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# The Roots of Science, Mathematics and Engineering Self-Confidence in College Students: Voices of Successful Undergraduate Women

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# The Roots of Science, Mathematics and Engineering Self-Confidence in College Students: Voices of Successful Undergraduate Women

**Abstract**

With the percentage of women in STEM majors at Texas State University, a large Hispanic Serving Institution, significantly lower than the percentage of women attending the university in general, the authors sought to understand this gap by studying the perspectives of undergraduate women who have successfully persisted in a STEM field of study at the same university. Specifically, the goal of this study was to gain a deeper understanding of what experiences women credited for influencing their self-efficacy, the development of their career interest goals and their academic course outcomes as related to studying science, technology, engineering and mathematics (STEM). This study is unique in that it was also designed to identify experiences that appear to contribute to women's identity development and self-confidence and includes a substantial representation of Latina women's voices. Data was collected and analyzed to identify if similar patterns exist between subjects and if so, which are the greater influencers in their decision to select a STEM major and to persist beyond the critical first two years of undergraduate studies.

The literature of socialization and identity development as related to women as STEM learners in diverse communities is reviewed. This study begins to create an understanding of how women think about their multiple social identities (field of study, gender, culture, etc.). Focus group strategies for obtaining in-depth feedback regarding young women's attitudes, perceptions, motivations, and behaviors are discussed. Observations and recommendations regarding the research methodologies for study design and data analysis are presented with particular attention to the rationale for cultural responsive practices in qualitative research. A mixed methods research approach including the use of surveys and focus groups was used to collect student perceptions from junior and senior status students in STEM fields of study. Preliminary results indicate that students identify early personal experiences as building their self-confidence and contributing to their identity development. Drawing on self-perception theory, women appear to develop a more robust sense of persistence and feel that they fit into STEM; even when faced with sexism from other students.

## Background

When retention theories first evolved 45 years ago, the issue was viewed through the lens of psychology. Student retention was thought to be a function of individual motivation, attributes, and skills; thus, students failed, not institutions[1]. From the 1970s onward, this view of retention yielded to one focused on the relationship between students and society. As a result, greater emphasis was placed on the role of institutions in students' decisions on whether to stay or leave[2]. Since then, several major theories/models have tried to explain student retention/attrition; the Center for the Study of College Student Retention lists as many as eight. Tinto's model paved the way for a sociological analysis of retention that has been popular for several decades[3] and it postulates that persistence occurs when students successfully integrate into the institution academically and socially. Integration, in turn, is influenced by pre-college characteristics and goals, interactions with peers and faculty, out-of-classroom socialization, and personal family dynamics and acculturation factors[4]. Additionally, Tinto argues that the first year of college,

indeed the first semester, is critical to students being incorporated into the college campus, as well as their eventual persistence through to graduation. Retention programs, therefore, are most successful when they utilize informal faculty-student contact in order to integrate students into the academic and social life of the college[5].

Some studies have examined the effect of precollege characteristics, parental socialization and college experiences to determine their relationship with female STEM major persistence. In a study by Espinosa, the experiences of 1,250 women of color and 891 Caucasian women attending 135 colleges nationwide were collected via a reflecting survey of their four years of study and post baccalaureate goals[6]. Results of the study showed that the role of women's college experiences was most paramount in their persistence of STEM majors[6]. Women of color who persisted in STEM more often engaged with peers to discuss course content, joined STEM-related student organizations, participated in undergraduate research programs, had altruistic ambitions, attended private colleges, and attended schools with a thriving community of STEM students. Ong, Wright, Espinosa and Orfield reviewed nearly forty years of research on post-secondary educational experiences of women in STEM majors[7]. Their synthesis of 116 research data provides insight in the factors that influence the retention, persistence and achievement of women of color in STEM majors and careers. Some of the factors they found to influence the undergraduate experiences of women of color in STEM persistence were: STEM enrichment programs, interactions with peers and faculty, academic sense of self, and personal agency and drive[7]. Edzie developed a 15-question survey instrument based on the Motivated Student Learning Questionnaire[8, 9], and additional qualitative research findings. This instrument was used to gather undergraduate student data regarding student self-efficacy as compared to pre-collegiate factors potentially contributing to STEM persistence. Although Edzie's work was conducted at a Midwestern university, amongst a population of predominately white students, the survey includes probing questions relevant across race and cultural experience. The authors selected to use this instrument in this study. By administering Edzie's survey at Texas State, a university with a significant minority student population (47% minority or multiracial) the results from the two universities can be compared, in detail in a future analysis report and briefly here, for differences in the factors generating STEM self-efficacy between the different student populations.

