

UNDERSTANDING UNDERGRADUATE STUDENT VETERAN ENGINEERS'
CONCEPTUALIZATIONS OF SUCCESS

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ABSTRACT

Scheidt, Matthew Ph.D., Purdue University, December 2020. Understanding Undergraduate Student Veteran Engineers' Conceptualizations of Success. Major Professor: Allison Godwin.

Common measures of undergraduate engineering student success are primarily used to judge “traditional” undergraduate performance in school and may not be appropriate to gauge understanding or capabilities of non-traditional students, such as Student Veteran Engineers (SVEs), who may have additional familial and financial responsibilities that cause them to focus less on school than a traditional student. One path toward supporting undergraduate SVEs is by both understanding how they are different than other engineering students, and by understanding how they conceptualize success. Continued research in this area is needed and can lead to a positive impact on SVEs and benefit the engineering workforce.

This research builds on prior qualitative work that investigates the experiences of SVEs, including their military experiences and college experiences in engineering, as well as what shaped their decisions to be engineers. This convergent mixed method study gathered qualitative narrative interviews of five SVEs and analyze a large national survey of 2,339 engineering students (49 of which were SVEs). The results of these two data streams co-inform SVEs success in engineering.

The stories of five SVEs were constructed through narrative analysis and highlighted how they conceptualized success, their experiences in engineering, and links between these stories. Success for SVEs was on a continuum from surviving engineering to a deep understanding of material. Within this range, some SVEs conceptualized success as accomplishing a small goal or large goals. Others also noted having the tools needed to accomplish a goal as a measure of success. It is important to con-

sider these different conceptualizations of success from the SVEs, because while they may be in line with traditional measures of success (e.g., good grades and retention), they can be much more nuanced. Therefore, these results begin to highlight student conceptualizations of success, but more specifically from the Veteran engineering perspective.

In addition to the stories, a multivariate analysis of variance was used in conjunction with post-hoc testing to identify differences in SVEs and non-military peers on 28 non-cognitive and affective (NCA) factors. Taken together, these differences in NCA factors suggested that SVEs may be better prepared to succeed as engineers than their non-military peers. Perhaps unsurprisingly, SVEs had higher conscientiousness or a better ability to control, regulate, and direct their impulses. SVEs may be more likely follow instructions, strive for timely completion of assignments, and plan long-range goals. Consistent with this finding, SVEs had higher motivation measured by Future Time Perspective: Perceptions of Future than their peers. This dimension indicates that SVEs are more confident in their engineering major and plan to pursue an engineering career in the future. The SVEs in this sample also had high meaning and purpose in life, potentially improving their overall psychological well-being and potentially helping them to attain goals. Additionally, they had less test anxiety and lower reactions to stress, helping them to deal with engineering's testing and stress culture. The quantitative findings indicate that SVEs have particular assets in engineering that may make them particularly successful. By understanding these assets and linking them to SVEs conceptualizations of success, broader measures can be used to define what it means to be successful in engineering.

Overall, this work highlights that SVEs can be different from their non-military peers in ways that set them up for particular kinds of success in engineering. Recognizing these differences can provide ways to support SVEs' pathways through engineering and acknowledge multiple ways that SVEs can be successful. In general, SVEs may be better suited to handle the stress associated with engineering. Another implication of this work is that it highlights the complexities associated with the SVE experience,

both inside and outside of school. Their stories illustrated potential disconnects from more traditional students due to age and experiences. Additionally, SVEs may not find value in small assignments that do not directly help them to attain their goals. Understanding that SVEs may need to better understand the big picture or overall *mission* and be able to relate each portion of a course to accomplishing that mission, may improve their experience and performance.

1. INTRODUCTION

1.1 The Importance of Studying Veterans in Engineering

Undergraduate engineering education has historically been designed around the traditional student. This traditional student graduates from secondary education and directly enters the university with little to no college or work experience. Because the majority of students fit this mold, undergraduate engineering education has adopted a one-size-fits all approach to both educating and measuring the success of these majority students.

[S]tudents enter with a wide range of goals and expectations, making assessment (and particularly benchmarking) of their outcomes complicated. For example, if success is based on the outcomes of all entrants, performance will be depressed unless success is very broadly defined. By the same token, measuring success only for a select group (e.g., those who indicate degree intentions or achieve credit thresholds) may produce a falsely positive appearance of success while also encouraging access to diminish (Goldrick-Rab, 2010, p. 438).

The above quote represents just some of the complexity associated with determining college student success, in general, but especially for a population that is often understudied and underserved in higher education—student Veteran engineers (SVEs). SVEs are a unique group that bring many assets and face particular challenges in engineering and higher education. By understanding how student Veterans conceptualize success, engineering education metrics can be developed separately from those used for traditional students. I use the word “Veteran” throughout this document to mean both those who have served in the military and those currently serving in the military, including Active Duty personnel, drilling Reservists, and those in the National Guard. This classification of Veterans is consistent within the taxonomy

developed by Daly & Garrity (2017) as well as the term “student Veteran” preferred by Vacchi & Berger (2014).

There are many different interpretations of success within and surrounding higher education. Generally, those interpretations are determined by those that are assessing students (e.g., researchers, administrators, etc.). These interpretations of success may not necessarily reflect what the students may believe to be a determinant of success. There are many measures of student success which include grade point average (GPA Deture, 2010), course completion (Leinbach & Jenkins, 2008), credit hour completion (Achieving the Dream Cross-State Data Working Group, 2012), retention (Baldwin et al., 2011; Campbell et al., 2017), job placement (Lafreniere et al., 2016), and earnings after graduation (Campbell et al., 2017). These measures of success are relatively easy to collect and track longitudinally. These determinants of student success are not inappropriate. Indeed, I have used GPA as a measure of success in engineering (Scheidt, Godwin, et al., 2018), but I also acknowledge the limitations of this single measure of success. These widely used measures of success may miss some of the other non-cognitive and affective (NCA) factors that influence students’ experiences in engineering education. Non-cognitive factors are best defined in contrast to cognitive factors, with the cognitive referring more toward abilities and achievements and the non-cognitive referring more towards “patterns of thought, feelings,... behavior, ... motivation, values, interests, and attitudes” (Borghans et al., 2008, p. 974). This dissertation focuses on understanding SVE’s conceptualizations of success and how SVE’s may have different NCA factors that indicate success in engineering education.

Although GPA, course completion, etc. are used as metrics for success, they may not be fully representative of student success, especially for students who transfer schools. For instance, within the military population, it is common to transfer duty stations, moving from one location to another, possibly overseas. Military students who are enrolled in college and forced to transfer duty stations, may leave the university. Their leaving does not necessarily mean that the student or the university

was unsuccessful at retention or graduation. However, that student may be considered a dropout, and deemed unsuccessful through a retention and graduation metric. GPA can also be problematic as a measure of success for non-traditional students, a term which is used to describe many student Veterans (Main et al., 2016; Wise, 2011; Soldan et al., 2013; S. L. Young, 2017). GPA is primarily used to judge “traditional” undergraduate performance in school and may not be appropriate to gauge understanding or capabilities of non-traditional students who may have additional familial and financial responsibilities that cause them to focus less on school than a traditional student (Durdella & Kim, 2012). Again, with GPA as a metric of success, these non-traditional SVEs can be deemed under-performers, many times, without acknowledging that they are performing more than one task outside of a traditional academic context. Therefore, understanding student success through a more nuanced approach can provide insights that are not available through traditional success metrics, potentially benefiting all students.

SVEs are often not a focus of educational research (Phillips & Lincoln, 2017). After a combination of the unpopularity of the Vietnam War and the subsequent peace that lasted afterwards, research on Veterans waned from an earlier interest in the 1950s (Vacchi & Berger, 2014). Not only has research waned, Vacchi and Berger describe current Veterans as being different than any of their predecessors.

[C]ontemporary student Veterans come from a professional all-volunteer standing military, seasoned by the highest-quality training, equipment, standards, and expectations, and most Veterans have deployed for modern combat duty around the world. (p. 106).

This quote leads my discussion of why it is important to study Veterans within the engineering education context, and more explicitly, why it is important to support student Veterans in engineering. Veterans have unique experiences that they bring with them from their military experience. These experiences can be beneficial to both society broadly as well as the field of engineering. Below, I focus on three different and supporting experiences that student Veterans can bring to engineering:

technical experience, communication, and leadership, which are highly valued in the engineering education community (ABET, 2016), and are featured in much of the literature on undergraduate Veterans.

1.1.1 Technical Experience

Veterans arrive on campuses with work experience, and often that experience comes with specialized technical knowledge (Griffin & Gilbert, 2015; Jovanovic & Dean, 2016; Military Leadership Diversity Commission, 2009; Murillo, 2017; Soldan et al., 2011, 2013). Indeed, there are existing university initiatives to help grant military members college credit for their technical expertise (J. C. Ford & Ford, 2018). For example, Soldan et al. 2011; 2013 developed a program that would allow a student Veteran to earn over 10% of required electrical engineering credits. In another example, training received in the military and documented on their military transcripts (called Joint Service Transcripts) transferred for engineering credit at other universities (Brawner et al., 2015). There are even engineering degree programs specifically targeted at student Veterans with technical knowledge (Jovanovic & Dean, 2016). These degree programs recruit Veterans with specific experiences to leverage that technical expertise along with a university education to transition into a job outside of the military. Recognition and respect of the technical knowledge that student Veterans bring begins to highlight their value to engineering.

Other researchers are seeking to learn more about how a Veteran's technical knowledge is translated into engineering education (Lord et al., 2016). Interviews with engineering student Veterans present their technical training as being more specific and less general than their college engineering curriculum (Brawner et al., 2017). The interviews also highlight the difference in pedagogy between military training and collegiate experiences (e.g., the military trains to a specific skill-set, while higher education provides general knowledge), as well as policy recommendations from the student Veterans (such as having Veterans meet during orientation). These inter-

views, where Veteran stories can be heard and be used within engineering education to develop engineering education, are highly valuable.

1.1.2 Communication

Another asset that Veterans bring is communication skills (Main et al., 2016; Olsen et al., 2014). Communication is an essential part of engineering. Engineers are not only individuals that apply technical concepts and knowledge, they must be able to communicate their ideas and solutions to other engineers, customers, and the public (Trevelyan, 2007). Although communications are taught throughout engineering undergraduate programs, much of what is taught is the technical application of engineering. Attracting and retaining students who have communication skills is an essential step in developing the next generation of engineers (National Academy of Engineering, 2005), whether they go on to industry or they stay in academia. The reason communication is valued is because many engineers spend most of their time communicating, with estimates ranging from 40-66% to as high as 75% (Tenopir & King, 2004). Additionally, in a study of engineers with between 3 and 35 years of experience, Trevelyan (2007) found:

Coordinating people, and gaining their willing cooperation, is the most prominent aspect of engineering practice for many (but not all) engineers, and that this relies on technical knowledge and expertise as much as interpersonal communication skills (p. 196).

This finding of where and how engineers spend their time emphasizes the importance of both technical expertise and communication skills. Both of these skills are also essential to leadership, something that those in the military value and are explicitly trained to do.

1.1.3 Leadership

Veterans often have leadership experience (Brawner et al., 2017; Dunn & Mulvenon, 2009; Jones, 2017; Jovanovic & Dean, 2016; Main et al., 2016; Olsen et al., 2014). As I describe below in more detail, the hierarchical structure of the military lends itself to having many people in leadership positions. Those in junior positions are mentored by those in senior leadership positions. With advancement and turnover in their first few years in the military, many find themselves in leadership positions or in charge of programs. Through these positions, they learn the skills of coordinating people and resources to accomplish a task. In addition to formal leadership roles, Veterans have also learned teamwork (Jones, 2017). Many in the military learn to work with others and leverage each others' skills to accomplish tasks. Although the military is hierarchical, my experience (discussed below) has been that the leadership style that is most prominent during real-world situations is team leadership, where the whole team works together to achieve a goal (Northouse, 2016). To further justify how military leadership skills are valued, similar to engineering credit for technical expertise, college credit is also considered for student Veterans for "professional and leadership development courses" (Soldan et al., 2013, p. 1). These leadership and teamwork experiences are highly valued in both engineering and engineering education (Main et al., 2019).

1.2 Researcher Positionality

The technical, communication, and leadership skills I discussed above are part of my story as well. As I write this dissertation, I am both a U.S. Navy Veteran and a U.S. Navy Reserve Officer. I enlisted in 2002, shortly after the start of the Global War on Terror, a war that still continues 18 years later. I enlisted to serve my country, but also for both a college education and work experience. As part of the Navy's nuclear power program, I began as a student, and stayed on as an instructor of nuclear power plant theory, operations, and maintenance. While completing my instructor tour,

I concurrently earned a B.S. in Human Resource Management through attending courses during my off duty hours. After my tour as a staff instructor, I attended Purdue University through the Navy's Seaman-to-Admiral commissioning program. At Purdue I earned a B.S. in Mechanical Engineering. This degree, along with my previous experience, prepared me to be a Submarine Officer.

While stationed on the boat (submarine), I worked through an engineered refueling overhaul, where a new nuclear reactor and systems were installed and tested. During that time, I led the electrical division, a group of Sailors in charge of operating and maintaining electrical systems throughout the boat. I also led the chemistry and radiological controls division, focused on maintaining reactor and steam plant chemistry as well as ensuring radiation exposure is minimized and documented. Each one of those positions taught me more about submarine operations as well as many engineering principles and system interactions. Additionally, this experience gave me an opportunity to develop leadership and communications skills.

Following my tour on the submarine, I worked for the submarine base where I led a group of stakeholders from submarines, base personnel, and local, state, and national first responders to develop procedures for combating a fire on board an in port submarine. Leading this team helped me to appreciate different points of view and different priorities, as well as how to learn to navigate a space where everyone's concerns are heard, and everyone has to negotiate priorities.

About six years ago, I transitioned from Active Duty to the Reserves. As a reservist, I lead multiple lives. I am a Ph.D. student and a research assistant every day. On average, I "drill" two days a month, and two weeks a year, I lead a team of two additional officers and seven enlisted personnel. During the month between drills, I am intermittently tasked with Navy Reserve duties. Additionally, during my drilling periods, I continue my role as a student and research assistant. It is from this position, one of researcher, reservist, and Veteran, that I approach research with Veterans in engineering.

I position myself within this research not to absolve me of research responsibility, nor do I include this position statement to claim dominance over the subject or my research subjects (Britzman, 1995). I include this statement to acknowledge my subjectivity, to begin to reflect “on how does who I am, who I have been, who I think I am, and how I feel affect data collection and analysis” (Pillow, 2003, p. 176). My research leads me to find some of the valuable assets I have gained from my military experience within others; to seek out the experiences of others that may be similar and different than mine; to take in anecdotes and informally shared stories; and to deeply study student Veteran’s success in engineering.

1.3 Purpose of Study

How SVEs conceptualize success is not well known. Understanding SVEs’ conceptualizations of success is important because they are a unique subset of the college population. U.S. military Veterans are attending colleges and universities at an increasing rate (Cate, 2014). Although U.S. military Veterans and student Veterans comprise a small portion of the college going population, the experiences Veterans bring to the classroom and the workplace are valuable assets to engineering. Many of them have technical experience and leadership and communication skills that they gather from their military experiences, as described above. Therefore, many military Veterans have great potential to succeed in engineering programs. However, SVEs are unlike many of their traditional student counterparts. SVEs are generally older adults who have different responsibilities such as families and other military service-related commitments (Brawner et al., 2016). For example, these added responsibilities can further complicate an already taxing engineering curriculum with extra time commitments keeping students off campus, apart from their peers, or even out of state. This example is just one potential complication that SVEs face within engineering programs designed for traditional students. Conversely, SVEs are also often more mature and able to self-regulate their own learning (Williston & Roemer, 2017). These

assets can support their engineering pathways, but may also be in conflict with engineering curricula focused on traditional engineering students. For these reasons, it is valuable to understand what drives student Veteran engineers to succeed in their engineering programs and to understand how to connect them to support systems within their engineering programs. Additionally, this information can be used by practitioners and administrators to make engineering education more supportive for SVEs.

Additionally, non-cognitive profiles of SVEs have not been explored. These profiles can provide unique insights into engineering student success by allowing for a deeper understanding of a myriad of factors that are related to holistic student success by not only improving metrics such as GPA and retention, but also well-being such as mindfulness and gratitude. Predicting SVEs' success, along with their traditional student peers' success, is a challenging and complex endeavor. My recent work has shown that non-cognitive and affective (NCA) factors (e.g., motivation, engineering identity, perceptions of faculty support, etc.) are better predictors of engineering student success than traditional cognitive measures (e.g., SAT/ACT scores; Scheidt, Senkpeil, et al., 2018). I have also shown that these non-cognitive factors can be used to identify clusters of students who fit into non-cognitive profiles (Scheidt et al., 0). Work in non-cognitive profiles of engineering students is new, and there little known about how SVEs may fit into these emerging models. Some engineering students group into common non-cognitive profiles (clusters), and others do not. For the SVEs that do not group within the common clusters of other students, it is valuable to understand what their specific non-cognitive profiles are, and how this data can be used to develop support strategies for SVEs. For the SVEs that do group within common clusters, it is useful to understand how they may be both like their traditional student peers attitudinally and still face different experiences in engineering as SVEs. Like the conceptualizations of success discussed above, these non-cognitive profiles will provide insight into SVE success, but through a completely different metric. This research is novel and will address these gaps in the literature by linking the

information learned from SVE conceptualizations of success with their non-cognitive profiles and use that information to inform our understanding of SVEs' experiences to provide evidence for future support initiatives.

1.4 Research Questions

To examine SVEs' attitudes and experiences in engineering, I conducted a parallel convergent mixed methods study (Creswell, 2012) combining qualitative and quantitative data streams as shown in Figure 1.1 to answer the following research questions:

RQ1: How do the narratives of undergraduate Veteran engineers incorporate their conceptualization of success in their engineering programs?

RQ2: What differences, if any, exist in SVEs' non-cognitive factors from non-SVEs'?

RQ3: How do the narratives of SVEs' military and engineering experiences describe the presence or development of NCA factors that uniquely position them for success in engineering?

I hypothesize that SVEs do not measure their success based only on their GPA, but also see value in the level of understanding and skills that they obtain, because they begin engineering programs with experiences beyond those of traditional college students which may shape their conceptualizations of success. To explore these conceptualizations of success (RQ1), I used narrative analysis. This methodology allows these conceptualizations to be grounded within the experience of the SVE and allow for the audience to experience the rich stories of the SVEs.

The qualitative data stream stems from a series of multiple semi-structured interviews of five SVEs, from three different institutions: a state polytechnic, a land-grant institution, and a public research university. These students were recruited from the SUCCESS survey (Studying Underlying Characteristics of Computing and Engineering Student Success), in cooperation with the partner sites. This national survey asks hundreds of questions measuring NCA factors, such as belonging, motivation, identity,

and personality. The SUCCESS survey also captures demographics such as Veteran status, gender, parent education level, and race/ethnicity. The survey encompasses responses from students enrolled in 17 U.S. institutions ($n = 2672$). From this survey, 49 students identified within the Veteran population, including active duty, reserve, and retired. The survey results were used as a recruiting tool for interviews.

The first interview focused on building rapport between participants and myself and covered topics such as: why SVEs joined the military, why they decided to transition out of the military (if they are not still affiliated), and why they decided to enroll in engineering. The second interview was preceded with a journey mapping exercise (Nyquist et al., 1999; Meyer & Marx, 2014) asking students to draw a picture depicting their experiences within their engineering programs. The accompanying interview explored topics such as a time that they felt successful in the military, a time that they felt successful since leaving the military, what do they think it means to be successful in their engineering program, what do their non-military peers think it means to be successful in their engineering programs, what support systems are in place within their communities, and if they have engaged with any of them. A third interview was used for member checking once the narratives from the participants were constructed. Member checking provides the participant an opportunity to clarify, add or remove content, and is important in narrative analysis to ensure that the participant is being accurately (by their standards) represented. Overall, research question one helps to answer the call to better understand success for undergraduate Veteran's qualitatively (Molina & Morse, 2015). More details are provided in Chapter 3.

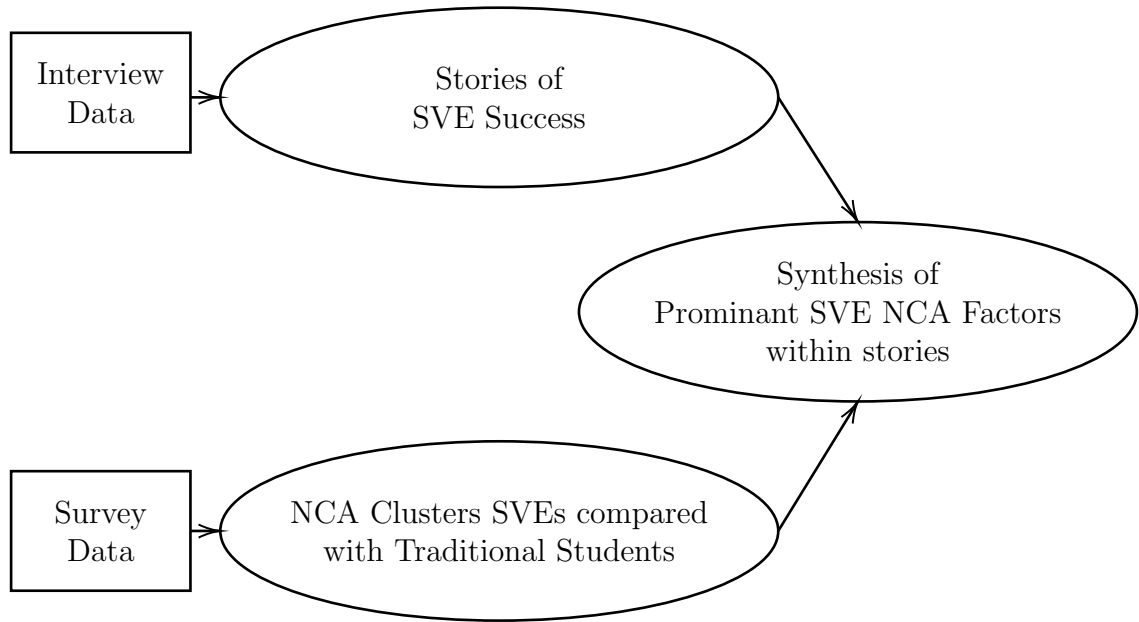


Figure 1.1. Parallel convergent mixed methods design with survey and interview data sources.

To answer RQ2, the quantitative data stream involves survey data of students' non-cognitive and affective (NCA) factors. I hypothesize that SVEs will have several different NCA factors that are different than their non-military peers. The SUCCESS survey (Berger, Godwin, Chen, et al., 2018) was developed to measure underlying factors that may influence engineering and computing student success including personality, belongingness, identity, motivation, mindset, and perceptions of faculty caring, and others that will be discussed in further detail in Chapters 6. The quantitative portion of this study answers the following research question:

Mixed methods does not involve simply the collection of different types of qualitative and quantitative data streams, but rather the connection between these types of data provides a richer picture of the phenomena of interest (R. B. Johnson & Onwuegbuzie, 2004). In this dissertation, the results from quantitative and qualitative data streams are synthesized to answer RQ3 and to better inform potential support initiatives. From the answers to these questions, I examined the specific student

profiles of interview participants and triangulated the information from their interviews to better understand the NCA factor differences. Each of the profiles present non-cognitive factor scores that are above/at/below the sample mean for each factor. Using the factors as themes, I coded the interviews to find where those themes are present within the data. Linking the profiles to the stories allows for us to better identify potential interventions to support SVE success.

Together, these questions with the many facets of experience and NCA factors, allow for crystallization (Ellingson, 2009) of SVE success. The profiles allow for understanding of SVE latent attitudes and beliefs. The profiles allow for the identification of strategies to enable student Veterans to succeed in their programs. Understanding how SVEs conceptualize success will better target those strategies to enable SVEs to meet their goals.

1.5 Background

Before describing the current literature on Veterans in post-secondary education, I will situate the Veteran population within the U.S. population at large and within post-secondary education. Living U.S. military Veterans make up about 6% of the United States population (United States Census Bureau, 2014; United States Department of Veteran Affairs, 2016), with these numbers including Veterans from World War II through the recent conflicts in Iraq and Afghanistan. Approximately 4% of undergraduates and 4% of graduate students are Veterans (Radford, 2011). Although the U.S. military is drawn from the national population, they are not demographically representative of either the U.S. population or the engineering population.

Radford (2011) provided descriptive statistics showing comparisons among different demographics. Undergraduate age and race/ethnicity demographics are quite similar to non-military students, with Veterans being generally older than non-military undergraduates. A larger divide occurs between Veteran graduate students and non-military graduate students, with Veteran graduate students being more racially di-

verse than of the U.S. population as a whole (Aud et al., 2010). Most notably, military Veteran graduate students identified as Black (20%) and Hispanic (12%) at much higher rates than non-military graduate students (Black: 11% and Hispanic: 8%). Radford did not offer any explanations for why the enrollment percentages of racial minorities in graduate school is higher for traditionally underrepresented minorities.

U.S. military Veterans are predominantly male (over 90% United States Department of Veteran Affairs, 2016). Although the military is over 90% male, only about 73% of Veteran undergraduates are male (Radford, 2011). The female population of Veterans is low compared to the 57% majority female enrollment in undergraduate education in general (National Center for Education Statistics, 2015), but female Veterans are entering college at a higher rates than males.

Another demographic that separates Veterans from non-military is that Veterans are more likely to be financially independent from their parents/guardians, with 97% of Veterans being financially independent (Radford, 2011). Compared to independent non-military undergraduates, Veterans are nearly twice as likely to choose engineering, engineering technology, or computer and information sciences (Radford, 2011), with 10.7% of Veterans choosing STEM related majors (Cate et al., 2017). Additionally, Veterans have a unique access to financial aid. Since World War II, military Veterans have had access to educational benefits. Financial aid for Veterans started with the WWII G.I. Bill, moved into the Montgomery G.I. Bill, and has since expanded with the Post 9/11 G.I. Bill (Crawford & Burke, 2016; Vacchi & Berger, 2014; O'Herrin, 2011). The Post 9/11 G.I. Bill increased benefits from the Montgomery G.I. Bill, and coupled with institutional support of Veterans through yellow ribbon programs, makes higher education available to Veterans like never before (Crawford & Burke, 2016; Vacchi & Berger, 2014). This funding has since been extended to military Reservists and the National Guard and may be used by family members.

