangulation profiles it as an “attempt to map out, or explain more fully, the richness and complexity of human behavior by studying it from more than one standpoint” (Cohen & Manion, 1986, p. 3).

In this case study, the data triangulation focused on the four data gathering tools used in data collection. The supplementary critical inquiry as outlined Chapter 1 used as the basis for the pre- and post-surveys was used as the framework for the triangulation strategy. The triangulation

strategy correlation framework is described in Table 3.4 and included supplementary critical inquiry forming the focus of the triangulation analysis addressing the following:

- a. What matters most to community mentors in enticing and preparing them to engage as mentors with students? Why do community mentors commit to mentoring students? What value do they propose to bring to students?
- b. What are the community mentor's expectations, apprehensions, familiarity, and mindset regarding the PASOS² program?
- c. How is addressing the readiness (capacity and competency) of community volunteers important for effective mentorship including advocating for STEM, fortifying student readiness, and using a technology-based platform?
- d. What factors do community mentors determine to be important in building strong mentoring relationships with students?
- e. Do community mentor participants believe the PASOS² program has value and serves a useful purpose in furthering STEM advocacy to Hispanic students? How?

Appendix F provides the detailed results from the qualitative major themes captured for the four TOOLS used in this study. This data is in addition to the quantitative feedback previously summarized, offering yet another look at the key research questions posed. The number in each TOOL in column 1 corresponds to the number of players engaged in each TOOL. Some key results from this quantitative look outlined in Appendix F includes the following overall program observations regarding the mentor motivations and attitudes influencing their engagement decision:

- The consistency with which individuals value mentoring is centered on sharing experiences and knowledge in a relationship with students that promotes trust,

encouragement, and expanding their eyes to new possibilities. Most notable is the opportunity to help students chart a pathway to accomplishing their dreams.

- 82% of those trained indicated little or no apprehension about the mentoring program and the expectations of the mentors. Some concern on time management was expressed by a few.
- Specific competencies, skills, and experiences aligned with their perceived value in mentoring including bringing workplace learning skills to students. The ability to network and effectively communicate was highlighted repeatedly.
- Their expectations of the PASOS² training was essentially to build their capacity and competency to become effective mentors. They enjoyed the depth, pace, and quality of the training provided. Very few recommendations on changes to the training approach were mentioned.
- After the training was completed, the mentors highlighted the preselected topics for engagement and online as top features of the program. The structure and the virtual environment with the EduGuide software were seen as a big plus for time management and interfacing with students.
- The synergy among the mentors at the events was underscored as a big motivating factor for further engagement. Several comments about spending more one-on-one time with students to further mentoring impact surfaced.
- Job demands, time constraints, technical software difficulties, and a personal lack of engagement were cited by those who failed to engage or provided minimal mentoring. The benefits of the program, however, still remained for those who had minimal engagement. For those that did engage, they had polar opposite opinions about how easy it was to engage both on campus and online using the software.

- The central theme for program sustainability and growth centered on getting adults to experience the value and impact community mentors can make via the PASOS² program with students. Making this value connection early is key!

A more succinct approach to the triangulation results is mapping the five supplementary questions to each TOOL mechanism used in this study. This profile is presented in Table 4.7 as a reflection of the following queries: a) What entices individuals to mentor and what value do they bring to the table?; b) What aspects of the PASOS² approach attracts or detracts from their engagement?; c) How ready and competent are they to mentor including using technology?; d) What is critical in building strong mentoring relationships?; and, e) What is the value of the PASOS² mentoring program approach.

4.5 Chapter Summary

Chapter 4 details the pilot implementation results highlighting the four data assessment tools, the data collection results, quantitative and qualitative feedback provided by the community mentors, and the analytic results of the community mentor experience and what influenced most their engagement (or lack thereof). This chapter profiles the impact of the community mentoring outreach, orientation, training, and mentoring experiences for the pilot program. The results from the four assessment TOOLS are contrasted applying the two analytical tools: the community mentor opportunity pipeline and the comprehensive triangulation analysis.

Table 4.7. The Triangulation Strategy Correlation Results (Page 1 of 3)

Simplified Supplementary Research Questions	Group Value Reflection Question (TOOL #1)	Pre-Training Survey Question(s) (TOOL #2)	Post-Training Survey Question(s) (TOOL #3)	Community Mentor Experience Interview Question(s) (TOOL #4)
a) What entices individuals to mentor and what value do they bring to the table?	“What do you value in mentors?” Ten major VALUE themes captured using Tool #1 surfaced with extremely high alignment to the mentoring value equation concept map as described in Section 4.2.1.	Q20. The VALUE profile summarized in Appendix F outlines the following value propositions: <ul style="list-style-type: none"> • Sharing life experiences • Defining a career pathway tied to their dreams • Making transition to college and career opportunities viable • Being a source of encouragement • Empowering and guiding students • Sharing workplace and business knowledge 	Q11. What liked BEST about PASOS ² training? Per Appendix F, the top themes: <ul style="list-style-type: none"> • The depth, quality, and delivery of the training and the program • The online nature of the program • The opportunity to enrich mentees and their quality of lives Q12. What liked LEAST about the PASOS ² training? Per Appendix F: <ul style="list-style-type: none"> • Would not change a thing • The training went fast (need more time) 	Relative to the overall PASOS ² Program: Q1. What do you see as the greatest value of the mentoring program? Per Appendix F, the top themes: <ul style="list-style-type: none"> a) preselected topics facilitated engagement both online and in person b) experiencing firsthand the impact on energetic students was valuable c) the structure and pre-planning of the “meet & greets” was very effective d) the technology as a virtual mentoring mechanism was convenient and effective
b) What aspects of the PASOS² approach attracts or detracts from their engagement?	Not addressed in this tool, This tool was administered prior to the presentation of the PASOS ² program.	Q6. The pre-test quantitative analysis dealing with the “familiarity with PASOS ² ” had a mean = 3.12 as reported in Section 4.2.2. Q7. The quantitative analysis dealing with the “comfort with PASOS ² ” mentor expectations” had a mean = 4.06 as reported in Section 4.2.2. Q10. Concerning apprehensions/ concerns in Appendix F: <ul style="list-style-type: none"> • 82% had no for apprehensions/concerns • A few worried about time constraints 	Q1. The post-test quantitative analysis dealing with “NOW with familiarity with the purpose of the PASOS ² ” had a mean = 4.85 as reported in Section 4.2.2. Q2. The post-test quantitative analysis dealing with the “comfort with the expected role of a mentor in the PASOS ² Program” had a mean = 4.94 as reported in Section 4.2.2.	Relative to the overall PASOS ² Program: Q2. 2 YEAR commitment? Q3. Share with any of your friends or family? Q4. Do you plan to participate in the future? Per Appendix F: <ul style="list-style-type: none"> • a surprising 90% agreement with a 2 year commitment from both the -- MENTORS and the ++MENTORS • 70% sharing of the program with friends and family • 95% commitment from all mentors to engage in next year’s program

Table 4.7. The Triangulation Strategy Correlation Results (Page 2 of 3)

Supplementary Questions	Group Value Reflection Question	Pre-Training Survey Question(s)	Post-Training Survey Question(s)	Community Mentor Experience Interview Question(s)
c) How ready and competent are they to mentor including using technology?	Not addressed in this tool, This tool was administered prior to the presentation of the PASOS ² program.	<p>Q9. The pre-test quantitative analysis dealing with the “comfort with the expected behaviors and code of conduct for a mentor” had a mean = 3.82 as reported in Section 4.2.2.</p> <p>Q12. The pre-test quantitative analysis dealing with “familiarity with ‘STEM’ and our local Borderplex economy” had a mean = 4.06 as reported in Section 4.2.2.</p> <p>Q13. The pre-test quantitative analysis dealing with “comfort with advocating STEM and providing career guidance” had a mean = 4.52 as reported in Section 4.2.2.</p> <p>Q14. The pre-test quantitative analysis dealing with “comfort with the use of a technology-based platform” had a mean = 4.33 as reported in Section 4.2.2.</p> <p>Q15. In Table 4.4.1, the top competencies, skills, or experiences included:</p> <ul style="list-style-type: none"> • Ability to share work, personal, and life experiences including STEM • Sharing how to get ready for college • Build expectations, determination, goals and aspire to succeed • Ability to network, communicate, and reach out to others 	<p>Q4. The post-test quantitative analysis dealing with “the comfort with the expected behaviors and code of conduct for a mentor” had a mean = 4.97 as reported in Section 4.2.2.</p> <p>Q7. The post-test quantitative analysis dealing with “familiarity with the term ‘STEM’ and our local Borderplex economy” had a mean = 4.88 as reported in Section 4.2.2.</p> <p>Q8. The post-test quantitative analysis dealing with “advocating STEM and providing career guidance” had a mean = 4.82 as reported in Section 4.2.2.</p> <p>Q9. The post-test quantitative analysis dealing with “comfort with the use of a technology-based platform (EduGuide) had a mean = 4.73 as reported in Section 4.2.2.</p>	<p>Relative to EduGuide: Q10, Q11, Q12, Q13 See Appendix F for TOP contributing factors to mentors’ INABILITY and ABILITY to engage with EduGuide”</p>

Table 4.7. The Triangulation Strategy Correlation Results (Page 3 of 3)

Supplementary Questions	Group Value Reflection Question	Pre-Training Survey Question(s)	Post-Training Survey Question(s)	Community Mentor Experience Interview Question(s)
d) What is critical in building strong mentoring relationships?	Not addressed in this tool, This tool was administered prior to the presentation of the PASOS ² program.	Q8. The pre-test quantitative analysis dealing with the “building meaningful 2-way relationships” had a mean = 3.94 as reported in Section 4.2.2. Q17. The pre-test quantitative analysis dealing with “providing advice and direction to students to get them ready for their life’s dreams” had a mean = 4.55 as reported in Section 4.2.2.	Q3. The post-test quantitative analysis dealing “now more comfort in building meaningful 2-way relationships” had a mean = 4.88 as reported in Section 4.2.2. Q10. The post-test quantitative analysis dealing “with providing advice and direction to students to get them ready for their life’s dreams” had a mean = 4.97 as reported in Section 4.2.2.	Relative to “Meet & Greet” Q6, Q7, Q8, Q9? See Appendix F for TOP contributing factors to mentors’ INABILITY and ABILITY to engage in “Meet & Greet”
e) What is the value of the PASOS² mentoring program approach?	Not addressed in this tool, This tool was administered prior to the presentation of the PASOS ² program.	Q11. What are your expectations of the PASOS ² Mentoring Training Workshop? Per Appendix F: <ul style="list-style-type: none"> • Gaining the knowledge necessary to be an effective mentor • Understanding program expectations Learning how best to provide guidance and knowledge • Making a positive impact 	Q11. What liked BEST about PASOS ² training? Per Appendix F, the top themes: <ul style="list-style-type: none"> • The depth, quality, and delivery of the training and the program • The online nature of the program • The opportunity to enrich mentees and their quality of lives Q12. What liked LEAST about the PASOS ² training? Per Appendix F: <ul style="list-style-type: none"> • Would not change a thing • The training went fast (need more time) 	Relative to the overall PASOS ² Program: Q1. What do you see as the greatest value of the mentoring program? Per Appendix F, the top themes: e) preselected topics facilitated engagement both online and in person f) experiencing firsthand the impact on energetic students was valuable g) the structure and pre-planning of the “meet & greets” was very effective the technology as a virtual mentoring mechanism was convenient and effective

CHAPTER 5: FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

“The challenges teenagers face today are more difficult to overcome in recent years. The stress and obstacles they face on a daily basis are insurmountable. More than ever, they must understand they are not alone. It is okay to ask for help and even more so to help a fellow student in need. There is nothing more powerful than extending a helping hand to a peer.” (Aviles, 2016, p. 1)

5.1 Findings From the Data Analytics

The PASOS² mentoring initiative was driven by a few dedicated individuals committed to encourage more students to become future STEM professionals by providing community mentoring assets with greater spheres of student influence. This experience of using a software-based mechanism for community engagement was a unique experience even though previous insights or other community mentoring examples with similar demographics did not exist. Nonetheless, the PASOS² pilot endeavor was promoted, funded, and committed with high expectations for learning what attracts, prepares, and retains community mentors.

The need, value, and impact of timely STEM related mentoring was not an issue for a CEA STEM Committee with 6+ years’ experience of essentially one-on-one mentoring contributions. The issue was how to increase community mentoring capacity and competency and spheres of influence. Chapter 5 outlines the findings, conclusions, and recommendations of this innovative case study underscoring the value in recruiting, preparing, and engaging community mentors by understanding and building their capacity and competency. The very nature of the PASOS² project being a civic community–based helps to inform other communities how best to optimize their community mentoring investments in fortifying Hispanic student social capital for their successful pursuit of STEM careers.

5.1.1 Observations From the Mentor Engagement Experience

Whether it came from the adult mentors or the student mentee perspectives, it was discovered that most individual expectations, values, attitudes, and their beliefs regarding mentorship systems were consistent and in definable patterns when contrasted from mentor experiences through interviews. Of particular significance in their reflection were the comments surfacing the motivations and values for engaging to build community-driven mentor capacity.

It is essential to learn from “seasoned mentors” what drives individuals to engage in the mentoring process. A cluster of representative quotes include reflections on various themes including what motivates individuals to mentor, what is the ideal mentor profile, and why the scarcity of mentors in our schools:

THEME A: Motivation to Mentor

“My drive to mentor is increasing that awareness and sharing with people what I have found to be my passion (in my case, materials science). If I get people interested in my field or not, I am still broadening their horizons to something they maybe were not aware of before.” **Female College STEM Participant #13**

“Motivating a student and inspiring a student in believing that the only limit to their success is themselves can be a great thing.” **Male College Student Participant #4**

“You can be a great STEM leader in your community, but I think you can only better yourself by serving others plus investing your time in growing others along with you by mentoring.” **Female Adult Participant #11**

THEME B: Ideal Mentor Profile and Roles

“I think that the best group is made up of people who are interested and personally invested in seeing young people move forward. That isn’t always an obvious group of people.” **Female Adult Participant #3**

“People who are excited by what they do and show enthusiasm seem to attract others to what they are doing. Enthusiasm and pleasure in what you are doing is infectious and attracts people of every age.” **Female Adult Participant #13**

“To be an effective mentor you have to be able to transmit, propagate and promulgate your STEM passion with your own personality while engaging your mentee through collaborative experiences.” **Female Adult Participant #1**

THEME C: Scarcity of STEM Mentors

“Our society is increasingly secular, and increasingly people find themselves, in our society, living to work, as opposed to working to live. And with that comes the loss of a sensibility regards “how can I help my neighbor? ‘Busy-ness’ is definitely a 21st-century disease.”