**Methods**

This study used a combination of an online survey and five focus groups It was important to identify contributing factors and trends between and within groups from a larger subset of students ($n>50$) as well as in order to gather self-perceptions from a larger pool of students as well as to get in-depth responses from a smaller group of students ($n<25$). Therefore, a mixed methods research study was used that combined the use of an online survey for quantitative analysis and five focus groups for qualitative analysis. The questions for both instruments were selected and modified based upon published studies in order that the results from this study to be compared to national trends[8, 10-12].

The sampling method for this study was non-probability sampling based on a voluntary sample from a targeted population group. This voluntary sample was made up of people who self-selected into the survey. The population of interest was women from four departments in the College of Science and Engineering with low percentages of female majors: Computer Science,

Engineering Technology, Engineering, and Physics. Women majoring in these departments that were ranked as juniors, seniors, or graduate students for the 2013-2014 or 2014-2015 academic years were invited to participate. Some underclassman students heard about the study from word of mouth and also participated. Formally, participants were recruited by developing a database of women meeting the criteria above, and inviting them to participate in both the online survey and a focus group. Participants were recruited via email. Email invitations were sent from the research team, a faculty member in each department, and through peer leaders of the SWE (Society for Women Engineers) organization. The email invitations containing the survey link also invited the students to participate in the focus groups. Participation in a focus group requires a greater time commitment than an online survey, so students were offered a $15 gift card as a research incentive for completing both the online survey and participating in the focus group. To further encourage student participation and to establish a welcoming environment, the focus group sessions also included refreshments and were held in an easy access location familiar to the students.

*Survey*

The online survey was developed and hosted through an online survey tool (Survey Monkey) for easy access to the participant. The survey developed utilized questions from Edzie and questions asked of faculty during the university's self-study in Fall 2013[8, 12]. The Edzie survey also contained a portion of the Motivated Student Learning Questionnaire, a widely used self-report instrument that measures student motivation and learning strategies at the subject domain level (MSLQ)[13]. While the survey technically had thirty questions including demographic queries, some of these questions were to evaluate a list of statements on a Likert scale. Thus, the survey featured twenty-two questions that were yes/no or selections from a list, seven questions asking students to rank statements with a Likert scale (sixty-five statements in total), and an open-ended request for two recommendations of how to increase STEM major retention. The demographic questions asked the students for their ethnicity, family education levels, socio-economic status, classification at the university (e.g. junior), and major. It took students, on average, fifteen minutes to complete the survey.

*Focus Groups*

One of the aims of this research was to gain an in-depth understanding of student behavior and to identify some of the reasons that govern such behavior. Therefore, it was important to utilize a qualitative research methodology that would provide the insight into the motivation and feelings of these students. Towards this end, smaller focused samples of data providing this insight were collected through a series of five focus group sessions. A focus group is a form of qualitative research in which groups of people are asked about their perceptions, opinions, beliefs and attitudes towards a concept. The use of a focus group emphasized the importance of looking at variables in a natural setting and allows the interviewer to establish a safe environment in which the participants feel comfortable enough to share personal information. An interviewer, or moderator uses a question guide to pose questions in an interactive group setting where participants are free to respond in order or in free form and they can talk with other group members.

An experienced research faculty member (and author) from the College of Education served as the facilitator for this focus group. It is noted that the facilitator, a Latina woman, is not an

instructor in the College of Science and Engineering, so the participating students are not students of the facilitator. Students were invited to participate to one of several scheduled focus group sessions. Students self-selected a session based on personal preference and schedule availability. As a result, demographic differences between focus groups were due to chance, rather than to a systematic selection process. Each focus group ranged in participant size from two to nine participants. Data was gathered through nine open-ended questions that allowed students to provide direct quotations. The focus group sessions were designed to last about one hour long and used a question guide with nine questions developed using key areas to probe based on a review of the literature and interview questions developed for similar studies[10, 11].