Military service can be both voluntary and obligatory, depending upon both geopolitical situations and citizenship. Students from outside of the U.S. with mili-

tary service may attend university at U.S. institutions. This service could contribute to their experiences within their educational pathways. Understanding the experiences of those with military service, including obligatory military service can provide additional insights to SVE success beyond what can be learned from U.S. military service members alone. In the United States, men between 18 and 25 years old are required to register to be drafted, although military service within the U.S. has been voluntary since 1973 (United States Government, 2020).

Several countries require military service (e.g., Angola, Iran, Israel, North and South Korea, Singapore, etc.), and these policies are administered in a variety of ways, with service requirements of typically two years (Central Intelligence Agency, 2020). In most countries with obligatory service, men are the only citizens required to complete military service. Additionally, some countries allow for different civil service obligations in place of military service. In European countries, mandatory service is found to generally reduce the lifetime earnings and the educational attainment of those conscripted (Wagener et al., 2009), although for those who do not pursue college education, those who serve have higher wages than those who do not (Card & Cardoso, 2011). In all, understanding how obligatory service can affect the college experience and shape success is important because many of those who complete service, do so before they attend college.

Some Veterans have some form of visible or non-visible disability, such as hearing loss (S. L. Young, 2017) or Post-Traumatic Stress Disorder (PTSD; Elliott & Gonzalez, 2016; Jones, 2017; Jovanovic & Dean, 2016). “[G]reater than 17% of returning Veterans may experience mental and physical health disorders, which can negatively affect school performance” (Norman et al., 2015, p. 701). PTSD makes it more challenging for these Veterans to integrate into the academic learning environment (Jovanovic & Dean, 2016). Indeed, PTSD has “been linked to greater alienation on campus, physical fighting, problem drinking, suicide attempts, and lower GPAs in student Veterans” (S. L. Young, 2017, p. 3), although resilience has been shown to help PTSD symptoms in a study of South Korean Marines (H. Kim et al., 2017).

While other students with disabilities have had the opportunity to learn to navigate support systems within an academic institution, and to get help when needed, some of the student Veterans are new to the institutional support, or may not even seek support.

Not only do some student Veterans have challenges working with university resources, some Veterans have challenging demands beyond those of a traditional student. In this work, I use the term Veteran to encompass those who have served in the military and those that continue to serve in the military. Another part of day-to-day life of some students who are on Active Duty, who are Reservists, or are part of the National Guard, is the additional requirements associated with their continuing service. This role could involve a spectrum of assignments from drilling to deployment. Deployment is where students are generally sent around the world, and at times are unable to continue their education for months or years at a time. Drilling is generally considered reporting to “drill” one weekend a month and two weeks a year, and is typical for Reservists and those in the National Guard. Drill occurs many times throughout an academic year and takes students away from the technology and communication avenues that they use otherwise. Drill can be both mentally and physically challenging, and can force students to have to negotiate around their school requirements (Williams-Klotz & Gansemer-Topf, 2017). Deployments can force students to transition from an academic setting, to a military setting, and then potentially back to the academic setting. Deployments can also be unplanned and unanticipated.

The above background information on Veterans is useful to understanding student Veteran demographics. Understanding the demographics begins to set the stage to describe:

- The unique experiences of Veterans
- The similarities between Veterans’ experiences and other, better-studied populations in engineering
- The importance of studying Veterans in engineering

These three subjects situate Veterans, and more specifically student Veterans within the larger population, and start to build the case for a need to explore the unique experiences of student Veterans in engineering and how they are similar to and different than their non-military peers.

1.6 Veteran Experiences Can Be Unique

Veterans often come to campus with the cultural values from their military lives. Their motives and goals are shaped by their mission-driven military experiences. The university environment is markedly different than the military environment in structure, hierarchy, process, and purpose. The day-to-day life of a student is fundamentally different from the life of a service member. The mismatch between the student Veteran value structure and the university environment can result in strain. This strain results from the student Veteran using the lens of military values to evaluate the academic learning and social environment. The greater the disconnect is between the personal goals and values of the Veteran and the environment, the higher degree of stress the Veteran will experience (S. L. Young, 2017, p. 2).

For me, the above quote represents a significant part of what it means to me to be a Veteran and a student in higher education. This quote also begins to hint at what types of experiences student Veterans may bring with them the university, classroom, and industry. I will break down this quote into three main ideas: military culture, hierarchy, and value structures.

1.6.1 Culture

Military culture is country and service specific (Soeters et al., 2006). For the purpose of this document, I lean on Hofstede's (1980) definition of culture as being a "collective programming of the mind" (p. 13) and an "interactive aggregate of common characteristics that influence a human group's response to its environment" (p. 21). Although my experiences lie within the Navy, I will attempt to address military culture as a whole.

Military culture is recognized by faculty as being something that sets Veterans apart from their college peers (Cook, 2017). Indeed, faculty are even encouraged to undergo training in Veteran experiences and military culture in order to be supportive of Veterans at their institutions (Elliott & Gonzalez, 2016). The institutions that have such programs along with other Veteran support structures are called “Veteran-friendly schools.”

The term “Veteran-friendly school” . . . is a general term used to describe those schools which have an awareness and sensitivity to military culture, which immediately establishes a common base of knowledge between the student/Veteran and the institution (Falkey, 2016, p. 28).

These cultural differences acknowledged by institutions are described in more detail below.

One of the more obvious components to military culture is the idea of combat readiness (Collins, 1998). Combat readiness connects to the idea of the warrior representing the Soldier, and “cherishes virtues such as self-sacrifice, self-denial, and physical courage that are increasingly alien to the larger culture” (Bacevich, 1997, p. 22). This warrior framing engenders masculinity, or even hypermasculinity (Chen et al., 2017; Novoselich et al., 2017), which adds to another complication associated with culture—gender.

Gender within the military is complicated, as many social norms are challenged throughout military life. Gender and its associated norms are socially constructed (Kessler & McKenna, 1978; Lorber, 1994). When female Veterans transition from military to civilian life, they can struggle to navigate the femininity associated with civilian gender expectations (Eichler, 2017). Additionally, gender roles among family units are challenged as Soldiers, Sailors, Marines, Airmen, or Coast Guardsmen transition from deployments (Eichler, 2017), where a returning Veteran comes home to a family they left behind and attempts to re-integrate into what may have come to resemble a single-parent household. Further complicating gender as part of military culture is how male Veterans associate mental trauma with emasculation, feeling

that admitting they are dealing with depression, PTSD, or other mental health issues weakens them in front of their loved ones and peers. Also related to the warrior attitude is a military culture that discourages asking for help (Jovanovic & Dean, 2016), so that members are not considered “a burden to their comrades and unit” (Jones, 2013, p. 109). Gender norms are just one of the cultural differences that separate the military from other groups.

Coll et al. (2009) provided many examples of the dissonance between military culture and academic culture. Veterans bring with them cultural values that are ingrained from the beginning of service and revisited throughout. Common fundamental values across all services “are honor and integrity” (p. 1). These values translate to direct and forceful speech, honesty, little tolerance for tardiness and mediocrity, and need for structure, amongst others (Coll et al., 2009). “Culture that is so heavily and consistently enforced does not diminish easily” (p. 1). This ingrained culture is what some student Veterans bring with them into the university.

1.6.2 Hierarchy

Although hierarchy is part of American culture as a whole, the military view of hierarchy and how it is operationalized makes Veterans different than their non-military peers. Within the military, there are always clearly defined, and written, chains of command where everyone is aware of who they report to, and who has both authority and responsibility to whom. Veterans bring a respect for those in positions of authority, simply because of the assumed authority.

Student Veterans seek a structured environment and an unobstructed path of authority. They want to be provided with clear objectives and procedures, and they prefer to be addressed in a direct manner. It may be incredibly disorienting for Veterans to be in a didactic setting in which students question the course material or challenge the authority in the classroom (Coll et al., 2009, p. 1).

This structured environment with clear lines of authority is not limited to the classroom. Indeed, students interacting within an on campus Veteran resource center felt insecure sharing space among service members that were higher ranking than them (Brawner et al., 2017), even though this idea of rank loses its meaning after leaving the military.

Another hierarchical concern for Veterans, is a perception of a lack of accountability for people in institutional positions on campus. Veterans have been conditioned to address concerns through their chain of command, are at a loss within the university setting when they have concerns about faculty or other figures within the academic sphere (Griffin & Gilbert, 2015). The command structure within the university is unclear to military students because the students are unaware to whom faculty report. The students are left without the clear chain of command that they had while in the military. Without this clear chain of command, student Veterans can let problems or concerns fester, and could contribute to student Veterans leaving the school. Transitions such as this ambiguity in where to find answers have led to Veteran attrition (Alschuler & Yarab, 2018).

1.6.3 Value Structures

All the branches of the military have their own versions of core values that they expect their service members to exemplify. Due to the importance that the services place on these values, I have included them here:

- Army: Loyalty, duty, respect, selfless service, honor, integrity, and personal courage.
- Navy: Honor, courage, and commitment.
- Marine Corps: Honor, courage, and commitment.
- Coast Guard: Honor, respect, and devotion to duty.
- Air Force: Integrity first, service before self, and excellence in all we do.

(Military Leadership Diversity Commission, 2009, p. 1)

These core values are ritualistically ingrained throughout a military career; they are included in nearly all ethical briefs and discussions and, speaking to the Navy in particular, as part of The Sailor's Creed, which is said similar to the Pledge of Allegiance at the beginning of the day within some units. The core value structures become part of a military member's identity (Jones, 2013). These identities are retained from their military careers as they move to civilian and academic life, even if they are not as explicitly referenced in day-to-day life (Mobley et al., 2019).

1.7 Similarities Between Veterans' Experiences and Other Populations in Engineering

When discussing demographics between Veteran and non-military populations, first and foremost, it must be said that those who serve in the military come from the United States population. Collins (1998) discusses some of the similarities between military and Veteran experience when discussing how society influences the military. Military members experience "the normal 'three-way strife' that comes from the gender, race, and ethnic issues that have migrated from civil society into the military" (p. 216). This quote highlights one of the biggest misconceptions about the U.S. military. There is this idea that members of the military are different than the ordinary population, but people in the military come from U.S. population and are subject to the same biases and beliefs of U.S. population in general (L. M. Young & Nauta, 2013; Burk & Espinoza, 2012; Dora et al., 2013). The military discourages bigotry (Kheel, 2017), but it does not mean that it does not exist. While not as an extreme of an example, the following example illustrates how military identities intersect with other demographics of military students.

In a phenomenological study of active military engaged in online coursework, Starr-glass (2013) considered military culture and stereotypes. Although military students tended to code switch (switch between enacting a military identity and associated behaviors to enacting student identities and associated behaviors; Cook,

2017), they readily adopted the culture of the local environment. Whether there is any basis for it or not, instructors generally look at military students as different. Starr-Glass's study encouraged instructors to be mindful of their military students "to examine their reactions to difference, providing an opportunity to explore personal, educational, and learning approaches to the unfamiliar" (2013, p. 1).

Student Veterans also share similarities with the student population at large as it relates to socioeconomic status. It is a myth that the military can be used as a way to escape poverty (Vacchi & Berger, 2014). About 10% of the military's enlisted come from impoverished neighborhoods, while 25% of enlisted come from some of the wealthiest neighborhoods (S. J. Watkins & Sherk, 2008). Additionally, 99% of enlisted personnel have a high school degree compared to less than 80% of men under 25 (S. J. Watkins & Sherk, 2008) in the general U.S. population. This myth of escaping poverty also surrounds receiving a college education. Because of high entrance standards and strict recruiting practices in both universities and the military, those of lower socioeconomic status are underrepresented within university, the college of engineering (Walpole, 2003), and the military (Kane, 2006; S. J. Watkins & Sherk, 2008).

Acknowledging, first and foremost, that the goals, conditions, and circumstances are completely different, there can be a similarity in individual outcomes between the study abroad programs offered at many universities and deployments. One of the main goals of study abroad is intercultural sensitivity (Pedersen, 2010). Intercultural sensitivity has been observed as a result of military deployments as well. Rumann & Hamrick (2010) noted, in a study of Veterans who deployed while enrolled in school and returned, more than one of their participants describing greater awareness of different cultures and how their awareness shifted from previously held beliefs. While not all Veterans that have been deployed experience this change in awareness, the same can be said for non-military students in study abroad programs as well (Mendelson, 2002).

Although Veterans bring unique experiences and cultures with them, they share many similarities with other non-traditional students. Durdella & Kim (2012) surveyed over 21,000 students. In their sample, 83.4% of the students were of traditional age (18-22) and of the 163 Veterans, 84.7% reported being older than 22. Veterans being generally older, along with other similarities to nontraditional students in general, is echoed in a Student Veterans of America report (Cate, 2014). “Like other nontraditional student populations, they tend to be older, have families to support, and juggle employment and school” (p. iv). Another similarity with non-traditional students is that Veterans can also be commuters and/or part time students (Murillo, 2017). Veterans are less likely to achieve their degree than non-military students (Durdella & Kim, 2012). However, degree attainment outcomes for Veterans are not substantially different between student Veterans and other non-traditional students (Cook, 2017).

There are many similarities between student Veterans and their non-military counterparts. There are also a number of differences, mainly communication, leadership, and technical skills acquired during their service. It is the intersection of those similarities and differences that make Veterans an interesting population to study. Many Veterans have applied engineering and other technical skills that they developed in the military. The differences make Veterans very attractive to the engineering profession. Therefore, raising recruitment and retention of Veterans should be a concern for all academic institutions, and one way to potentially help this is to understand how student Veterans conceptualize success.

1.8 Overview of Document

In the above (Chapter 1), I introduced military terminology, student Veterans as a subset of the population, and the need to study student Veterans in engineering. In Chapter 2, I provide a review of literature of related to SVEs to situate the proposed work for this dissertation within the available literature, as well as the

theoretical frame I used as I collected, explored, and processed data. In Chapters 3 I discuss the methods used for collecting and analyzing qualitative data. Chapter 4 contains the stories of the SVEs and Chapter 5 presents the results of the qualitative portions of the overall study. Chapter 6 combines the methods and results of the quantitative portion of the study. In Chapter 7, I combine the results of the qualitative and quantitative results into an overall discussion of student Veteran's conceptualizations of success and their non-cognitive profiles, synthesize the relationship between the two, and provide a summary of the overall study. Chapter 8 provides implications, limitations, and future work. Appendix A provides a copy of the survey used to collect data for the quantitative portion of the study and was the survey used to recruit participants. Appendix B provides the interview protocol used for the qualitative portion of the study. Finally, Appendix C provides the code used for the quantitative analysis.

2. LITERATURE REVIEW

Formal literature on student Veteran engineers (SVEs) is sparse, but growing. Since 2016, there has been an increase in the number of published studies on this population. For this literature review, I focus on research that explores the experiences of SVEs in higher education. I situate this literature within the space of student success, more specifically Veteran success and engineering student success. This focus establishes the current research on SVEs, more broadly. This review allows me to use the experiences of SVEs to understand how they relate to their success and provides a nuanced approach to grapple with the complexities associated with SVEs' success within engineering education. In conjunction with the literature review situating SVE experiences of success, I also describe literature on non-cognitive and affective factors (NCA) and how they are interpreted by researchers to relate to specific phenomena. This literature review will set the stage for interpreting SVE NCA factors as compared to their non-military counterparts and allow for understanding more nuanced ways to approach measures for student Veteran success. The merging of results from exploring both the lived experience and how it comes to define success for SVEs and their understanding how their non-cognitive profiles are potentially different than their traditional student peers will allow for a more nuanced understanding of student Veteran success which could shape Veteran support initiatives.

2.1 SVEs in Engineering Education

2.1.1 Decisions to Choose Engineering

Few studies exist that describe how Veterans experience engineering education, however there is growing interest among engineering education researchers. As of July

2020, there have been fourteen articles published within engineering education spaces, including conferences and journal papers, which explore the experiences of SVEs. No literature is available specifically regarding the experiences of SVEs prior to 2016. Much of the available conference literature, particular from the American Society for Engineering Education Military and Veteran Division focuses on local initiatives and general evaluation of these efforts that engage this population; however, there are no comprehensive research studies prior to the 2016 publications focused on deeply understanding Veteran experiences or supports for success. Exploring each of these available resources describes the general landscape of SVE's experiences within the literature and how these experiences were examined.

SVE experiences have been used to identify why SVEs chose to study engineering. One research group working on an NSF grant titled, "Military Veteran students' pathways in engineering education" (National Science Foundation Grant Nos. 1428512/1428646) published three conference papers which include some SVE experience data and analysis using data collected through focus groups as well as a journal article. Main et al. (2016) used focus groups to identify why Veterans pursue engineering, what their experiences were in engineering, and how those experiences are shaped by their military past. Across five focus groups, the researchers collected data from 21 White, male student Veterans. They found that military experiences, family and friends, intellectual challenge, and positive job outlook were common themes that emerged through their stories. Regarding SVE experiences, the authors described difficulties for student Veterans to work on teams, and how SVEs attempt to get teammates to "pull their weight" (Main et al., 2016, p. 9), as well as how military experiences have helped SVEs to work on teams. The researchers also described how SVEs may feel different than their peers because of being generally older and with more responsibilities. Although not specifically using SVE experiences, Mobley et al. (2017) interviewed student Veterans who were no longer serving in active duty or the reserves and conducted thematic analysis to examine the decision points to enter engineering and how the military influenced those decisions. They found that

some of the Veterans they interviewed made their decision to study engineering even before they joined the military. They also found, similar to Main et al. (2016), that the decision to study engineering was influenced by the people around them and their potential job prospects after graduation. Examining why SVEs chose to study engineering highlights their values and can help to understand their motivations to study engineering and to follow through with graduation.

More specifically, first-generation (college student) SVEs have been examined to highlight why specifically they chose to enroll in engineering. Mobley et al. (2018) found that first-generation SVEs primarily chose to enter into engineering for the financial security and the prestige associated with engineering. These reasons for entering engineering are not unlike other first-generation students who decided on engineering as a way toward financial stability with support of their families (Simmons, 2012). Although for SVEs in general, military experiences may influence why some choose engineering, for the group of Veterans that Mobley et al. (2018) studied, military experiences were not as strong of an influence. They were influenced more similarly to other first-generation students.

2.1.2 Experiences of Different Demographic Groups

To better understand different demographics of SVEs, besides first-generation status, sexual, gender, racial identities, and disability status have also been explored. Gay SVEs' narratives have been studied, highlighting the intersections of their identities (Veteran, engineer, sexual identity, etc.; Lord et al., 2019). The two Veterans discussed how challenging it was for them to share their sexual identities in the military, through either the “don’t ask don’t tell” policy or the prohibition of gay marriage, but have found that they have been more able to share in the university environment, but that engineering as a whole is not “necessarily the most welcoming for gay people” (Lord et al., 2019, p. 18). Additionally, the Veterans describe how the students in engineering are surprised by there being Veterans who identify as gay.

Overall, this presentation highlights how competing identities, brought forth through narratives, can shape a college experience.

As stated in Chapter 1, women are a growing demographic within the military. Women Veterans enrolled in engineering in higher education have been studied to understand why they joined engineering, how their military experiences have shaped their engineering experience, and how their identities have shaped their experiences within their engineering studies (Atkinson et al., 2018). In this study, the majority of women stated that their military jobs encouraged them to enter engineering, although they were good at math and science before entering the military. They were able to connect their military experiences to their engineering studies; one participant was double majoring in Japanese and nuclear engineering, allowing her to be able to “climb the ladder” (p. 12). Some of the women were used to not asking for help in the military (because they felt it was stigmatized), and that behavior carried over into their engineering programs. Unlike many of the men in the authors’ other studies (Brawner et al., 2019; Lord et al., 2019; Mobley et al., 2018), many of the women rated their military identities quite highly, and their gender identities very low, as they relate to their engineering college experience. The military environment, which they noted as being shaped by their gender, may have helped to enculturate them into a largely male engineering program. This study highlighted how the experience of women Veterans in engineering are potentially different than other (non-Veteran) women in engineering.

Black male Veterans have also been studied to understand why they chose engineering and how their multiple identities manifest within engineering (Brawner et al., 2019). Several of the participants linked their military experience to their desire to pursue engineering, whether that was to learn about how things worked, or to advance to break through a “glass ceiling” (p. 8). The participants mostly identified as engineers, but more closely as specifically Black men. Many believed that they had a responsibility to be role models for future generations of Black engineering students, because they had so few growing up. Overall, these interview results further

the need to study diverse populations, to better understand how different experiences and motivations can be for different Veterans.

Veteran's studying engineering with a Veteran's Affairs (VA) certified service connected disability have also been studied to learn about their challenges and their assets (Sheppard Jr. et al., 2019). The Veterans with disabilities experienced some specific challenges related to their disability, but also the some stigma associated with "disabled vet." They also had adjustment challenges, missing the camaraderie and structure that they experienced within the military. The assets highlighted in the study include leadership skills and teamwork skills that help the Veterans better navigate their engineering programs, which is also echoed in (Main et al., 2019). Overall, the Sheppard Jr. et al. (2019) paper begins to highlight the value added from Veteran's in general, regardless of dis/ability status.

2.1.3 Transition Between the Military and Engineering Education

Brawner et al. (2017) examined SVEs' transition from the military to engineering undergraduate education. The researchers highlighted how some student Veterans from different services share different yet complementary experiences that have prepared them for engineering education. The study described how some student Veterans felt unprepared for attending school and using benefits, and described the lack of support given to some students from the military and their military supervisors. They also discussed how military rank affects behaviors on campus, even though their participants stated that rank shouldn't mean anything on campus. Brawner et al. (2016) explored the intersection of age and Veteran status within engineering. This study included some more data on teamwork and some experiential data on class experiences. Overall, they found that for the SVEs that were interviewed, technical experience within their respective branch contributed to them pursuing engineering. They also found that the older the SVE, the more likely they were to both share their military identity with and attempt to connect with faculty. Considered together,

these studies which used thematic analysis of focus group data, explored some of the SVE experiences with teaming and with starting college, including more information on in and out of class experiences.

As a consideration for how SVEs transition from the military, engineering has also been described as an acculturation tool for Veteran transitions into civilian life. Lim et al. (2016), like a previous study above (Brawner et al., 2017), sought to learn more about the transition of military Veterans into post-secondary engineering education from an identity negotiation perspective. Lim et al. (2016) discussed how Veterans balance their identities as students, engineers, and Veterans as they express a military leader identity in group work in their engineering program. They also discussed how SVEs apply a “goal-driven mindset” (Lim et al., 2016, p. 9) to their engineering studies. These authors highlighted how similar engineering programs and a military lifestyle describe both engineering programs and the military as male-dominant and using adjectives such as “strong” and “blunt” (terms traditionally associated with masculinity; Riley, 2017), allowing Veterans to easily transition from the military into civilian life as an engineering student.

Although sparse, the available literature focuses on engineering student Veterans’ experiences transitioning from the military into engineering student life. With so few studies that focus and present student Veteran experiences within engineering, there is clearly a gap within the literature. All of the studies presented within this section highlight both the need to learn more about the value that SVEs add to their disciplines and programs. The motivation for this research is to highlight the success of undergraduate SVEs. Specifically how they are uniquely valuable to engineering is outlined in Chapter 1. Further research is needed in experiences of SVEs in engineering, especially research that can contribute to the understanding of success for SVEs.

2.2 Student Veteran Success

Although not specific to engineering or even STEM, research to support student Veterans is widely available. Much of the research focuses on how to help student Veterans, but not necessarily on what success for these Veterans means or what it means to succeed. A number of studies found that that on campus student Veteran centers are important for Veteran academic success (Cass & Hammond, 2015; Brawner et al., 2015; Heineman, 2016; Williams-Klotz & Gansemer-Topf, 2017). There is evidence from these studies that students find these support centers valuable, and that they improve their experience in their undergraduate education. However, none of these papers provided evidence to connect these support centers with academic success measures. Kirchner (2015) claimed that there is no evidence that “Veteran resource centers, student organizations, and additional programs significantly impact retention, graduation, and overall satisfaction rates for Veterans” (p. 121). Kirchner specifically focused his claims on external measures of academic success rather than qualitative experiences of students. However, Kirchner raised an important point about evidence-based support for student success. While the connections between specific support efforts and traditional measures of success may not be evident, student Veterans seem to view these programs as valuable for their success (Ackerman et al., 2009; Baechtold & De Sawal, 2009; Lokken et al., 2009; T. Johnson, 2009; D. Ford et al., 2009). Additionally, the number of publications on the effectiveness of these programs is growing. Researchers are developing programs that support student Veterans and collecting best practices (Murillo, 2017; Mitchell, 2017). One of the driving forces for learning more about Veteran success centers is to help Veterans with service connected disabilities.

Services connected disabilities have been a considerable focus of literature to support student Veteran success. A current topic of investigation is Veterans with post traumatic stress disorder (PTSD). Although only about 10% of Veterans are diagnosed with PTSD, it is still a concern. Norman et al. (2015) discussed PTSD and

other mental health concerns to student Veteran success through problems “with attention, memory, and concentration, skills that are important to academic success” (p. 702). These researchers also quantitized interview results to reveal that nearly half of the students interviewed claimed that their physical and mental health were barriers to their success. Although research within this area is important, I prefer to avoid focusing on service connected disabilities. First, I intend on conducting research with more of an assets based approach. I aim to shift the narrative away from an assumption that Veterans return from their service somehow broken and focus more on how their experiences have shaped their conceptualizations of success and helped them to succeed.