Male Professional Participant #14

“They don’t have time or make the time to get away from their daily routines to give back. It takes a person who is willing to give and has a sense that they owe something to society and share their knowledge and expertise.”

Male Professional Participant #14

“I feel that the main reason why there are few mentors willing to invest time is because there hasn’t been enough exposure as to the rewards that come from being a STEM mentor. I feel that society has made these careers seem as a tough task, that most people shy away from a STEM career.”

Male College Participant #2

What conclusions can be drawn from the community mentor pilot experience detailed in Section 4.1.4? Figure 4.5 in that section outlines the community mentor engagement cycle from recruitment to training to mentoring either online or via campus visits. The following sets of conclusions enumerated in Table 5.1 below are aligned to the community mentor experience cycle. The numbers in parenthesis indicate the number of community mentors in the cycle step.

Table 5.1. Conclusions From the Mentor Experience Cycle

Mentor Experience Cycle	Conclusions
(67) Mentors Indicating Interest	<ul style="list-style-type: none">• The focus on attracting and recruiting female mentors is viable yielding for this pilot a 2/3 female mentorship pool• Interestingly, attracting mentors from all functional areas resulted in many non-STEM professionals who made excellent mentors. Their STEM knowledge was augmented by the STEM modules in the mentoring curriculum they completed.• A well-designed outreach campaign will easily attract interested mentoring prospects• The value proposition for professional adults vs. college students is similar but the message to engage is different• Giving prospective mentors options to engage with students in a STEM-focused campus is attractive to them

(38) Registered On EduGuide SW	<ul style="list-style-type: none"> • The software orientation process is most effective when introducing a hands-on exercise to have mentors experience the online process • The older the mentor the more technical issues will surface – more one on one support is required • Most of the mentors preferred only one campus to support • Five people who registered with the software did not finish the training nor engaged on campus – three were remote users of the system
(33) Completing PASOS2 Training	<ul style="list-style-type: none"> • The value in providing a structured curriculum to mentors is not only beneficial but essential • 95%+ of the mentors trained expressed little to no concerns in engaging in the program • No issues came up regarding the rules of engagement from the mentors • While many professionals were not able to do the workshops due to personal or professional conflicts, few migrated to using the online training made available in the early spring • Getting prospective mentors to complete the training is the real sign of commitment to engage in the program • The vast majority found the training program substantive, encouraging, and comprehensive
(27) Engaged in “Meet & Greets”	<ul style="list-style-type: none"> • Surprisingly, (17) mentors did only “meet and greets”. Need to train them and get to see the ease and value in engaging with the software. • Letting mentors only engage in campus visits is a positive aspect. • The older the mentor, the more unlikely they are to use the software.
(17) Engaged with EduGuide SW	<ul style="list-style-type: none"> • Getting mentors to use the software on their own is the real sign of commitment to the program • (7) only did the EduGuide software – the program must allow for those mentors not able to engage at the campus level • Those having difficulty with the software did not persist – technical support is key
(9) Engaged in BOTH EduGuide & “Meet & Greets”	<ul style="list-style-type: none"> • Those exemplary mentors that did both the software and on campus engagements recognized the value of the program • Even those prospective mentors that failed to engage showed interest in continuing with the mentoring in the future

Based on the community mentor experience in the PASOS² pilot, the overarching challenge to increasing the numbers of community mentorship (i.e., addressing the lack of mentorship in our schools) is ensuring potential mentors genuinely appreciate the value of mentoring and what its rewards can be. Perhaps some people do not see the immediate benefit in mentorship since it usually takes a while to see results, but it might benefit these unwilling

enablers to see the fruit of other mentors' labor as a source of inspiration. Preparing mentors as role models for developing other mentors is highly recommended.

Students are looking for people they can relate and trust and this includes access to a multiple progression of mentors throughout their education career. The focus on relationship building should be on making a connection that facilitates dialogue, discourse, and exploration of options with SUSTAINABILITY of the relationship paramount to creating value. What is vital is the goal-centered planning that needs to start early for STEM career pursuit. A formal mechanism for cross-mentor support and mentor sharing of best practices is recommended.

5.1.2 Findings From the Mentor Value Concept Mapping Correlation Analysis

As introduced in Section 3.2.2, the mentor value framework equation resulted from interviews of key players accomplished in STEM studies and careers. The resultant mentor value framework from this investigation formed the basis for the development of the PASOS² curriculum including the following four key variables of the “mentoring value equation”.

So what conclusions can be arrived from the mentor value concept mapping detailed in Section 4.2.1? As part of the introductory component of the community mentoring training, the community mentors as a group were asked to reflect on what they perceive to be the true value of mentoring. As depicted in Figure 4.7, every one of the ten major themes captured using Tool #1 and contrasted against the mentor value equation concept map showed an extremely high alignment. Conclusively, the values of relationship building, demystifying college and STEM, providing direction and career guidance, and building student readiness are the same relative mentoring factors perceived and valued by the community mentors as to what mentoring can and should deliver. Their basis for engagement is driven by the same four components outlined in the mentoring value equation framework.

Therefore, the use of this mentoring value equation framework for the development and delivery of PASOS² mentoring program curriculum was appropriate and produced effective training results as highlighted in the pre-workshop and post-workshop survey results in Section 4.2.2 of the previous chapter.

5.1.3 Findings From the Pre- and Post- Survey Analysis

Section 4.2.2 summarized the results from the pre- and post- workshop surveys administered to thirty-three (33) community mentors who completed the PASOS² mentor curriculum either in workshop format or online. The *mentor value equation* profile formed the basis for the creation of the PASOS² mentor curriculum, as well as, the community mentor feedback design mechanisms for this research study. Feedback via pre- and post- workshop surveys as outlined in Section 3.2.5 and 3.2.6 were used with community mentors to assess the effectiveness, impact, and attitudes of mentors and what matters most to them as they decide to engage with students.

Specifically, the pre- and post- workshop survey addressed community mentor assessment with inquiry of the following key mentoring dynamics:

- familiarity with PASOS² program purpose
- comfort with expected mentor role in PASOS²
- experience in building 2-way relationships
- comfort with expected behaviors + conduct
- comfort with familiarity of STEM concepts
- comfort in advocating stem to students
- comfort in the use of mentoring software
- familiarity with building student life readiness

The resultant t-test for all eight (8) mentoring dynamics highlighted in Figure 4.8 resulted in all eight p values $< .05$. Thus the null hypothesis was rejected for all of them, i.e., the mean differences was significant and not due to chance. The conclusion is the training did have a significant impact on the attitude, expectations, comfort, and competency of the community mentors.

Consistent with the congruency of the values perceived by the community mentors in TOOL #1, the pre- and post- workshop surveys in TOOL #2 and TOOL #3 underscored the value and need to prepare the mentors for their mentoring experiences. In addition, the qualitative input provided by the mentors as part of the surveys was contributed to the triangulation process.

The idea of developing “willing and able” mentors positioned to engage was done in the training curriculum. However, what the training did not do is surface the potential obstacles and challenges to mentoring engagement from each individual that resulted in only two of three mentors trained actually engaging with the students. The results of TOOL #4 completed at the end of the pilot did surface these obstacles and challenges of both a personal and professional nature. Surfacing these challenges for engagement earlier in the mentoring experience cycle is necessary.

5.1.4 Findings From the Mentor Summative Interview Protocol Analysis

It became apparent early in the PASOS² pilot program during the recruitment, training, and engagement cycle of community mentors that the level and extent of engagement would vary tremendously among community mentors. Some mentors readily sought out opportunities to engage with students by voluntarily applying the EduGuide software and/or participating in the “meet & greet” scheduled events on school campuses. Understanding both the motivation and basis for their engagement, as well as, the reasons for non-engagement is equally as important in

assessing the major contributing factors for the motivation for engagement as empowerment agents.

Section 4.2.3 summarizes the TOOL #4 interview protocol results contrasting the results from those mentors that engaged (++MENTOR) versus those that did not (-- MENTOR). The investigation focused on their experience and the challenges or obstacles to engaging with the three major PASOS² program components: a) the overall PASOS² mentoring program; b) the “meet & greet” campus sessions; and c) the EduGuide software mechanism. The results were supported by mentor input direct quotes (Appendix E), a profile of engagement categories (Table 4.6), and a contrasting summary of the TOP contributing factors for engagement (or lack thereof) found in Figures 4.9, 4.10, and 4.11.

Whether it came from the community mentors that engaged or did not, most individual values, attitudes, and their belief systems were consistent in the patterns contrasted from interview to interview for both groups of mentors. Of particular congruency of thought were the comments surfacing the following significant themes or attributes for building individual community-driven mentor capacity and a willingness to engage:

1. Resolution of the inherent VALUE to both students and self in taking the time and energy to learn, grow, and invest as a community mentor;
2. Recognition of the contributing factors to engagement influencing the decision to embrace mentoring by building strong relationships with all stakeholders;
3. Resolution of the ways and means to consistently commit to mentoring in light of, (or in spite of) personal or professional demands;
4. Ownership to mentoring through personal interest, self-motivation, selfless sacrifice, and engagement leading to success in mentoring.

Specifically, the following conclusions (Table 5.2) are derived from contrasting the summary of the TOP contributing factors for engagement (or not) as outlined in Figures 4.9, 4.10, and 4.11). They almost appear as polar opposites in perspectives, i.e., those that engaged found the program flexible, accessible and easy to engage versus those who did not engage found reasons not to overcome obstacles of time, schedule, software competency, mentoring venues, and job or personal challenges. Notwithstanding, the level of engagement can be deduced to Ken Blanchard’s situational leadership model that focuses on an individual’s “willingness” and the “ability” to engage, i.e., the “will and skill” behavioral model (Blanchard, 2017). Effective community mentoring is as much about wanting to as it is being able.

Table 5.2. Contrasting Conclusions Regarding the Pilot Engagement

Program Component	-- MENTOR Viewpoints & Behaviors	++ MENTOR Viewpoints & Behaviors
The “EduGuide” Experience	<ol style="list-style-type: none"> 1. Did not find or make time to finish the software training 2. Technical difficulties were the cause for no further engagement 3. Conflicts in schedule both professional and personal in nature were cited as reasons not to engage 4. Even though the software was available 24/7, did not find or make time to use it. 5. Awaited for next steps direction from project team 	<ol style="list-style-type: none"> 1. Finished the software training and found it easy to use. 2. Minimal technical difficulties arose with further software use self-initiated. 3. Regardless of professional and personal demands consistently engaged with students via the software 4. Sustained software use developing a discipline to find and make time to use it. 5. Self-starters in using software
The “Meet & Greet” Experience	<ol style="list-style-type: none"> 6. Again, conflicts in schedule both professional and personal in nature were cited as reasons not to engage 7. Had insufficient lead time or did not find or make time to schedule the campus visits 8. Awaited for next steps direction from project team 9. Found the campus session format and topics limiting 	<ol style="list-style-type: none"> 6. Made the time to consistently engage 7. Responded consistently regardless of schedule changes 8. Self-starters in engaging on campus visits 9. Found the campus session format and topics effective and easy to implement

The PASOS² Overall Experience	10. Even without engaging, stated the value of the program 11. 70% shared the program with friends and family 12. Even not engaged, did show interest to engage in the future	10. Strongly endorsed the value of the program 11. 95% shared the program with friends and family 12. 100% indicated interest to engage in the future
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Therefore, based on the viewpoints and/or behaviors contrasted above, those ++MENTORs who committed to engage found the program easy to get involved with the supportive structure and quality of materials delivering value to the students being mentored. “Keep it growing!”, “a real opportunity to make a real difference!”, and “time is well-worth it!” were but some of the supportive excerpts from the ++MENTORs.

5.1.5 Findings From the Mentor Opportunity Pipeline Analysis

The Community Mentor Opportunity Pipeline model as an adaptation of the popular sales and marketing model describes the emergence of the pool of community of mentors. This analytical tool as described in Section 3.2.3 characterizes the community players in the stages as mentoring suspects, prospective community mentors (prospects), adults committing to mentor (engaged), and finally PASOS² Program (seasoned) trained mentors (See Figure 4.12). The stages of mentor engagement flow from casual, informal mentoring to value-focused STEM mentorship advocacy engaging capable and competent community mentors.

The resultant opportunity community mentor pipeline flow in Figure 4.12 surfaced a 6:3:2:1 “flow rate.” The pipeline for the pilot resulted in having to attract six (6) interested community mentors to eventually develop one single “seasoned” community mentor. A seasoned mentor is one who engages both using the software online and engages with students on campus. The conclusion reached by the PASOS² Project Team is the challenge to improve the engagement rate resulting in more seasoned community mentors willing to engage both at the

software level and the campus session level. The recommendations for “opening up the flow rate” start with first selling the value of mentoring earlier in the recruitment and training cycle. Only then should the PASOS² curriculum and registration be completed.

5.1.6 Findings From Triangulation

The triangulation research strategy described in Section 3.2.7 outlines the research methodology applied in this study (CrowdSource, 2017; Flick, 2009; Kulkarni, 2013; Todd, 1979). Triangulation identified the level of congruency and alignment through the use of a variety of multiple methods (four TOOLS) to collect data on the same topic. The purpose of triangulation is not necessarily to cross-validate data but rather to capture different dimensions of the same phenomenon contributing to the research validity and the garnering of additional study insights. The supplementary critical inquiry defined in Chapter 1 for this study was used as the basis for the pre- and post-surveys and contributed to the framework for triangulation. The supplementary critical inquiry shaped the focus of the triangulation and how the TOOLS surfaced consistent perspectives or observations regarding community mentoring engagement.

Of the four types of triangulation defined by Denzin (1970), *methodological triangulation* was selected assessing the effectiveness and impact of using more than one method for gathering data to answer the research questions. The following refined set of supplementary research questions was used to reflect on the level triangulation: a) What entices individuals to mentor and what value do they bring to the table?; b) What aspects of the PASOS² approach attracts or detracts from their engagement?; c) How ready and competent are they to mentor including using technology?; d) What is critical in building strong mentoring relationships?; and, e) What is the value of the PASOS² mentoring program approach.