The focus group data was analyzed using a careful approach in order to minimize the potential bias when analyzing and interpreting this kind of data. Krueger & Casey point out that a robust analysis should be systematic, sequential, verifiable, and continuous[17]. The Krueger content analysis framework was used. This framework includes the following headings for interpreting coded data: 1) words; 2) context; 3) internal consistency; 4) frequency and extensiveness of comments; 5) specificity of comments; 6) intensity of comments; and 7) big ideas[18].
Some of the drawbacks to conducting a focus group are the amount of time required in conducting it and the small number of participants that can be involved at a time, however, the advantages include high quality insights revealed through the interaction of the group and enhanced memories and experiences shared by participants as a result of the group dynamic[14].

**Results and Discussion**

*Survey*

Of the survey respondents (N=48), 52% identified themselves as white and the rest (48%) as a minority or multi-racial, including 37% Hispanic and 8% African American students. This proportion of ethnicities reflects the overall student population at Texas State, where 51% of the students identify themselves as white and 47% as a minority or multi-racial, including 33% as Hispanic and 8% as African American. (Note that some students decline to report ethnicity.) Therefore the student population in this survey is culturally different from those attending a Midwestern university in Edzie's study, which self-identified as 84% white, 3% Hispanic, and 2% African American[8]. The overall response rate for the survey was 19%. When looking at the response rate by the targeted departments, it can be seen that Computer Science's response rate (8%) was much lower than the other three departments: Engineering Technology (29%), Engineering (26%), and Physics (22%). If the response rate is viewed by student classification it can been seen that Graduate Students (5%) had a much lower response rate than Juniors (24%) or Seniors (21%).

Figure 1 presents the results from both Edzie and this study in asking students what the primary factor was that influenced their enrollment in a STEM major. The results from this study are presented both as the overall results from the survey and broken down by the student's reported ethnicity. For simplification these groups are limited to white and minority students. While this study and Edzie's study revealed the same factors to be the top two reasons for majoring in STEM ("I am good at math and science" and "I wanted career options"), the ordering of these factors is reversed for the two studies. Over half of the students in Edzie's study reported being good at math and science as being the primary factor influencing their decision, only a third

(32%) of students in this study reported it as their primary factor. The overall response to the survey indicated that students in this study were strongly motivated by career options with 52% of the students selecting this option as their primary factor. When looking at the students by ethnicity, the white students have a much stronger preference for career options (62%) to being good at math and science (27%) as being their primary factor. The minority students also show a preference for career options (43%), but the difference is minimal with 38% selecting being good at math and science as their primary factor. Despite the large difference in percentage between the minority and white student responses for career options, the results are not statistically significant at a 95% confidence level (one tailed N-1 two proportion test, p= 0.103), likely due to the small sample size that resulted from dividing the survey respondents by ethnicity. The remaining six factors were cited as the primary factor by 25% of the students in Edzie's study, but just by 10% of the students in this study.