2.3 Engineering Student Success

Engineering student success is a broad and widely studied topic. In line with my research questions, I focus on literature surrounding engineering student success that is explored qualitatively through story as well as quantitatively through success measures and clustering. The NCA factors and their relationships are important for understanding student success because cognitive measures are not enough. The majority of high school students are admitted into engineering programs because of their outstanding GPAs and standardized test scores. These cognitive scores do not explain nearly as much variance in undergraduate engineering GPA as NCA factors (Scheidt, Senkpeil, et al., 2018). Therefore, NCA factors can help to better understand students beyond their past cognitive performance.

2.3.1 Links Between Non-cognitive and Affective Factors and Student Success

To begin to explore success beyond GPA and SAT scores using a quantitative approach, I utilize NCA factors. NCA factors are a “collection of skills, traits, behaviors, mindsets, and attitudes” (Khine & Areepattamannil, 2016) whereas cognitive

factors are factors that are generally measures of achievement, either through grades or test scores. Predictive models including NCA factors are more robust than those with cognitive factors alone (Richardson et al., 2012). Models including learning strategies and study skills (Credé & Kuncel, 2008; Ruffing et al., 2015) have shown a 10% increase in incremental predictive validity compared to cognitive-factors-only models. A recent meta-analytic study concluded that self-efficacy and similar NCA factors account for as much variance in GPA data (about 20%) as do cognitive factors (Richardson et al., 2012). Additionally, students most often transfer out of engineering because of campus climate, perceptions of abilities to succeed in engineering, or interests and career goals (Seymour & Hewitt, 1997; Geisinger & Raman, 2013), rather than academic ability. This literature illustrates the potential of NCA factors to enhance student success models and increase our understanding of how students achieve specific outcomes. However, most prior work has only studied the effect of a single NCA factor at a time, so the role of collections of NCA factors (and their interactions) is currently unknown.

The literature on NCA factors focuses primarily on one main point: NCA factors used in predictive models of student success help explain additional variance beyond that of cognitive measures. NCA factors, including academic behaviors, perseverance, mindset, learning strategies correlate with student academic success (Nagaoka et al., 2013). In a review, Farrington et al. (2012) described how affective factors, which relate to feelings or emotions (Reyes, 1984; Russell & Mehrabian, 1977), have also been shown to support student success. Together, NCA factors show significant relationships to student outcomes and are an area with calls for additional study. Indeed, the Herman & Hilton (2017) has highlighted a need to better understand certain NCA factors that may be related to student success in higher education, and especially STEM. Those include intra- and inter-personal competencies such as conscientiousness, sense of belonging, academic self-efficacy, growth mindset, utility goals and values, interest, pro-social goals and values, and positive future self (i.e.,

identity). They note that “there are major gaps in the research evidence” (Herman & Hilton, 2017, p. 4).

Most prior NCA studies focused on a single factor, rather than potential synergies among factors (e.g., Sparkman et al., 1999; Lee & Stankov, 2013; Parker et al., 2014; Duckworth et al., 2007; Durlak et al., 2011). For example, studies of students’ self-efficacy in engineering contexts provide valuable insights into how students’ perceived abilities to accomplish particular academic tasks may influence their outcomes (Hutchison et al., 2006; Lent et al., 2008; Fantz et al., 2011; Ponton et al., 2001). These studies provide insight into the importance of individual factors, but do not help researchers and engineering educators understand combinations of factors that engineering students possess or that may be essential to their success in engineering programs. A few recent studies have focused on synergies among NCA factors that may influence specific student outcomes like retention or academic success (Credé & Kuncel, 2008; Godwin, 2017; Lin et al., 2011; Scheidt, Senkpeil, et al., 2018); however, the connections between NCA factors and collective influence on students’ success is understudied. Moreover, using the constellation of NCA factors to better understand the differences between SVEs and their traditional undergraduate peers has not been used to help support SVE success. I plan to use NCA factors to describe the differences between SVEs and their non-military peers, beyond demographics and traditional measures of academic success.

2.4 Construct Summaries

In this section, I provide a brief overview of the constructs measured on the SUCCESS survey (see Chapter 6 for details on the survey and Appendix A for the survey). Each construct is described, and one or more example items from the survey are presented to give a sense for the kinds of questions that help define the construct. Many of these constructs have been used in various contexts with many different

populations over an extended period of time, so they naturally have a larger and more persuasive body of literature relative to some newer constructs.

2.4.1 Big Five Personality

The Big Five personality traits, sometimes referred to as the five-factor model (McCrae & John, 1992), characterize personality across five dimensions: openness (open to change and new experiences, imaginative, insightful); conscientiousness (reliable, hardworking, trustworthy, dependable, orderly, thorough); extraversion (sociable, talkative, impulsive, energetic, assertive); agreeableness (cooperative, helpful, likeable, sympathetic, kind); and neuroticism (anxiety, personal insecurity, tension, hostility, irritability). A large number of big five survey instruments exist (including both very long and very short (Gosling et al., 2003)), and I used a 15-item version comprising three items per big five dimension. Each item presented a statement (e.g., “I have a vivid imagination”), to which respondents rated how accurately that statement described them. Big five dimensions are known to correlate with a variety of desirable academic outcomes, including GPA and SAT/ACT scores (Trapmann et al., 2007; Lounsbury et al., 2004).

2.4.2 Grit

Grit is defined as perseverance and passion for long-term goals and can be viewed as an essential component to high achievement beyond personality and intelligence. The grit scale contains two factors: consistency of interest (staying focused on a goal for a long time) and perseverance of effort (working diligently). These two dimensions capture an individual’s intensity, direction, and duration towards achieving a goal (Duckworth et al., 2007). Early research on grit showed that grit was a better predictor of success than other measures of preparation including I.Q. or talent (Duckworth & Quinn, 2009). The original proposer of grit, Angela Duckworth, also claims that anyone can learn to be “gritty” (Duckworth, 2016). There has been some

concern about the use of grit as a privileged measure of students' abilities to focus solely on one goal regardless of their background or circumstances (Ris, 2015; Warner, 2014). Additionally, a recent meta-analysis of grit studies showed that the construct might be only weakly correlated with student success. However, this construct still garners high interest within the education community as it relates to student success.

2.4.3 Identity

Identity is defined as “being recognized as a certain ‘kind of person,’ in a given context” (Gee, 2000, p. 99). Students' engineering identities were measured in three dimensions: performance/competence beliefs (i.e., beliefs about their ability to do well and understand the subject), interest (i.e., their enjoyment of and desire to learn the subject), and recognition (i.e., their feelings that others see them as the kind of person who can succeed in an endeavor Godwin, 2016). Recognition is from both an individual as well as from others. Recognition develops as individuals tell stories about who they are and act in congruence with these stories (Holland, 2001). Students whose identities align with their classroom and disciplinary roles experience an improved sense of belongingness, increased persistence, and better retention (Godwin et al., 2016; Hughes, 2010; Kraus, 2006; Perez et al., 2014; Pierrakos et al., 2009; Wolfram et al., 2009).

2.4.4 Mindset

Mindset is a construct designed to gauge individuals' beliefs about their own talents and intelligence. There are two factors within the mindset construct: fixed mindset (talents and intelligence are set and cannot be changed), and growth mindset (talents and intelligence can be cultivated and developed Dweck, 2016). These factors are occasionally referred to as entity beliefs and incremental beliefs. Mindset has been associated with student resilience and their subsequent success (Yeager & Dweck, 2012).

2.4.5 Motivation

A Future Time Perspective (FTP), a theory of motivation, describes how students formulate distant motivational goals and develop long-range behaviors to achieve those goals (Kirn & Benson, 2018). Motivation was measured as five constructs: expectancy (belief one will do well in their endeavors); connectedness (tying current tasks to future goals); instrumentality (current tasks are useful for my emerging identity as an engineering or computing professional); value (value of future goals over present goals); and perceptions of future (domain specific valuing of the future). FTP Motivation has been shown to influence how students approach and create value for engineering tasks (Kirn & Benson, 2018). This theory to motivation has influenced online course development where changes promoted student retention (Schmidt & Werner, 2006).

2.4.6 Gratitude

Gratitude consists of feelings of appreciation for someone else in response to receiving benefits that were intentionally provided, especially at some cost to the benefactor (Froh & Bono, 2011; McCullough et al., 2002). Literature suggests gratitude is one of the strongest correlates to emotional well-being (P. C. Watkins et al., 2009), life satisfaction, optimism, and reduced anxiety (Kerr et al., 2015). Reducing anxiety (such as test anxiety) can help with overall GPA, a common measure of student success (see test anxiety below).

2.4.7 Test Anxiety

Test anxiety is a subscale of the Motivated Strategies for Learning Questionnaire (MSLQ) developed to determine the degree to which students struggle with the cognitive and emotional aspects of test anxiety (Pintrich et al., 1991). Test anxiety has been shown to negatively affect students' academic performance (Richardson et al.,

2012; Chapell et al., 2005; Ergene, 2003; Chapell et al., 2005; Motevalli et al., 2013; Putwain & Daly, 2013; Yoon et al., 2013). However, in a recent study of engineering students, we found that women, although they experienced statistically high test anxiety, had higher STEM GPAs suggesting that women overcome test anxiety to achieve higher grades Major et al. (2020).

2.4.8 Time and Study Environment

Time and study environment is another subscale of the Motivated Strategies for Learning Questionnaire (MSLQ). This scale was developed to measure the extent to which students can effectively manage and regulate their time and location set aside for studying (Pintrich et al., 1991). Time and study environment has been shown to positively affect student academic performance (Credé & Phillips, 2011).

2.4.9 Mindfulness

Mindfulness is defined as intentional, purposeful, focused, and nonjudgmental awareness (Kabat-Zinn, 2003; Froh & Parks, 2013). Although often associated with Buddhism, it is conceptualized as a universally applicable practice and an innate human capacity (Froh & Parks, 2013). Neuroscience studies have indicated that mindfulness cultivates attention, creativity, and increased cognitive performance (Tang et al., 2015; Shapiro et al., 2008).

2.4.10 Belongingness

Sense of belonging or a student's belongingness is an important factor in STEM education and is considered a basic human need that is dependent on social relationships for fulfillment (Maslow, 1943). Indeed, one of the top reasons that students leave engineering is not academic preparedness but lack of belonging (Geisinger &

Raman, 2013; Seymour & Hewitt, 1997). The construct of belongingness has been linked to undergraduate engineering student retention (Scheidt, Major, et al., 2019).

2.4.11 Perceptions of Faculty Caring

The perceptions of faculty caring scale characterizes faculty caring in two ways: empathetic understanding and perceived support and comfort (Hoffman et al., 2003). The empathetic understanding scale asks questions such as “I feel that a faculty member really tried to understand my problem when I talked about it”, and the perceived faculty support and comfort scale asks questions like “If I had a reason, I would feel comfortable seeking help from a faculty member outside of class time (i.e., during office hours, etc.).” This scale relates to a sense of belonging by focusing more on how faculty shape belonging. Our recent research shows a moderate correlation between the perception of faculty caring and engineering belongingness (Scheidt, Senkpeil, et al., 2018). This research suggests that the two scales are, although correlated, indeed different. Overall, students who perceive they are a member of the academic community recognized and valued by the faculty generally have a higher sense of belonging (Hoffman et al., 2003). A supportive classroom environment is linked to academic achievement mediated by belonging, self-efficacy, and engagement (Zumbrunn et al., 2014).

2.4.12 Self-Control

Self-control can be characterized by two factors: self-discipline (showing restraint) and impulse-control (impulsivity Maloney et al., 2012). There are many reasons that self-control is theorized to contribute to success for college students. Self-control has been linked to better academic performance as measured by grades (Feldmann & Martinez-Pons, 1995), better psychological adjustment and interpersonal skills Tangney et al. (2004), as well as better regulation of eating and alcohol consumption (Heatherton & Baumeister, 1991; Heatherton, 1993; Baumeister, 1994).

2.4.13 Student Life Stress

Student life stress was measured through five different dimensions, including stress due to changes (disruption of goals, many changes occurring simultaneously), frustrations as a result of not achieving goals, conflicts (with positive and/or negative options), reactions to stress (sweating, fear, irritability, etc.), and stress support (peer, family, exercise, etc.). Stress can greatly impact student performance, both positively and negatively (Gadzella et al., 2012). Academic stress is positively correlated with both test anxiety and time management (Misra & McKean, 2000), both discussed above.

2.4.14 Meaning and Purpose

Meaning and purpose in life is a multidimensional construct that can be conceptualized as a set of values, actions, and goals that interact to create a sustained life purpose (Moran, 2009). While there are multiple measures of meaning and purpose, we used a subset of the Thriving Inventory (Su et al., 2014) due to its conciseness. Students were given three statements (e.g., “My life has a clear sense of purpose”) and asked to indicate the extent to which they agreed or disagreed with each statement. A greater sense of meaning and purpose in life is associated with a variety of desirable academic and personal outcomes, such as academic achievement, creativity, learning, motivation, character growth, and life satisfaction (Fredrickson, 1998; Peterson et al., 2013; Damon et al., 2003; Noble & McGrath, 2008).

2.5 Conceptual Framework Guiding this Research

The conceptual framework that guides this research provides connections between Veteran student success and experiences in engineering, as well as NCA profiles (see Figure 2.1). In Chapter 1, I described how military Veterans have different experiences and values that can make them different than their traditional student peers. Through

narrative (discussed in Chapter 3), some of those experiences can be understood through story to learn how the experiences have allowed for SVE success and have influenced their perceptions of what it means to succeed as undergraduate engineers. In this chapter, I describe how NCA factors have been related to undergraduate and even more specifically engineering student success. Some of these factors (discussed in more detail in Chapter 6) that can contribute to student success may have been shaped through military experience. Together, these experiences in engineering and NCA profiles can inform SVE perceptions of success, which provide the conceptual framework that guides my methodology to answer RQ1 and RQ2.

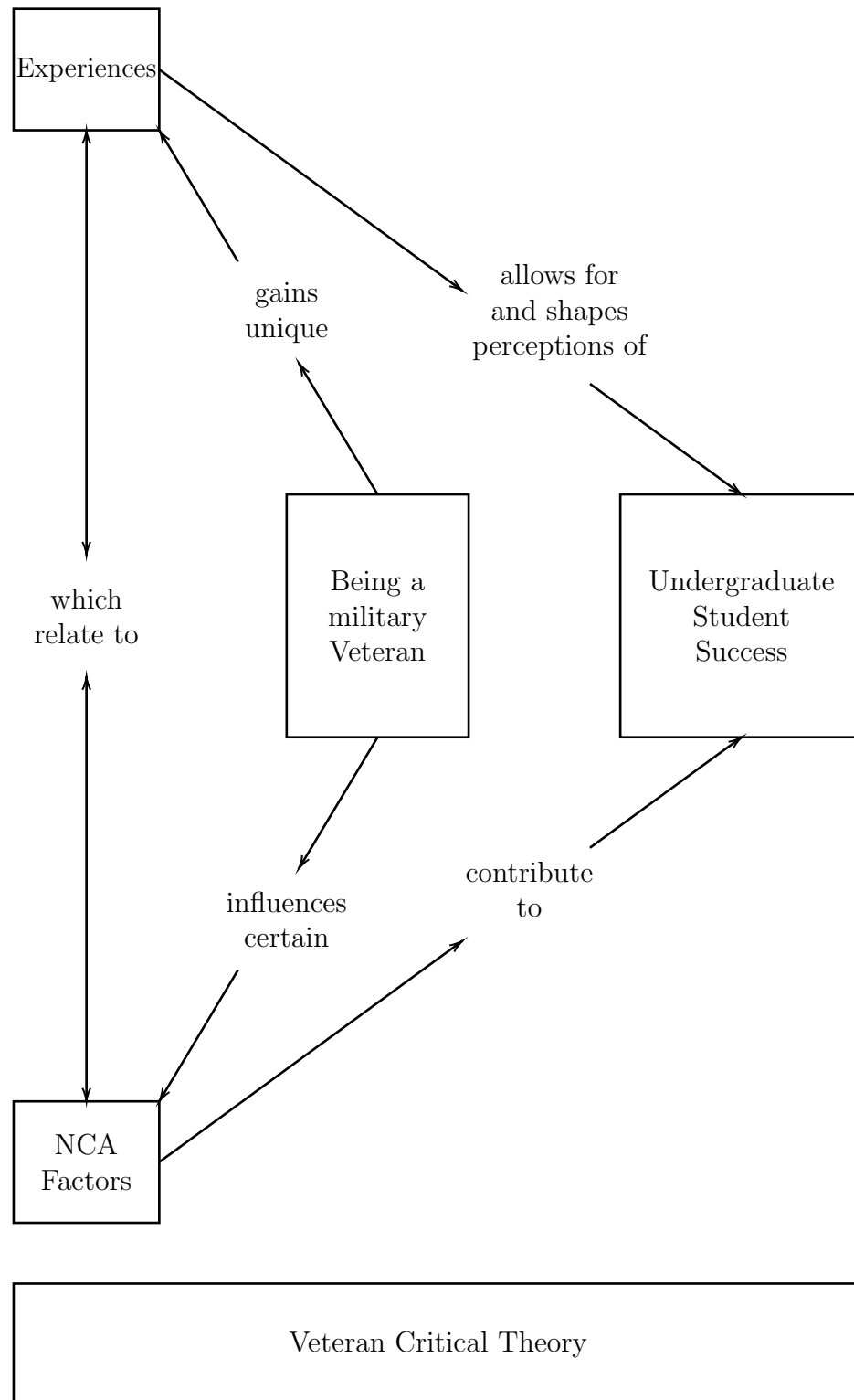


Figure 2.1. Conceptual framework for understanding the relationship between Veterans and success.

2.5.1 NCA factors

The NCA factors that are discussed above are all potentially malleable, depending on the time scale and as a result of experiences. As discussed in Chapter 1, those in the military have experiences that shape who they are, and how they see the world. Veterans are enculturated into their respective branches of the military, and develop skills and behaviors. Enculturation is a two way term, where a person is both exposed to a new culture, but brings their own culture along with them as they merge into this new culture (Yoon et al., 2013). In a meta-analysis, Yoon et al. (2013) showed that identity, behaviors, self-esteem, and life-satisfaction (all NCA factors) have all been impacted through enculturation. Additionally, there are strong links between NCA factors and success, with a myriad of work studying how NCA factors predict GPA and retention (Palmer & Strayhorn, 2008; Adebayo, 2008; Scheidt, Senkpeil, et al., 2018, in addition to some of the individual factors listed above). Using the idea that the military experience is an enculturating experience, I consider how the non-cognitive factors are affected by experience, but also how they may shape experience.

2.5.2 Conceptualizations of Success

Success is contextual. For example, Lau et al. (2007) investigated how success is different for Chinese entrepreneurs than for those that are employed at large companies and even those that are entrepreneurs outside of China. In another example, although success for doctoral students had largely been defined through academic achievement, graduation, and professional association, Gardner (2009) found that success for these students can also mean having self-direction, research dissemination, being happy and comfortable, and securing employment. These two examples illustrate how success is contextual and conceptualized differently by different groups in different situations. Some of these conceptualizations of success are influenced by experience, such as being able to secure employment. I am interested how SVEs conceptualize success in their engineering programs. Understanding how SVEs con-

ceptualize success will allow for construction of metrics that recognize these conceptualizations of success, making engineering education more conducive to SVE success.

2.5.3 Veteran Critical Theory

Veteran Critical Theory (VCT) underpins not only the research questions, but the approach to answering these questions (Phillips & Lincoln, 2017). VCT is a new critical theory which seeks to disrupt the narrative that student Veterans at large require mental health and academic support services. Phillips and Lincoln call for both new ways in knowing student Veterans, and a change in the kind of research that is being conducted.

Research on student Veterans needs to critically consider systems instead of students, question traditions instead of transitions, and offer practical ways to recognize student Veterans as a sustained part of the twenty-first century student body. (p. 656).

Critically considering systems instead of students, puts the onus on engineering education practitioners and administrators, those who shape the systems, as opposed to determining ways that Veterans can change to better fit within the existing systems. Questioning traditions, such as a university system setup for a *traditional* student, opens the gates for creating an environment that is supportive to all students. As discussed in Chapter 1, with the Post 9/11 G.I. Bill, many Veterans are able to attend college and are doing so at an increasing rate, making them a growing population at college campuses. VCT and its tenants help to guide research and thinking in support of making campuses and educational experience more friendly for SVEs.

There are 11 tenets of VCT, and the authors of this seminal work on VCT purposefully made the list of tenants long to allow researchers to pull from a broad perspective and whittle the list down as applicable to their research goals. The 11 tenets are as follows:

1. Structures, policies, and processes privilege civilians over Veterans

2. Veterans experience various forms of oppression and marginalization including microaggressions
3. Veterans are victims of deficit thinking in higher education
4. Veterans occupy a third space (country) on the border of multiple conflicting and interacting power structures, languages, and systems
5. VCT values narratives and counternarratives of Veterans
6. Veterans experience multiple identities at once
7. Veterans are constructed (written) by civilians, often as deviant characters
8. Veterans are more appropriately positioned to inform policy and practice regarding Veterans
9. Some services advertised to serve Veterans are ultimately serving civilian interests
10. Veterans cannot be essentialized
11. Veteran culture is built on a culture of respect, honor, and trust (p. 660-663)

This theory is designed to “challenge and change institutions” (p. 657-658). I use VCT as the foundation of this research on SVE success. The conceptual framework, with the SVE at the center, and including the experiences as told by the SVE, is in keeping with the spirit of VCT. Success in the literature is largely defined by university structures, including researchers, and this conceptual framework allows for understanding of success at the student level, as told by Veterans. Additionally, understanding their experiences, through their own voice, would allow for perceptions of oppression and marginalization as well as experience of deficit thinking to surface. As presented in the literature review and introduction, Veterans leave the structure of the military, which has a clear terminology, chain of command, and career progression, to move into the generally unstructured college environment.

Experiences of SVEs, as told by SVEs, allow for the Veteran to control the narrative, and to identify policies that are beneficial and detrimental to their success. Additionally, through the experiences and the student level NCA factors, the different identities of SVEs are allowed to emerge. Again, with the stories of Veterans, as told by Veterans, the SVE is not reduced or essentialized. Therefore, this conceptual framework, and the research it supports, build upon the military's culture of respect, honor, and trust.

2.6 Summary

In this chapter, I show how formal literature on student Veteran engineers (SVEs) is sparse although there has been an increase in the number of published studies on this specific population. The research that I highlighted explores the experiences of undergraduates in higher education and justifies the need to extend this type of work to the SVE population to allow for better understanding of their experiences and perceptions of success. Simultaneously, understanding the literature on non-cognitive profiles and how they are interpreted by researchers to relate to specific phenomena supports a more generalized way of understanding Veterans as a whole. The merging of results from exploring both the lived experience and how it comes to define success for SVEs and understanding how their non-cognitive profiles are potentially different than their more traditional student peers allows for a more nuanced understanding of student Veteran success which could shape Veteran support initiatives.

3. UNDERSTANDING SVE SUCCESS THROUGH NARRATIVE INQUIRY

In this chapter, I discuss my methodology for understanding Student Veteran Engineers' (SVEs') conceptualizations of success in their engineering program, narrative inquiry. I describe how data were collected, what data were collected, and the general methods used. To structure this methods section, I will use Jean Clandinin's (2016) book, *Engaging in Narrative Inquiry*, as a guide to describe the steps and important aspects of conducting narrative inquiry. First, I discuss the theoretical foundations of narrative inquiry as a methodology. I present how narratives have been used in the engineering education literature. Then, I describe the process of collecting and analyzing narrative data (i.e., methods). The methodology supports answering the research question:

RQ1: How do the narratives of undergraduate Veteran engineers incorporate their conceptualization of success in their engineering programs?

Learning about a lived experience through narratives allows for a deep insights that can be lost with other methodologies. In narrative inquiry, the shared experiences of participants allow for more connection between the research and the reader, potentially allowing a small group the *power* needed to have an impact within a positivist landscape (J.-H. Kim, 2016) such as engineering. Using narrative methodology is in juxtaposition with the both the quantitative methods (Chapter 6) as well as the synthesis the narratives and quantitative results through mixed-methods to answer RQ3 (see Figure 1.1). The lived experience, although epistemologically different than the other methods used within this larger study, provides unique insights into SVEs' conceptualizations of success.

3.1 Theoretical Foundations of Narrative Inquiry

Narrative inquiry has its foundation in stories. Connelly & Clandinin (1990), two prominent educational scholars with a rich history as narrative inquirers, separate stories from narrative by claiming that “people by nature lead storied lives and tell stories of those lives, whereas narrative researchers describe such lives, collect and tell stories of them, and write narratives of experience” (p. 2). The word narrative means both “to tell” and “to know” (J.-H. Kim, 2016). Therefore, narrative is both a way of providing information (traditionally through story) and a way of knowing (an episteme). Narrative inquiry has a complex history (Pinnegar & Daynes, 2007). In the broadest sense, narrative inquiry is the heart of qualitative research. Narrative inquiry is also isolated and distinguished from many forms of qualitative research. What I describe below is my understanding of narrative inquiry’s theoretical underpinnings.

In this study, I combine perspectives from different philosophers of education to relate stories to narrative inquiry as a theory and methodology. Stories are based on experience (Dewey, 1934). Dewey claimed stories are told in ways that are natural to the teller and have beginning and end. Dewey explained an experience as not trivial, but enduring. Dewey used as an example, not just having a meal (“I ate pasta for dinner”), but experiencing a meal, as being different and more profound (“When I was in Tuscany, I looked through a shop window as pasta was being cut by hand. The smells from the neighboring Trattoria, both fresh and old, invited me in. As I consumed my lasagne, I knew this was an authentic taste of Italy”). Later, Vygotsky (1962) related sociocultural experience to how humans develop thoughts, and that these experiences are critical for development. Bruner (1986) built on the ideas of both Dewey and Vygotsky. He described two modes of thought: the narrative and the pragmatic. The narrative mode is imaginative. Compelling stories are told in the narrative mode, which is where truth and lies intermingle. The pragmatic mode is logical. This mode tells stories of cause and effect and meaning, and are based on some generally accepted truth. I believe that the role of the narrative inquirer is

to internalize a story of an experience through attempting empathetic understanding (relating to the participant), acknowledge that the story contains imaginative thought, and to apply pragmatic thinking to re-story it in a way that can be experienced by someone else. The role of the narrative inquirer is, like an artist, to shape and form story. This perspective is the theoretical basis for narrative inquiry I use throughout this research.