The results of the triangulation summarized in Table 4.7 were used for the following assessment. Table 5.3 captures the qualitative assessment of the derivatives for the major themes

captured with the qualitative components of the four tools used in this study. The term derivative is analogous to a mathematical derivative where a real variable measures the sensitivity to change of the function value (output from the tools) with respect to a change in its argument (input from the community mentors). Table 5.3 reflects the H = high, M = medium, L = low or N/A rubric assessment of the relevancy and relative contribution of the tools to informing the supplementary research question.

Based on the derivatives profile highlighted in Table 5.3, the four tools surfaced the following conclusions:

- Confirming the use of the mentor value equation components to structure the community mentoring training curriculum;
- Validating the congruency of thought of the mentors' perceived value that they bring to the table and their motivation to engage;
- Underscoring the effectiveness of the design, structure and implementation of the PASOS² program to deliver on the mentoring promise to students;
- Reinforcing the enhancement of the mentorship capacity and competency to enrich students with strong relationship building options using both technology and on-campus visits;
- Surfacing the contributing factors for mentor engagement (or not) including the contrasting polar opposite perspectives from both sets of mentors; and,
- Underlining the mentors' endorsement of the PASOS² program value.

Table 5.3. The Triangulation Strategy Derivatives

Simplified Supplementary Research Questions	Group Value Reflection Question (TOOL #1)	Pre-Training Survey Question(s) (TOOL #2)	Post-Training Survey Question(s) (TOOL #3)	Community Mentor Experience Interview Question(s) (TOOL #4)
a) What entices individuals to mentor and what value do they bring to the table?	H A profile of 10 VALUE themes fully aligned with the mentor value equation.	H A VALUE profile of (11) themes emerged and aligned with the mentor value equation.	M Very positive themes regarding the depth, quality, and delivery of the training program with few changes recommended.	H A VALUE profile of (11) themes emerged highlighting the program concept, quality, structure, and deliverables.
b) What aspects of the PASOS ² approach attracts or detracts from their engagement?	n/a Not addressed.	H Knowledge of the program was as expected with high comfort with mentoring expectations and minimal apprehensions or concerns	H High scores regarding the mentoring program expectations and high level of comfort with expected roles as a result of the training.	H High commitment to multiple years and future engagement in the program. Willingness to share value of the program with others.
c) How ready and competent are they to mentor including using technology?	n/a Not addressed.	H Substantive quantitative input regarding expectations, STEM proficiency, use of technology, etc. Identified a profile of (11) competencies, skills, or experiences to bring to the students.	H Substantive quantitative input regarding expectations, STEM proficiency, use of technology, etc., as a result of the training program.	H Substantive qualitative input regarding the top contributing factors to the mentors' ABILITY or INABILITY to engage with EduGuide.
d) What is critical in building strong mentoring relationships?	n/a Not addressed.	H Strong quantitative input in building meaningful 2-way relationships and providing them direction.	H Strong quantitative input for building meaningful 2-way relationships and providing them direction as a result of the training.	H Substantive qualitative input regarding the top contributing factors to the mentors' ABILITY or INABILITY to engage in the "meet & greets".
e) What is the value of the PASOS ² mentoring program approach?	H A profile of 10 VALUE themes fully aligned with the mentor value equation.	M Quantitative input in building meaningful 2-way relationships and providing them direction.	M Very positive themes regarding the depth, quality, and delivery of the training program with few changes recommended.	H A VALUE profile of (11) themes emerged highlighting the program concept, quality, structure, and deliverables.

LEGEND: H = High relevancy; M = Medium relevancy; L = Low or no relevancy

5.2 Conclusions

“I am very excited to help in this initiative because it is a program that I have felt is very much needed within our community. I have been blessed with the opportunity to travel and I have built relationships and had many conversations with people about their “growing up”. One major consistent topic has been the fact that these people had mentors guiding them and more importantly supporting them and the decisions they’ve made. I have and had these mentors too and I look forward to bringing this same support I have received to others willing to receive it.” Young Female STEM Professional

When everything is said and done, what motivates a community mentor to engage is a willingness to unselfishly give of oneself with the hope and desire of bettering somebody else’s life. In this section, the investigatory journey of the PASOS² pilot is profiled using the “fisherman’s story” and the “tactics of collaboration” model as a framework for highlighting the conclusions reached from this case study research.

5.2.1 Community Mentoring Top Ten Lessons Learned -- “A Fisherman’s Story”

Is the purpose of fishing to fish or to catch a fish? Anyone who has fished can attest to the many lessons learned including patience, persistence, and to some degree luck. The charm of fishing is what Buchan (2017) calls “the pursuit of what is elusive but attainable, a perpetual series of occasions for hope” (Buchan, 2017, p. 1). Given the experiences with “catching”, training, and engaging community mentors, the fishing metaphor is presented in Figures 5.1 and 5.2 to underscore the key lessons learned from the PASOS² community mentoring experience:

1. Mentoring is easy to volunteer for but difficult at times to engage;
2. Mentors must experience the value of mentoring to cement their commitment;
3. Sharing the tools to mentor may not guarantee their engagement;
4. Mentoring takes time – doing it by learning is very effective;
5. Without patience in working with students, it is easy to disengage;
6. Mentors are positively influenced by their mentoring peers;
7. Rationalizing why not to mentor is easy – personal commitment is key;

8. The technical nature of the software, no matter how user-friendly, can be intimidating;
9. Attitude and passion to mentor are keys to engagement; and,
10. Mentoring success stories, recognition, and celebration are key to mentoring.

Community Mentoring Top Ten Lessons Learned – A Fisherman's Story...	
THE FISHING LESSON.....	THE MENTORING LESSON
1. Teaching mentors how to fish doesn't always guarantee a catch. You've got to put the hook and bait in the water first to catch any fish!	1. The volunteer nature of mentoring makes it easy to disengage or not engage at all. Well-intentioned adults don't always deliver on mentoring commitments.
2. Experiencing your "first catch" gets you hooked on fishing. The thrill of the catch is what makes for lifelong fishermen.	2. The key to sustained community mentoring engagement is first seeing the VALUE in making student connections. "Doing to learn" in how to mentor is more effective than a "learning to do" strategy.
3. All the best fishing tackle and bait in the world will not guarantee a catch.	3. Making a decision to share one's time as a mentor in a sustained manner requires planning, time-management, self-discipline, and commitment on the mentors' part.
4. Successful fishing adventures are a result of many failed attempts at fishing.	4. "Doing to learn" how to mentor is more effective than a "learning to do" strategy.
5. Patience is a virtue for catching fish.	5. The volunteer nature of mentoring makes it easy to disengage or not engage at all.



Figure 5.1. COMMUNITY MENTORING TOP TEN LESSONS LEARNED (1 OF 2)
 Portrays the fishing lessons learned from the community mentoring PASOS² pilot experience.
 Moreno, G., & Silva, G. (2017). Building STEM community mentorship capacity: A case study. NCCEP Conference (pp. 1-46). San Francisco: NCCEP Self-Publishing.

Figure 5.1. Community Mentoring Top Ten Lessons Learned (1 of 2)

Mentoring from a community leadership development perspective is an opportunity to challenge the underrepresentation of Hispanics in STEM. Community mentoring is an altruistic endeavor and an exciting opportunity to help more Hispanics take a leadership role in a STEM profession and in their community. Given the youthful talent in El Paso, they just need exposure and encouragement to pursue their dreams via STEM. What students need is a long term vision

and plan -- the effectiveness of ‘near-peer’ mentors and Hispanic professionals as ideal mentoring candidates cannot be overstated.

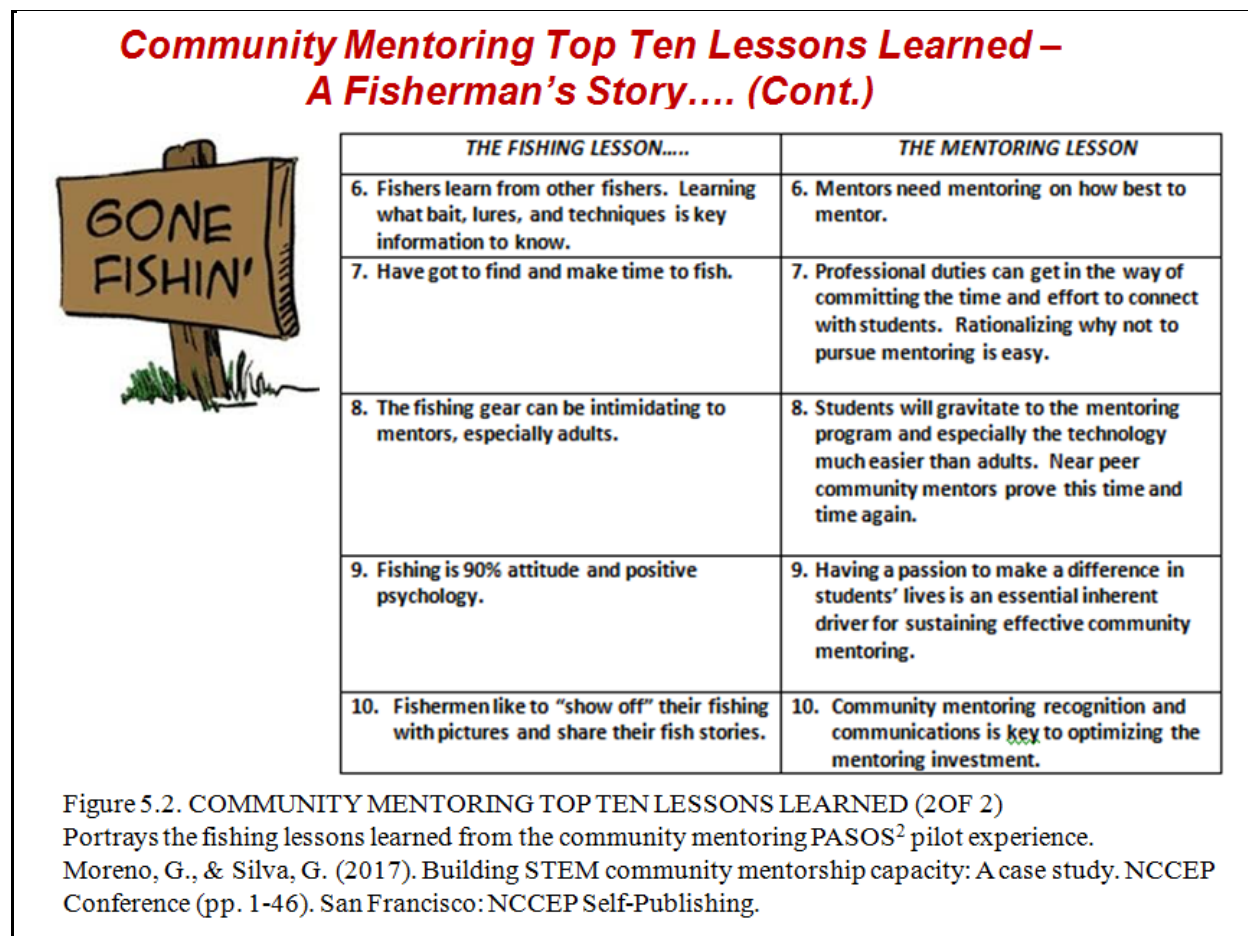


Figure 5.2. Community Mentoring Top Ten Lessons Learned (2 of 2)

What was most surprising or revealing about the case study? Effective mentoring requires mentor preparation and includes building a community readiness checklist profile to attract mentors. The key to effective mentor capacity building is having mentors appreciate and value how to better help students by student building ‘grit’ (i.e., resilience, determination), sharing their personal failures, doing career strategizing, having patience, and always taking a student’s perspective. Focus on the relationship building portion of the mentoring curriculum is essential to delivering mentoring value.

5.2.2 “Tactics of Collaboration” Stages in Community Mentoring

The meaningful and substantive engagement of community mentors is predicated on the hierarchy of collaboration from community empowerment agents. The “Tactics of Collaboration” model is introduced as the collaborative framework to present the conclusions reached about the community mentoring engagement from the experiences in this case study (Wright, 2017). Wright asserts that “effective collaboration depends on effective relationships between humans” especially true of both mentors and students willingly to nurture meaningful relationships via mentoring. The art of networking is an acquired relationship-building skill set void in many Hispanic students. Mentors must relay their personal experiences including networking and provide constant nurturing and feedback.

The building of effective community mentoring is not just about developing proficiency and competency in mentors, but also about advancing the key stages of “moral development, where we learn to weigh personal benefit against collective benefit” (Wright, 2017, p. 2). The four stages of this development, as Wright sees them, include:

Stage 1: Commitment-- the context for commitment to community mentorship

Stage 2: Partnership-- community mentors as “impact investors” in a win-win partnership

Stage 3: Vulnerability-- the foundation for building mentor: mentee trust

Stage 4: Emergence – working together to create collective impact

Table 5.4 summarizes these four stages of effective community mentoring as an ideal framework for highlighting how collaborative mentoring adds value by focusing on how the parts of mentoring all work together. These conclusions and observations are derived from the community mentoring experiences supported by the PASOS² case study. Bottom-line the return on community mentorship investment is a function of the collective commitment, partnership, trust, and emergence from each and every community mentor!

Table 5.4. The Tactics of Collaboration in Effective Community Mentoring
(Wright, 2017)

Stages of Collaboration	Observations/ Conclusions
Stage 1: Commitment	<ul style="list-style-type: none"> • Embracing and delivering on the mentoring expectations • Being fortified from mentoring events that are meaningful • Balancing both the “will & skill” aspects to effective mentoring
Stage 2: Partnership	<ul style="list-style-type: none"> • Recognizing mentoring relationships are a two-way street • Ensuring all collaborators in mentoring gain value (win-win) • Serving as impact investors for students to profit and prosper
Stage 3: Vulnerability	<ul style="list-style-type: none"> • Resolving it is not about ‘my’ success but ‘our’ success • Accepting failure as the foundation for success • Being trusting and trustworthy in every mentoring experience
Stage 4: Emergence	<ul style="list-style-type: none"> • Finding common ground and facilitating value exchange • Measuring mentoring effectiveness through students readiness • Pulling other mentors through leadership and example

5.3 Recommendations

This section outlines the definitive recommendations emerging from the lessons learned in this case study. The recommendations are organized by those intended for: 1) a community wanting to undertake a community mentoring effort; 2) the expansion of the PASOS² program; and 3) recommendations for future research in community mentoring.