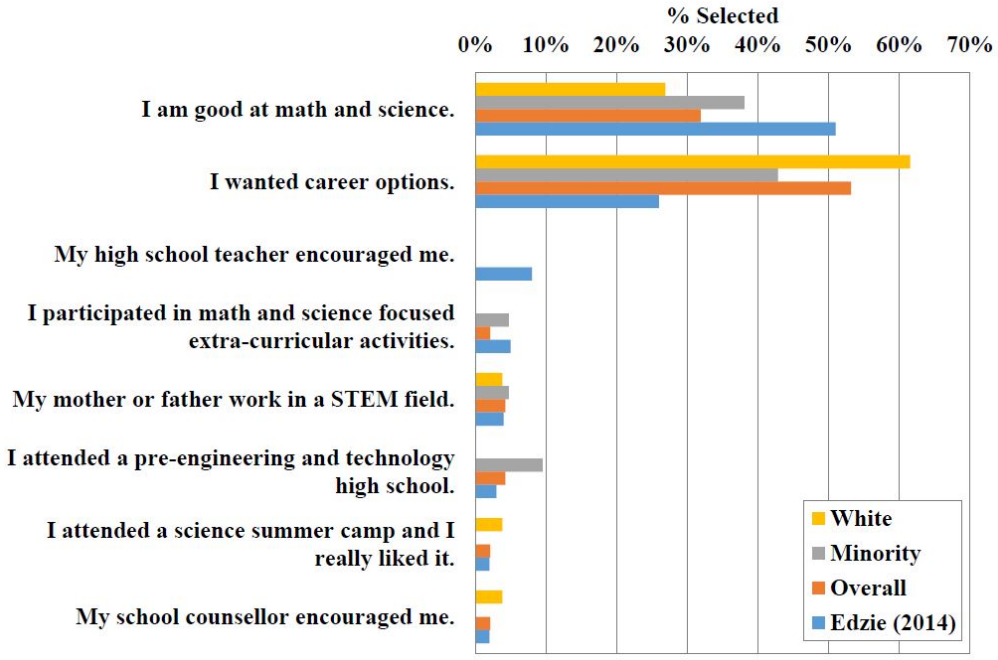


Figure 1: Primary Factor in Female STEM Major Enrollment

Many of the lower ranked factors in Figure 1 can easily lead to the students believing in their abilities in math and science or being aware of the career options available to them with a STEM major. As there seemed to be some overlap in the choices, this study also included a survey question requesting the students to select all of the factors that influenced their decision to enroll in a STEM major (Figure 2). Thus, Figure 2 shows the relative influence of the pre-collegiate experiences represented by the six low ranking factors from Figure 1. By looking at all of the factors influencing enrollment in a STEM major, findings from the focus groups are supported. For instance, many students in the focus groups cited early experiences with STEM including encouragement from family and teachers as being influencers in their decisions to pursue and persist in a STEM field. Student survey responses reported participation in math and science focused extra-curricular activities as an influence in their decision to persist for a third (33%) of the minority students and a quarter (27%) of the white students. Students were also influenced by having a parent working in a STEM field, which is often cited in literature as a factor in

female STEM persistence[15]. Forty percent of the overall student response cited this factor as one of their influences. Minority students cited this factor fewer times than white students (38% and 42%, respectively), but the responses were similar. With the exception of "My school counselor encouraged me" (one tailed N-1 two proportion test, p= 0.031 with the white students more likely to cite this factor) none of the differences between the responses of the minority and white student groups in Figure 2 were statistically significant.