Pinnegar & Daynes (2007) claimed that qualitative research in general is narrative inquiry. They noted how in all qualitative research stories are collected from participants and those stories are retold in some way. They also identify that boundaries have formed that situate the narrative inquirer within qualitative research. Polkinghorne (1995) separated narrative inquiry into two, “analysis of narrative” and “narrative analysis,” where analysis of narrative is when several narratives are analyzed for common themes and narrative analysis is where the narratives are organized in a way where they can be evaluated on their own. Similarly, Kellam et al. (2015) also broke narrative inquiry into methods of analysis, “thematic analysis,” “structural analysis,” and “constructed narrative analysis.” Thematic and structural analysis fall within Polkinghorne’s analysis of narrative, and constructed narrative analysis is similar to Polkinghorne’s narrative analysis. For the duration of this discussion, I will refer to Kellam et al.’s definition of constructed narrative analysis.

“Constructed narrative analysis involves constructing narratives based the data of single or multiple participants and then developing theories based on these constructions” (Kellam et al., 2015, p. 3). Narratives that are constructed in this way do not necessarily represent a specific theme or idea, but what an individual has experienced. Narratives are in stark contrast to what thematic analysis and, even more broadly, quantitative methods seek to accomplish. Thematic analysis, results in themes and ideas that are common to participants. Constructed narrative analysis includes what is not common—a participant story which offers at times a counternarrative to grander themes and conceptions.

Additionally, narrative inquiry, or more specifically constructed narrative analysis, allows the researcher and readers to question generalizability, and therefore rigor. Pinnegar & Daynes (2007) suggested that the fundamental assumptions behind narrative inquiry are to reject reliability, objectivity, and generalizability. In doing so, the reader can interpret a story as a participant's truth, allowing for a deep understanding of an individual. Stories often inspire thought and generate questions from the readers (Clandinin, 2016). Although stories are thought provoking, directly linking them to overarching themes allows them to be used for a specific purpose. I am in tension as I think about trade-offs between research methods. I believe that there is power in story, and I believe in the voice of the individual. In my mind, constructed narrative analysis is among the more empowering research tools for elevating voices of those to which society traditionally does not attend. I also believe in the importance of using commonalities across different people and groups to inform theory, constructs, and policies. There is strength in common trends illustrated through large numbers. Sacrificing breadth for depth is the trade-off between constructed narrative analysis and other forms of qualitative research that rely on thematic analysis.

What makes narrative different from other methodologies is how entrenched the methodology is within the method. The methodology is rooted in the idea that the story is knowledge, and a storied approach is needed to interpret the data. The methods involve collecting stories that help to represent the storied way of knowing. These serve as examples of how narrative is both a method and methodology.

3.2 Experiences of Other Engineering Students Through Narrative

Experiences of students outside of the military, as documented through narratives, are more prevalent than those within the military. Therefore, for the purpose of this review, I focus on undergraduate student experiences described through narratives. Focusing on this subset of literature situates research question one—How do the narratives of undergraduate Veteran engineers incorporate their conceptualization of success in their engineering programs?—within engineering education research,

acknowledging that studies using constructed narrative analysis (Kellam et al., 2015) with a focus on SVEs have not yet been published.

Constructed narrative analysis has been used to examine why undergraduates leave engineering. Meyer & Marx (2014) recruited a total of eight participants but only interviewed four “in order to allow for deep and detailed inquiry into the experience of each participant” (Meyer & Marx, 2014, p. 530). They used journey maps (Nyquist et al., 1999), drafted by the participant ahead of the first and only interview, as both an elicitation tool and as an artifact that they include in their paper. Meyer & Marx (2014) set the stage for the reader by providing information about the school. The narratives were temporally organized and described interactions with the university and the people within it. The authors narrated the stories in the third person with quotes interspersed throughout. After the stories were presented with the journey maps, the authors synthesized some of the common threads and linked that synthesis back to prior literature. Although Meyer & Marx (2014) focused on why students leave, they also highlighted both how students struggled with success in engineering and how they were successful in other programs once they left. In their paper, they included the stories of four students, who for various reasons, left their engineering program. This paper also highlighted the widely different ways that students interpreted their academic success. One student struggled through calculus courses, having to retake courses multiple times to pass. Another student was afraid of earning a “B” in a computer science course and decided to drop the course and leave engineering to avoid the risk of what she interpreted as a bad grade, and failure. This paper highlighted the complexities associated with student success through their stories. Meyer & Marx (2014) also showed how the stories provided new insights into what happened after students leave engineering, insights that were made salient through the stories.

Minichiello (2016) followed a similar approach to Meyer and Marx in a study of how non-traditional engineering students experience success and identify barriers to their success. The author set out to collect and tell the stories of at least five students,

but wound up with 14 total participants after an initial screening process of 29 students. After the first interview, Minichiello had the participants draft journey maps. She used the maps, along with the interviews to construct timelines of the students' experiences in their community college program. Minichiello used the timelines in the second interview to fill gaps in students stories and ensure accuracy with their lived experience. She used an iterative member checking process, where she finished the final research text only after the member agreed the entire story represented them. Her stories were also told in the third person. Again, similar to Meyer and Marx, to identify similarities across the stories, Minichiello compared the narratives against each other. She also connected these similarities to literature. One of the students in that study indicated that success for them was "surviving." Another student in that study noted that he viewed success as more than just grades. Understanding in engineering, was one of his "biggest successes" (p. 109). Similarly, a different student in that study noted that success was more than just grades, but competence in solving engineering problems. The findings in this study highlight students' multiple and different ways of defining success; understanding and competence is more than just grades and retention.

What separated the stories in the Minichiello work from those in the Meyer and Marx paper were creative liberties. The first story by Minichiello opened: "With tousled blonde hair and blue eyes sparking, Cooper eagerly made his way across the main university campus toward the engineering building" (Minichiello, 2016, p. 88). This creative approach is explicitly more storied than the narratives in Meyer and Marx, and highlights the influence of the researcher on the story and the presentation. Methodologically, the Meyer and Marx study as well as the Minichiello study are very similar. The major deviations include: 1) the number of interviews, 2) the number of participants, and 3) the creative liberties, but they use the same general structure for their "data." The larger number of interviews in Minichiello's work allowed for more insight into the different participants, but the volume of information could cause the reader to become fatigued. Additionally, with more interviews, more insights could be

gained, but organization of the information could become cumbersome, again, causing the reader to become fatigued. A balance of “creative liberties” in storytelling can help with reader interest and flow, without becoming distracting to the reader.

Foor et al. (2007) presented a different approach to constructed narrative analysis. Foor et al. (2007) told a story of Inez, the story of one, and how she represented the opposite of a stereotypical engineering student. Her story tells how “an average-achieving, first generation college attending, economically-disadvantaged, multi-minority female [who] is truly different” experienced undergraduate engineering (p. 103). Throughout her story she described how she felt she did not belong in engineering, how dealing with paying for college affected her performance, and, overall, how her background shaped much of her college experience. Although this paper highlighted the complexities associated with belonging in engineering and social capital, I would like to focus on how Inez was successful despite challenges. During her first year, she lost her scholarship because her grades did not meet the GPA threshold. She had to take on work outside of school to help pay for rent. Her senior year, she decided to cutback work hours to focus more on school, and her GPA rose by 1.3 points on a four-point scale. This improvement in GPA highlights how GPA alone can be a poor judge of a student who is successful through persistence. GPA does not capture contextual or personal factors. Little information regarding data collection is available within the paper, but the structure of the story is considerably different from the stories presented by Meyer & Marx (2014) and Minichiello (2016). Narrated text surrounds quotes, but within the narrated text, Foor et al. performed their analysis. After they presented Inez’s story in the “results” section, they discussed how Inez’s story challenges dominant engineering discourse, identifying that engineering can be an unwelcoming discipline that is not built for everyone equally.

3.3 Applying Narrative Inquiry

While the three studies described above are not all inclusive of how engineering student experiences are related to student success, they begin to highlight the value of the deep insights provided through narrative. They allow for the understanding of tipping points and other influential experiences that shaped success, or shaped decisions. These three representations of narrative in engineering education set the stage for how I use narrative analysis. I employed a similar use of data collection and analysis to that of Meyer and Marx (2014), using available resources to recruit a sample appropriate enough “to allow for deep and detailed inquiry into the experience of each participant – qualities that are highly valued in qualitative and narrative research” (p. 530). Similar to both Meyer and Marx (2014) and Minichiello (2016), I used journey maps as elicitation tools as well as artifacts. Although intriguing, I feel Inez’s story is lost within the analysis. With Meyer and Marx’s storytelling, the participant’s voice is in the narration, but is subdued in both Foor et al. and Minichiello’s narrated stories. Therefore, I kept the stories as stand-alone, with minimal (only used for transition and flow) interjection from the me, the narrator. The separate discussion links the stories to other literature and implications. Foor et al. demonstrated the power of $n = 1$, but studying a single student Veteran was not enough to reach the depth that I desired to account for the diversity among Veterans (Beitin, 2012). On the opposite end, the fourteen narratives Minichiello presented are overwhelming to digest in one sitting. The depth required to construct meaningful narratives is challenged by the need to group them into a cohesive whole, and to process them as individuals within a chorus. Therefore, I chose a middle-ground of six participants to recruit for this study; five agreed to participate, which is appropriate for the depth of this study. This sample size is on the lower end of sampling for narratives, but consistent with a synthesis provided in Beitin (2012), who provides the ranges: 6 to 12, 5 to 25, and 2 to 10 from different researchers. More detail on recruitment and interview procedures is provided below.

3.3.1 Recruitment

I completed multiple semi-structured interviews of five SVEs from three different institutions across the U.S. These students were recruited from the SUCCESS survey (Studying Underlying Characteristics of Computing and Engineering Student Success, see Appendix A), in cooperation with the partner sites. Each of these sites collected identifying information for each participant that allowed me link their contact information to their survey responses. This national survey asks hundreds of questions pertaining to NCA factors, such as belonging, motivation, identity, and personality. The SUCCESS survey also captures demographics such as Veteran status, gender, parent education level, and ethnicity. The survey encompasses responses from 17 schools across the nation of engineering and computing students ($n = 2672$). From this survey, 49 students identified as Veteran engineers, including active duty, reserve, and separated Veterans. A fraction of these 49 students are from the three sites described above ($n = 19$), with one institution having separate survey data targeting student Veterans ($n = 5$).

After receiving IRB approval for the study, I reached out to the available participants in the Spring of 2020 through email (not to exceed three emails to each potential participant), informing them of my study as well as providing information about myself. I used a structured incentive plan, where each participant is given \$20 for the first interview, \$30 for the second interview, and \$50 for the third interview. Ideally, this structure encouraged participants to continue with the study through its conclusion. Only five Veterans responded to my call for participants. All interviews, with the exception of one of the first interviews, were conducted virtually due to restrictions in place to limit the spread of SARS CoV-2.

I attempted to recruit six participants from the available 24 Veteran contacts I had available through the SUCCESS survey. The intention was to be able to tailor the sample to have responses from all five U.S. services (Army, Navy, Marine Corps, Air Force, and Coast Guard). Additionally, I intended to have two participants from

each of the three available schools. After the first email, I received one volunteer. After the second email, I received three volunteers. The third email, which included a plea for help to complete the study yielded only one more participant. Therefore, I was only able to recruit a total of five participants. Only being able to recruit five participants, even with a \$100 total incentive, could be due to Veterans having additional familial and other responsibilities, or due to them not wanting to share their experiences or a desire to remain anonymous. Students may not have been able to commit to a study that added to their additional responsibilities and did not volunteer. Additionally, some military members may try to purposefully keep their military identities hidden, by either not expressly identifying as a Veteran or by participating in an activity that challenges their ability to keep their military identity separate from their college student identity. Other researchers should understand that the purposeful sampling for qualitative work that is sometimes needed to delve into a specific phenomena is particularly challenging with a Veteran population. From my experience, the most difficult part of conducting this work was getting individuals to respond to my initial request. Connecting the outcomes of research to supporting other Veterans and clearly identifying the contribution that participation can have on their future may help to recruit and retain Veterans in research studies. Researchers should also consider how engaging in research may be competing for other time and responsibilities that Veterans have.

3.3.2 Interviews

Each of the interviews followed the protocols in Appendix B. Interviews were recorded through two means (digital recorder and livescribe™echo®smart-pen) to minimize the loss of data due to a faulty recording and serve as an audio backup in case the sound quality was poor. The use of the smart-pen allowed me to take notes about what I was thinking, what I was observing, and any other thoughts during the interview, with those notes connected to audio recording. The recordings were

stored on a secure, password protected server. I personally transcribed each of the interviews, which allowed me to better link the participant voice to the words on the page. Clandinin (2016) emphasized the need to listen to the interview and to re-read the transcripts multiple times. This practice ensures that the next interview can be used to answer questions and address some of the “tensions” that appeared in the first interview. These tensions occur in not only what the participant had said, but in how the researcher interpreted the participant’s words. This practice also allows for richer understanding of the participant.

The first interview focused on relationship building and covered topics such as why participants joined the military, why they decided to transition out of the military, and why they decided to enroll in engineering. This interview lasted about an hour. The first interview also provided an opportunity for me to familiarize myself with the participant, as well as build rapport and trust. Each Veteran came from a different service and had different experiences within the military. It was valuable to understand this background information before beginning a second interview. The background information allowed for more targeted questions relating to service and experience so the participant could describe a story that shows an example of how they conceptualized success.

The second interview was preceded with a journey mapping exercise asking students to draw a picture depicting an experience within their engineering programs where they felt successful. Journey maps are pictures drawn by the interviewee mapping their journey from one point in their life to another and are used as conversation starters to guide the interview (Nyquist et al., 1999; Meyer & Marx, 2014; Minichiello, 2016). The journey maps are artifacts included in the study. The guidance to the participant for how the journey map was constructed is included in Appendix B. These maps served as both a primer for conversation and were integrated within the narratives. The maps add a different medium for understanding a participant’s story and their interpretation of events and help to ground the interview temporally. The accompanying interview explored topics such as a time that they felt successful in the

military, a time that they felt successful since leaving the military, what do they think it means to be successful in their engineering program, what do their non-military peers think it means to be successful in their engineering programs, what support systems are in place within their communities, and if they have engaged with any of them. This interview was designed to take over an hour.

After the interviews, the stories I generated around the interview responses were emailed to the participants, encouraging them to edit, add to, and remove anything that they did want included. This contact was primarily used for member checking. Member checking gives the participant an opportunity to clarify, add or remove content, and is important in narrative analysis to ensure that the participant is being accurately (by their standards) represented. Developing the narratives is iterative, and should involve the participant. As they work with the participants, researchers must pay careful attention to the dimensions of “temporality, sociality, and place” (Clandinin, 2016, p. 50; how the story moves through time; with whom the participant was interacting; and where the story is taking place) as they craft narratives to ensure that temporality, sociality, and place are interwoven throughout the narrative, which allows for deeper meaning of the text.

Deciding what to do with the narrative interview data is where constructed narrative analysis and thematic analysis come to a cross. In all of the design considerations discussed thus far, the stories are whole. But, thematically analyzing narratives has the potential to break from a narrative way of thinking. Gergen (2003) likened deconstruction of narratives in thematic analysis to having a house and dismantling it into “various piles of bricks” (p. 272). As discussed earlier, thematic analysis has its place, but it is through thematic analysis that stories lose their coherence in the dimensions of time, space, and people. It is therefore important to retain the story as the final narratives are developed.

The result of these interviews is a story, oriented in time and place, describing the participants journey to and through engineering. The stories introduce the participant through their military background and how they arrived to study engineering. The

stories focus on a time that the participant was successful in engineering through their own metrics (how they conceptualize success). Within that story, the journey map is included so that the the ideas from the participant are both drawn and written, adding to the richness and authenticity of the presented experience. These stories were co-constructed with the participant, with the voice of the narrator only present for flow. Overall, the series of stories extracted through the interview processes provide a rich understanding of student Veteran engineers' conceptualizations of success.

3.3.3 Considerations for Narrative Inquiry

Two major considerations with narrative inquiry are both ethics and quality, both of which are tied closely together. Qualitative research, especially constructed narrative analysis is voyeuristic. It is important to be explicit that I, as a researcher, and you, as a reader, are peering at someone's experiences from afar, but with sometimes intimate clarity. Having this intimate knowledge can raise ethical concerns as to what the participant shares, and the role of the researcher in the sharing and presenting of the participants stories. I frame this discussion around the relationships between the researcher and researched, and the role of the researcher in narrative.

Relationships Between Researcher and Researched

One consideration in narrative inquiry is the relationships that are developed with participants. Researchers usually start the relationship with the participant being a source of information. Over time, the participants can view the researchers "as people in relation with them—a reminder of our short term and long-term ethical responsibilities" (Clandinin, 2016, p. 51). Josselson (2007) expanded on this idea stating, "People can give informed consent to participate in the research project, but they cannot give prior consent to participate in an open-ended relationship that is yet established" (p. 545). She likened interviews to flipped therapy sessions with the researcher being in a position of power as well as being the one who seeks to

benefit from the encounter. Related to the analogy, she stressed the importance of being neutral, neither agreeing or disagreeing, because people will share information that they would not ordinarily share. These are examples of short and long-term responsibilities of a narrative researcher. Ethical responsibility to participants applies not only to narrative inquiry, but human based research as a whole.

To address this ethical responsibility, I attempted to be as neutral as possible. However, there were times that I commiserated with the participants about military and scholastic experiences. To help ensure that I stayed true to the participant and allowed their story to shine through, I scheduled an interview set that was designed around them understanding what will be considered the “data,” their narratives. I was prepared, if anything arose where I had concern for the participants well being, to recommend resources where professional help is available.

Positionality

Positioning is essential to understand the role of the researcher or the narrative inquirer and to reflect on the approach to research (Clandinin, 2016). The narrative inquirer must hold true to the storied form, and the narrative way of knowing. Positioning is also related to reflexivity. Reflexivity concerns not only the epistemological concerns (what constitutes truth and knowledge) noted above, but who can study whom (Pillow, 2003). The researcher needs to reflect on who they are and why they are researching a given population or phenomena. I believe that my reflection starts within the positioning I did in Chapter 1, and continued as I explored the stories of others and reflect on both their and my past experiences.

3.4 Summary

Above, I described the theoretical foundations of narrative inquiry by linking educational theories together. I justified the use of narrative methodology. I provided examples of how narrative inquiry has been used within engineering education. I also

provided details of the methods used for data collection and analysis. Finally, I addressed some of the considerations that need to be met throughout the research process using this method. Through the narratives focused on success (Chapter 4), I present the stories of the participants which help to answer the research question: How do the stories of undergraduate Veteran engineers incorporate their conceptualization of success in their engineering programs?

4. STORIES OF STUDENT VETERAN ENGINEERS

The following represent the narratives of the students who participated in the qualitative portion of the study. They are contained in this independent chapter to give the reader the opportunity to delve into the stories and engage with the experiences of the SVEs (Student Veteran Engineers) through their distinct stories. The stories were created from a series of interviews, with the content sometimes disjointed. The words of the participants were organized for flow, both in content and temporality. The italicized portions of text represent my words, added for flow or to summarize participant information. The names are pseudonyms provided by the students. Table 4.1 contains a list of the participants and their respective military service. Below are their stories.

Table 4.1.
List of participants with pseudonyms

Pseudonym	Service	Undergraduate Major
David	United States Army Reserve	Industrial Engineering
Mark	United States Army Reserve	Mechanical Engineering
Digi	United States Marines	Mechanical Engineering
Ryan	South Korean Marines	Mechanical Engineering
Jay	Singapore Army	Mechanical Engineering

4.1 David

The way I would describe myself would be a Jack-of-all-trades. But, there's a specific saying that says, you know, the Jack-of-all-trades is a master of none. Funny enough, the first time I heard it was from my senior instructor in Junior ROTC [reserve officer training corps]. I can honestly say she was the biggest influence in

my life for what I want to become and who I want to be in the future. She said it in a passive aggressive kind of way, because even back then, I would still kind of spread myself very, very thin. I was doing gymnastics, ROTC, guitar, and I still kind of had to do well at school. I did okay back then. But, I was also straining myself kind of thin, as I am doing currently now. But when she said it, it kind of really resonated with me in a positive sense because I saw myself being able to have a little bit of experience in everything I can possibly do. You know, if you're just focused on military, you learn everything about the military. You're always thinking that mindset. But, you don't know if something can be working better or faster if you're just looking at it in a traditional sense. So, if you're able to bring the mindset of a civilian side, or engineering side, or even a liberal arts side, you can find different ways of doing things better. So, I'm trying to see if I can get myself through the military, through working at a retail job, going through engineering, to benefit any project I'm involved in and try to see if you can apply a kind of retail sense to the military or an engineering sense to retail, so just different combinations of what I am a part of and see if I can produce something better. So, I guess, industrial engineering would really resonate with that. Something better.

David is an industrial engineering student and an Army Reservist, and also works part to more than full time at a department store, but his story starts earlier than this point. Both my parents were born in Mexico. My dad got his citizenship as a kid and my mom didn't get hers until she was 43, so very recently she acquired it. I am a First generation Mexican American in my family. I guess you could say second generation college student. My aunt, my mom's sister, was able to go to college and get a degree as well. I'm born and raised in [school's town]. I lived at home for my freshman and sophomore year, and I moved out the beginning of my junior year. I've been here ever since. I'm the only one in my family currently going to college. I'm the youngest of four, so the second child would be my brother, the one who did Navy, he is doing trade school and he's trying to become a welder. I can honestly say his

experience in the military shaped how he is now. Unfortunately for him, it didn't affect him as well as it affected me. It was more of a negative effect for him.

I have always had it in the back of my mind that I wanted to join the military, especially for school. Growing up we didn't have a lot of resources. The military was the big gateway to college. So, I decided to do it. I was already fixated on that plan when I was 15 years old. I did have an Uncle who married my Aunt and he was military. Before I joined, my brother joined the Navy.

The biggest influence I had was the Junior ROTC program in high school. My parents, back in the late 80s, early 90s, they both went to high school and they both did JROTC, so I thought I'd give it a try. After that, going through the classes and having the instructors, that was the big factor in me deciding to do the military. Now the reason that I did the Reserves is to be able to go to college.

I enlisted in August of 2013, right out of high school. I was trying to go active, but I thought that going the Reserve route would be beneficial to me especially going to college. My goal was to be able to get my degree. I've been in almost seven years now, six and a half. And I've been through a couple of different schools, advancing in my specific MOS, being my Military Oriented Specialty, which is a Chemical Specialist, CBRNE specialist. Initially, I just wanted to do one contract in the Reserves. It's very different than active, so I just wanted to be in for six years, off for two, meaning I would actually go to drill and do my drill for six and just be inactive for two. If they need me within that two-year period, I would go. I just wanted to do one contract, but now that I see that it works very differently, the impact of duty, so I had to stay in longer to get 100% of my benefits. Now that I think about it, being in it also gave me a lot of ideas of what I'm going to do after I get my college degree which is just going to push me to become an officer and end up staying, hopefully staying in with 20 years to hopefully get the pension and other benefits. I've had one deployment in February 2016.

Usually in the Reserves, we don't have a lot of time to kind of train or keep up with everything that we have to do in that weekend. So, we try to emphasize as much

as we can because we don't have a lot of time to train. Surprisingly enough, I train and study for my job more than you would think. I consider myself with the CBRNE branch, the chemical branches.

Since being in the Reserves, David has been on one deployment. It wasn't as traumatic as you would think. It was very calm the year I went. I was a part of the Inherent Resolve, so most of the fighting was over when I got to Iraq. So by the time I was there, it was after any major attacks were happening and before we took back Mosul. So it was very calm.

The most memorable thing or experience I've had in the military was during deployment. I was a part of the chemical defense for a FOB [forward operating base], or a camp in Iraq. I would do a lot of briefing for the incoming soldiers in that camp and just describe all the chemical attacks that have happened, the dangers of chemical attacks, or what is imminent. I would instruct or brief a lot of U.S. Soldiers and a lot of coalition forces that were out there, so I would be able to cross train with Australians, New Zealanders, Canadians, UK soldiers, very little Spaniards, but they were out there. And, the most memorable thing that I had the most fun with was I was able to train with the Iraqi soldiers as well. So, I would do a lot of briefing for them and do a couple of classes and I got a chance to brief a couple of their generals. So, I was more of an instructor, in a way, out there. So, that's what I can see myself as mostly.

When I was overseas and I was tasked to do a lot of these in-processing briefings for a lot of soldiers that would come into our camp, this is back in Iraq when I was tasked to be an instructor. I had to present in front of many, many, many, many different forces. I just had to do so much studying, and so much preparation, to have a presentation and a whole show for people that need this information to survive if anything goes wrong. Through trial and error, through many, many, many rehearsals with my commanding officer at the time, I was able to have an impactful informational presentation that not only gave them a sense of safety with information that they got from the presentation, but a sense of understanding that, "if something happens

and if it does affect me, that's not the end all be all. There is hope for me to get through if I get attacked, and I can kind of keep going with what is going on. It's not as soon as I get it, I am going to die." I felt that that was very impactful for them. It just gave me this sense of relief and success when my commanding officer said, "this is good enough to be presented to anywhere from the Iraqis, Australians, Kiwis, to generals and majors in our Army."

I came back November 2016, and then I was able to get started on my college career the following year for that Spring semester 2017. I knew that [this school] was a good engineering school. When I was in high school, a lot of the upper classmen ended up going through the engineering route. I would hear a lot of feedback from them how good engineering was at [this school]. So, I just automatically had a mindset of going to [this school] ever since then. It was nearby. I can still be with my family. So, it was not only the fact that it was convenient but also a good engineering school. So, it just was luck I would guess.