5.3.1 Recommendations To Communities Undertaking Community Mentoring

The need for community mentoring was not surprisingly substantiated in this case study. Not one of the actors, be they students, teachers, parents, educators, or mentors, questioned the need or value of PASOS² as an approach to community mentoring. What is important for any community is crystallizing and significantly expanding the levels commitment of professionals and adult volunteers to invest in the next generation. So what should a community of actors willing to undertake an effort such as PASOS² consider? Table 5.5 provides a list of the wealth of lessons learned from the pilot forming the basis of recommendations to consider.

Table 5.5. Recommendations to a Community Considering Community Mentoring

Areas of Key Focus	Recommendations
Pre-Planning	<ul style="list-style-type: none"> • Prepare wisely for getting the adults to engage at all levels -- takes more time, energy, and patience than you think • Every situation is unique –use a pilot process to set the tone among stakeholders that the program will naturally need refinements • There is an overwhelming base of students that need mentoring – choose the student cohort groups that will reap the benefits from the mentoring program • Get the community to fund and sponsor the initial pilot program – it speeds up the engagement process with the school districts • Focus on the 4Ps (policy, people, process, and plans) of the program early – it will help surface the “rocks on the road” making implementation smoother
Advocacy/ Outreach	<ul style="list-style-type: none"> • Be prepared to spend considerable amount of time promoting and selling the value of mentoring and your program approach – program marketing materials are imperative • Incorporate a strategy to use students in the process of promotion and advocacy for the program • Include the parents early in the rollout of the program to garner their support and engagement from the home front • Focus on attracting STEM, female, and near-peer mentors as the pool of coaching talent to work with students – these will become your ‘rock stars’ in the eyes of the students
Talent Development	<ul style="list-style-type: none"> • Focus first on building an awareness, understanding, and buy-in to the VALUE of mentoring – ease of use, access, and support for all facets of the program is vital • Get the players focused on making connections with firsthand student experiences before they get overwhelmed with the rules of engagement • Integrate college students as interns – they make great trainers and supporters of the software • Provide access to an online version of the training material -- it will expand the base of mentors being prepared and helps to remove the excuse of work related time constraints
Engagement/ Implementation	<ul style="list-style-type: none"> • Keep the end results of the journey in front of all the players – the detours may be disheartening at times to some • Don’t be disappointed when adults volunteer to mentor but don’t deliver – nurture the opportunity pipeline stages • Don’t underestimate the power or peer influence, especially among community mentors • Keep the program in front of the actors’ radar with a continuum of communications

Expansion/ Growth	<ul style="list-style-type: none"> • Get the school districts and parents to be part of the future funding and resources – there is no substitute for shared investment and buy-in • Cement long-term funding and resource support as key to any expansion and growth of the program • Focus on growing the role of business and industry as sources for community mentoring by using business players as centers of influence
Sustainability	<ul style="list-style-type: none"> • Design the capturing of the metrics of programmatic success -- need to be measured, documented, and shared with all stakeholders • Follow-up with mentors as a continuum is key to protecting the investment in mentor training and keeping the program on their radar • Sharing anecdotes from students, educators, and mentors
Other Items of Interest	<ul style="list-style-type: none"> • Develop a team of project advocates – a few doing it all is a plan for future failure • Mentoring is a great way for college students to develop leadership, service learning, and selling competencies – a great resume builder with meaning and relevancy to their own career journey

5.3.2 Future PASOS² Mentoring Program Expansion Recommendations

The overwhelming endorsement by the actors in the PASOS² mentoring program pilot all recognize the value, potential, and innovation in expanding the community mentoring capacity in the Borderplex community. Given the lessons learned outlined in Section 5.2.1, the mentoring actors all agree that the “lift as you climb” approach for empowering others has tremendous growth potential in every community. The PASOS² mentoring program’s success is centered on expanding the community mentor competency profile that must attract more STEM mentors willing to invest *sustained* time and energy, grow relationships, and share meaningful life perspectives.

There is a great need to demystify mentoring to potential mentors and establish its value early from both the student perspective and the mentor perspective. As underscored by this research study, relationship building is a key factor in mentoring success. STEM community mentors should be passionate, able to transmit the STEM message, have a personality to engage, and bring a collaborative spirit. Being a difference maker in the lives of students, identifying

student traits to enrich their readiness for life, and finding meaningful personal and professional experiences to share is the vital.

Expansion of the PASOS² program must include selling students on the essential ingredients needed for a successful completion of a STEM college degree: passion, perseverance and discipline. Knowing that students find different sources of motivation to fuel their fire in pursuing a STEM degree is critical. Whether it is becoming the first in their family to receive a college degree, or whether it is to better one's life and their family as well, students must feel comfortable in making a connection with mentors that facilitates participation, sharing, and a high comfort levels with both parties.

As a result of a reflection process by the PASOS² Project Team, the following are the major changes or improvements recommended for the roll-out of the program for its second year:

- Selling mentors first on the program value – must be done early in the recruitment phase before any training is introduced. They need to “do to learn” vs. “learn to do” mentoring. The ease of using the EduGuide software technology is key to this initial kickoff.
- Solidifying campus champions – a campus sponsor, project champion, and supportive personnel must be committed BEFORE the campus training is done to ensure timely decision-making and commitment of campus resources.
- Requiring formal in-class EduGuide activity for students – it is key that students are encouraged and held accountable to the use of the software for them to reap the benefits of the learning and mentoring (EduGuide, 2017).
- Inspecting what we are expecting – more formal and timely reporting of student, campus, and community mentor activity throughout the year is essential.

- Signing formal MOEs with campuses/ ISDs – ensuring the rules of engagement from the school districts and campuses are understood and agreed upon.
- Expanding the EduGuide local SW support strategy -- provide additional channels of support for both campus and mentor personnel. Avoid the excuse to disengage due to technical issues that can be easily overcome.
- Focusing on keeping mentors “in the boat!!” -- must increase keeping the mentoring program on the mentors’ radar with timely communications and advocacy.
- Producing a mentoring e-newsletter -- part of the more formal capturing of mentoring successes and cause for celebration.
- Sharing a college transition readiness checklist -- based on the GEARUP experience with several districts, to provide a checklist to students early in the process of building a college-going mindset.
- Implementing a mentor recognition program -- formalize a system of recognition for exemplary mentor engagement promoting engagement and innovation.
- Conducting mentor sharing sessions – provide a forum for intra-mentor sharing of experiences and ideas to augment the mentoring experience.
- Recording of the mentoring journey – using both electronic and print media to publicize and market the attributes of the PASOS² mentoring program value.
- Developing an outreach program centered on attracting mentors based on the value proposition profile
- Expanding a mentoring curriculum and instructional program to include parents of mentees
- Using mentors to attract other mentors

- Creating a mentor readiness checklist with specific metrics to enhance the community mentoring opportunity pipeline metrics of successful engagement of more mentors
- Creating a ‘STEM Mentor Corps’ throughout the Borderplex region

Additionally, as it relates to EduGuide-specific recommendations:

- Developing STEM-specific modules
- Developing career awareness and exploration modules
- Assigning fewer students per mentor to develop more interaction
- Providing more training options with focus on hands-on

Also, as it relates to the “meet & greet” campus visits the specific recommendations include:

- Doing a debriefing with all the mentors to share
- Increasing the number of “meet and greet” sessions
- Providing venues for more one-on-one dialogue with students
- Getting more college students and community leaders to engage in campus visits

In addition, the following Table 5.6 outlines some additional PASOS² strategic initiatives yet to be crystallized, considered, and/ or funded. These strategic initiatives were collected during the pilot year as recommendations to improve the program surfaced via meetings with the pilot project stakeholders, both at the campus level and at the community mentoring level.

Table 5.6. Future Potential PASOS² Strategic Initiatives

STRATEGIC INITIATIVE	PASOS ² COMMITMENT	CEA COMMITMENT
1. The Student “GRIT” College Going Sustainability Program	<ul style="list-style-type: none"> ▪ PASOS² will expand (based on the pilot results) a mentoring system, a GRIT information technology tool, a structure to connect mentors with students/ parents, and an evaluation model to more cohort groups. PASOS² will match CEA’s online software sponsorship of students 1:1 with organization, foundation commitments and other sources of funds. 	<ul style="list-style-type: none"> ▪ The proposal is for CEA to match PASOS² online software sponsorship of students 1:1 at \$10/ student/ year with a target of sponsoring 2,500 K-12 students in five years. In the three years, CEA’s annual commitment would be \$25,000.

2. PASOS ² Advisory Board	<ul style="list-style-type: none"> PASOS² will organize and engage a team of regional and national advisors to provide input to PASOS² mission. At the request of CEA, a PASOS² member (who is a CEA member) will serve in an advisory capacity or committee with CEA. 	<ul style="list-style-type: none"> CEA will name one advisory board member to serve on the PASOS² Advisory Board.
3. Collaborative Website Links & Publicity	<ul style="list-style-type: none"> PASOS² Website will provide a link to the CEA Website. PASOS² will highlight its strategic initiative as a “spin-off” of CEA’s education efforts. CEA’s logo will be displayed in PASOS² marketing material. 	<ul style="list-style-type: none"> The CEA Website will provide a link to the PASOS² Website. PASOS² logo will be displayed in CEA marketing material
4. PASOS ² “STEM STAR” Dinner	<ul style="list-style-type: none"> PASOS² will celebrate STEM successes in K-16+ with a “STEM STAR” dinner to raise funds for the “GRIT” software initiative. 	<ul style="list-style-type: none"> CEA will sponsor a minimum of one table at the PASOS² “STEM STAR” Dinner.

5.3.3 Recommendations for Future Community Mentoring Research

What might have been done differently for the case study? In retrospect, spending more time in selling the value proposition to potential community mentors earlier in the recruitment process could have improved the mentor opportunity pipeline results. Also, less focus on hurdles to jump to become a mentor may have encouraged more mentors to engage. In addition, emphasis on communicating more often with mentors highlighting positive student feedback from the mentoring exploits is key. Another consideration is holding campus players accountable for engaging the students in the use of the EduGuide software sooner in the semester.

Often a research study surfaces more questions than it answers. Additional research should be pursued to further the understanding of the community mentorship dynamics and its impact on driving more Hispanic talent into STEM careers. Included below is a discussion of how the recommendations for further research are tied to the changing dynamics surfaced in the study findings and the literature review. Subsequently, the proposed future research for expanding the knowledge base regarding STEM community mentorship with the Hispanic cohort

is outlined. This includes the recommended natural transition to applying action research methodology to continue to study the future PASOS² project expansion, as well as, the recommended profile of the plethora of potential research questions to be explored regarding community mentoring to explore in the future.

5.3.2.1 Changing Community Mentoring Dynamics to Study Findings and Literature Review

It is important to understand the changing community mentoring dynamics regarding the confluence of STEM, social capital, and the edu:eco forces as it impacts the Hispanic student cohort. The search revealed the limited knowledge base regarding community mentoring promoting STEM in an Hispanic community. As the literature review summary in Chapter 2 underscored, the case study findings and recommendations in this section are connected to the following literature review findings.

- a. The social capital challenge for Hispanics pursuing college or STEM is a major opportunity to address through mentoring. This case study underscored the value community mentors place in building meaningful mentoring relationships with students as they develop their career options and plans. Community mentors recognize the key role they play in addressing the social capital challenges of Hispanic students. Those community mentors that significantly engaged in PASOS² highlighted their effectiveness in using the EduGuide mentoring software and campus visits as keys to fortifying both the student's school and home support structure. Building community mentor capacity and competency through a formal community mentoring system such as PASOS² enhances student grit, self-efficacy and self-determination and can influence their pursuit of post-secondary and STEM studies.
- b. Community edu:eco partnerships are emerging for joint STEM career advocacy key to driving talent for regional economic plans. The emergence of the Borderplex Alliance

regional strategic plan (Borderplex, 2016) and the CREEED 60x30EP Plan (CREEED, 2017) initiatives are both centered on developing the future talent required by the identified industry clusters that represent that best use of regional assets to create high-tech, high-skill, and high-technology employment in the region. How mentor: student connections are facilitated by community mentoring systems such as PASOS² can help address the Hispanic STEM career achievement gap critical to this nation's sustained innovation and competitiveness.

- c. The US STEM educational focus surfaces as new opportunities for Hispanic students necessitating post-secondary academic, college-transition, career, and life readiness. While the TEA career pathway endorsement for 8th graders transitioning into high school fortunately includes the STEM option, the building of STEM proficiency and preparedness is left up to the creativity and resource investments by local school district leadership. TEA provides neither funding nor curriculum for STEM schools. The emergence of more T-STEM schools, early college high schools focused on STEM, gender specific STEM academies, and other STEM-related education offerings (e.g., robotics clubs, CTE offerings, STEM competitions, etc.) are on the rise. As such, the need for increased community mentoring is critical to bringing workplace learning and career relevancy to the learning process. Capturing the community mentors' experiences and wisdom are powerful and life-changing instruments impacting students' lives.
- d. Technology-driven solutions are shaping the non-cognitive dynamic of addressing Hispanic post-secondary readiness. The PASOS2 program focuses on building community mentor capacity and competency by sharing with future mentoring practitioners how best practices can best be delivered to optimize the impact of

community mentorship. As reflected in this study, focus on cementing community mentor “will and skill” must first be done by establishing the inherent value propositions in the minds of community mentors for meaningful engagement. The mentor opportunity pipeline outlined in this study reflects a need to optimize the cycle of attracting, training, engaging, and sustaining community mentors. The use of technology is a viable strategy to expanding the community mentors sphere of influence with more students.

- e. The building of community-driven STEM mentorship systems is a relatively new dynamic for Hispanic communities. This study surfaced what matters most to community mentors in building their competency and capacity to influence students including STEM as a career. The identification of ten key value propositions for community mentoring aligned directly with the mentor value equation variables used to create the mentoring training curriculum.

5.3.2.2 Action Research -- Studying PASOS² Community Mentoring Program Expansion

The literature review consistently calls for new research needed to inform how best to dramatically expand Hispanic student participation in STEM, including addressing the well-documented gender shortfalls in STEM. Given my thirty plus years’ experience with total quality management (TQM) and continuous process improvement (CPI) methods in the private and public sector worlds, the *plan, act, observe, reflect* framework of the action planning research methodology is a natural for future community mentorship research (Kemmis & McTaggart, 2000). Action research as a research approach consists of a family of often overlapping research methodologies which pursue action and research outcomes at the same time (Dick, 2000; Carr & Kemmis, 1986; Merriam, 1998). It therefore has some components which resemble a

consultative or change agent approach and some which resemble field research (Adler & Adler, 1987).