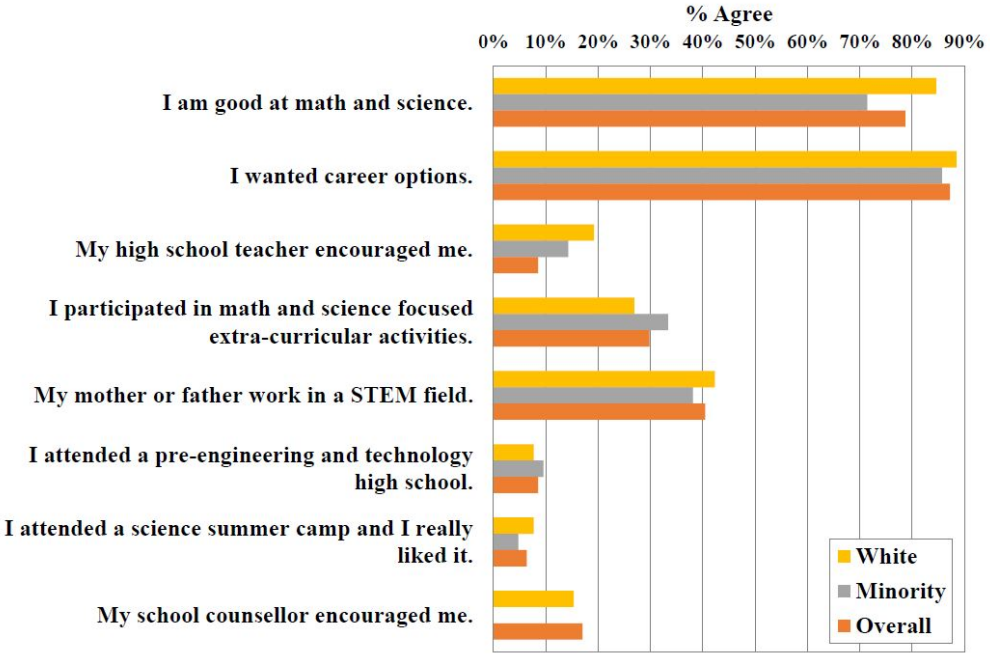


Figure 2: Factors in Female STEM Major Enrollment

Figure 3 presents the students' responses to a series of statements about what factors motivate their persistence in their STEM major. Like Edzie's study, the top two motivating factors overall were the student's personal drive and desire to pursue their STEM majors. The students in this study also reported the challenging nature of their STEM fields to be a motivation for persistence at a higher level than Edzie. Being motivated by a challenge does fit into the profile of a highly motivated and determined individual. Thus, these findings across demographics are in line with other research on female persistence in STEM majors[16]. Student motivations do reflect their cultural backgrounds with the minority students reporting a greater influence from family support in their motivation to persist versus the white students at this institution, or the mostly white student population in Edzie's study. The family support factor in student motivation for minority students is comparable in score (6.05, True of Me) to the top two motivation factors from Edzie's study: personal drive and desire to persist. The family support factor in this study for minority students was also higher than for white students, with statistical significance of p= 0.038 (one tailed t-test). The other responses did not have a statistically significant difference in response between the minority and white student groups. As the other factors were ranked in the same order of importance for the two groups excepting that family support was the third highest ranked motivating factor for the minority students versus the challenging nature of the major for the white students, the lack of statistically significance for the other response is not surprising. All of the students in this study indicated that they are least likely to find motivation to persist in their major from their friends (Figure 3). Nearly a third of the students indicated that this

statement was untrue of them to some degree (38% of the minority students and 23% of the white students as shown in Table 1). Having so many students disassociate with this statement is likely a result of American culture, where a student's friends may not understand why they want to pursue a male-dominated field.