Initially, I did say I started January 2017, but I did have one semester that I kind of don't count. I did start Spring of 2015. I joined [the military] in August of 2013, and I did my basic training and was able to get out by April of 2014. I was signed up for Stryker school, which is just a different school for my MOS. The school trains you to be in and operate a Stryker vehicle, which was specified for chemical branch. The vehicle just comes with all the bells and whistles to do any kind of detecting and surveillance of chemical warfare and any kind of attacks that happen. So, that school ended up not allowing me to do the Fall semester of 2014. So then as soon as I got out of that school, I was able to complete one semester of Spring 2015, but the reason I don't count it is because I got one F and two Cs, so it was not my best semester. I could honestly say right now that it's been my worst by far.

The habits I had back then were very bad. I went from you know just going to work every day because of the school, the Stryker school that I had, and just college life and it was a huge adjustment because I had been out of school for about a year and a half. Jumping right in it was just a different world to me. The reason why I

just didn't do so well was because my studying habits were of course really bad. I just had a mindset of, "You know what, if I don't go to class it's not a big deal." And I just put everything... I would procrastinate a lot. I would always think, "Oh, I'll just read this chapter later, you know, I'll be able to catch up later," and eventually everything just fell on me all at once and it was too late to kind of play the catch up game. I was just trying to do as much as I could before the time ran out.

Toward the end of the Spring 2015 semester, David's unit got news that we were going to be deployed the following year. So, I stopped any kind of pursuit towards a college degree then and just stayed on to train and just get different certifications through the rest of 2015 to get ready for our deployment. So, then we just went over our pretty much full time by October of 2015. So, we're pretty much active on active duty orders for the remainder of 2015 and then the deployment took place. Now, just to jump ahead a little bit, after the deployment, that's when I decided to continue college, but because of the deployment, I feel like I did a lot of growing up. I went through a lot of changes out there. And so, then by the time I came back, I had a clear conscience and a clear mindset of what I wanted to do and how to do it and that's basically all due to the deployment. It was able to help me kind of grow up a little more, so I was able to you know hit the ground running as soon as we got back and just haven't stopped since.

I've been able to narrow down at what specifically I went through to kind of realize what I did and didn't do [the "first" first semester of college]. And through these couple of semesters that I've had, I've always had to write about myself, especially in rhetoric writing classes. I was able to kind of like explain, and I've picked up a certain speech about it. I just didn't see, or I didn't think about the impact it would have if I failed the classes. I just didn't have... I was just really immature in my way of thinking. I always thought you know eventually I'll be able to do this; you know, eventually I'll pick this up, and I never worked towards getting better. Then by the end of the semester, I had failed a class and I had gotten two Cs, so my GPA was 1.7. It's below what you need for financial aid. Then after I saw that, that's when

it shook me. Like if I don't change, I'm not going to be able to do this in the long run. So then it was just, I guess you could just sum it up as not seeing the impact of actually going to college or the impact of all my grades and how that was going to affect me in the future.

David is not only a Reservist and a student, David works a minimum of 20 hours during the regular months of the year, but when it starts getting closer to holiday season, because it's a retail store, I can see myself doing 40 to 60. So anywhere from October all the way to the beginning of January, I'm doing about 40 to 60 hours a week. In the beginning of my college career, I still had that other job that I would choreograph, and I would still do a couple of events. That slowly started dying out because I needed to be at my school more and at my civilian job. So as of right now, I'm in administrative support for [department store]. I do a lot of their finances, training for new employees, a little bit of HR. So I'm more of a behind the scenes guy.

[This job] doesn't affect me when I go to the Reserves because by law I have to go to the Reserves. So, when I have to go to drill, I have to go, regardless of what work says, but I try to put in as much time at work as possible. Even after I get out of drill sometimes, I would go back to work, just to put in the time and effort, just to let them know that just because I have this military, doesn't mean I am not also very interested in helping my department out. And, school is the one that kind of suffers the most. It's really hard to balance, you know, a set schedule from 20 hours a week and then just automatically just double or triple it. I still have school to do, I have group projects to do, and it's just there's not enough time in the day to be able to kind of hit everything. So sometimes my grades do suffer. Fortunately, I don't have to pay for my own school, so even if I do fail a class, it's not the end of the world. Most times, I am able to pull through and get a B or higher, but very few times I've had to take a D or an F. As of right now I can say that I've only failed two classes. One in the beginning, in the Spring, and one recently. And then all the other classes I've gotten a D, but a lot of times you need to retake the class even if you got a D

because in engineering classes you need a minimum of a C or above to continue. So, for sure I've had to retake a couple of classes because of the D. The F, it doesn't affect me, because of the rules at [this school]. You can get it replaced as soon as you redo the class, which is good. So, work does affect my school.

For example, in my Department we are three people, and between us three, we have our boss, our lead, and then we have two part-timers, which would be me, and this former employee that was with us. Now I would kind of pick up the slack at the very end, so back then I would get anywhere from 12 to 20 hours. This coworker ended up going to the hospital for about 2 months so the work kind of fell on me and my boss, so because of that school did suffer a lot because I couldn't leave this job that was kind of very flexible and very understanding of my school and the military. I was there and I wanted to show support so I couldn't leave the job just because the work got heavier. So that specific event kind of threw me off because I wasn't used to the job yet and I wasn't used to the amount of hours I had to be putting in. So that right there, I can isolate as a factor of it just kind of throwing me off. Because, there was a one week period where my boss had to take mandatory vacation and it was just me trying to run the entire store, doing training for newcomers, doing the financial side of the store, and then still having to kind of fix problems day in and day out depending if there was a mishap with a charge or a return or things like that. That just would come up daily. So I could honestly see myself waking up at six o'clock in the morning to be at work by seven and then leave by eleven to go to class. Then I have to go back to work at the end of my school day and stay there till about eight o'clock at night, go home, do homework, and then hopefully get everything done by midnight to go to bed and wake up at six o'clock in the morning to do it all over again. It just threw me off. It was just crazy.

So then she [the boss] was able to come back and then after that everything went smoothly until November of last year, it's around the holidays like I said, and my hours jump from 20 to 40. Her [David's coworker] husband is in the military, and he ended up PCSing [permanent change of station] to Georgia and she went along

with him. That left me and my boss, again. Fortunately, she didn't go on vacation. But, it was just a huge jump. That was another period of struggle and I feel like it was affecting my schoolwork more than the military. It was just a lot of adjusting to do. Now more recently, because of all the traumatic events I went through, I am able to balance it out little better. For an example, this past month, actually a couple of weeks ago, I did CLS training, which is Combat Life Saver. It's a course that is like a step down or a couple steps down from an actual combat medic. You just learn basically combat first aid. I get certified every year in February, but I got the opportunity for this class during the second week of my school. It was kind of in the beginning of the semester, so it wasn't that bad if I missed.

I did the right thing. I sent my professors a copy of my orders so that they could excuse me and kind of give me a little bit of leniency. And work unfortunately was a little harder to convince because I was voluntold to go, and I have a set schedule for work, so it was kind of hard to kind of help both, especially because we didn't have the coverage. My boss went on vacation, and we have two new employees to train, specifically in our Department, which kind of alleviated some of the work. But, I still had to be there to teach them. So, what I did was I went to work in the morning at [department store] and then I had to go to my CLS class for training. Luckily, it was five minutes away from the store, so driving was super easy. I went on base to do my class. I had a two hour lunch which I took to go back to work at [department store] and then, you know, after I put in two hours for lunch, grab a quick bite, I went back to finish the class. We got out early, so I was able to have enough time to kind of take care of school stuff anywhere from my statics class, my online class that I do. I actually felt OK. I wasn't as panicked as I was the year before. I was able to control everything. I knew how much time I needed to work my classes and the combat life saver course, so it was more relaxed. I was able to manage everything a lot more, so I felt a lot more prepared this time around. So slowly but surely, I've been able to kind of organize and handle everything all at once now.

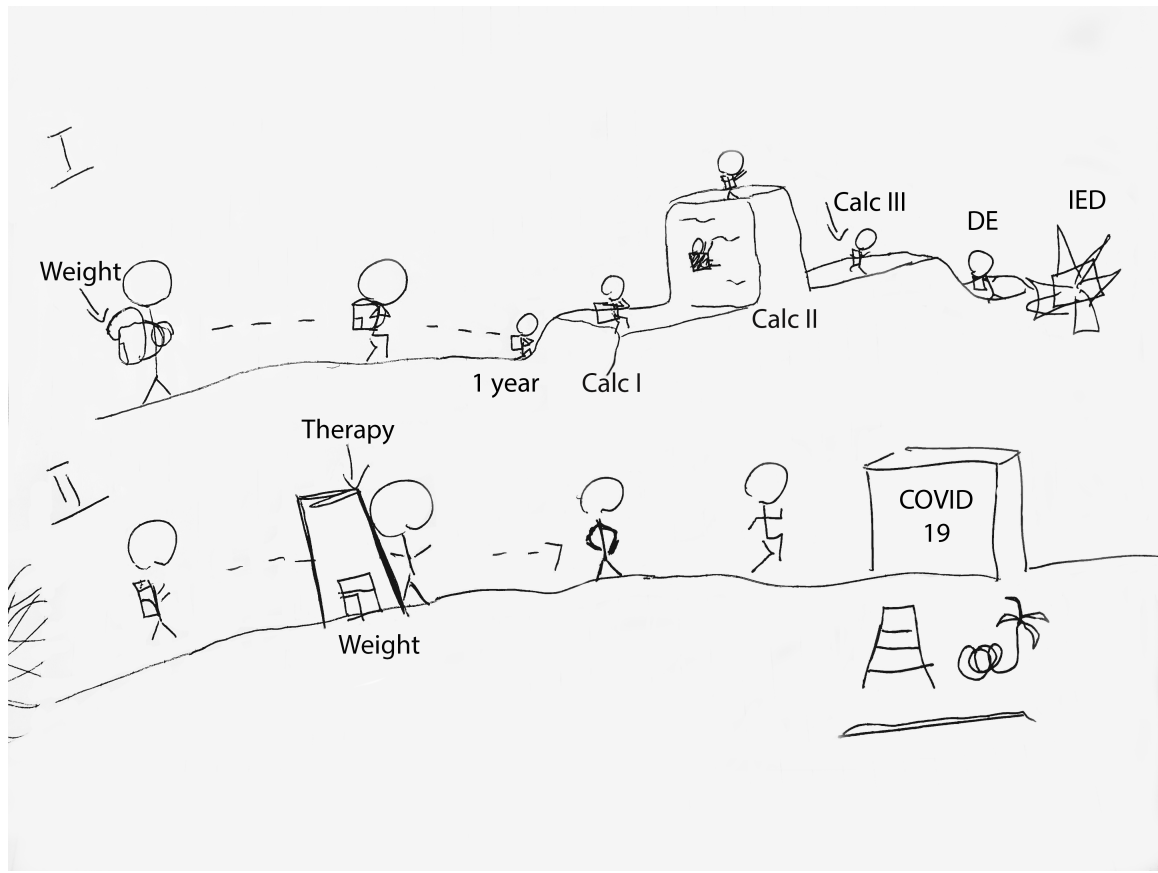


Figure 4.1. David's journey map of a time when he was successful in engineering. This journey map shows two scenes. In the first scene, David is shown carrying a weight as he moves through different college courses, first a bump for Calculus I and then a wall for Calculus II. David is shown scaling the Calculus II wall, and then once on the other side, he moves through Calculus III, and then down through Differential Equations. The end of the first scene ends with an IED exploding. The second scene starts with the IED explosion, and shows David taking the weight he is carrying into therapy with him, where he drops the weight and leaves therapy to face the next wall, COVID 19, with tools, shown as a ladder, pole vault and grappling hook.

David was asked to draw a journey map of a time when he felt successful (Figure 4.1), I guess the way I see it, I have a lot of different definitions of success. There's, to me, it could mean "a job well done," or "a good grade on a project", but to be extremely successful is to prove that you can do something when there is doubt from

yourself. It's kind of proving yourself wrong, regardless of the way you've been telling yourself. "Maybe I can't pass this test. Maybe I can't finish this project. Maybe I can't find a solution to the problem. Maybe I can't find a different way of making the system work better." Finally, being able to say, "You know what? I was wrong. I was wrong to doubt myself. I was wrong to say that I couldn't do something when I have all the tools in front of me. I just wasn't using them the right way or in the right order." So, if you have confidence in doing something and you do it without doubting yourself, that's job well done. For me, it's all the doubts that I have had about myself and finally overcoming those. If you doubt yourself because you're having a hard time, but you proved yourself wrong and you find a solution to not only help yourself, but potentially help someone else, that is success.

David saw his presentation on chemical attacks as a job well done. There was no doubt in myself, because I had gone through doing all the training that I needed to be able to do the presentation. It was more about just getting over the fears of presenting in front of people that really don't understand what's going on. Our regulation is not the same as the Iraqi or the Canadians'. So what I needed to say, needed to be factual, correct, and presented for them to understand, especially for the Iraqi's. The ones that I was presenting to didn't speak English. There was no doubt that I would be able to get it together. There was a little bit of a doubt, but not enough to me to have the same sense of success that I had with Calc II.

So, the character is myself and I'm carrying a bag. This bag is filled with baggage, just things that I've carried with me. Either grudges, ideals, past mistakes. They are all just bunched up into bags. Emotional baggage and mental blocks that I would have. Unfortunately, I carried that around with me throughout the first couple of years of my college career. This is why you would see most of the characters holding a bag. I separated it [into I and II] because the way I see my college career, it really did change after that one incident. That is one of the reasons why I made that one incident split everything in half. [The scribbled lines to the left of II are] just to indicate that that part is the IED. That is just the continuation point. [The size of

the weight] is pretty much the same size. It only changes when I finally leave it after therapy. I chose two [events] because when I was thinking about it, these two are really impactful to me. So, the first event is overcoming Calculus II, and the second event is going to therapy. It was really hard for me to kind of choose between the two, because from how I see, they both affected me the same and I felt the same level of success coming through them. A third would have been COVID, but we're currently going through that. I don't know the extent of the impact it is going to have on me and the impact it's going to have on everyone. So, I wouldn't really isolate that moment as something that affected me the most or more than the other two, because everyone is being affected the same as me, with some people more than I am.

The first one was I did have the hardest time trying to go through Calc II until finally I was able to pass, specifically because of my professor. I myself am not really good with math. I understand it. I liked math as a kid, but as soon as we started adding letters to it in algebra, it just became confusing for me. I was always able to keep English and math separate until it got jumbled together, and then we have unknown variables. Calc I was a bit of a struggle. Later on, you see Calc II. I really did struggle with this one. It took me awhile to overcome. I had to climb the cliff with a bag, which made it a lot harder.

So, I'm a little embarrassed to admit that I had to take it three times to pass. The third time was the charm. But, at the same time, I didn't know anyone else that had failed more than one time and then passed the class. Now that I can say that I failed the class two times before I passed. I feel like I should be able to share that with people. A little ashamed, but thankful. The professor that I had the first time, very interactive, but when it came to the exams, they were very hard. He would give little to no indication of what he had wanted, and it would just be one small sentence which was one small problem and a blank canvas. It was just, "Here you go." So, it was kind of hard to go from a very interactive person that, you know, kind of gives you the reason behind why we do things, and then exams or the assignments you get would have little to no help on there. It just was very hard for me to kind of

understand how he wanted things done. A lot of professors, if you don't do it the way they want you to, then it is just wrong. Most of them for whatever reason don't give credit for the correct answer, they give credit for the steps you took. So, if you do something that you learned outside of the class, they see it as, "it's wrong," regardless of the answer. This is a little unfair because there's many different ways of getting to the right answer in math, some more specific than others, but in these instances we were learning, I saw it as so long as I was using the method established in the book, it would work. He was very difficult. My second professor, less interactive. Pretty much no enthusiasm in his work. I never heard him raise his voice in excitement or anger or frustration. He was very monotoned. He gave out homework regularly and quizzes regularly. He was a little more descriptive on what he wanted to do, but I would just find myself not engaged in the class and just drift off. I understand that college is very important, but to me, I just didn't realize how impactful my third professor would be until I went through this professor. I just thought, "OK, this is going to be every class from here on out. This is going to be how every class is going to be taught. No one is going to have any enthusiasm. I am just going to have to power through and learn on my own." I couldn't, so then I just failed it a second time.

So, then I took it a third time. I got a professor who had a thick accent. He was from Venezuela. He was very laid back as far as formalities. He was very welcoming. When he would teach, he would be so enthusiastic. He would be able to give us a lesson, and within the lesson, he would be able to get us excited. And, he himself, he would be so excited he would be able to teach us anything with Calc II. He would be like, "Look! Look at this! This is really, really exciting!" And, with that, I lit up. I was just so amazed at how this professor was teaching. And, he was excited. Regardless, he taught the same thing as the class before would, he would have the same energy from his first class to his last class. That just changed my perspective on math classes in general, and all the classes I have taken. Unfortunately, I didn't have again the easiest time, but with him, I was able to pull off an A when I kept

getting Ds. I didn't really fail the classes, but I see the D as a fail because you need a C or higher to pass. I finally got an A. That was a huge jump for me, from a D to an A. I was able to pass that class with him and then I took Calc III with the same professor, and I passed that with an A my first try. I saw him as so impactful to me and the way that I learn and how I was absorbing the information from him.

On there [the Calc II wall], I told myself while climbing the wall, I told myself, "If I don't pass this class, if I can't pass it on the third time, or if I can't pass it once on this third try, I'm going to change my major, I need to do something else." This is the point where I told myself, "If you don't do this, you have to find a different career," and the fact that I was able to pass it, standing on there, I was finally able to say, "I can do this. I can be an engineer. I can get through all these other classes and become an engineer." Thank God for that professor because he was able to help me through Calc II and Calc III and set me up for the rest of the courses that are coming up. Once I was successful, Calc III and differential equations went pretty quick. So, I was able to get through those.

Although David wanted to be an engineer for a long time, his reason for why he wanted to be engineer changed while he was in Iraq. So, before [the deployment to Iraq], going back to when I was about 14 or 15, I had my own business. It was a very under the table kind of business. I'm very into dancing and choreography. I would get hired to choreograph events, specifically for dancing. I would help a little bit on the planning of the events, but mainly focus on a couple of dances. And from there I had the idea of, "You know what, what if I open up my own dance studio along with a catering business, a tuxedo business, having them all kind of work together to provide a specific package for our clientele and things like that?" So, I kind of wanted to be an industrial engineer to find the best process and the fastest way to plan a party, and have you know, the clients not worry so much about the planning and just enjoy the time that they're having. So, it went from a business standpoint to more political change.

I was out there [on his deployment in Iraq] for the year of 2016. That was the last presidential election that took place. And, day in and day out I'd be out there just listening to news, watching videos, keeping up with what's going on. I was very interested in politics. More so than I thought because what did wake me up was some of the misinformation that was out there, especially coming out of the candidates themselves. They would either cite a survey incorrectly or misuse information given to them, then just push their agenda, just to convince people that what they were fighting for is right. And, the biggest factor that I kind of paid attention to was the public education system and how some people wanted to cut the funding, or just put funding somewhere else. It really did bother me.

I've always wanted to be an engineer, but for other reasons. So then, when I was out there, it gave me a different reason to become an engineer. So, because I saw this, it kind of slowly started molding itself into an idea. I need to be able to kind of push out correct information. Kind of be part of a legislation that kind of enforces the importance of education, the importance of politicians being science literate, engineering literate, or at least have the understanding that if they're not experts they need to have someone on their team that is getting them on how to use information correctly, how to actually do research on certain topics and how to actually admit that you if you don't know something that's perfectly fine. Because you always have the ability to learn it. So my idea was to hopefully, eventually, become a politician that has a background in the military and engineering to be able to be a part of legislation that kind of enforces education, the importance of using assets available to you to enhance any kind of structure, whether it be with engineering projects, helping the military out, or education. I want to be not only a politician that could enforce the importance of STEM, but also have a background in military to understand why we're going to need a military. Why some legislation and funding needs to go to the military, but also needs to go back to our educational system. The way to improve the society is by education. It's always education. So

the more educated your public is, the more educated the leaders will be, and therefore the entire system kind of rises up.

David chose industrial engineering because he is trying to please all the avenues that I have for myself. Another aspect of why I want to be an engineer is to be a part of a lot of climate change prevention projects. I'm very involved with what's going on with climate change. You know, what can we do to stop it. And so specifically for my field of engineering, I feel like being an industrial engineer kind of helps you be a part of every branch of engineering because you're part of manufacturing, or more kind of helping a system kind of running more efficiently its like developing a car, to developing a more fuel efficient car to kind of seeing how we're able to as community recycle better, use solar power and any kind of other environmental friendly power sources. Industrial engineering kind of gives me a reach everywhere so more on the environmental sense. That's why I want to be an industrial engineer. It does a lot with numbers and I'm really bad at math, so I felt like if I take this route, I will be able to a) confront my fear of math and b) still be able to be a part of all the other branches of engineering.

As I was walking, at the end of the first half of the drawing, you see an IED explosion. This was the event that happened in [city]. There was a mass shooting in a [store], and [several] people have died now because of that incident. This is a bit of a wrench in everyone's life here. So, I see it as a huge event in my life, as well as everything that I'm a part of in this community. It led me to go to therapy. The first three sessions were about what had happened, why I went to therapy. I kept going because I knew that there's always been something inside me that always wanted to get better, not just physically, but mentally. I stayed there. I didn't really know what was wrong. I didn't feel anything was wrong. Me and my therapist were able to talk through things that might have been a problem that I didn't know about. Through that, we were able to continue on making my mental state a lot better. Through that, I finally felt clarity.

After that, in the second half, I am walking out of there. I went through therapy. In the pictures it is depicted as a little gate. I was able to drop off this baggage afterwards. The reason why I went to therapy was due to the incident that happened here. I felt guilty and saddened by what had happened, and I didn't know how to deal with it. At this time my fiancé, she had left to go to basic training. So, I was by myself, and I didn't know how to deal with this correctly. I had spent some time with my family, but even with them, I can only talk to them so much. And, my fiancé, since she was in basic training, we had no communication or regular communication. I would talk with her maybe once every two weeks. There was no sit down, talk about, you know, what I'm going through. I had to go to therapy.

Once there I was able to kind of deal with this whole survivor guilt that I had and this whole feeling of uncertainty. I felt guilty because in my job, I do a lot of supply shopping for the store I work at [department store]. The mall is right next to where the incident happened. Luckily, I was at drill, so I was away from work and I didn't go to the mall and I didn't go to [store]. I do go there often to buy supplies for an event that is coming up or if we are running low on our suppliers aren't shipping what we need. In emergencies I would go. At that time, I could say I would be going to the store maybe once every shift. So, if I was at work, I would have been there. I was happy that I wasn't. So, that's initially why I was there [therapy] so we had to deal with that. And then, I kind of felt guilty because I felt sad. I kept telling myself, it is not right for you to feel this way because it didn't affect you directly. Now after a couple of sessions I was able to kind of get over that. I stayed there because I knew I wasn't 100% where I wanted to be. I have always been an optimistic person. I look at the brighter side of things. I could say I was 85 or maybe 90% there, but I really feel like that 10%, 15% was holding me back.

So, I stayed. We kept talking about different issues, a bunch of different things that kind of bothered me a little but I always let them go. I would be like, "You know what, things are just this way. Things are supposed to happen this way." Finally, after a couple of sessions, I kept thinking to myself, I'm going to keep going to just

one more session and see how far I can go. The progress wasn't huge. It wasn't miles of success. It was baby steps every session. I think I went a total of, I did it once a week for about 3 months, so 12 sessions. We took a break for winter, and then I kept going for a couple of more and then I stopped. Throughout those sessions, I was able to understand myself even more than I did before. I was able to understand that the way you feel about something is always right. If an event causes you to feel sad, mad, happy, depressed, angry, it's okay to have those feelings. Your emotions are reacting the way that they are supposed to. They are telling you about how you feel about something. How you deal with those feelings and how you act because of those feelings are what is more important. You can feel how you feel, but after that, you have to know how to react and act on the feelings.

With that, I felt just so empowered to tackle situations that occur and myself react and act better. I was also able to relieve the weight of stress. I tend to stress about situations that I really don't affect me. I tend to over stress on things that are happening to other people. And, if they are feeling a certain way, I worry, and I worry, and I over worry. I was able to understand, "why am I worrying for them? I should try to help them instead. I can help them without worrying about them so much." I was to leave the baggage of procrastination and the feeling of, "maybe I'm not good enough. Maybe this one event is proof that I'm not going to be successful." So, a lot of the things I was able to get over, I was able to get over because of therapy. Coming out of that, I felt like I was able to handle every situation that came at me way better and have my motivation back and my determination after the incident. I am continuing my college career, you know, with a little bit more understanding of what to let go and what to keep with me.

Towards the end, you see a wall that says COVID-19. This is a struggle for everyone, not only with avoiding the disease, but trying to address our lives with it. As of right now, it's a wall. So, my wall right now, is just the event that has been happening not only locally, but globally. It is affecting everyone a different way. It is putting a roadblock on a lot of things. For example, I had BLC [basic leaders course]

lined up in April. It got moved to June and now it's not happening physically. We're going to be doing BLC online.

BLC is basic leaders course. It is a course that I need to take to become an E5, a sergeant. I had multiple opportunities to do it in the past, but school always got in the way. If it wasn't school it was work. So finally, I had a slot open this Summer to go to it. Originally, I had a slot to go to Puerto Rico, but that was cancelled. Then I was going to go to Wisconsin, and then finally now I am going to do it now online.