Action research has developed a different set of research principles pertinent to understanding the community mentoring dynamics (Corey, 1949; Dick, 2000; Denskus, 2009; Herr & Anderson, 2005; McCutcheon & Jung, 1990; Stringer, 2014). Action research practitioners emphasize that to achieve action, action research must be responsive to the emerging needs of the situation. It must be flexible in a way that some research methods cannot be. The process is gradual so action research, by its nature, is also emergent (Edwards, 2016). Its cyclic nature helps to conduct the later cycles, thus continuous improvement is an inherent research discipline. Another crucial step consists of critical reflection on model fidelity to the PASOS² value propositions.

The researcher and others involved reflect then critique what has already transpired. The increased understanding emerging from the critical reflection is then put to optimal use in designing the later steps in improvements of the mentoring model. This reflective process then leads to the next stage of community mentoring planning which is embedded in the action and reflection. Short, multiple cycles allow greater rigor to be achieved over time. The growth of the PASOS² program could benefit considerably from this research approach.

5.3.2.3 Other Recommendations for Future Community Mentoring Research

Given the dynamics at a local and regional level described above, this study can act as a launching pad for further investigation of the community mentoring dynamics. The CEA organization has committed to tripling the number of students for the 2017-2018 school year, thus the expanding pool of community mentors can serve as a petri dish for further discovery. As the actors in education reform (be they business people or educators) formulate new strategies and initiatives to attract more students to STEM, the need for community mentoring

collaboration will only intensify. Understanding how to optimize the finite community engagement resources, talent, and assets will require the right systems and innovative approaches to mentoring. Growing the capacity in a community to rally its empowerment agents in coaching future STEM professionals will pay enormous dividends.

The 4P profile highlighted in Figure 3.9 describes the implementation components that were investigated in this case study: people, policy, process, and plans. The people component relates to the competencies of key stakeholders especially community mentors. The rules of engagement including the governance process is the focus of the policy component. The functions of how to do community mentoring is the focus on processes. Finally, the structured plans for implementation and management of the program are the focus of the last component.

Table 5.7 highlights the recommended research questions to explore for consideration in future

Table 5.7. Future Potential PASOS² Strategic Initiatives

Future Research Recommendation	Categories of Mentoring System Components			
	People	Policy	Process	Plans
1. What is the effect of using PASOS ² and EduGuide as a mechanism to attract, train, and engage parents as mentors?	✓		✓	
2. What is the effect of using PASOS ² and EduGuide as a mechanism to have community mentor parents to mentor parents as they invest in their children's education?	✓		✓	
3. What is the optimal ratio of community mentors to mentees facilitating more one-on-one vs. one on many mentoring relationships? What is the effect of technology usage based on mentor age?		✓		
4. What is the impact of using PASOS ² and EduGuide as a platform for mentoring cross-border students from Ciudad Juarez and El Paso using trained multilingual, multicultural community mentors?	✓	✓		✓
5. What are the most effective "meet & greet" topics for different grade levels aligned to district curricula and EduGuide topics?	✓		✓	
6. What is the impact of using PASOS ² and EduGuide to grow the number of students selecting the House Bill 5 STEM pathway endorsement from 8th grade to high school?	✓			
7. How best to create a longitudinal data model mapping the impact of PASOS ² and EduGuide in student achievement and readiness (academic, college transition, career, and life)?	✓		✓	✓
8. What policy position can be created enabling school district and community partnerships to expand community mentorship capacity and competency?		✓		

9. What is the effect of defining and having community mentors use a Borderplex student avatar profiling the desired set of competencies directly aligned to the regional workforce talent needs as defined by business and industry?	✓	✓		
10. How to enrich the development of a wider pool of “seasoned” community mentors by contrasting the motives and motivation for mentoring from different communities in the US and in Mexico?	✓			
11. Is there a difference in the makeup and competency profile of “seasoned” mentors who have a STEM vs. a non-STEM background?	✓			
12. What are the enablers in a “for profit” vs. “not profit” organization to encourage and promote their employees to mentor?	✓	✓		✓
13. What topics should be expanded in the EduGuide offerings that are age-appropriate, relative to the STEM focus, and meaningful to the local student demographics?	✓		✓	✓
14. How are the social capital challenges for Hispanic students addressed with the mentoring program? What are the lasting impacts or effects?	✓			✓

community mentoring research studies mapped against the 4P implementation component categories. Again, the focus of this research is to improve the empowerment agent model that can best deliver an effective community-driven mentoring network significantly impacting the pool of Hispanic students pursuing post-secondary and STEM careers.

The significance and value of the fourteen (14) research investigations recommended for future study above are represented in Table 5.8 using an “i⁶” linear thinking tool (Moreno, 2008) that outlines the idea/ initiative, issues, intent, innovation, investment, and impact. For each research topic, the i⁶ profile addresses:

- What is the research effort being investigated or expended?
- What issue, problem, or challenge is being addressed or investigated?
- What is the desired research VALUE or intent?
- What unique or creative research idea or innovation is being introduced?
- What resources are necessary to invest and realize the desired research results?
- What are the expected research outcomes?

The last two columns of the “i⁶” template provide a way to prioritize which research may prove to be most worthy of addressing first by assessing the investment required with the potential impact .

Table 5.8. Significance and Value Of Proposed Research Investigations (Page 1 of 2)

RESEARCH INITIATIVE(S) PROPOSED	ISSUE(S)	INTENT	INNOVATION	INVEST- MENT(S)	IMPACT(S)
1. What is the effect of using PASOS ² and EduGuide as a mechanism to attract, train, and engage parents as mentors?	<ul style="list-style-type: none"> Lack of parental engagement or opportunity to mentor 	<ul style="list-style-type: none"> Tap parent resource to mentor other than their kids 	<ul style="list-style-type: none"> Use of technology to connect with students 	<ul style="list-style-type: none"> Tap parent resource to mentor others 	<ul style="list-style-type: none"> Engaged parents building community of support for students
2. What is the effect of using PASOS ² and EduGuide as a mechanism for community mentor parents to mentor parents as they invest in their children's education?	<ul style="list-style-type: none"> Lack of parental knowhow regarding their children's learning or readiness 	<ul style="list-style-type: none"> Tap parent resource to mentor other parents as peer mentors 	<ul style="list-style-type: none"> Use of technology to connect parents with parents 	<ul style="list-style-type: none"> Tap parent resource to mentor other parents 	<ul style="list-style-type: none"> Engaged parents building community of support for parents
3. What is the optimal ratio of community mentors to mentees facilitating more one-on-one vs. one on many mentoring relationships? What is the effect of technology usage based on mentor age?	<ul style="list-style-type: none"> Some students need or want more individualized mentoring 	<ul style="list-style-type: none"> Provide deeper level of mentoring to address specific student needs 	<ul style="list-style-type: none"> Use of technology to connect mentors to a fewer set of students 	<ul style="list-style-type: none"> Tap mentor resource to provide more personalized mentoring 	<ul style="list-style-type: none"> More specific mentoring driven by stronger mentor: mentee connections
4. What is the impact of using PASOS ² and EduGuide as a platform for mentoring cross-border students from Ciudad Juarez and El Paso using trained multilingual, multicultural community mentors?	<ul style="list-style-type: none"> Need to increase cross-border learning opportunities and collaboration 	<ul style="list-style-type: none"> Build on the multi-cultural and multi-lingual assets of our community 	<ul style="list-style-type: none"> Use of technology to connect cross-border mentors and students interchangeably 	<ul style="list-style-type: none"> Tap cross-border mentors and resources to provide region wide mentoring 	<ul style="list-style-type: none"> Creation of global citizens with international experiences unique to our region
5. What are the most effective "meet & greet" topics for different grade levels aligned to district curricula and EduGuide activity topics?	<ul style="list-style-type: none"> Need to align "meet & greet" topics to district curricula and EduGuide activity 	<ul style="list-style-type: none"> Align topics with school learning activities and subject matter 	<ul style="list-style-type: none"> Complement and supplement topics to enrich student learning through mentoring 	<ul style="list-style-type: none"> Develop and aligned "meet & greet" curricula 	<ul style="list-style-type: none"> Enriched mentoring topics that support the EduGuide and curricula subject matter
6. What is the impact of using PASOS ² and EduGuide to grow the number of students selecting the House Bill 5 STEM pathway endorsement from 8th grade to high school?	<ul style="list-style-type: none"> Need to expand more students selecting the STEM HB5 endorsement & pathways 	<ul style="list-style-type: none"> Significantly increase the # of STEM endorsement selections 	<ul style="list-style-type: none"> Use mentoring to sustain STEM endorsement persistence & completion 	<ul style="list-style-type: none"> Grow the STEM career awareness, exploration, and preparation advocacy via mentoring 	<ul style="list-style-type: none"> More students in the region completing HB5 STEM endorsements upon HS graduation
7. How best to create a longitudinal data model mapping the impact of PASOS ² and EduGuide in student achievement and readiness (academic, college transition, career, and life)?	<ul style="list-style-type: none"> Need to assess the long-term impact of sustained community mentoring with a longitudinal model 	<ul style="list-style-type: none"> Provide evidence of sustained community mentoring impact on student readiness 	<ul style="list-style-type: none"> Create a data backbone to support mentoring effectiveness 	<ul style="list-style-type: none"> A data collection research approach and methods with data analysis and results 	<ul style="list-style-type: none"> A data collection framework and process supporting evidence of mentoring impact

Table 5.8. Significance and Value Of Proposed Research Investigations (Page 2 of 2)

RESEARCH INITIATIVE(S) PROPOSED	ISSUE(S)	INTENT	INNOVATION	INVEST- MENT(S)	IMPACT(S)
8. What policy position can be created enabling school district and community partnerships to expand community mentorship capacity and competency?	<ul style="list-style-type: none"> Need to address the student social capital challenges and deficit in their post-secondary journey to STEM careers 	<ul style="list-style-type: none"> Set district policy to facilitate community mentorship as a best practice in every campus 	<ul style="list-style-type: none"> Make community mentoring an inherent part of campus and district improvement planning 	<ul style="list-style-type: none"> The infrastructure to identify, recruit, train, and support community mentoring capacity with STEM proficiency 	<ul style="list-style-type: none"> Where appropriate, districts integrate community mentoring as a best practice in every campus
9. What is the effect of defining and having community mentors use a Borderplex student avatar profiling the desired set of competencies directly aligned to the regional workforce talent needs as defined by business and industry?	<ul style="list-style-type: none"> Need for regional talent development aligned to the needs of the Borderplex economic 	<ul style="list-style-type: none"> Define the profile of student competencies to be developed for the future regional workforce 	<ul style="list-style-type: none"> Build supply and demand leadership consensus on the future worker of the region avatar 	<ul style="list-style-type: none"> A mechanism to collectively define the competencies of the future worker of the region 	<ul style="list-style-type: none"> Students, parents, and educators focus their efforts in building workforce ready talent germane to the region
10. How to enrich the development of a wider pool of “seasoned” community mentors by contrasting the motives and motivation for mentoring from different communities in the US and in Mexico?	<ul style="list-style-type: none"> Need to engage more adults in the mentoring of the future workers in the Borderplex setting 	<ul style="list-style-type: none"> Promote the cross-fertilization of community mentorship in the EP border setting 	<ul style="list-style-type: none"> Build a model to contrast the motives and motivations for cross border mentorship 	<ul style="list-style-type: none"> Application of qualitative methods to capture the contrasts of motives and motivations 	<ul style="list-style-type: none"> Identification of the motives and motivations contrasted along the US/ Mexico border
11. Is there a difference in the makeup and competency profile of “seasoned” mentors who have a STEM vs. a non-STEM background?	<ul style="list-style-type: none"> Many mentors do not have a STEM education or professional background 	<ul style="list-style-type: none"> Identify the differences, if any, among STEM and non-STEM mentors 	<ul style="list-style-type: none"> Build a model to contrast the make-up, motives, and competencies of both mentors 	<ul style="list-style-type: none"> Application of qualitative methods to capture the contrasts of STEM and non-STEM mentors 	<ul style="list-style-type: none"> Surface the needs of both STEM and non-STEM mentors in their training, if any.
12. What are the enablers in a “for profit” vs. “not profit” organization to encourage and promote their employees to mentor?	<ul style="list-style-type: none"> Need to understand if the enablers for both profits and non-profits mentors are different 	<ul style="list-style-type: none"> Identify how both profit and non-profit enablers can encourage community mentors 	<ul style="list-style-type: none"> Build a model to contrast the make-up, motives, and competencies of both mentors 	<ul style="list-style-type: none"> Application of qualitative methods to assess enabling in both types of organizations. 	<ul style="list-style-type: none"> Identify the enablers for both profit and non-profit community mentor employees
13. What topics should be expanded in the EduGuide offerings that are age-appropriate, relative to the STEM focus, and meaningful to the local student demographics?	<ul style="list-style-type: none"> Need to expand the EduGuide topics to bring added relevancy to our region 	<ul style="list-style-type: none"> Identify relevant topics that are delivered using the EduGuide platform 	<ul style="list-style-type: none"> Expand the portfolio of EduGuide subject matter offerings using this platform 	<ul style="list-style-type: none"> Development of added curricula using the EduGuide solution set including STEM modules 	<ul style="list-style-type: none"> Supplement mentoring topics using the EduGuide delivery system
14. How are the social capital challenges for Hispanic students addressed with the mentoring program? What are the lasting impacts or effects?	<ul style="list-style-type: none"> Need to understand how community mentoring impacts student social capital challenges 	<ul style="list-style-type: none"> Determine the effects on social capital needs through the use of community mentoring 	<ul style="list-style-type: none"> Develop a feedback mechanism from students regarding the mentoring program impact 	<ul style="list-style-type: none"> Development of research methods to capture social capital dynamics and feedback from students 	<ul style="list-style-type: none"> Identify the impact on student social capital dynamics

5.4 Chapter Summary

Chapter 5 summarizes the investigation and discovery of the substantive findings and conclusions derived from the implementation of the PASOS² pilot program. This chapter helps inform the civic and education actors and stakeholders, as well as, future communities interested in introducing and sustaining a community-based mentoring program and what drives community mentors to engage.