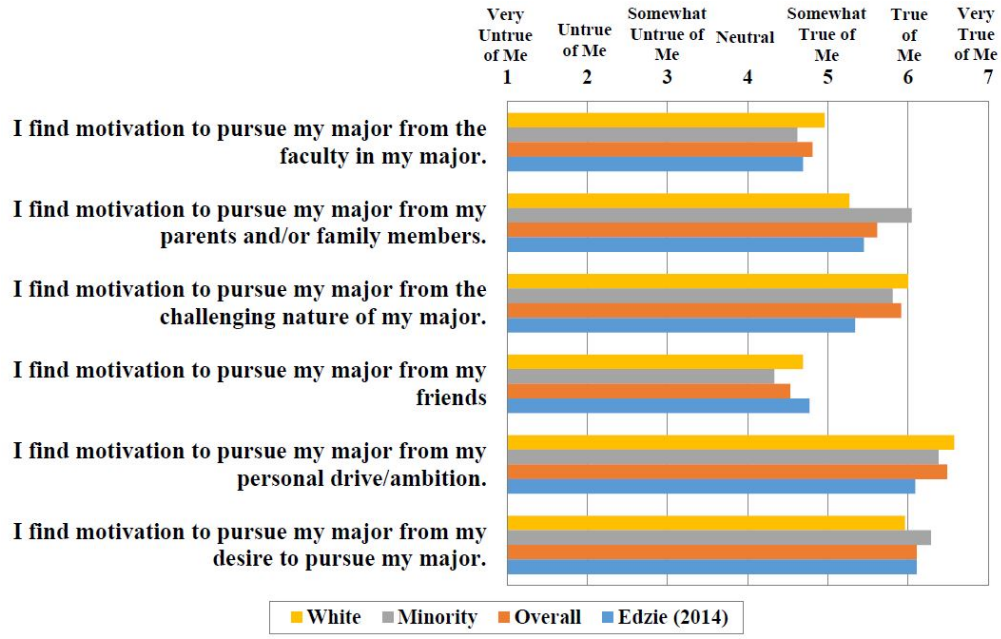


Figure 3: Sources of Motivation to Persist

Table 1: Motivational Factors Positive v. Negative Responses

| Factor/Ethnicity | # Below Neutral | % of Responses | # Above Neutral | % of Responses |
|---|---|---|---|---|
| I find motivation to pursue my major from the faculty in my major. | | | | |
| Minority | 5 | 24% | 12 | 57% |
| White | 5 | 19% | 19 | 73% |
| I find motivation to pursue my major from my parents and/or family members. | | | | |
| Minority | 1 | 5% | 18 | 86% |
| White | 4 | 15% | 21 | 81% |
| I find motivation to pursue my major from the challenging nature of my major. | | | | |
| Minority | 2 | 10% | 18 | 86% |
| White | 0 | 0% | 23 | 88% |
| I find motivation to pursue my major from my friends | | | | |
| Minority | 8 | 38% | 12 | 57% |
| White | 6 | 23% | 17 | 65% |
| I find motivation to pursue my major from my personal drive/ambition. | | | | |
| Minority | 1 | 5% | 20 | 95% |
| White | 0 | 0% | 26 | 100% |
| I find motivation to pursue my major from my desire to pursue my major. | | | | |
| Minority | 1 | 5% | 20 | 95% |
| White | 1 | 4% | 24 | 92% |

*Focus Groups*

Five focus group sessions were held during the eight-month period of this study. The number of participants at each session ranged from 2 to 9 women, for a total of 25 participants. Of the focus group participants (N=25), 56% identified themselves as white and the rest (44%) as a minority or multi-racial, including 36% Hispanic and 12% African American students (one student selected both Hispanic and African American).

The eight groups of focus questions from the guide are shown in figure 4 below:

| |
|---|
| 1. *Please tell us a little bit about your self- How would you define your personality? What do you enjoy doing most? How does Science, Technology, Engineering or Math fit in with that definition?* |
| 2. *How long have you been interested in STEM? Was there a particular experience that you can remember that sparked that interest as a child, middle and high school student, and now college? If yes, can you please explain?* |
| 3. *Describe yourself as a student. What was your original declared major? What is your major now? What are your best subjects? Why? What are your least favorite subjects? Why?* |
| 4. *How would you define the culture of the university/department/program? Please comment on the role of faculty in creating this culture. Has this culture influenced your decision to pursue and or persist in a STEM major? Any specific examples?* |
| 5. *Do you know other women at Texas State that were pursuing a STEM field of study but then changed majors before completing? Do you have any ideas of the kinds of issues that may have caused them to change?* |
| 6. *Over 50% of the students at Texas State are women, but only 20% of the students in STEM are women. Why do you think more women are not here?* |
| 7. *What are your career aspirations? Do you think there are barriers to women with careers in STEM? Why? Do you think this is changing? Why?* |
| 8. *What do you think of current programs on campus and across the country that aim to increase the number of women in STEM fields? What is the most important action that Texas State University can take to increase the number of women who graduate with STEM degrees? A) Are you in any mentorship programs* |

Figure 4: Focus questions in focus group guide

The first three questions of the focus group deal with personality, the academic self, and field of study influential memories. These are selected as the subgroup of questions that will be analyzed

and presented in this paper. The analysis that follows is an impressionistic analysis of session transcripts consistent with the purpose of enhancing and highlighting student feelings and ideas related to the concepts more thoroughly reviewed in the quantitative section.

Response Analysis to Question One: *How would you define your personality?*
One of the underlying motives for question one was to understand how women in this study described their personality and whether they made any connections between their personalities and their choice and interest in STEM fields of study. The following selected quotes from a longer transcript (using speaker pseudonyms) reveal some of the variety in personality descriptions:

**Anisa:** *I am independent and like to stand out. As a girl in engineering, I stand out / it's easier to stand out. I like to be better than the guys. I like to know (that) I'm better than guys. I'm a girl and the best, so I stand out.*

Anisa expresses a strong drive to be the best and attributes her gender as an identity element that let's her and others know she is the best.