As far as I know, I would be the second person going through BLC online in my unit, so that's going to be different. It's also kind of put a wrench in how school is working. It is making it a little more difficult. If for example, I got paired with my same teacher in Calc II, my third teacher, and this happened, I can see myself not being able to pass that class how I did because of the teacher. If we had done everything online. I'm expecting to kind of learn differently and having to come up with ways for me to understand the new material that is coming through. It did put a wrench in how I was going to work. I was out of work for about three maybe four weeks. Thankfully, I get most of my benefits from school, the military, and other stuff. I was okay. It didn't impact me so much to where I was financially struggling. It just stopped me from going to work and having that sense of urgency that gave me a good sense of stress, the good stress that keeps me going. I have that need to go to work, I have to go to school, I've got to do homework, I've got to go do this, this, and this. As soon as they took that away, it just threw me off. It was a huge relief for the first week or maybe week and a half, but then afterwards, the same thing over again. I get up, I work on my homework, school, all this stuff. I go for a run and come back. It was just the same routine over and over again. But now, I'm back at work, so that's a little better. Everything is changing. So maybe that wall that was there isn't as big, but you know the closer I get, the bigger it might get. I still don't know how were going to continue, if things are going to stay this way, if there is going to be a modification later on, or if it's just going to put a halt on everything. I'm just trying to understand the diameter of the wall, and severity, and how thick

it is, before I able to make a game plan on how to get over it, under it, through it, however I need to, to get on the other side.

I don't know how to get over it, as far as right now. There's a bunch of tools on the side. The ladder, a grappling hook, and a pole-vaulting stick. Obviously one of the tools is a lot easier to use than the others, but the others are the quicker way over. I don't know how big the wall is, and I don't know if I'm going to need one tool or I am going to need all the tools or what exactly I need to do to get over this wall to continue and progress with everything.

David has found many benefits to being an Army Reservist. So, like I said it's very, I guess in the beginning you could say I sort of find natural benefits. You know you're always needed, so you're always going to have a steady job. You know the benefits are there. The payment is there. The financial stability was what drew me in. I stayed even if the classes were hard, because of what experienced on deployment. I saw a need to expand my knowledge and my way of thinking, that way I can employ whatever I learn into all the other things that I am involved in. For example, I can see I could use my engineering mindset in the military in training. I can use it for my work at [department store] and things like that.

At school, David has several resources available to him for support. At [school], actually it was the therapy. The counselor that I went to at [school], I was able to talk to them about everything that was going on. She was very understanding. She didn't have a background in the military, so most of that stuff I had to explain and talk through. She was very helpful, and I was able to go to her because of the tuition I paid. It's part of the tuition when you pay for [school] it is just one of the resources that you are able to talk to. So, that was a huge help. There is also kind of like an outreach group that she had informed me about that I could talk to. A lot of military folks that are in this specific group, the Veteran's group, you're able to get with. I haven't had a chance to go to that. It's just another resource that is there for me. I guess the other support system that you can see is tutoring, the professors. I do feel like some of the professors are more supportive than others. I could say that about

my Calc II professor. The last one was there. He himself was a support system, because he was a lot more than just a professor or instructor. He was a friend, a mentor. I would see him as an actual support system.

Not only is there a support system for me in [school] to help me through everything that's been going on that's outside of [school], but there's also a support system for me in my unit to help me with everything that has been happening outside of my unit. In active duty, everyone pretty much has the same life so there's not really huge differences in what is going on outside of it. But in the Reserve side, those differences are tremendous because we're only there for one weekend a month and we have 28 other days that things can happen that are different for everyone in different ways. So, a lot of times when you work at drill, I am able to share what has been going on this past month or the past couple of months, and I am able to ask questions and understand that not everyone has the same things going, but everyone is able to help each other. Some of the Soldiers in my unit, they are going to school, maybe not in engineering, but nursing, law school, maybe they are just doing a trade school. They are still very helpful and very supportive when we talk to each other about what's going on in school. I feel like I am a lot closer to them than I would be if I was on active duty because they are so helpful and so caring. With everything that is going, one of my Sergeants that transferred out to Washington and she still messages me on, "How is school?" and, "You got this," and, "You're gonna do great," and "Just a couple more months or a couple of more years and you'll be an engineer." It is so helpful that I have those connections inside my unit that help me with those things that are outside of my unit.

I didn't really speak about how the military has been affecting my college career after my deployment. I don't know why I forgot to mention it, but it's actually helped me a lot. Like I said, I had a better mindset and better just idea of what I wanted to do. Because of my experience in the military, because of what I went through, I can honestly say that you know when it comes to group projects or when it comes to presenting myself for a presentation or lecture that have to give on a specific topic,

I'm able to get up there with total confidence and just speak my mind or to get people to put in a little more effort, especially in group projects. Because you always have ones or twos that don't always want to put in as much, but instead of just kicking him out of the group and finishing it up, I feel like I'm able to bring them in. Even if they don't feel like they have anything offer, they can offer something. I feel like because of my military background and because a little older than my classmates, I feel that I can have a better attitude towards the assignments or the work.

I had to take a couple of RWS [rhetoric and writing studies] classes. Everyone has to, but for my first RWS class, I was paired with a couple of other students. I was in a group of four. Two of us were 24, the other two were, one of them was 17, she started college very young, and the other I want to say was 19. He was actually from Kuwait. He was here on an engineering program that they have that they get to come over here. So, I was able to bond with him, especially him being from Kuwait and me being over there in Kuwait and Iraq. I was able to kind of speak a little bit of Arabic to him, and we kind of like made a branch on that. We just started being able to just communicate a lot better that way. So it kind of like put his walls down and he was able to talk more. And for the other two, I know a 17-year-old and a 24-year-old don't have a lot in common. I was able to, you know, put my hand out and kind of like try to see how she's dealing with everything, because you know she's very young to be in college. She's 17 years old. She spoke mostly Spanish, so she was kind of closed off. I was able to kind of like speak to her and bring her out of her shell a little bit more that way she can kind of share and take on tasks in the project. And last girl, she was more on the introvert side. She was very closed off and she wouldn't speak a lot. I would just try to find common ground to also bring her out of her shell. She's very into video games, Anime, that kind of stuff. I wouldn't say I'm an expert on that stuff, but I do watch and read a couple of things. I was able to make a bond on that. I am used to that in the military, because you're always with a certain group of people and you never know if in a split second, they're going to move you to a different platoon or a different company, so you just always try to

build that common bond. And so, because I was so used to doing that, I was able to bring it on over here, to have a little bridge with all my teammates, able to bring us all together. Because of that we're able to kind of communicate very fluently, even if the Kuwaiti student wasn't able to speak Spanish and she [the 17-year-old] wasn't even able to speak English. There were like three different languages going around, so we were able to get them to communicate and things like that. I may not have been the only thing that kept the group together, but at least be able to bring them together.

4.2 Mark

Mark is a U.S. Army Veteran. He joined the Army and served for over six years as a Reservist before transitioning out of the Reserves. Before the military, Mark was an athlete in high school, participating in track and field. He also had a strong high school academic record. I mean I did pretty well in high school without really even trying very hard. I'd say I was a smart kid. And I was pretty good at math and sciences and stuff. Mark's family had a strong influence on his choices and shaped many of his decisions, not only his decision to change what job he did for the Army, but even what starting college major he chose. When Mark was young, his parents divorced. To help him deal with the divorce, he visited a psychologist. When Mark started college, he began to study psychology, because he wanted to help people that were going through some of the same troubles that he had experienced.

Even though he was excited to start school and begin a new chapter in his life, going to school represented its own set of challenges. I mean I was just like 18 at the time. I had tried going to community college right out of high school, but I had an hour commute each way. I was trying to like live on my own, do the whole thing. And honestly, I just kind of bungled the whole thing because I wasn't really ready. I didn't have a real goal. And I believed at that point that this was kind of just like... this is

supposed to be the next step. And then when I wasn't succeeding because I didn't, you know my heart wasn't in it, I kind of just said OK and didn't fight for it.

Mark started going to college directly after high school because it's the next step. It is what everybody does. Instead of a trade career, education was the "obvious" choice for Mark, largely because his parents both had graduate degrees. His father had multiple master's degrees and a Ph.D., and his mother was working on her master's degree. At least to me it was the thing you're supposed to do at that point. If it would have probably continued, it would have been a way for me to continue the sort of lifestyle that I wanted and was used to having. To have just a degree and a career, normal life stuff. So, that was kind of just like the only choice for me at that point. I wasn't really looking at other things. I didn't really know what I wanted to do, but I did know that I wanted to pursue a college degree and move on, whether I knew what exactly that was, maybe not, but I did know that that would bring me to the kind of lifestyle that I was expecting to have and expecting to try to build.

Mark chose a community college that was about an hour away from his home, even though there was a local community college for him to attend. He chose a school an hour away for the athletics, because I was pretty big into athletics when I was in high school. I was trying to continue on with that, so I went where the good coaches and teams and stuff, to see if that could continue to be part of my life. I went to [community college] specifically because I was interested in the athletics program. I did track and field there. I don't think I was even there long enough for the season because the season is a Spring season and I was there in Fall. I could have gone to one, you know, nearby, down the street from my house, but they had a very high-level team where I chose to go. At least for my specific event in track and field, they had some of the Japanese Olympic coaches there that were the head trainers there [at the U.S. community college]. So, it seemed like a good thing for me to do, at least in the sense that if I wanted to continue to do that to the best of my ability.

I think I made it through like one semester. I was 18 years old. Like I said, I just didn't have, you know, something long term that I was like, "This is what I want.

This is what I believe in.” I just needed to do something, you know. I was just not in the headspace to be able to jump into and take care of that. I mean some people are, but for me I just wasn’t really sure where I was going and what I was doing. So, it just didn’t work out for me. Having to pay all my own bills all the sudden on top of trying to fit all this stuff in, it just didn’t, it was just kind of like too much pressure without me having something that I was working towards. I was just kind of rowing the boat in circles and just trying to go through the motions. So, it didn’t really click with me at that time. I wasn’t originally going for engineering. I was doing psychology I think when I first got in, or when I first went to school back then. And I mean I only went for the one semester, so I didn’t really get a ton of experience with that. It just wasn’t my cup of tea at the time with all the other stresses that I was still trying to get used to hanging over me. I just wasn’t ready to handle that as well.

Mark joined the U.S. Army in 2007, two months after his first semester at community college. He joined the Active Duty Army first to be a member of an Explosive Ordnance Disposal [EOD] team, but then, because the school was full, he decided to transition to the Army Reserves. He wanted a “technical job” within the Reserves because his family was concerned for his safety as part of EOD and provided pressure for him to switch to something “less dangerous.” So, he spoke with his recruiter, got his contract changed from Active to Reserve, and became part of Psychological Operations.

Mark joined the military to help pay for school and as an opportunity to grow and develop. Yeah, I’ll join the military for a while. I will figure out, you know, at least take some time to think about what I want to do and be able to pay for school on top of that afterwards. So, it was sort of like a placeholder where I was looking at the benefits to go to school. Also, to just give myself some time to just grow up and figure out what it is I was trying to do with my life. And I was like, “I need to do something.” The Army was sort of like a no brainer kind of thing where I can just go and I’d have something to fill up my time. There were definitely benefits to it, but

I didn't have to think too hard about it because I expected to go in, be the bottom of the totem pole, and just be told what to do all day, which worked better than me having to try and decide what to do all day with my time.

Mark did one deployment to the Middle East. I volunteered to deploy with a sister company on their deployment because I was not able to get a deployment with my unit, they weren't on cycle for a long while out. *When Mark first reported to his unit after attending his AIT (advanced individual training) where he learned the skills to perform his Army job,* his unit was already in a "pre-mob" phase, as they prepared for their mobilization. They were too far through the training when I arrived to join them, so I was left behind. I spent about a year and a half in the Reserves sitting around with maybe 15 or 20 other people doing not a much at all, as my unit went through their pre-mob and actual mobilization.

Although Mark was "sitting around," he was still able to promote to E-4. An example of when I was successful in the military was getting promoted to E-4. I define success as being able to make real, long term goals and achieve them or be satisfied in your effort or progress when/if you decide to adjust those goals for another that may now take precedence. While I didn't exactly have much control of the timeline [for advancement], I knew what was expected of me in both attitude and stepping up to lead more junior soldiers. I spent time learning the material and skills that were expected of me to a high level and did my part passing them on to those below and around me. I volunteered to teach short classes and took chances to lead and prove my abilities when given the opportunity. I made myself available when things needed to be done and volunteered my time and effort in appropriate situations. Because of this, I eventually was promoted because I was proactive in discerning what it was that was expected of me at the next level and put myself in a position to both learn and then demonstrate those requirements.

Mark described his military experience as primarily his deployment. I would say most of my experience is really just my deployment because it was completely different than what I was used to. The normal, one weekend a month and then random other

trainings here and there wasn't quite the real deal. It was interesting going from... I don't want to say we weren't trained at all, but when you're not doing it every day, it's almost like a part time job, but barely even that. So, it's just go and show up and it's like you're playing the game for the weekend until you leave and then you're back into it... we kind of just did our own training [and] we went to the range or stuff. *During his deployment, his military experience was much different.*

Even though Mark had signed up for a "technical job" in the Army instead of EOD (explosive ordinance disposal), he still wound up being in the thick of things in Afghanistan. Little did I know I was going to end up in the hot spot of Afghanistan anyway, doing all the same stuff and was in probably more danger than I would have been as an EOD in a lot of instances. Since they ended up just using a lot of the little robots they had sent out to do stuff. And anyway, from my experience around them they usually just sat in the truck while I was deployed with Marines out walking around on foot because we didn't have enough trucks to use every time we left the wire. It was all just foot patrols and fighting. It didn't end up the way my family was hoping it was, but you know, that's just kind of how the game goes.

I was, as part Psychological Operations, part of the special operations community. When we deployed, we kind of went out in different areas supporting the large infantry style forces. So, when I was working with the Marines, we were stuck out on many small bases, forward operating bases. We only had a team for each small AO [area of operations], where usually you'd have an entire detachment working out of somewhere supporting a larger company footprint. But we were out there, each of our teams are just supporting different company AO for the Marines. So, we kind of had a lot of, I don't know if freedom is the right word, but we're sort of taking on more work and more responsibility in our own areas than we usually would have. Supposedly, you know our team was three guys, and we had our own translators to do our work. I was the low man on the totem pole for that one, so I would have supposedly been the driver and then my assistant team leader is kind of like the helper. The team leader is supposed to be the one going out and doing the important work, doing the

interviews, writing all the reports, that kind of stuff. But here we were all at different FOBs [forward operating bases] most of the time. Granted they were only maybe 10 miles apart, but we're all running our own missions, doing our own stuff, while supporting the Marines.

I will say that that was interesting because I went from having what felt like no regular, serious training, to doing something fairly technical. As a Psy-Ops soldier, what we were supposed to do is kind of study the local population we were going to work with. We would almost be a PR [public relations] agent for the leg units in the area, the guy who's building rapport and finding social solutions to work with the locals as a team. But we were out there trying to provide security, at least in our areas, because we were still building bases where they've never even seen Americans before. We were supposed to smooth out the interactions between the local governments and people with our own forces there to kind of see how we could be a force multiplier.

Mostly during my deployment, but I was lucky to actually kind of make a difference out there. When we were deployed, it was definitely hard to know what the actual end goal was, especially since, you know, we're not out there fighting a war on drugs. A lot of that was causing all the instability out there, money coming in, black tar from the poppy fields going out. What is it that we're actually trying to accomplish out here? We've got our patrols every day. We provided security, but then, for what? The people that weren't really psyched to have us there, many times they're working against us. But, there's plenty of times where I did things that were meaningful, like helping build services for them; water, electricity, and building schools. Doing something where you can see that you're helping these people survive as well as giving their children an opportunity to learn and be able to advance themselves and do something. They can build their community up from where it was, giving them the opportunity to have growth and hope for the future.

A lot of stuff I did, we worked very closely with the Civil Affairs guy, and they're kind of like the money guys. So, we would talk with the local populous, the local government, see what the local people needed. And then, we would see if we could

facilitate projects and bring in local contractors from the population to build wells, schools, and different buildings, whatever kind of stuff they needed. And then, the civil affairs guys would go and fund that kind of stuff. So, we did a lot of community building to kind of get the people to work with us and kind of have a common mission so we can all move forward. Our forces would provide the security for them to be able to do that and then have a reason to continue the progress themselves. Other than that, we would study people. So, I would go out and I would be the one talking to like the local tribal leaders, the elders. And, I would in a way do case studies on the people, so we can see who had power both in front of and behind the scenes. . . so, I would say it's pretty interesting. Would I say I was able translate a lot of those skills into the real world? Not so much, maybe like marketing or something, but as you already know I'm an engineering student. Selling is not really my forte.

When he returned from his deployment, he started attending school at a local community college. He was unsure of what he wanted to do with his life after the military, but knew he was ready for a change. He got his opportunity at a community college in a "beach town" with a "laid back lifestyle" that featured plenty of beautiful people [and] plenty of activities. After spending the whole year deployed in that kind of like high stress environment, I was looking for somewhere that I could just relax and enjoy some slow living a little. So, from there [after his deployment], I ended up going to school for community college. I kind of like hung out a little bit too, trying to figure out what I want to do, where I wanted to head. And then I was there for maybe four and a half or five years, something like that. When he started at the community college, he was still a drilling Reservist, but he decided to transition out of the Reserves.

After his deployment, Mark decided that he was ready to transition out of the Army reserve. When I came back from my deployment, I still had some time on my contract. I think I ended up being in as a reservist until maybe early 2014, it could be. I ended up doing like six and a half years. Something like that. I originally had a six-year contract. Then when I was due to get out, I did not know that we had to

turn in paperwork for a contract to end, so that took like an extra nine months of drilling. It was definitely fun thinking it was my last drill saying bye to everybody. And then being like, “Adios guys. I’ll see you later.” And then the admin is like, “What are you talking about?” And I’m like, “What are ‘you’ talking about?” So, another nine months of me banging my head against the wall. I had pretty much checked out and had been ready to get out and move on with my life, but life goes on.

As just a regular Reservist not being deployed, I mean you’re barely making any money at all. You know I was going to school hours and hours away. I think I lived like, when I started going to school even while I was still in, but after my deployment, I lived like four hours away. It wasn’t really helping me, anymore at that point. And, I definitely knew after spending a lot of time in there [the Reserves] that I just didn’t want that much structure. Like it’s not that I did not want any structure in my life, but to have somebody having expectations and telling me how to live, it just wasn’t in the long term plan for me.

I was out there you know, so when I first came back I kind of screwed around there for a while. Like I said, I was also just looking to doing some living. I was taking classes... sometimes I wasn’t. I thought I was going to be super serious about it. But I ended up not being extremely serious right off the bat. I was still asking myself, “what degree and future do I want?” What kind of life did I want? I mean I had a lot of money saved up from my deployment. So, I wasn’t living a hard life paycheck to paycheck. It’s was just easy living, and I kind of swung the other way from the structure, so you could say. So, I ended up being there for, like I said, four and half or five years, where I was like half-assing in the beginning. I was just living day-to-day, enjoying my life. But towards the end there I was like, “I need to kick it up a notch and be very serious to get through this. Bump up my GPA and actually look at transferring, going to a four-year institution to finish my degree.”

I would say the military experience can help you in some ways and it can hurt you and others. Like when I first started going to community college, I swung wide the

other direction, away from the right and tight, get it done, hit it hard kind of thing, because I almost wanted to get away from that. That just wasn't the desire for my personality. I still had a lot of exploring to do at that point.

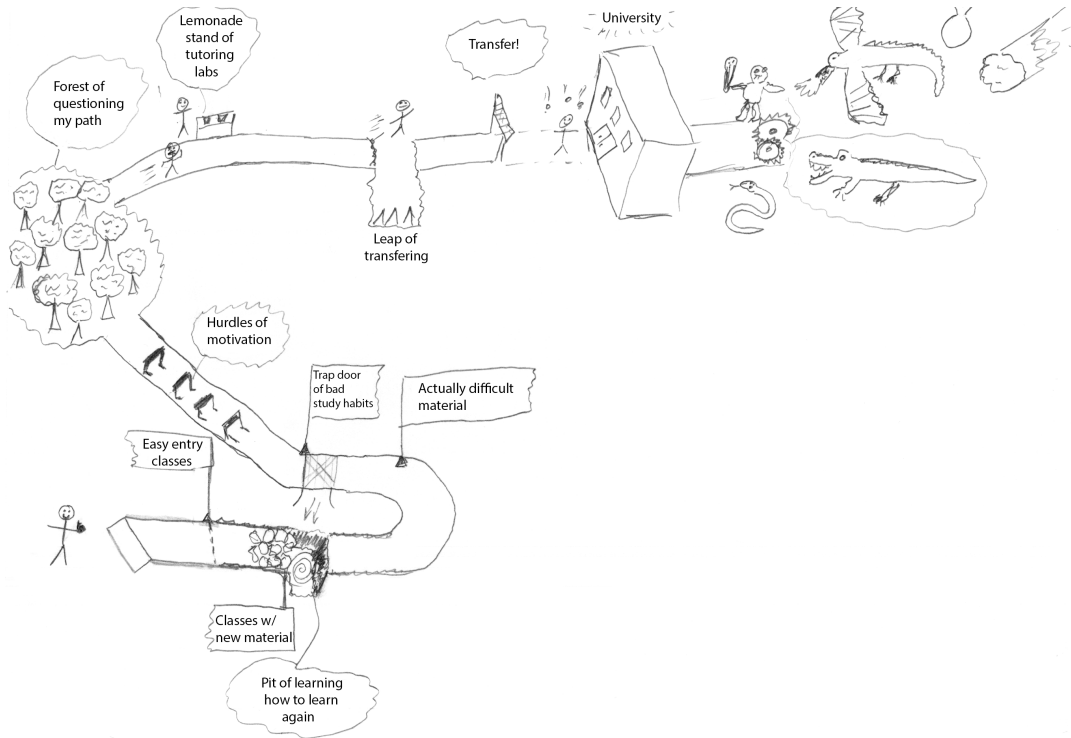


Figure 4.2. Mark's journey map of a time when he was successful in engineering. This journey map shows a path through an obstacle course. First the road is smooth, then it becomes rocky. Next is the pit of learning how to learn again, for actually difficult material. Then is the trap door of bad study habits, which sends Mark back to the pit of learning again. Next are the hurdles of motivation, and into the forest of questioning my path. After the forest is a lemonade stand of tutoring labs, followed by a leap of transferring over a pit of jagged rocks, then to the finish line of Transfer! After the finish line, University, and behind University are depictions of the following: dragon, crocodile, meteor, bomb, ogre, snake, and saw blades.

In Mark's journey map (Figure 4.2), he describes his pathway through college. The journey begins at the start where Mark is giving a thumbs up. "Hey I feel great.

This is going to go well.” This begins at the start of my school career, coming back from my deployment and then starting to actually take college classes. I was not really seeing the struggles and difficulties along the way. That was more of, the good attitude. Along the way was all the sweat and hard work and pain. Dealing with myself to be able to just have the motivation and the drive to get through, knowing if this is something that I really wanted to pursue. This is all before the shift, where I was taking the easy classes. I still got to live easy. For the most part, I’m just living the life that I want and going to some class. A little homework here and there. It slowly turned into the thing that took up the large majority of my time.

Before he gets to “the pit of learning how to learn again,” rocks are on the path. The path is a little harder. It stopped being a nice, light jog down the street. I start to have to pay a little more attention here and there to see where I was tripping up. I didn’t want to draw them the whole way across. I have to make a lot of personal sacrifices from the life that I was living to be able to continue doing this. The free time to travel around or just have a strong social life. Where as now, everything else has to come second. I had to be very careful with my time just to make sure, at least these days, that I am passing and I’m staying up to date and not just, “did I put the time in studying, doing the homework,” but, “am I trying to master this stuff.”

Obviously in the very beginning, it was easy to do well. I got through pretty far in high school, so none of the classes that I was taking off the bat were particularly difficult. It was kind of like a facade for what was to come, but once I started running into new material, stuff I hadn’t seen before, that was definitely a trip. It got hard and I had to learn how to learn again, compared to just recalling stuff that I’d seen before. It was definitely interesting to figure out, not knowing how to study well, having to manage my time, and just to deal with constant new information from a week to week basis and being able to master it, not just kind of look over it.

Mark started community college as an engineering student. When I moved up there, I was originally following a track for engineering. I took a break from that too, before I was too locked in, to try out environmental science. I did that for maybe

like two quarters. And at the same time, it just wasn't enough to pull me back away, and then I was just like I'm going to go back to the stuff that I'm good at. While these classes are harder and more technical, I don't completely hate the path and the engineering style courses. I figured I might as well just do that. I didn't feel like I was going to be upset about picking that major at that point. I wasn't finding anything else that was just blowing my mind like I can't wait to do this kind of thing. So then I switched back [to engineering] until I finished and transferred to [state university].

So eventually, I ran into the problem with hard material where I just didn't have good study habits because it'd been years and years since I had actually had to do anything like that and anything academic. So that just kind of threw me right back down into the situation again where I was having to learn how to learn properly; having to set up and structure my time. I had to go through that a couple of times to adjust and move forward and eventually succeed along the way.

What got Mark past the "trap door of bad study habits," was developing academic skillsets and trying to find balance. I had to learn to not just study the night before the tests. I had to give more time to this and less time to other parts of my life, my personal life or how often I go to the gym, doing hobbies and just relaxing. I had to make more sacrifices there and be a little more real with myself about how often and how much I had to like study outside of simply the prescribed work in the classes.