The impact of this case study research is contributing to the knowledge base having:

- validated the mentor value equation variables as key components for building value in community mentorship;
- surfaced what matters most to community mentors in their decision to engage in building their competency and capacity to influence students including STEM as a career;
- understood the cycle and methods for building mentor: student connections and how it can address the Hispanic STEM career achievement gap critical to this nation's sustained innovation and competitiveness;
- underscored community mentoring relationship building as a key ingredient to addressing the social capital challenges of Hispanic students including how to fortify the school and home structure;
- captured the community mentors' contributions via their anecdotal experiences and engagement as powerful and life-changing instruments in student's lives; and,
- shared with future practitioners how community mentoring and best practices can improve investments in mentorship.

Based on these case study findings and conclusions, definitive recommendations for the future expansion of the PASOS² program and growth in the recruitment of competent community mentors are outlined in this chapter. In addition, the new areas for further research investigation are enumerated to provide further insights to the art of community mentoring.

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GLOSSARY

AACU	Association of American Colleges and Universities
Borderplex	The international region composed of the communities of El Paso, Texas; Ciudad Juarez, Chihuahua; and Las Cruces, New Mexico.
CEA	CommUNITY en Acción – a civic organization focused on education, cultural, and economic development in the Borderplex region. CEA helped fund the PASOS ² Project.
CIT	Campus improvement team, part of the TEA site-based decision making improvement process of planning at the campus level.
DIT	District improvement team, part of the TEA site-based decision making improvement process of planning at the district level.
edu:eco	The continuum of education and economic development mechanism supported by the integrated supply and demand dynamics.
EduGuide	Provider of the ‘grit’ software application used in the PASOS ² pilot.
EPCC	El Paso Community College with campuses throughout El Paso, Texas.
grit	Grit is the internal capacity to undertake a hard-fought struggle, a willingness to take risks, a strong sense of determination, working relentlessly toward a goal, taking challenges in stride, and having the passion and perseverance to accomplish difficult things,
HENACC	Hispanic Engineer National Achievement Awards Corporation
HSI	Hispanic serving institution
IHE	Institution of higher education
K-12	Refers to the kindergarten to 12th grade education grade levels.
MOU	Memorandum of understanding
PASOS ²	This innovative CommUNITY en Acción (CEA) education initiative focuses on building stronger community-driven mentor capacity. Technology is integrated to enhance a mentor’s impact in building student self-confidence, self-efficacy and self-determination. The students’ pursuit of post-secondary careers in STEM is a major area of emphasis.
PLTW	Project Lead the Way – a popular curriculum integrated into STEM education ventures in K-12
STEM	Focus on the development of skills in science, technology, engineering, and mathematics careers to enhance global competitiveness. PASOS ² = “Partners Advocating STEM Opportunities for Student Success”.
TEA	Texas Education Agency
triangulation	Triangulation means using more than one method to collect data on a topic for the purpose of capturing different dimensions of a similar phenomenon.
UTEP	University of Texas at El Paso located in El Paso, Texas.
WHIEEH	White House Initiative for Excellence in Education for Hispanics

APPENDIX A -- CASE STUDY RESEARCH PROCESS APPROACH

APPENDIX A. CASE STUDY RESEARCH PROCESS APPROACH (1 of 3)

SOY KEY STEP	SOY'S CASE STUDY RESEARCH DESIGN POINTS	MORENO'S DISSERTATION APPROACH
STEP 1. Determine and define the research questions (Chapter 1)	<ul style="list-style-type: none"> Define the research focus on the study of a complex phenomenon or research object (program, entity, person, or people) Form research question (begin with the how and why) about the situation or problem Use the literature review to lead to refined, insightful questions Determine the purpose of the case study Connect research object(s) to political, social, historical, or personal issues Determine early the audience for the final report 	<ul style="list-style-type: none"> The research object is the community mentor engaging with the PASOS² Program. Problem/ Issue: Given the social capital challenges for Hispanic students, to examine the issue of how best to establish and build community: education partnerships and leadership to advocate for STEM career pursuits by Hispanic students Research Question: How can a formal community mentoring system be developed to be beneficial in attracting, developing, and sustaining community mentoring talent? Purpose: To surface what matters most to community mentors in enhancing their competency and capacity and engaging them to serve as mentors. The potential audiences for the final report are communities wishing to build community mentoring capacity to influence the Hispanic youth to contribute to the STEM talent pipeline critical to regional economic systems.
STEP 2. Select the cases and determine data gathering and analysis techniques (Chapter 3)	<ul style="list-style-type: none"> Consider single or multiple real life cases Use a variety of data gathering methods to produce evidence that leads to understanding the case that answers the research question <ul style="list-style-type: none"> Erect boundaries around the case(s) Define the unique parameters of the case Focus on how the case will provide evidence to satisfy the purpose of the study and answer the research question Use systemically multiple sources and techniques for data gathering Design the study to ensure validity and reliability Procedures used are well documented and can be repeated 	<ul style="list-style-type: none"> A single real life case includes studying the collective pool of community mentors who volunteer to serve in the PASOS² Mentoring Program pilot. This pilot was introduced in school year 2016-2017 supporting six groups of identified middle school cohort student groups. Unique parameters include the introduction of an innovative “value-based” mentoring curriculum, ‘grit’ software tools, a “meet and greet” interaction series, and mentor: student rules of engagement. While campus mentors (teachers, administrators, counselors, etc.) are included in the PASOS² system, the study boundaries are centered on investigating the community mentors volunteering for the pilot study. These volunteer community mentors are sourced from the El Paso Electric Company, the CEA membership organizations, college student ‘near peer’ mentors, and other CEA sourced volunteers. They represent the gamut of college students to STEM professionals with decades of professional experience in both STEM and non-STEM fields. Four sources of data gathering methods and protocol were designed to produce evidence including: 1) a community mentor group reflection exercise on mentoring value; 2) an individual pre- training survey; 3) an individual post- training survey; and, 4) a summative post-pilot interview protocol for selected community mentors. All of these methods are aligned and contrasted with a Mentor Value Equation profile of categories introduced as keys to effective mentoring systems. An aggregate, within-case analysis technique of a systemic gathering of quantitative and qualitative data produced the evidence tied to the purpose and help answer the research question defined above. Validity and reliability factors were addressed by the study design with a four step data gathering process that is repeatable.

(Continued)

APPENDIX A. CASE STUDY RESEARCH PROCESS APPROACH (2 of 3)


SOY KEY STEP	SOY'S CASE STUDY RESEARCH DESIGN POINTS	MORENO'S DISSERTATION APPROACH
STEP 3. Prepare to collect the data (Chapter 3)	<ul style="list-style-type: none"> Develop systemic organization of data bases to categorize, sort, store, and retrieve data Consider a pilot to clearly refine the data gathering protocol and procedures Multiple data gathering techniques offers triangulation opportunities Develop investigator capacity to ask good questions and interpret answers Develop data collection deliverables (identify key players, letters of introduction, rule of confidentiality, etc.) 	<ul style="list-style-type: none"> For use during the PASOS² mentoring training program, design and produce the following data gathering tools: <ul style="list-style-type: none"> Tool #1:The group reflection exercise on the perceived value of mentorship Tool #2:The pre-training community mentor profile and survey questions regarding mentor mindset and expectations prior to the training Tool #3:The post-training mentor survey questions regarding the impact and readiness to mentor as a result of completing the mentor training program. For use after 6-8 weeks after the mentoring experience has started, design and produce the Tool #4 Mentor Post-Pilot Summative Interview Protocol. This protocol is an interview of open-ended questions assessing what most influences community mentors experiences and engagement in building community mentor capacity and competency. Pilot the training deliverables with the PASOS² Program Committee to make adjustments and refinements to the mentor curriculum training and data gathering tools. Introduce the PASOS² Pilot Program by the PASOS² Program Committee to prospective community mentors soliciting individuals who are willing to volunteer as mentors. They are then scheduled to complete the PASOS² Mentoring Training Program. Key contact information is assembled. The intent and confidentiality of the data gathering is explained including the detailed purpose of the pilot case study and the value of the mentor training program investment.
STEP 4. Collect data in the field (Chapter 4)	<ul style="list-style-type: none"> Collect and store multiple sources of evidence comprehensively and systematically Reference converging lines of inquiry and patterns to be uncovered Document data gathering changes systemically Record feelings, hunches, testimonies, stories, illustrations, etc. using the interview protocol Determine whether inquiry needs reformulation or redefinition Maintain the relationship between the issue and the evidence collected 	<ul style="list-style-type: none"> Schedule, organize, and conduct multiple PASOS² Mentoring Training Program Workshops to deliver the mentorship curriculum and record the following field data from community mentors: <ol style="list-style-type: none"> Tool #1: The group mentoring value reflection exercise Tool #2:The pre-training community mentor profile and survey Tool #3:The post-training mentor survey Select two groups of community mentors who engaged (or did not) 6-8 weeks to conduct Tool #4 Mentor Post-Pilot Summative Interview Protocol. After each workshop collect, store and document the group reflection data input. After each workshop collect, store in a structured data base, and identify each pre- and post- survey results. After each workshop determine if reformulation of the data gathering is warranted. Surface any feedback, surprises, hunches, testimonials, etc. from the mentors. After the mentor interview protocol collect, store, and document each interview for future coding and analysis. After each interview determine whether interview reformulation is necessary.

APPENDIX A. CASE STUDY RESEARCH PROCESS APPROACH (3 of 3)

SOY KEY STEP	SOY'S CASE STUDY RESEARCH DESIGN POINTS	MORENO'S DISSERTATION APPROACH
STEP 5. Evaluate and analyze the data (Chapter 4)	<ul style="list-style-type: none"> ▪ Provide a chronological recounting reporting the case study as a story ▪ Interpret raw data to find linkages between research object and outcomes with reference to the original research question ▪ Triangulate data to strengthen the research findings and conclusions ▪ Sort data to expose or create new insights ▪ Use specific analysis techniques (e.g., place information into arrays, create matrices of categories, flow charts, frequency profiles, etc.) ▪ Do cross-case search for patterns or evidence of conflicts and identify cause or source of conflict 	<ul style="list-style-type: none"> ▪ Describe the roles of participants and describe the research method explaining the data gathering process, analysis techniques used, and the results of the four data gathering research tools to answer the research questions. ▪ Build an array concept mapping of the group reflection statements (Tool #1) regarding the value of mentoring categorized and correlated to the Mentor Value Equation variables of effective mentoring. ▪ Perform a correlation t-test community mentor individual pre-training and post-training survey results (Tools #2 and #3) with open-ended questions analyzed for the triangulation process. ▪ Enter and code the interview data (Tool #4) to identify patterns, similarities, and differences based on selected community mentors that both engaged or did not engage providing a summative contrast of both interview groups. ▪ Triangulate “value proposition” statements with the group reflection, the surveys, and the interviews tied to the Mentor Value Equation profile. ▪ Identify the “lessons learned” in rolling out and implementing the PASOS² pilot program including the community mentors' perspective. ▪ If necessary, conduct follow-up interviews to confirm or correct initial data (both for surveys and interviews).
STEP 6. Prepare the report (Chapter 5)	<ul style="list-style-type: none"> ▪ Report data in a way that transforms a complex issue into one that can be understood ▪ The goal of the written report is to convey a vicarious experience to the reader ▪ May lead the reader to apply the experience to their own real-life situation ▪ Must display sufficient evidence to gain readers' confidence 	<ul style="list-style-type: none"> ▪ Describe the issues driving the research question, problem, and purpose. ▪ Describe the findings and conclusions using the analysis techniques above and conclude the answers to the research questions. ▪ Provide a narrative by retelling specific stories related to the community mentoring process illuminating issues and keys to the research questions. Point out the triangulation of data results. ▪ Correlate the findings to the two analytical models: the <i>Mentor Value Equation</i> and the <i>Community Mentor Opportunity Pipeline</i> model. ▪ Provide conclusions from the research applying the “tactics of collaboration” stages model and make assertions and provide suggestions for further expansion of the PASOS² program. ▪ Determine applicability to other situations or localities and outline future research.

APPENDIX B -- MENTOR PRE-TRAINING SURVEY

Appendix B. Mentor Pre-Training Survey (Page 1 of 2)

	PASOS2 PROGRAM SURVEY – PRE-TRAINING PASOS2 is requesting input from its mentors to assess the effectiveness of its PASOS2 Mentoring Training Program implementation and support plan. This voluntary input will enhance the program resource investments to best serve you as a mentor to connect with students. We value and appreciate your opinion.
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MENTOR DEMOGRAPHICS:

Please enter your name: _____ Today's Date: _____

1. Which of the following best describes your CURRENT role? (Please check one primary role)

- ☐ College student (near peer mentor)
☐ Professional in the workplace (non-educator)
☐ Professional in education
☐ Adult volunteer/ Parent of student
☐ Other _____ (e.g., retired)

2. Which age group do you fit in?

- ☐ Under the age of 26
☐ Between 26 and 40 years old
☐ Between 41 and 60 years old
☐ 61 or over years young

3. What is your gender?

- ☐ Female
☐ Male

4. Have you received a degree(s) in a STEM field?

- ☐ Yes – Please list: _____
☐ No





5. Have you previously or are you currently working in a STEM-related career?

- ☐ Yes
☐ No

SECTION A: THE PASOS2 PROGRAM AND YOU:

Select one of the following possible answers that best reflects your opinion:

5 = To a great extent 4 = To some extent 3 = To a very little extent 2 = To no extent 1 = Don't know/Does not apply

	6. To what extent are you familiar with the purpose of the PASOS2 Mentoring Project?
	7. To what extent are you comfortable with the expected role of a mentor in the PASOS2 Program?
	8. To what extent are you experienced in building meaningful 2-way relationships with students as a mentor?
	9. To what extent are you aware and comfortable with the expected behaviors and code of conduct for a mentor in the PASOS2 Program?
Write in your response	10. What are your concerns or apprehensions, if any, in engaging as a PASOS2 mentor? (Enter NONE if appropriate) _____ _____ _____
Write in your response	11. What are your expectations of the PASOS2 Mentoring Training Workshop? _____ _____ _____

Appendix B. Mentor Pre-Training Survey (Page 2 of 2)

SECTION B: CAREER ADVOCACY, GUIDANCE, AND PLANNING:

Select one of the following possible answers that best reflects your opinion:

5 = To a great extent 4 = To some extent 3 = To a very little extent 2 = To no extent 1 = Don't know/Does not apply