**Ellie**: *I'm joking and sarcastic. I'm curious; I want to know how things work. I want to learn why things happen. I would be a professional student if I could and not be in debt the rest of my life. But can also be very lazy at times. Like, I could get A's if I applied myself more.*

Ellie identifies with the characteristic of curiosity and her love of learning as part of her personality and her interest in STEM.

**Carina:** *I'm basically… I'm very bubbly, and very outspoken in a way. I've been told I am resilient, and I didn't know what that was, so I had to look it up. I found a lot of meanings about it, one of them is actually like a, an example is pulling a spring and having it bounce back. I go oh, there goes engineering right there, that's science. Cool, I'm relating to both I guess.*

Carina shares her discovery of the word "resilience" and presents it now with pride as not only an identifying word about her but also an interesting science phenomena.

**Ana:** *I'm a people person. I really like making things run efficiently, for things to work effectively. I don't like things to be broken, and so I wanted to apply that to people and to companies and organizations.*

Ana discusses how she does not like things to be broken. She describes her personality as one that wants to improve things for people and larger organizations.

**Stacey:** *I'm very outgoing and I love meeting new people. I love art, I love building things out of nothing, I love math- I get a math test and I get excited!*

Stacey describes her outgoing personality and love for building out of nothing as a good match for STEM learning. She also shares her love for mathematics.

**Gabriela:** *I like everything neat and all in its place – code is neat and perfect and all in its place so that fits well with my personality.*

Gabriela likens her preference for order and neatness and a close link to her engineering field of study.

Overall analysis revealed that even those women who described themselves as introverts, revealed an inner independence and curiosity aligned to their particular personal skills (organization, problem solving, technology, etc.) and saw this as a good fit to their chosen field of study.

Response Analysis to Question Two: *Was there a particular experience that you can remember that sparked that interest as a child, middle and high school student, and now college?*

One of the underlying motives for question two was to explore if students credited particular experiences with motivating or sustaining their interest in a STEM field of study. The following quotes reveal some of these memories:

**Olivia:** *The first thing I wanted to be when I was younger was an astronaut. I'm from Galveston and they opened a new planetarium and my friends and I got to meet all these astronauts. I always really enjoyed my science classes. I don't feel like sociology or philosophy would spark my interest. It's like "hey here memorize Aristotle." I like hands on and doing things. Science does take memorization but it's more hands on."*

Olivia describes her visit to a new planetarium when she was a student as influential.

**Alicia:** *I have an older brother who was in a science fair and created an amusement park out of K'NEX and I thought it was so cool! The Ferris wheel moved. Also, I really loved Rollercoaster Tycoon. I spent hours designing. I knew I was an engineer right there. Playing that I knew that I was going to be an engineer.*

Alicia describes the influence of her brother's participation in a science fair as an early interest trigger.

**Sarah:** *We did a lot of residential work growing up. At first I only watched and then I was allowed to wield tools. My parents remodeled the home and I was finally allowed to wield tools. It was like, "Look, I can make something out of this!"*

Sarah credits her family's building construction business and access to early experiences with tools as empowering.

**Gabriela:** *When I was little…we had a Synertek, the 3rd Apple computer [and it was] always crashing – so I had to troubleshoot to fix it so could play the computer games (internet didn't work on it). Both my parents worked at Apple so I always had a computer…Dad would take apart a computer to show me the inside and teach me how to fix it. I was really young when I saw the inside of a computer – it looked like a little city!*

Gabriela describes her early exposure to computers, problem solving, and her father's involvement with as early influences to identify with STEM as well as her parents serving as role models.

**Ellie:** *"[STEM] sparked my interest at a young age. My high school was in a great school district. They offered AP Bio, Anatomy, regular Bio, Chem. It confirmed that this is something that I wanted to be doing."*

Ellie discusses her experiences in a STEM-focused high school as confirming of her field of study choice.

**Joslyn:** *My Mom was a biology teacher – so my whole life was a science lesson! Like when I was 7years old – I learned about genetics from my mom because my older sister said I was adopted.*

Joslyn notes that her mother, a science teacher, serves as a role model and learning support at home.