I was having to adjust my life to make time and energy for that constant work. It turned into a constant grind at that point. I wasn't letting up. It was just like one task to the next, to the next. I had to be able to keep that new outlook and schedule. I guess you could say I was getting used to the feeling where I was constantly behind. I didn't have any experience in the new material, as it was. I just continued moving forward and moving forward. *Eventually, Mark got past "the trap door of bad study habits."*

That led into what I have here as The Hurdles of Motivation. As the classes started to get harder, I wasn't getting easy grades. I do value my personal life and my hobbies, but I definitely had to learn that I can't just completely give up

everything that I like to do. I would just end up miserable. I am not trying to live to work, I am trying to work to live. This has turned into a balancing act, having to learn to be efficient with my time so that I can include my hobbies and my life, in general, outside of school. Without a balance, I went back and forth a few times. If I would put my head down and do nothing but school; I would just be miserable. I would run into a wall where I just can't do this. I would just shutoff and disappear from my school life for a while. I was having this this internal struggle. "Where can I survive, because I have more needs than just getting this degree?" So eventually more motivation definitely hit me. Even with lots of effort, I wasn't getting great grades. I wasn't acing all my classes. It was a hard balance to try and fight through, to accept the reality of the situation. That is still an ongoing process because I have more work than ever the farther I get. I still need to have a life and do things that I enjoy or I will hit another wall. It's constantly kind of playing, trying to find that edge and be good to myself as well as good in school.

After that, I ended up here in The Forest of Questioning My Path. "Is this what I really like, now that I'm having actual exposure to higher level material? I was wondering if this is something I wanted to do for the rest of my life?" So that took a lot of time, just being held up. "Do I want to do something different or do I want to continue putting my head down and getting through?" I actually switched my major once, and then changed it back after learning that I also didn't like that other thing. I was thinking it was going to be a good fit and I'd be refreshed, sort of jump through to move forward. So, I bounced around in there, lost for a while. I was figuring out, "Am I actually ready to move forward and am I willing to put in the time to work for what I see coming in the future?" Everything was difficult and stressful. "Where do I go from here?"

I was originally still looking at engineering and taking all the math and sciences for that, but as the classes got more technical, I was like, "Do I want to spend my life doing something extremely technical, constantly stuck behind a computer, or do I want something that means a little bit more to me, something that gives back a

little more?" So, I switched over to environmental science for a quarter or two and realized that, you are still going to have the hard work and technical knowledge. I wasn't seeing a great job outlook at the same time. I started to notice that I can do this, but that it was going to have to be more of a passion thing where I would not be able to afford the lifestyle that I was hoping, the hobbies that was hoping to do. I wouldn't have as much choice of where I was going to live. Then I kind of had to spend some time figuring out, is there a way that I could still do that with engineering, so I could have more of a lifestyle that I wanted, to have the options to live where I wanted to live? Could I find something that would still give back, where I could still give back and do something meaningful. I had to spend some time doing research, seeing what kind of options there really were, and what kind of commitments and sacrifices I would have to make. Weigh the commitments and extra footwork, or time spent trying to find those things in an engineering degree. So, I did eventually switch back to engineering and started spending more time seeing how I could use that in a way that was meaningful for me. It was pretty hard from a city college perspective because you're not in the extremely technical classes or getting job experience. You don't have access to employers coming to the college all the time and showing you the kind of options you actually have. So, I had to search that out myself and question and weigh my values against each other to see what would make the most sense for me, see how I could live my life in a way that I was happy with in the future.

Mark worked some while attending community college. Most of it was like odd jobs. Towards the end, I worked for a defense contractor for about a year, up until the time I transferred schools. This was the time I was being more serious about exploring the actual work environment that I would end up in. And I was just at that point more serious about trying to make the right choices in my life instead of just screwing around. I kind of had been hanging out for three years burning time up until that point. So I thought, "now it's time, I really gotta be serious about next steps" so, it all kind of started falling together.

After leaving the “forest of questioning my path,” Mark found a figurative lemonade stand to help him on his race to the four-year university. I started trying to be more efficient with my time, going to get help at tutoring labs. At first I started going to tutoring, instead of just studying on my own. I realized that I need more help, but I had never been great at working with other people and students. I have always felt like I was different than a regular student, there’s a gap. I have lived a different path with my life. I have always kind of done things my own way, made my own mistakes, and trip-ups. It was an interesting challenge beginning to incorporate other people into my learning, but I did see success from getting help. I had a lot of trouble just asking for help really, but spending more time just studying on my own at home, doing my own thing, I did eventually start going in and seeing positives in both my personal life as well as my school life. It’s sort of in the theme of I was running this race. I got a little help along the way. There were people there to support me that wanted to see me do well. They helped by giving me a leg up and just being there to understand my struggles. Eventually once I’d gone through some classes and I was getting better grades, I went back as an actual tutor. That helped me as well just solidifying the knowledge and learning that I had learned previous because I was constantly having to recall stuff from all sorts of classes. This helped me be better in the classes following as well. I think that was probably one of the best things that I did in my college career, especially for my success and just general happiness and contentment. I got to say that, “I was the just the same person coming here into the tutoring lab confused and stressed out and upset about it, to being somebody who could do something where I could help people,” all while helping myself. I finally had to build up the grades to go to be able to transfer to move on. I was about done with my time there, at the City College.

The “leap of transferring” was a big one for Mark. There was just so much unknown. I want to live somewhere that I enjoy but where would I end up heading? I wasn’t sure if...I still didn’t know...from my entire path up to there, obviously, I didn’t have amazing grades or anything, so it was very much like a leap of faith. I

was hoping that I would be able to end up somewhere that I would enjoy that would be able to provide a good learning environment and good opportunities in the future. It was a little bit of the unknown. At that point I didn't have any more control. All the grades I had gotten and the stuff that I had done building up to that, it was up to them at that point. "Were they going to be willing to take me? Was I going to get into anywhere I wanted to? Was I going to have to make an extremely big move across the country where I didn't know anybody and have no more support group or anything when I got there?" So that was kind of just one of those times where it's just like, "Who knows what's going to happen from here?" That is why I had to take the jump and hope for the best there. In this path, it was the last step. Either you're going to flop and fail, or you're going to succeed. It was just a stressful thing. There's all this competition. All you can do is look back and be like, "Wow." You say stuff to yourself like, "You know, I wish I'd learned to be better and all of the secrets and the best practices earlier, learned how to utilize them from the beginning." I would have been in a much better position moving forward since all I had at that point, was to show what I had done.

Then I got to the finish post there. That is me just like, "Hey! I made it." That was the end of that story, the story I have here. Now I am at a big university building. I am like, "Great, I am there!" Then there's all the other stuff on the other side that I literally could not foresee until I walked in.

Past the finish post, Mark made it to the four-year university after five years in community college. I just drew a bunch of dangerous stuff. The beginning part was almost sort of like a race. Now, I have this this obstacle course I have to fight through as well, with much more serious threats and challenges on the other side. Everything on the other side here is a power of ten. Everything is just a lot more of the same stuff that I went through earlier, but on an entirely other level. A lot of it is the classes. You have to be on them from like the first day to the last day. Whereas, at least here at the school I am at now, it is a lot more than just the classes. The classes involve a lot more than just the actual learning. Now, I am taking a bunch of

labs where we are getting graded on the quality of our technical memos. In general having to be able to use all my skills at once. The classes I take, I have to pull knowledge and learning from multiple different areas. Everything's sort of like the culmination of everything I've learned in the past, all at once. And there are just so many pitfalls. You run into teachers that just teach different ways, they grade different, they expect different levels of professionalism out of you. For a lot of my labs, you work in groups so you have to be able to balance getting along with and just dealing with other people to get to the same goal who may have different ideas about how that's done. You have to balance your own schedule with theirs as well to get a lot of this stuff done. The classes are just generally much, much harder. So, it's sort of like a culmination of putting everything together sort of in a way you would see in an actual work environment being run.

I do the best I can. We are on the quarter system, and on top of having to deal with other people, working with other people in these groups to get all the stuff done, I would say I have had to definitely make more sacrifices and be even more efficient with my time. I have had to learn to suck it up and miss out on a lot of stuff that I am sad to see go. This quarter is like a perfect example. I'm taking the last undergraduate fluids course, a heat transfer course, a linear algebra and differential equations course. I have the second to last mechanical design class where we are having to be able to design different types of components for engines and how they all work together. We are doing stress and strain analysis. They're all kind of like pretty in-depth. I'm also taking an industrial manufacturing class on like how parts are actually made the way they need to be, like materials, processes, stuff like that.

We have this new challenge where we are trying to do everything online [as a result of the COVID pandemic]. The learning just takes that much longer. It is very detached. At least half my classes are this way. It is hard to get any time out of the teachers, whatsoever. It is not optimal. Having to go back and forth with emails for everything is a pain, and some of them are just not very responsive. They're too busy keeping their own classes just going and processing the stuff the way that they

are. Some of the learning is almost just on your own it feels like. So that's been a struggle. It's been like...in the morning when I wake up to at night when I go to sleep kind of thing. I get to do a couple things here and there on the weekends, but I'm still putting in pretty much the large majority of my time on weekends just doing work and studying and trying to just keep up. It's definitely been a difficult quarter, given the circumstances.

Although Mark is a mechanical engineering student now, he began as an electrical engineering student. Well I chose electrical, you know, I've had a little bit of experience with that. I worked for a defense contractor that did a lot of like cameras and optics and stuff while I was still in community college. A lot of it was that I got to take like an extra five or six classes that while I was being very serious that I knew I could get really good grades in—bump up my GPA. And at that point, it wasn't anything so technical that it drove me insane yet. So, I did that—transferred—and then I had already switched my major to mechanical, I think towards the end of my first year here at [state university]. Well I am doing mechanical engineering right now. I decided to switch over. Mechanical engineering matched my interests more. As an active person, just like camping, you know riding bikes, working on my truck, just more of the physical things interested me more.

Mark has also been working while attending [state university]. I've done some kind of odd jobs since I transferred up here. Last summer, I worked an internship in the engineering field, but while I've been here actually in school. At least this year, I'm tutoring at the Vet center now that we have on campus. So that is a little bit of extra money, but that's because I'm trying to continue my exposure to the school environment. The more that I am around it, the better I am going to do.

The Vet center definitely helps, because I mean, I have just accepted that I'm not really living the same social lives as a lot of students I go to school with. I'm just a different generation than they are, and I look to different things in my life for happiness in my free time. Being around other people that have been through and see life in a way that I do has really helped. I have connected with people taking

the same major and some of the classes as me, through there. They are also at other points in their life. They are thinking about different things and adjusted their goals and their hopes and dreams to reflect where we are at this point in their lives. I think that's probably been the most helpful, because at least here, we don't have... when I was in the community colleges, where I was spending most of my time was the math and physics lab, but now everything is a little more segmented. The campus is much larger, and there's no one obvious place for me to go to deal with all my classes. Everybody is kind of doing the same thing. So, the Veteran community here has really helped me be successful. I try to take the same classes, the same teachers and sections with other Vets whenever I can.

I would assume, in most schools they have a Veterans department outreach. At ours, we specifically have a big room in one of the campus buildings. And they allow some of us to tutor in the center. We end up only tutoring each other really. Instead of the regular students. And you know obviously I'm tutoring in the classes that I'm taking so I'm tutoring other engineering students or other Veteran students that are doing the math and sciences and stuff because that's just my background and what I know. I feel like it connects me more, compared to just doing an odd job off campus somewhere. It connects me more with what I should be practicing and learning anyway for school. I wouldn't say it's not connecting me to the regular student body as much, but that's alright. The more time I'm at school, the more time I'm working, practicing the stuff that I'm supposed to know and have under lock and key, the better I'm going to do in my own classes.

I think that all Veterans going back to school have different experiences, at least at my age and the place in my life that I'm in. I don't connect with the regular student body as much, especially here at a four-year university where it is a much younger age range. Whereas at the community college you have all kinds of people coming there. So, it's a little different. Some people get along just fine with the regular student body, but I feel a separation from them because they're just living different lives. They are a drastically different age than I am, by almost a decade or

more. So, I'm not really involved with the regular student life. That can definitely make it hard at times especially now in my career, where you know really the best way to succeed in your courses is to work together. Mostly because, you know it's a lot faster paced. Everything is a lot more technical.

While I should try to connect with the people more in my classes, I guess you could say, I just probably don't. It's harder for me to relate with them. I've had drastically different life experience. I feel like I lived my life sort of out of order. I tried one path and got all the shitty stuff out of the way, sort of all the bad decisions. And now I'm trying to prepare myself, not just for the job after my degree, but where I expect to want to be in my life at that point. So, I mean I know some people, some Veterans are more challenged with that, some are not. I think it would have been easier for me if I had just gone back to community college, done the two years, and got out instead of taking five years just hanging out, living life. But it's just the way the cookie crumbled for me.

This story ended when I got to this university, but now it's like everything just gets ramped up. It's not just a race, but a complete obstacle course. Getting started is always the hardest part. Everything after this is sort of like a rerun of all the previous map, just at a higher level, like sharpening the stone. Now that I have the tools, I just need to continue to improve them. Honestly, all my classes at this point are all extremely challenging, but it wasn't like I've been dropped off in the wild I had to survive to begin with. How to increase that [quality of survival] as the same types of challenges for ramp up is what I'm doing now.

But Mark found success along this journey. In the beginning, like this pit of learning how to learn again, obviously, I have fallen into that trap a couple of times, but did eventually get past it. Granted, that's still an ongoing thing. I have built up my survival skills in that respect. In the hurdles of motivation, you trip and fall, but I've had to learn how to get back up and reattempt the same challenges with the motivation, over and over again. You have to be able to persevere through there. That [being accepted to university] was definitely success. For me to be able to see,

even though I was never the perfect candidate, I actually got myself to a level where I did get accepted to schools. Even if I wasn't the best, I had gone far enough along the path that they had confidence I would be able to succeed in the future. The tutoring labs, being able to find places where I could succeed and make the most out of my time and ways that I could shift my life to hit two birds with one stone, so to say. Being able to start to find balance when I could actually find some enjoyment in the process.

I just need to complete it. I need more than just get the passing grades in these classes. I want to be able to utilize them in a useful way and to be able to take what I have learned and be given a general pseudo-ambiguous situation where it's like, "OK, we're not telling you to use skills A,B, and C. Here's a problem, what can you pull out of your own head to find a path from here to a solution?", and that be a useful challenge. That's the kind of thing that you would see at the job you will eventually get, where it's not so much like, "OK, can you use this equation do that?" But like, "hey, here's a problem. How can we solve this with the knowledge that we have gained along the way." It's definitely in much more of an immersive capacity. Being successful is being able to see problems and use all the knowledge that has been gained to find my way through them. How to work with people for common goals. Obviously, you're not going to be working at a company where you're solving stuff that's pointless. They are going to keep you around because they are trying to make a product or reach a goal that is meaningful and useful to both them or humanity, something that is meaningful or profitable. They don't want just any solution; they want good solutions.

Mark has set himself up to find an internship through the actual presence of employers and companies that take a more active role in the school community. They do research at the school and we actually get to see projects that pertain to stuff that we can directly move straight over into. . . we actually seem to have a lot of clubs and organizations that are sponsored sort of the same way. It is nice to get more of a

direct connection to the people and things that you could potentially do when we're finished here.

I've been looking at the master's degree program here at school. I have used the club to get involved with the company that specifically does that [the same thing that a specialized master's program would prepare him for]. I ended up going to some info sessions and talking with people in the club. I got an internship this summer involved in it, so I can get some experience in it to see if I really do want to spend the extra time pursuing that master's program.

The companies involved were one of the three or four schools that offer that type of specialty engineering degree. So, they're definitely involved with us here. They recruit through the club and the classes. They also get their names out there and say, "Hey, this is an option. This is a type of engineering that you can do since it's not like widely known." It is kind of a newer field. It is interesting to go to an info session and see the things that they do. You can talk to them, and that's actually what led me to getting the internship. Seeing that I had talked with these people and seeing that I had a general interest in what they're doing, then they offered me a position. They even let me choose which office, anywhere in the world, that I wanted to go. I had the opportunity to be like, "Hey, this is where you guys do work from." They let me know the type of work they do, specifically at each office. They let me choose where I want to go depending on the work that they're doing and the area. They want to bring in people that actually want to live in this place and invest in them if they are going to invest in you. It is unfortunate that everything is happening the way it is at the moment [referring to restrictions of movement due to the COVID-19 outbreak], because my internship got cutdown to about half of what it was and it's going to be mostly working from a distance. I'll be down there a little bit, but I won't quite get an entire summer living in that city to experience the lifestyle as much as I would have liked. Nobody really saw this coming, so. That is just how the cookie crumbles in this case. I will still make the most out of it that I can. I will see if that is something that I can enjoy doing in the future—generally setting up opportunities

for me to have somewhere directly to go instead of being, “Now where do I apply for a job?” Luckily, I have a direction to walk and goal in mind. It’s been a long road but you’ve got trust the process and go where life pulls you, working hard along and learning to take advantage of opportunities along the way.

4.3 Digi

Digi grew up in a small town. In high school, I was really into sports, but I wasn’t really into education. I wasn’t into the public education system. I could skip class half the time and then come back in and pass the test and they’d say, “Congratulations, you’re an adult now.” I didn’t understand or believe in or whatever you want to call it, the education system. So, I kind of just didn’t show up to school most of the time. Instead I just kind of hung out with my friends, playing sports, or just wandering around or whatever. I had a really really narrow mindset on the future. I wasn’t like an asshole or anything, but a lot of my friends were assholes, pardon my language. Yeah, I really, just didn’t give a hoot about education. But that doesn’t mean that I didn’t have respect for superiors or anything like that. No, in fact, actually it would probably be the opposite. I did have a lot of respect for my superiors. It’s just they didn’t necessarily tell me what to do, and then I would just figure it out on my own. So wayward, if you will, if that is the right word. That’s how I would kind of describe myself in high school. I just wanted to do my own thing and there was no plan. There was not really any planning. There was no forethought. It was just, “I live in the day.” And so yeah actually, I think my junior year, like I said, I cared so little about school, I think in my junior year at some point people were like, “Oh yeah, I took the SAT and I got these scores and I am going to start applying to these schools” or whatever. Junior or senior year, either way, I don’t know. And I said, what’s college? And they said, “You are supposed to have already applied.” I was like, “Alright, so I need something to do after I finish high school.”

So, my friends in high school ended up spiraling downwards. This is the tradition, I guess. They weren't necessarily a great influence. But actually, I would probably say that me being there with them was a better influence on them because I could kind of better direct them. I would make sure that they are behaving properly, if that makes any sense. I wouldn't call myself the nanny of the group, but I kind of would at some points because I do care about how we are seen.

The friends that I had in high school, we started like our own little Fight Club. For me it was like a survival self-defense kind of thing. You know, and so we started that up. For them it was a lot of fun, we did like kickboxing or MMA or whatever. It was a fun thing for me to do. But, for me it was more so that when I go home, I'm fine. And so they really helped me kind of keep control of my aggressive brother. Of course you know when your brother is like two years older than you, it's a big difference when you're 8 and he's 10, but it's not a big difference when you're 15 and he's 17, especially if you have some kind of background in martial arts and they don't. I was able to essentially get ahold of the situation with my brother pretty well. When he found out that he couldn't pick on me anymore, he started directing his anger towards like my mom and my dad or something. So, those are kind of the stressors that I had to deal with. So, you know being home was nice [sarcastic tone]. I liked being around my parents, but I didn't like being around my brother kind of thing.

In high school, Digi met with a Marine Corps recruiter. My recruiter gave me some cheeseburgers. We just talked. And at that point my friends had gone pretty downhill, and I wanted to get away from it all. I didn't want to be caught up with their mess. You know, there's only so much that I can do, but they were spiraling so rapidly that if I wasn't with them, then, you know, what are they going to do kind of thing. So, I wanted to get away from it all. My relationship with my brother wasn't very good. The house was not such a great place to be. The town is small. The promise of adventure is a lot of fun, and I was an athlete. So it [joining the Marines] just seemed pretty good to me. And then, you know, when I talked to my recruiter

over some cheeseburgers, we talked about the job opportunities and stuff like, things that I could do, places that I could see, and stuff like that. And so I thought, “Why not?” I wasn’t really a planner kind of guy. If an opportunity comes up, I’ll probably just take it. All it took was some cheeseburgers and some talking.

Digi was accepted into a niche field in the Marines, but first he had to make it through boot camp. Initially, I was trying to get into infantry or field artillery. I did well enough on the pre-ASVAB [Armed Services Vocational Aptitude Battery, a test that is administered to all enlisted military applicants] that I had a lot of options open, but my recruiter said it would be a 10 month wait to get into the infantry or field artillery. I went and took the DLAB [Defense Language Aptitude Battery]. I did well enough on that, and then my recruiter convinced me to do cryptologic linguistics. Then I went into the Marine Corps.

The beginning was pretty rocky. I wasn’t the greatest kid. So, I did get into a little bit of trouble while I was in boot camp, not that I was like trying to start any problems, but it still happened. I think the trouble I got in fixed my character, so I’ll tell the story. It’s a bit long. When I was in high school, you know, it was really easy for me to figure out what they were going to ask me in the test. They [teachers] kind of hinted at it. That’s the public education system. You can show up there and just listen to when they stomp their feet and be like, “I’ll have to remember this.” Then you can save the rest for all the music lyrics.

It’s similar in boot camp because they’ll send you to the same place for the same thing 100 times. I went to the ophthalmologist or ophthalmology department for eye tests. I got it done at MEPS [military enlisted processing station] before I went, and they said I would need glasses. So I was like ok, I will need glasses when I get there... I go to boot camp and they say, “Oh you’ll probably need glasses, but you have to come back two more times to verify.” Well, I memorized the chart. I memorized the chart and I knew which line they kept asking me so then when I went in to get glasses prescribed, they said “you have 20/20 vision why are you in here.” I was like, “I don’t know my drill instructor told me to come in.” So, I didn’t have to wear glasses. My

eyesight wasn't bad, I just didn't want to wear the BCGs [birth control glasses]. I didn't want to do it.

Fast forward to shooting at the rifle range, 500 yards from an iron sight, you know now they have cogs so you can actually see really far away. But for me, it was like I have a tiny black dot over a tinier spec that's supposed to be a target, and then I hope that that's my target and not someone else's. Yeah so, you know I was pretty nervous. I'd never shot a rifle before boot camp. I didn't want to UNQ [be unqualified]. I didn't want to fail. And so, we go to the range. I wasn't shooting too good on the qualifier that goes up to your actual test. For the next day, they put me on the morning session when the winds are weakest, so I have to do less windage adjustments. Which was great, but the problem is that that morning there was a really heavy fog so you couldn't see anything in front of us, except for 20 yards. We had to wait until the fog subsided. That took like two hours, and so the wind started picking up again. Our primary marksman instructor, he saw us getting really nervous and anxious, and the last thing you want with people with guns to be is nervous and anxious. He tried to calm us down by telling a joke. And of course, the joke was... I'm not even going to qualify the joke. Anyways, so the guy, he told us a joke, and for whatever reason we were like, "Haha, that's funny." And then, the clouds went away. We were like, "Alright, cool. We're in a better mood now." The Marine Corps is not all squeezed butt cheeks the whole time.

And so, I shot, and I ended up getting expert by two points. I was super excited. I mean I was super [emphasis] excited. And then, I went down, and we call it pulling the pit. You'll shoot at the target and then someone has to pull the target down and show you where you hit then put it back, wait a bit and pull it back down and then stick it up and then now you can shoot again. And so, you shoot, and then you go be those people. We call that working the berm or pulling the pits. And so, I'm pulling the pit, working in the berm. I'm pulling these things down and sticking them up. Then I saw one of the guys that was at my bench. There was only four people at our bench. And honestly, I couldn't remember for the life of me what the joke was. But

honestly, I was in a good mood. I was like super laid back. I was like, I passed, but like I really [emphasis] passed. I was super excited. And, we're all wearing our ear protection, and this guy is off in the distance. I was like "Hey, what was that joke that [primary marksman instructor] told us?" He didn't hear me. The guy, he just kept walking. He had a wheelbarrow and was picking up some stuff on the ground. He didn't hear me, and I was like, "Alright, whatever."

Well, my series commander was right next to me, and you're not supposed to tell jokes, period. It's just a lack of bearing. He was trying to find out who told the joke so that he could go chew them out. He asked me, "What was the joke, what was so funny?" I said I didn't remember, and so then he called me an integrity violator. Then he pretty much pressed charges. He's a Captain and I'm a... I haven't even gotten an EGA [Eagle, Globe, and Anchor; symbol of being a Marine] yet. Yeah, it was pretty damn scary. So, the next two days I was hazed, where I would drink water for 100 seconds and then I would chew MRE [meal ready to eat] crackers for every one of my meals for 100 seconds. And then, the rest of the time I spent doing pushups and burpees and mountain climbers in a puddle of sweat. Pretty much all day, every day for two days. Everybody else got to do their training. I just sat there in the barracks working out.

One of the kill-hats, one of the lower ranking drill instructors, they spend a lot more time with us. He was the guy that kinda stood back and just exercised the living hell out of me. So, after two days, I am asking around the entire company, you know, I ask the fire watch to go up into the different barracks and figure out what the hell the damn joke was. And so, after two days, I figured out what the joke was, and then of course it turned out to be this derogatory one that is against Mexicans and Blacks, and both my kill-hats were Mexican and both my junior-hat and my senior-hat were Black. they made me tell it to the entire platoon when I said I had "remembered" the joke. That was their first time hearing it as well. And so, they got really pissed off, and yeah. Then I was like, "Alright, well I'm going to hell, and blah blah blah." Another day went by, and then I got marched over to the to the

Major now. Yeah, I mean it was just going so high up the damn chain. It was like, I don't even know what these ranks were. And so, my kill-hat, he just took me away from the entire platoon and basically like ran me over there walking, it was such a fast walk. It was like "How are you doing this without running?" We got there and they said that you have five minutes to write the joke and why you're not guilty. I then had to present it in front of the Major, my series commander, my senior drill instructor, and a couple other people. But, I had to talk in third person and stare at blinds the whole freaking time. It was just a really weird experience, but I was able to, I mean, I didn't laugh at the joke because of its derogatory nature. I laughed at the irony of it all. Essentially it was, a plane is going down and everybody wanted to throw someone else out of plane. Nobody was willing to jump out of the plane to save everyone else. And that was it. I was just laughing at the irony of it all. They valued themselves more than their entire crew. And so that was the perspective that I gave to the Major. They were like, "Okay, that's what we need in the Marine Corps." My drill instructors still hated the living shit out of me, but at least I was able to stay in the Marines.