5 4 3 2 1	12.To what extent are YOU familiar with the term 'STEM' and its growing focus and movement in American schools, as well as, our local Borderplex economy?
5 4 3 2 1	13.To what extent are you comfortable with advocating STEM and providing career guidance and planning to students to pursue a STEM career?
5 4 3 2 1	14.To what extent are you familiar and comfortable with the use of a technology-based platform to interact and guide with students?
Write in your response	15.What special competencies, skills, or experiences can you bring to students that are of value and why? _____ _____ _____


SECTION C: FORTIFYING STUDENT READINESS:

5 4 3 2 1	16.To what extent are YOU familiar with what and how your students must be academically prepared to be college ready?
5 4 3 2 1	17.To what extent are you comfortable providing advice and direction to students to get them ready for their life's dreams?
5 4 3 2 1	18.To what extent are YOU familiar with the community resources available that help provide college access and STEM success pathways for students?
5 4 3 2 1	19. To what extent are YOU familiar with the following programs and their requirements that can benefit a student (child) entry into post-secondary education: a) dual credit? b) advanced placement (AP and pre-AP) c) career & technology (CTE) courses d) international baccalaureate (IB) e) early college high school (ECHS)
Write in your response	20.How would you answer: "The greatest VALUE I can give students as their mentor is: _____ _____ _____ _____ _____

Any Other Comments:

THANK YOU FOR YOUR PARTICIPATION AND INPUT

APPENDIX B. Mentor Post-Training Survey

<p>PASOS² PROGRAM SURVEY – POST TRAINING</p> <p><i>Given you have completed the PASOS² Mentoring Training Program, please reflect on the following questions (similar to the ones in the Pre-Training Survey). We appreciate your feedback that will be key in continuously improving the training program.</i></p>	
<p>Please enter your name: _____ Today's Date: _____</p>	
<p>THE PASOS² PROGRAM AND YOU:</p> <p>Select one of the following possible answers that best reflects your opinion:</p> <p style="text-align: center;">5 = To a great extent 4 = To some extent 3 = To a very little extent 2 = To no extent 1 = Don't know/Does not apply</p>	
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>1. To what extent are you NOW familiar with the purpose of the PASOS² Mentoring Project?</p>
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>2. To what extent are you NOW comfortable with the expected role of a mentor in the PASOS² Program?</p>
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>3. To what extent are you NOW MORE COMFORTABLE in building meaningful 2-way relationships with students as a mentor?</p>
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>4. To what extent are you NOW aware and comfortable with the expected behaviors and code of conduct for a mentor in the PASOS² Program?</p>
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>5. To what extent were your concerns or apprehensions, if any, addressed in engaging as a PASOS² mentor?</p>
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>6. To what extent were your expectations met in the PASOS² Mentoring Training Workshop?</p>
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>7. To what extent are YOU MORE familiar with the term 'STEM' and its growing focus and movement in American schools, as well as, our local Borderplex economy?</p>
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>8. To what extent are you MORE comfortable with advocating STEM and providing career guidance and planning to students to pursue a STEM career?</p>
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>9. To what extent are you NOW MORE familiar and comfortable with the use of a technology-based platform (EduGuide) to interact and guide with students?</p>
<input type="radio"/> 5 <input type="radio"/> 4 <input type="radio"/> 3 <input type="radio"/> 2 <input type="radio"/> 1	<p>10. To what extent are you comfortable providing advice and direction to students to get them ready for their life's dreams?</p>
<p>Write in your response</p>	<p>11. What did you like BEST about the PASOS² training? Why?</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>Write in your response</p>	<p>12. What did you like LEAST about the PASOS² training? Why?</p> <p>_____</p> <p>_____</p> <p>_____</p>
<p>Any Other Comments or Recommendations:</p> <p>_____</p> <p>_____</p> <p>_____</p>	
<p>THANK YOU FOR YOUR PARTICIPATION AND INPUT</p>	
<p>Page 1 of 2 GM PASOS2 Project 2016 -- V1.0</p>	

APPENDIX C -- POST-PILOT MENTOR INTERVIEW PROTOCOL

APPENDIX C: The Post-Pilot Mentor Summative Interview Protocol (Page 1 of 2)

“Given your engagement in the PASOS² Mentoring Program, please provide your feedback regarding WHAT MATTERS MOST TO YOU AS A COMMUNITY MENTOR for making improvements.

Key Themes	Introductory & Transition Questions	Core Interview Questions	Potential Follow-up Questions
THE PASOS² PROGRAM ROLLOUT EXPERIENCE	<i>What was the effectiveness of the PASOS² Program Rollout?</i>	<ol style="list-style-type: none"> 1. What do you see as the greatest value of the mentoring program using software as a mentoring mechanism? 2. To what extent did you find the 2 YEAR commitment to mentoring student(s) to be reasonable? 3. To what extent did you share the mentoring opportunity with any of your friends or family? 4. Do you plan to participate as a mentor in the future? 5. Any other comments you would like to share to make the program better? 	<ol style="list-style-type: none"> a. Did you have an introductory presentation on the PASOS² Program? b. What were the most valuable parts of the rollout program? Least valuable? Why? c. Were the rules of engagement and the code of conduct a necessary process?
THE “MEET AND GREET” STUDENT EXPERIENCE	<i>What is the basis for building MEANINGFUL 2-way mentor: student relationships?</i>	<ol style="list-style-type: none"> 6. To what extent did you have an opportunity to interface with the students in the “meet and greet” sessions scheduled at the campuses? 7. How would you describe your “meet and greet” experience(s)? How easy was it to engage? 8. Explain which of the following were the contributing factors to your ability (or inability) to engage with the “meet and greet” sessions (select all that apply): <ul style="list-style-type: none"> <input type="checkbox"/> a. I see (don’t see) the value in interfacing with students in person <input type="checkbox"/> b. The demands of my job afforded (did not afford) me the time to engage <input type="checkbox"/> c. The demands of my personal life permitted (did not permit) me the time to engage <input type="checkbox"/> d. I was aware (not aware) of the schedule of the meetings with the students <input type="checkbox"/> e. The student sessions were workable (conflicted) with my schedule <input type="checkbox"/> f. I was able to engage vs. waiting for further directions from the PASOS² training team <input type="checkbox"/> g. I am comfortable (not comfortable) in dealing with students <input type="checkbox"/> h. I felt (did not feel) prepared to engage at the campus <input type="checkbox"/> i. I had (did not have) access to the PASOS² training team <input type="checkbox"/> j. Other factors: _____ 9. What, if anything, would you like to see different regarding the “meet and greet” sessions with student mentees? 	<ol style="list-style-type: none"> d. Why did your expected role as a PASOS² mentor exceed (or fall short) of your expectations? e. What has surprised you most about your relationship with your students? Why? f. What are the positive experiences in meeting with students on campus? g. What stymies or invigorates a sustainable student: mentor connection?

APPENDIX C: The Post-Pilot Mentor Summative Interview Protocol (Page 2 of 2)

Key Themes...	Introductory & Transition Questions	Core Interview Questions	Potential Follow-up Questions
THE “EDUGUIDE” EXPERIENCE	What was the level of effectiveness in using the PASOS2 EduGuide software mechanism?	<p>10. To what extent did you have an opportunity to interface with the students using the online EduGuide software application?</p> <p>11. How would you describe your “EduGuide” experience(s)? How easy was it to use?</p> <p>12. Explain which of the following were the contributing factors to your ability (or inability) to engage with the “EduGuide” sessions (select all that apply):</p> <ul style="list-style-type: none"> <input type="checkbox"/> a. I see (don’t see) the value in the EduGuide online application <input type="checkbox"/> b. The demands of my job afforded (did not afford) me the time to use the software <input type="checkbox"/> c. The demands of my personal life permitted (did not permit) me the time to use the software <input type="checkbox"/> d. I was trained and prepared (not trained nor prepared) to use the EduGuide software application <input type="checkbox"/> e. I proceeded independently to use the software (I was waiting for further directions from the PASOS² training team <input type="checkbox"/> f. I had access (did not have access) to EduGuide or to technology to use it <input type="checkbox"/> g. I had no problems (had problems) in using the EduGuide application <input type="checkbox"/> h. I felt (did not feel) prepared to engage online with students <input type="checkbox"/> i. I had access (did not have access) to the PASOS² or EduGuide technical support team <input type="checkbox"/> j. Other factors: _____ <p>13. What, if anything, would you like to see different regarding the “EduGuide” application?</p>	<p>h. Did you have an introductory presentation on using the EduGuide Program? How effective was it delivered?</p> <p>i. What were the most valuable parts of the EduGuide program? Least valuable? Why?</p>

APPENDIX D -- EXAMPLE OF PAIRED SAMPLE T-TEST

Two Sample T-Test with Paired Samples – Dynamic #1 Familiarity with PASOS²

Mentor Trainee	Pre-Workshop	Post-Workshop	Difference
1	3	5	2
2	2	5	3
3	2	5	3
4	3	5	2
5	3	5	2
6	3	5	2
7	4	5	1
8	1	5	4
9	4	5	1
10	3	5	2
11	4	5	1
12	4	5	1
13	3	5	2
14	3	5	2
15	3	5	2
16	4	5	1
17	2	4	2
18	2	5	3
19	3	5	2
20	2	5	3
21	4	5	1
22	2	4	2
23	3	5	2
24	4	5	1
25	4	5	1
26	5	5	0
27	3	5	2
28	4	5	1
29	3	5	2
30	4	5	1
31	1	5	4
32	4	5	1
33	4	5	1
		Mean	1.81818182
		Std. Dev.	0.91701095

APPENDIX E -- CLUSTERS OF SEMINAL QUOTES

THEME A: “PASOS² – Value As A Mentoring Program”

++MENTORS – Theme A

“I shared my experiences with other attorneys in my office with the goal of getting them to participate in the future.” **Female Professional Participant #2**

“In my opinion, the greatest value of the mentoring program in general is the opportunity that it provides connecting students and their mentors in the common journey towards the set goals. I really believe that both groups learn in this process.” **Female College Student Participant #3**

“I really believe it is a great initiative, especially because it is open to mentors with different professional and educational backgrounds.” **Female College Student Mentor Participant #3**

“It allows me the flexibility to mentor in line at the grocery store and reach far more students than I anticipated.” **Female College Student Mentor Participant #5**

“It is a way for students to have constant access to a learning path that engages them in activities that can be applied to their every-day and future lives. They also always have the help of multiple mentors to guide them along their journey.”

Female College Student Participant #5

“Providing mentorship alongside my peers was the greatest value for me; seeing them be proactive on the platform motivated me to be proactive as well.” **Male College Student Mentor Participant #7**

“The impact it has on future STEM stars!” **Male Professional Mentor Participant #8**

“Students were so impressive along with educators. Very rewarding project!”

Female Professional Mentor Participant #9

“The two year commitment to mentoring is reasonable. Keep it going and grow!!”

Female Professional Mentor Participant #11

“The key to enhanced community engagement is having adults see the value in investing time and energy to make a realistic difference in the lives of our students – they need and want our guidance and wisdom.” **Male Professional Mentor Participant #12**

“I think a two year commitment is great because I think it is ideal for students to have a consistent mentor throughout the duration of the program. Mentoring is one of my passions and I share it anywhere I go.” **Female College Student Mentor Participant #13**

“Find a way to impress on adults the importance and impact that this program has on students. Convince them that this is a way to move forward.”

Male Professional Mentor Participant #14

- -MENTORS – Theme A

“The idea that the program was virtual was very appealing in that it allows mentors who are not available at specified times to participate in a meaningful way.”

Female Professional Mentor Prospect #18

“The [program] starts the conversation between the mentor and the student. You don’t go through that awkward period of, what should I say? What should I ask? During our training session, we had very little time to really learn how to use the software. If possible, can you spend more time on it?”

Female College Student Mentor Prospect #19

“These students already know what they want from the education. They are committed. They already plan out their future and education. I think you guys did a great job in starting the program.”

Female Professional Mentor Prospect #20

“I would like to participate in the future if my work demands/ schedule permits.”

Female Professional Mentor Prospect #22

“I find the program to be beneficial and nurturing to the students.”

Female Professional Mentor Prospect #24

“[Team’s] dedication and excitement is very contagious. Broke the mold when God made Gilbert!”

Male Professional Mentor Prospect #25

“The two year commitment is adequate and appropriate given the nature of the academic calendar and the schedules of the mentors in the PASOS² program. I look forward to next year’s schedule! (It’s not excessive at all!).” **Female Professional Mentor Prospect #27**

“Our mentorship should complement the teachers teaching curriculum during our visits.”

Male Professional Mentor Prospect #29

THEME B: “PASOS² – EFFECTIVENESS OF THE ‘MEET & GREET’ COMPONENT”

++MENTORS – Theme B

“In my opinion, it is really hard to keep people committed for such a long period of time and not lose interest. I think that it would be a good idea to have a meet and greet at the beginning of the school year where the mentor and the mentee can sit down and talk for a certain amount of time and have bonding activities.” **Female College Student Mentor Participant #1**

“I do see the value of meeting students in person. Communicating with students face to face is important in building a strong relationship between both mentee and mentor.”

Male College Student Mentor Participant #4

“It was easy to engage and the scheduled topics helped us to engage students and helped me have a direction when meeting with the students.”

Female College Student Mentor Participant #5

“Meet and greet was a wonderful experience ☺.” **Male Professional Mentor Participant #8**

“Students were very energetic, interested, excited about new opportunities and the mentoring program.”

Female Professional Mentor Participant #9

“Inspiring, uplifting – these young women are incredibly focused, intelligent and fun to be with. I feel I learn more from them than I am impacting.” **Female Professional Mentor Participant #10**

“I was a strong advocate for the meet & greets. The topics/ subjects were applicable and very engaging with the students. I made time because it is important to our future.”

Female Professional Mentor Participant #11

“The “meet and greet” sessions were a great way to get to meet the students and share insights about a variety of topics. Having a predetermined theme and process made the mentoring engagement meaningful to both students and the mentors.”

Male Professional Mentor Participant #12

“I can only comment in communication. E-mails are good to inform volunteers about all the opportunities, however, I think it is important to drive accountability and have mentors attend the meet & greet sessions.” **Female College Student Mentor Participant #13**

“Fantastic! Very easy to engage with students because both the mentor and the students could relate to the EduGuide modules to keep conversations going. Developed themes for the meet and greet was very helpful.” **Male Professional Mentor Participant #14**

“Attended all “meet & greet” sessions. Really great! Easy to engage.” **Male Professional Mentor Participant #29**

- -MENTORs Theme B

“It appears the students are involved.” **Female Professional Mentor Prospect #16**

“Unfortunately, I was unable to attend any of the “meet & greet” events.”