Analysis revealed that the majority of these students readily point to early experiences of hands-on learning with building kits or with real technologies such as computers. They reveal great joy when, for example, they describe their use of real building tools and how this transformed how they see and think of themselves. Many also identified an early STEM-career role model such as a family member or community hero. Some students also point to strong academic programs in their schools that welcomed girls and helped them become familiar with advanced science, technology, pre-engineering and/or mathematics courses.

Response Analysis to Question Three: *Describe yourself as a student.*
Question three probed students academic identity and discussion of the challenges and successes of their academic pursuits. The following comments are self-explanatory and are not individually analyzed. Students discussed some of their insecurities as women in a male dominated environment, the perception that men would or should know more than women in STEM classes. Some suggested that large classes and the inattention of their lecturer or the intimidation of such an environment were not conducive to their academic success. Some suggested that smaller class size helps to engage students and relieves feelings of feeling lost or insignificant. Finally, several discussed the importance and need for supplemental academic support or dedicated learning peers and caring professors. The following quotes present some of these student insights.

**Ellie:** *I took three math classes and dropped one. It was college algebra and a huge freshman lecture class. You could tell the lecturer was an older lecturer. I enjoyed my statistics class, as it was smaller. I feel like it would be good if supplemental instruction went along with math classes. I know people who have classes where all they do is take tests but I thinking having to practice is good. Forced practice is good.*

**Alicia:** *So far, classes are challenging. I don't struggle but I have to work hard to understand. Like I just learned the universal [coefficient] theorem and how it connects to my research project. Once I understand and can apply it, then I get it. I work twice as hard [as others] to understand, but once I get it then I really see the connection and it's much easier for me. I have to see how it's applied in a conceptual way for me to get it.*

**Carina**: *Honestly, I'm a little lazy, to be honest, especially when it doesn't really interest me. If it's something I have to do and I know I'm not going to like it. I guess I come to the point where, if it's too much material to where is overwhelming just to learn one simple thing, its just too much, and I get lazy about it and I don't even want to pursue reading it.*

**Jasmine:** *I prefer to work by myself, but I've noticed that the girls have started to gravitate to working together on group projects, but a lot of the guys are always asking for help whereas the girls try to figure it out on your own.*

***Gabriela:*** *When you're one of like three girls, I feel like I have to be smarter because you are being looked down upon and judged.*

**Joslyn:** *I was weeded out of Aerospace engineering at (other University name) because I wasn't getting the grades I got in high school. I got a 74 on my 1st test and so I fled. I didn't know about curves or that your grade on first test may not be your final grade. I didn't know to go talk to my teacher-or about rounding*!

**Christine:** *I'm independent and faster than the guys – they would ask me for help sometimes, but I would be surprised because I thought they were supposed to be better than me.*

This brief analysis of the three select focus questions reveal some of the elements in the study's young adult participants' identity development. According to Erikson's life-span stage theory, identity development is the main developmental task in late adolescence[19]. Understanding how women see themselves now and what factors they credit as influencing their identity formation add to the collective understanding.

**Conclusions and Next Steps**

This study contributes to the field by revealing a more in-depth account of what experiences women credit for influencing their self-efficacy, the development of their career interest goals and their academic course outcomes as related to studying science, technology, engineering and mathematics (STEM). This study contributes a substantial Latina point of view (with over 45% of participants identifying as minority or mult-racial students). Quantitative analysis of survey data revealed that the factors of "career options" and "family support" emerged as significant influences to persistence in STEM majors for the minority-rich student population in this study. The importance of family support is seen as a reflection of culture for the minority students in the study. Family support and attitudes regarding these female student persisting in STEM fields was frequently discussed in the focus groups and this concept will be explored in future analysis. The strong preference for career options as the primary factor in deciding to enroll in a STEM

major could be a result of the large number (41%) of respondents who self-identified as being either from socio-economic lower or lower-middle class backgrounds. These students could view the famously higher wages of STEM careers as a pathway to socio-economic mobility. To explore this perspective, future work will also examine students' responses broken down by socio-economic background data. Finally, the qualitative analysis of the focus group content begins to reveal the rich tapestry of experiences, influences, and values that women bring with them to their undergraduate academic journeys. In a subsequent publication, more of this content will be analyzed and compared to the quantitative findings.

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