Female Professional Mentor Prospect #17

“I didn’t have the opportunity, but I would like to attend a session in the future.”

Female Professional Mentor Prospect #18

“I attended one of the meet and greet sessions at Henderson Middle School, but didn’t have the opportunity to truly engage with the students.” **Female Professional Mentor Prospect #19**

“It was a hands on with the whole group. The whole class participated. It was pretty easy, some kids very shy, but for the most part, all others would engage in the conversation.”

Female Professional Mentor Prospect #20

“I’m not so sure all of us were always prepared to “teach” an entire class, especially if we would up doing it on our own.” **Female Professional Mentor Prospect #21**

“I was only able to attend the initial meeting, but did not make it to any of the meet and greet sessions. The demands of my job did not afford me the time to engage.”

Female Professional Mentor Prospect #22

“I was only able to attend the initial meet and greet session with the students. It was a good opportunity to understand the purpose of the program. The students and teachers are very welcoming and excited to

be part of this program.” **Female Professional Mentor Prospect #23**

“Unfortunately, the time conflicted with my schedule.” **Female Professional Mentor Prospect #24**

“My first meeting at the El Paso Electric offices was a very pleasant surprise. Student mentors were very open and approachable. Their level of confidence and respect toward the presenter was evident and reassuring.” **Male Professional Mentor Prospect #25**

“It was so energizing to be able to listen and interact with the students at YWLA because for the most part, they are very open to communicating with others and exhibit a high level of self-confidence.” **Female Professional Mentor Prospect #27**

“It was a good opportunity to understand the purpose of the program. The students and teachers are very welcoming and excited to be part of this program.” **Female Professional Mentor Prospect #28**

THEME C: “PASOS² – EFFECTIVENESS THE ‘EDUGUIDE’ MECHANISM”

++MENTORs Theme C

“I believe it is a really easy software to work with and it provides really good customer service if you encounter any technical issues.” **Female College Student Mentor Participant #1**

“It is easy to use but because of my preference to make every response unique, it did take lots of time.” **Female College Student Mentor Participant #5**

“I used it often to ask questions of the students throughout their path activities and get them to express themselves more in depth. Very easy to go through the modules and mentor students.” **Female College Student Mentor Participant #6**

“Extensively, every day was an opportunity! The EduGuide platform is very easy to use and has a user interface that allows the user to succeed in providing an effective mentorship! The tutorial videos are not too long, the instructions are clear, and the experience is enjoyable much like that of a video game.” **Male College Student Mentor Participant #7**

“Lots of opportunity ... Great Always can be improved like any software but great company to work with.” **Male Professional Mentor Participant #8**

“There should be no fear in using EduGuide from the mentoring side. The application is as advertised – as easy to use as a cell phone!” **Male Professional Mentor Participant #12**

“The EduGuide software was very great. It was very easy to use once the students were actually using the software.” **Female College Student Mentor Participant #13**

“Very involved with the EduGuide application. Being able to use the application on my phone was very helpful. Once you get over the short learning curve, it is very, very easy to use. The platform is easy to navigate.” **Male Professional Mentor Participant #15**

- -MENTORs Theme C

“I was unable to communicate with the students after they completed their modules. I did show [friends and family] the application.” **Female Professional Mentor Prospect #17**

“The system was a bit difficult to understand without someone walking me through it....simply make it easy as possible to participate and I’ll make it work! **Female Professional Mentor Prospect #18**

“I proceeded independently to use the software (I was waiting for further directions from the PASOS² training team.” **Female Professional Mentor Prospect #18**

“Although the interface of the software is not intuitive, it was relatively easy to use.”
Female Professional Mentor Prospect #19

“I had problems in using the EduGuide application... I didn’t experience enough to provide feedback.”
Female Professional Mentor Prospect #20

“It was easy to use, but seemed time consuming (each session may be limited, but for it to be effective, you really need to have the time to monitor and engage with the students.”
Female Professional Mentor Prospect #21

“I did not interact with any students – had very little exposure to [the] portal but it seemed user friendly.” **Female Professional Mentor Prospect #22**

“The trainings provided did not work with my schedule.”
Female Professional Mentor Prospect #23

“Very positive initial experience and indicative of a very successful future interaction with the mentees.” **Male Professional Mentor Prospect #25**

“I was unable to finish my training online.... Having technical problems accessing the website and not being able to finish the training was disappointing.”
Female Professional Mentor Prospect #26

“The modules that I completed were quite “user friendly” and succinct.”
Female Professional Mentor Prospect #27

APPENDIX F -- TRIANGULATION RESULTS SUMMARY

Summary of Qualitative Results From TOOL Components (Page 1 of 3)

TOOL	Qualitative Interview Question(s)	Major Themes
TOOL #1 (n=67)	“What do you value in mentors?”	<p>Listed in order of most cited themes:</p> <ul style="list-style-type: none"> • giving advice & guidance / sharing of knowledge & experience • willingness to invest in others • networking / relationship building • role modeling / leadership • a source for motivating, inspiring • exploring / opening eyes to new possibilities including lifelong learning • uncompromising focus on setting high career expectations • being an advocate/ cheerleader for mentees • acceptance of failure as path to success
TOOL #2 (n=33)	Q20. How would you answer: “The greatest VALUE I can give students as their mentor is:”	<p>Listed in order of most cited themes:</p> <ul style="list-style-type: none"> • Sharing life experiences (18) • Defining a career pathway tied to their dreams (8) • Making transition to college and career opportunities viable (7) • Being a source of encouragement (7) • Empowering and guiding students (6) • Sharing workplace and business knowledge (6) • Getting involved, committing my time (5) • Challenging the students to succeed (5) • Building confidence and self-reliance (3) • Building trusting relationships (3) • Impacting the local and global community (3)
	Q10. What are your concerns or apprehensions, if any, in engaging as a PASOS ² mentor?	<p>Listed in order of most cited themes:</p> <ul style="list-style-type: none"> • 82% indicated “none” for apprehensions/ concerns of no response (27) • Time constraints (3) • Worried about connecting with students (2)
	Q15. What special competencies, skills, or experiences can you bring to students that are of value and why?	<p>Listed in order of most cited themes:</p> <ul style="list-style-type: none"> • Ability to share work, personal, and life experiences including STEM (12) • Sharing how to get ready for college (10) • Build expectations, determination, goals and aspire to succeed (10) • Ability to network, communicate, and reach out to others (8) • Ability to connect and relate to younger students (6) • Develop leadership skills (6) • How to share and develop the skills to achieve (5) • Start developing a business acumen (5) • Share organizational skills (3) • Share how to engage in learning (2) • Build teamwork and working with others (2)
	Q11. What are your expectations of the PASOS ² Mentoring Training Workshop?	<p>Listed in order of most cited themes:</p> <ul style="list-style-type: none"> • Gaining the knowledge necessary to be an effective mentor (14) • Understanding program expectations (10) • Learning how best to provide guidance and knowledge (7) • Making a positive impact (7) • Learning how to navigate the software (4)

Summary of Qualitative Results From TOOL Components (Page 2 of 3)

TOOL	Qualitative Interview Question(s)	Major Themes
TOOL #3 (n=33)	Q11. What did you like BEST about the PASOS ² training? Why?	<p>Listed in order of most cited themes:</p> <ul style="list-style-type: none"> • The depth, quality, and delivery of the training and the program (16) • The online nature of the program (5) • The opportunity to enrich mentees and their quality of lives (5) • Outlet to encourage students (3) • The level of enthusiasm in project leadership (3)
	Q12. What did you like LEAST about the PASOS ² training? Why?	<p>Listed in order of most cited themes:</p> <ul style="list-style-type: none"> • Would not change a thing (15) • The training went fast (need more time) (3)

Summary of Qualitative Results From TOOL Components (Page 3 of 3)

TOOL	Qualitative Interview Question(s)	Major Themes
TOOL#4 (n=30)	<p>Relative to the overall PASOS² Program:</p> <ol style="list-style-type: none"> 1. What do you see as the greatest value of the mentoring program using software as a mentoring mechanism? 2. To what extent did you find the 2 YEAR commitment to mentoring student(s) to be reasonable 3. To what extent did you share the mentoring opportunity with any of your friends or family? 4. Do you plan to participate as a mentor in the future? 5. Any other comments you would like to share to make the program better? 	<ul style="list-style-type: none"> • Top themes regarding “greatest value of the mentoring program”: <ol style="list-style-type: none"> a) preselected topics facilitated engagement both online and in person (9) b) experiencing firsthand the impact on energetic students was valuable (8) c) the structure and pre-planning of the “meet & greets” was very effective (7) d) the technology as a virtual mentoring mechanism was convenient and effective (7) e) making connections towards a common path or journey is key to setting goals (5) f) the synergy among fellow mentors was contagious (5) • Engagement categories derived from the coding and subcategories: <ul style="list-style-type: none"> Category A: Finding Value In Mentoring Category B: Understanding the Ingredients Necessary For Effective Mentoring Category C: Recognizing the Commitments & Expectations Necessary in Mentoring Category D: Embracing the Importance of Collaboration and Advocacy Category E: The Willingness vs. Ability Factor To Mentor Category F: Nurturing Strong Mentor: Student Relationships Category G: Level of Interaction with Students Via “Meet & Greet” Mechanisms Category H: Contributing Factors Influencing the Ability to Engage with Students (both on campus and via the EduGuide technology) Category I: Leveraging the Use of Software Technology In Mentoring Effectiveness Category J: Personal or Professional Demands Affecting Engagement As Mentors Category K: Building Capacity and Competencies As a Mentor Category L: Effective Communications Among Stakeholders • Feedback on the top three program inquiries <ol style="list-style-type: none"> a) a surprising 90% agreement with a 2 year commitment from ALL mentors b) 70% sharing of the program with friends and family c) 95% commitment from all mentors to engage in next year’s program
	<p>Relative to EduGuide:</p> <ol style="list-style-type: none"> 10. To what extent did you have an opportunity to interface with the students using the online EduGuide software application? 11. How would you describe your “EduGuide” experience(s)? How easy was it to use? 12. Explain which were the contributing factors to your ability (or inability) to engage with the “EduGuide” sessions (select all that apply). 13. What, if anything, would you like to see different regarding the “EduGuide” application? 	<ul style="list-style-type: none"> • The TOP contributing factors to mentors’ INABILITY to engage with “EduGuide”: <ol style="list-style-type: none"> a) the demands of my job did not afford me the time to use the software b) had technical problems in using the EduGuide software c) did not use the software enough / needed to dedicate more time d) unable to finish the EduGuide training e) EduGuide training conflicted with my schedule • The TOP contributing factors to mentors’ ABILITY to engage with “EduGuide”: <ol style="list-style-type: none"> a) the EduGuide platform is very easy to use, to navigate and is user friendly b) EduGuide module activities are inspiring, user friendly, and succinct c) The ability to use my cell phone (smart technology) was awesome! d) The ease of interaction with students was great! e) Easy access to software anytime, anywhere, was super convenient • The TOP recommendations for “EduGuide” <ul style="list-style-type: none"> ✓ develop STEM-specific modules ✓ assign fewer students per mentor to develop more interaction ✓ develop career awareness and exploration modules
	<p>Relative to “Meet & Greet”</p> <ol style="list-style-type: none"> 6. To what extent did you have an opportunity to interface with the students in the “meet and greet” sessions scheduled at the campuses? 7. How would you describe your “meet and greet” experience(s)? How easy was it to engage? 8. Explain which are the contributing factors to your ability (or inability) to engage with the “meet and greet” sessions (select all that apply). 9. What, if anything, would you like to see different regarding the “meet and greet” sessions with student mentees? 	<ul style="list-style-type: none"> • The TOP contributing factors to mentors’ INABILITY to engage in the “Meet & Greets”: <ol style="list-style-type: none"> a) The demands of my job did not afford me the time to engage with students on campus b) The campus sessions conflicted with my schedule c) Was waiting for the next step and directions from the PASOS² support team d) Had in sufficient lead time to schedule the sessions e) Primarily lack of follow-up • The TOP contributing factors to ABILITY to engage in the “Meet & Greets”: <ol style="list-style-type: none"> a) The format, schedule, and timing of the sessions were ideal! b) The students were energetic, excited, and genuinely interested making it easy to engage c) The themes and activities developed and planned made it easy and meaningful d) The energy and spirit of fellow mentors to make a difference was contagious! e) Making time is important – students experiencing multiple mentor was impactful! • The TOP recommendations for “Meet & Greet” <ul style="list-style-type: none"> ✓ do a debriefing with all the mentors to share ✓ increase the number of “meet and greet” sessions ✓ provide venues for more one-on-one dialogue with students ✓ get more college students and community leaders to engage

VITA

Gilberto Moreno has built a 40+ year career as a professional strategist, consultant, and practitioner assisting organizations in effectively managing organizational change. Gilberto has extensive experience in delivering practical solutions in the STEM arena including strategic thinking/planning, reinventing organizations, technology transfer, leadership and human development, continuous improvement, and project management. Gilberto has made keynote presentations and is the creator of the Creating Functional Value-Driven Strategic Planning Series® and of the “i⁶ Functional Value Profile®” linear thinking methodology. Gilberto also serves as a clinical professor at the UTEP College of Engineering.

Gilberto has held a number of enterprise marketing, systems, and executive management positions with IBM, VIVA Environmental, and Prestige Consulting Services and is a registered systems engineer in the State of Texas (#77907). Having graduated WITH HONORS from UTEP in mechanical engineering, he was twice selected to Who's Who in American Colleges and Universities and selected as a UTEP TOP TEN SENIOR. Graduating with TOP HONORS, Gilberto received a master's degree in Operations Research from the University of Notre Dame.

With an active interest in educational, health, social, and STEM developmental programs, Gilberto is actively involved in the leadership of numerous community organizations and K-12 schools and has received regional and national awards for his service to the community. In October 2011, Gilberto was recognized by the Great Minds in STEM National Convention in Orlando for his promotion of STEM to the youth. Gilberto enjoys family activities with his wife Teresa, his six children and six grandchildren.

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This thesis/dissertation was typed by the author.