It was a pretty trying experience for me because, you know, first someone's accusing me of being a liar when I'm not being a liar. And then I have to have people that I really respect hate my living guts because of a joke that I was told in order to calm me so I can shoot and qualify. It changed my character and set the theme of how I viewed boot camp and working around Marines. It is always a team affair, at every step.

If I look at me before boot camp and I look at me after boot camp, we'll say it was after the Marine Combat training because I got to go home after that, I actually had the ability now to influence my brother instead of having to tell him, "Don't do it," or a punch in the face or something. Instead of doing that, I was able to talk to my brother. I was able to say, "Here's where you are and here's where you could be. You have the potential to..." Basically, I could mentor him essentially. But, I was able to convince him to be a better person and all and despite our differences,

our family is a team. He ended up joining the Army for a little bit. Now he's all happy and living in [a different State]. The family is not as disconnected. So yeah, I think things kind of turned out pretty good. I don't know if it was that anything in me changed, or because I had just gotten my Eagle, Globe, and Anchor that he was looking at me differently, you know, as like a role model or whatever you want to call it. But, that was probably the biggest change that happened after boot camp. From that point, it was kind of like, "Who am I and what can I do for other people?" kind of thing, if that makes any sense.

So, that's why I essentially started taking up a bunch of leadership roles and trying to be a mentor. I had a platoon sergeant that was teaching how if you're working on a team, and if you have high standards up for yourself, that means you can take better care of your team. It wasn't about your own ambitions necessarily; it was about being able to get your team to accomplish the mission and have everybody make it out. And so, I kind of took all of that. It was kind of a long culminating thing. I guess you can kind of say that the roots were planted in boot camp, maybe even because of that joke.

After boot camp, Digi went into a language training school to learn Tagalog. It was a 48 week-long course, or something like that. I spent a pretty good amount of time in Monterey. While I was there, a little bit before I started doing my language training, I had a platoon sergeant that was former reconnaissance. We called them radio reconnaissance because they had this linguistic ability and were special operations capable, and so they could go augment Recon. So, we had a very elite platoon, although as far as the Marine Corps goes it's supposed to be elite on its own. This was like pretty much like my indoctrination into the Marine Corps out of boot camp, and so this is what I thought the Marine Corps was. And you know, it was like, if you don't get a perfect score on the PFT [physical fitness test], like 300 on the PFT is considered the minimum [a 300 on the PFT is the maximum], like you're supposed to beat that and exceed that. If you don't meet that, then you are not a Marine. So,

that was my indoctrination for a little bit over a year into what I thought was the Marine Corps.

I did my language training there, and I kind of preface everything that is coming forth, because it kind of details out the rest of my military career into how that foundation was set. So, then I worked pretty hard in my classes. It is an eight-hour school day for just pure language training. You will work out in the morning or workout in the afternoon or whatever, but the school is all focused on how you can harness the language. So then, you know in high school, I was like a 2.0 kind of kid. I didn't really care. But, joining the military and people paying me, taxpayer money coming in, I felt I should work hard because I owe something, you know. And so, I ended up finishing that language school as the honors graduate. For me, from going through high school and kind of going through the motions, and not really giving a crap, and then feeling like I could be more if I applied myself...I never actually had the drive for educational stuff, to actually ask myself, "What if I did try? What if I did try for this, and this, and this? What if I challenged myself in this way?" That was the first validation that I had, being the honors graduate. If I want to do something, I can do it. Everything else is kind of based on that. Once you have inspired yourself, once you have the confidence in yourself, everything else just kind of happens afterwards as part of the same success. I failed French in high school twice, but my teachers [in linguistics school] told me that I was the fourth person to get a score like that in like 30 years. So, that was extremely inspiring for me.

My MOS [military occupational specialty] in the Marine Corps was cryptologic linguistics, where I graduated with highest honors in the Tagalog class. I consider this a significant success not because I received a high grade, but because I had failed French in high school and proven to myself that I could master a foreign language. Looking at my military career as a whole, I can see significant development in my own character, self-confidence, and direction. When I enlisted into the military, that is exactly what I hoped to achieve, so I consider my military career a success. I also

consider all the small things I did in my military career to be successes, but they are all smaller parts of the whole.

Well yeah, I mean the really pivotal one [event] that that kind of setup all of my belief in myself in motion was at linguistics school, when I was able to graduate there as the honors graduate. For me, from going through high school and kind of going through the motions, and not really giving a crap, and then feeling like I could be more if I applied myself... I never actually had the drive to for educational stuff, to actually asking myself, "What if I did try? What if I did try for this, and this, and this? What if I challenged myself in this way?" That was the first validation that I had. If I want to do something, I can do it. That was the most... everything else is kind of based on that. Once you have inspired yourself, once you have the confidence in yourself, everything else just kind of happens afterwards as part of the same success. That was probably the most pivotal one [event]. Then I moved over to Texas where we had our signals intelligence training.

In Texas, you get all the different languages kind of getting mixed up in a hodgepodge. In Monterey, you're kind of in your own language group, you're kind of like consolidated into a platoon that is your language specifically. You really don't get a whole lot of interaction with all the other people because the campus is so large and you're spending so much time studying in your classes. Because of my success in Monterey, I came over to Texas, and they put me into a leadership position. I was still under the impression that everybody, all platoons in all companies, performed the same way that mine did. Which was not the case. So, I kind of got a name for myself as leading the platoon that works people really hard. I'm not saying like hazing or anything. But, you know, like our PT [physical training] sessions are tough PT sessions. I check on people pretty frequently to make sure that if they have any questions, I can get them an answer. That's the way I think the Marine Corps was supposed to be.

When you get into the fleet, it is kind of like a battle for deployment essentially. All Marines want to get deployed, and that is just the thing that you strive for. And

typically, when you get into the fleet you have to wait six months before you can start pre-deployment training. I got there and about two weeks later, they wanted to put me into a cycle that was already getting ready to go. I was fast tracked eight or nine months. I was pretty excited about that. An hour later, after I got told that, a different company, one that I was not in, their Master Gunnery Sergeant came over to our company and said, “these three people come with me.” I was one of them. “You’re now being drafted into radio reconnaissance.” So, I went from about to be deployed, which is exactly what I wanted to do, to now I have to do this extremely long training pipeline in order to be deployable. Which turned out fine, I wasn’t the one to turn down opportunities. I met a really good group of people. It pretty much brought me back to my Monterey days. It’s pretty much like it went full circle, right? And so, that was just, as you can imagine, just a bunch of swimming and rucking and obstacle courses, and helocasting [small unit insertion technique], and playing around on boats in the ocean and stuff like that. We have six-man teams that have to augment special forces. So what they do is they will have six people and they will take one or two and make them coxswain. And, they will take one or two and make them actual recon by sending them down to basic reconnaissance course. And then, they will take one or two and send them down to do all of the other operator stuff. They took me in and they put me in the operator pipeline. They flew me to a few other states to do all this extra training. We have a Marine expeditionary unit that goes out into Asia. We have a Marine expeditionary unit that used to go to Afghanistan and Iraq. That got cancelled when I showed up, and so I was pretty bummed out about that. And then, we have detachments. One of those detachments goes to Korea, one of those attachments goes to Okinawa, and the other detachment goes to the Philippines.

The language that I studied in Monterey was Tagalog. That is the Filipino language, their national language, if you will. So, I was really trying to get to the Philippines. I just felt like that is where I could actually use my language skills, because up until now, I really hadn’t. There’s probably about 30 people every six

months that got to go to the Philippines. But, they ended up completely downsizing that to just one place. They downsized it even more so—it's four junior enlisted, one senior enlisted, and one officer that could go. And somehow, I ended up getting picked to be one of those four junior enlisted that got to go to the Philippines. And that's when I actually got to work with special operations teams. I actually got to use my language skills. Most Filipinos speak English, but to have someone in your group that can speak the host nation's language builds rapport really well. So, my language skills were more for rapport than anything, but I essentially, through my language skills and through the training that I had, and through the contacts that I made down there, was able to do some significant advise and assist work. When I came back from my detachment deployment, my platoon was pretty excited; Our unit doesn't actually have funding necessarily, we didn't have any way to say, "Hey, look, we're not just really good at running around. We can actually do stuff," And so, that was kind of like the way that we were actually able to get funding; successful deployments were where we made our biggest funding argument.

And, you know of course along the way you have all these issues where you start to go, you know, "Do I want to stay in the military?" Because of my language training and because of the special operations training, when I went to reenlist, I actually didn't have the opportunity to go anywhere. My options were stay in Hawaii in the same unit as an instructor or go on to MARSOC (marine special operations capable unit). They're basically Recon guys, except they have way more funding and they are way more professional. They live to deploy basically. They'll deploy and then go on pre-deployment. So yeah, I mean it's great for a lot of Marines, it's like that is what you look for when you join. And like, that was the dream, but I was getting pretty burned out. When I first entered, I would probably say I would stay in the military just whatever is on my contract originally. I originally only signed a four-year contract. I only planned on doing one four year contract and then I would see where things took me, essentially. I thought that by the time that my reenlistment came up in about three years that I would be able to make my decision if I was going to

reenlist or not. So, it actually ended up being a five year contract because of the language stuff that I ended up choosing. And then, I extended three months for my deployment. So, it ended up being just over five years. There's just a lot of work and you know waking up at 4:00 AM and getting home at 9:00 PM to have dinner was pretty brutal on me, and that's basically the way that I saw MARSOC [United States Marine Forces Special Operations Command] being also. And also, the entire experience from when I was in Monterey to when I was in Philippines was, made me think, "What am I actually capable of? Should I go back and try and fix younger me and go to school again?" That is why I ended up getting out and going back to school.

The Marine Corps kind of helped me see myself in a different light and my potential to do other things. And then kind of talking with others, you know, you get a lot of interaction with a lot of different people from a lot of different places and talking with them inspired me to pursue engineering [school] essentially. And then also, I couldn't move anywhere that I wanted to in the Marines. I had to stay in Hawaii, as bad as that sounds [sarcasm]. But when you work, when you get up at 3:30-4 in the morning and you get home from work at 9 PM, it's not Hawaii anymore. Yeah, they're like, "So you'll just live this lifestyle for the rest of your life," basically. You reenlist and you're stuck, essentially: If I do eight years or 10 years or whatever, why not do 20? It's difficult to say, "No," after eight years. If I was stuck in Monterey for 20 years with that same unit I would be absolutely down for it. But, the command that I had in Hawaii... I was not looking forward to becoming a Staff Sergeant and working under them. So, there's a whole bunch of different reasons. It all ended up with me saying, "You know what? Why don't I just try school?" I really didn't consider going to school my first few years in the Marines.

Actually, I take that back. When I was at Monterey and I was at school, and I was actually going every day and getting paid to learn and you know, actually interacting with the professors. That definitely changed my mindset entirely about school. So, I would probably say that mostly what actually got me thinking about school was that.

I had joined the Marine Corps to get away from school, more or less. I then ended up going right back to school and then saying, “I really like this kind of thing,” which is weird, but yeah. So, I’ll probably say it was the instructors that I had which inspired me to go to school. And, yeah actually, they weren’t even professors. A lot of them were more like, you know, degrees in real estate or something like that. They were all from the Philippines, I think. They were all extremely fluent in the language and the colloquialisms and stuff like that, so they were the right people for the job. They definitely changed my perspective on school, and I got excited about learning and going to school. And of course, every training that you do in the military is basically a school. I just ate it up. It doesn’t necessarily mean I’m reading out of books all the time, but having to go to all these different schools and do all these different kinds of trainings. I was learning about all this technology out there and trying to see how things work. A lot of what I did was extremely technical and physicsy and I really enjoyed all of that. I was really good at it and it just made sense to me. And then, I got to be a teacher. I would be teaching new guys, “This is how you do these things, this is the best way to do it. This is how you can kind of get a sense of if you’re doing it right or doing it wrong.” So, it was pretty much the classroom environment my entire career.

When I deployed, I met one of the officers who was an aerospace engineer graduate. The other one was a mechanical engineering graduate. I spent a lot of time talking with them. They told me all the stuff they built. Things in their designs. They were extremely passionate about it. They made me reflect back on my childhood because I spent a lot of my childhood building stuff with my dad. So my dad, I think he has a high school diploma, but he doesn’t have any college and he’s like an electrician, plumber, carpenter, welder, you know, a tradesman. And so, we did everything out on our house by ourselves, you know—sprinkler systems, a barn, sheds, terraced walkways, balconies. So, we did all that kind of stuff. My dad didn’t necessarily plan on how to build anything, it seemed like he just kind of figured it out as he went. I am not saying that he didn’t know what he was doing, but it wasn’t like, you know

engineering is like you definitely design and analyze everything before you commit, before you purchase anything essentially. You could build a couple of prototypes, but you're not like, "Here's the final product, I've been tweaking it this whole time and relying on my instincts," because that will never fly in court. But yeah, so you know, it still made me think back to working as a kid. I spent a lot of time working on my truck and my dad's truck and all that kind of stuff. So yeah, basically it was meeting all these people learning all these things made me look back to middle school, high school, the things that I did, and the things that I enjoyed as opposed to school and I said, "Well I could probably link these two." I made the decision to go to school while I was on my deployment. I want to say it wasn't the first time that I thought about college, but it was the first time that I thought seriously about college and started planning my route. While I was on deployment, I made my entire flow chart for what classes I would take and where, and where I would be staying while going to school and that kind of stuff.

Although Digi had originally planned to start his university education immediately after his deployment, he was unable to do so because of academic timing. However, this hiatus gave him an opportunity to take a year off. I had to extend my deployment, there were a couple of operations that they wanted me to stay around for to oversee. There's also like a sixty-day EAS [end of active service] restriction. . . if you get back from deployment, you cannot EAS before the sixty-day period ends. So, I got back in July or August, and actually wasn't able to EAS until late September. I wasn't going to go to school in Hawaii. I picked [a community college] in a different state because it was a feeder into [state university]. That was the intent. I wasn't just about to start spending time going to some school in Hawaii if the courses probably wouldn't transfer there, or commit more time to living in Hawaii where it is extremely expensive to stay. Once I EAS'd, I just kind of I went to Oktoberfest and drank a lot of beer. I went to a few different countries and just kind of relaxed and took in some time for myself.

Digi couldn't start taking the classes that he wanted straight out of the military.

I didn't do so well in high school because I didn't really go to my classes, and I didn't really try to take any AP classes or anything like that. So then to compensate and expedite my engineering timeline, what I had to do is I had to assess high into chemistry and math and English. And so, after my vacation, I spent a good month preparing for my assessments. And then, I did my assessment tests so I could get placed properly into the timeline. I allotted myself time to relax, and I allotted myself time to prepare. And then, I started college in January on track.

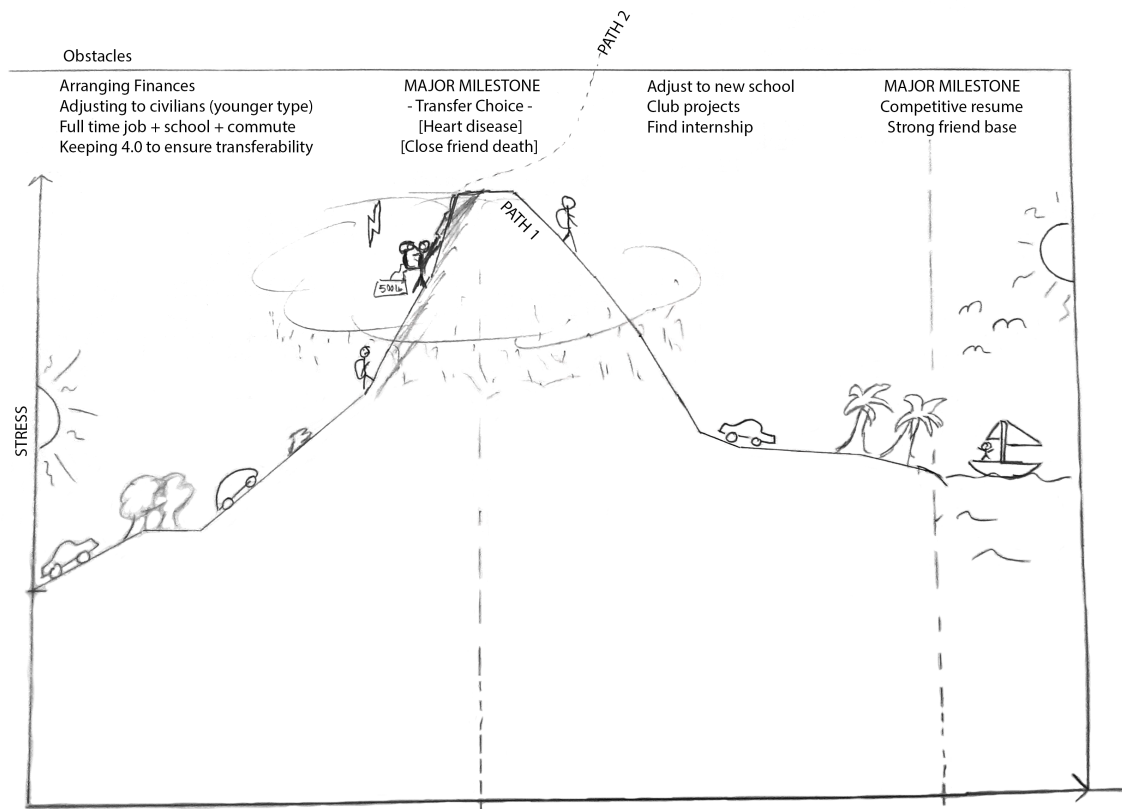


Figure 4.3. Digi's journey map of a time when he was successful in engineering. This journey map is drawn on stress versus time axes. The map shows starting out in a car going up a hill with trees and the sun behind the car (Obstacles, arranging finances, adjusting to civilians (younger type), full time job + school + commute, keeping 4.0 to ensure transferability). Then a Prius with a bush showing the hill getting steeper. Then a person climbing with a weight climbing to a mountaintop shrouded with clouds and storms. Then a divergence of path 1 and path 2 is shown (Major Milestone, transfer choice, heart disease, close friend death), path 2 is shown with a dotted line going up and out the page and path 1 is down the hill. Path 1 continues down the mountain onto a plateau (adjust to new school, club projects, find internship) with the car and finally a beach (Major Milestone, competitive resume, strong friend base) with a sailboat and the sun in front.

In his journey map (Figure 4.3), Digi drew a time when he was successful in his engineering program. Mine is kind of like a two-fold thing. I don't know if

you can see my major milestone dividers there. I did community college first, and then I transferred from community college to a four year institution for my degree. Originally, I had drawn this like a stress to time diagram. It's kind of like this is a mountain that I'm climbing, but the mountain is the manifestation of the amount of stress that I would be going through on my way up. This is chronological from left to right. I kind of cropped the image there, but it already starts at an elevated state of stress because you are just separated [from the military] and trying to figure out what the heck you are doing. When I drew it, I was trying to emphasize that fact. As I'm coming up to the top of the mountain, I was trying to represent that at this point I'm basically crawling and exhausted. There's not necessarily anything inside of the backpack, but I mean at the same time you could say that everything was inside of it. I mostly drew it to symbolize that, "Good luck getting up." I think that when you tend to hit a major road block, or obstacle, sometimes you just want to put your pack down. Then you start questioning yourself. You really can't see the top either, because of the clouds...nobody knows what happens tomorrow, right? Nobody knows what's going to happen next week. I really just drew that on there to say that you're struggling up to the top and you don't even know if it's worth it. It is just getting steeper and steeper, but you're just gutting it out and believing in yourself.

I had a flow chart already made for how I want to go about my school and stuff, and the order I will be doing things when I separated from the military. It was a matter of, "Will my finances align?" and stuff to try and get it all figured out. Getting adjusted to, being around, you know, people that are 19 that are pretty spoiled -that's like the first little car there. It's everything optimistic, you've got all the trees around, you got the sun beating down on your shoulders, it's good. You are heading up a little bit. The classes are getting harder, but you're still cruising and then it kind of plateaus a little bit. I got a little bit comfier. Essentially, the next little incline there means it became slightly more difficult. I drew the car like a Prius because I was trying to be a little bit more economical. I started a full-time job plus my school.

The way that it worked was, my school had two satellites, and my work was over there. My house would be here, the mountain would be here, and then my satellite schools would be here and here [gesticulating an equilateral triangle with a mountain near his house at one point and the two schools at the other points]. There's only one path around the mountain which you can take. If I want to go from my house to any of the satellite schools, it's an hour drive. And from satellite school to the other was an hour drive. It was like a perfect little triangle that was set up there for me to have to circumnavigate the mountain every day.

I thought I was prepared to get out of the military. I didn't dot my i's and cross my t's. When I went to this community college, it was because I was staying with my family originally. That was a financial choice. This is all in the [a very expensive area to live]. If you want any place to stay for under \$1,000, you have to be even further away than I was. And that is for just like a room. You hope that you have a kitchen. The location was based on the school choice, too, and the reason why I chose to go to school where I did was because it was a feeder into [state university]. You have even higher acceptance rates because their teachers are part time there, and their curriculum is essentially the same. Usually community colleges and universities that are nearby have some kind of agreement with each other. They like taking people from nearby schools. That was where I originally thought I was going to transfer to. I tried to do the research on the school and then I tried to figure out a plan to get to the school. That's just how those all aligned up. My plan originally seemed pretty solid.

I had full-time work that was over in [a city] which was another hour of driving from one of the satellite schools. Originally, I just went to go work for a company that my dad was working at just to shadow those guys and see what they're doing and see if I could apply anything that I was using in school to any projects there. Really, the experience was more for me to learn industry than it was for me to get money. Then they ended up getting swamped with some other stuff, so they gave me some other projects to work on. I took them up pretty well. The company owner over there, it

was a small business and they were pretty excited with my work, so they hired me. Then, I had my hours and stuff. It was full-time. I would say it was like 30-40 hours. It wasn't necessarily 40 hours every single time. They were pretty flexible around my schedule if need be. I could also remote sometimes. It was allowing me to get some kind of industry level experience before I had engineering experience... it's really difficult, or at least from my shoes, it felt like it was going to be extremely difficult to get a job anytime soon in an engineering field, especially if the only experience I had was linguistics. I was trying to expand my portfolio. I was moving into a lot of coding and stuff like using a bunch of different software programs in order streamline logistics and stuff. That was why I took up that job. They did pay me pretty well. It's better to have a safety net while you can, so I figured that while classes are easy, I might as well try and stockpile as much as I can. It puts me in an advantageous position.

The amount of time I was spending driving was huge, and the amount of time that I had left to study for my classes and how much time I had left to exercise and sleep and see people was very little. So, I ended up reducing that to a part time job and then ultimately just got rid of it and started working at the school instead. So, really it goes back to how I planned it and the little blunder that I made was to consider only living close to school and not consider where I could work. Like I said, though, it's been pretty useful, the stuff that I learned there. It kind of worked out in its own little weird way.

I was actually just cleaning out my computer recently and I found all the Excel sheets that I had made in order to plot my classes based on work schedule and travel distance, depending on which school I went to in order to minimize my route. Essentially, I was averaging 130-140 miles of driving daily. I would basically spend two or three hours of my life in the car everyday just driving around. A lot of this is trying to figure out how I was going to eat, how was I going to have my meals ready to go, and all that kind of stuff. The whole point of me going to the community college was to adjust but was also to make sure that I made it easier for me to learn

everything and cheaper. But, in order to transfer, you have to have really high GPA. That whole time I was just trying to keep a 4.0 so I could transfer to wherever I ended up wanting to go. As you can imagine, that became extremely difficult to maintain. Then I started having to cut back on my job hours. When I started working at the school instead, it was less income, but at least it was less driving. Everything else kept getting harder, too. The classes got harder.

And then, it comes down to crunch time. Setting up for writing all of your essays and stuff to apply to all the places you are actually going to transfer to, “Are you actually going to transfer and all this other crap?” So then, that is when it starts getting really steep. Pretty much right there at the peak of that mountain is where I had one of my close friends pass away in a helicopter crash. And then coming back from his funeral, my dad called to say that he had heart disease. It was all bad. At that point, as you can imagine, the stress kind of peaked... which is why I drew this as a mountain.

I guess I’ll talk about why I drew this picture this way, on a bigger scale. It’s not the most amazing picture ever. I don’t know if you noticed, but I have two little trees in beginning with sun. Then I have a little bush. The vegetation is getting sparser, and it’s getting steeper. And now, I’m entering into a cloudy, rainy area, no vegetation. And now as I approach the top, now it’s like a thunderstorm, hailstorm. You can’t really see the top. You never really could have seen the top from the beginning. You didn’t really know how difficult it was going to be in the first place. You didn’t really know what was on the other side. You just told yourself you were going to walk through it. That is kind of the metaphor of this drawing, if you will. I had to get out of the car due to terrain and hike. It felt like my hiking up is taking a lot longer. Time slows. And now I’ve got a backpack on and for whatever reason, now my backpack got bigger, it got heavier, and now it’s steeper. So, that is pretty much what it felt like right before I was able to transfer with all that stuff going on. Trying to make sure that bills are paid, personal issues, and that I could transfer and all that kind of stuff.

There's actually two paths at the peak. One is a dotted line that goes all the way up and the other path I drew with the person walking down. When I hit the top, if you could imagine, like I said before, you don't really know how tall the mountain is, and you can't see well. Essentially, it kind of felt like a choice between continuing to potentially have to try and climb a mountain that might not exist, maybe it might feel like it, or to go a route that at the time seemed like it had the least resistance. You can't see through the fog, and you had no map, so you chose with your gut. My friend passed away, and my dad told me about his heart disease at pretty much the same time. So, I was like, "I am taking the least stressful route from here on out so I can manage my personal things." That's really why the peak flat tops and diverges into two paths. I believe the path I took was the least stressful route, from what I've heard about the other school and cost of living there. The route I took is still at an elevated stress level. It still has the shitty conditions, just probably not as bad as it could've been if I went to the other school.

I transferred to the new school, so I had to adjust. A lot of the Vets choose the schools they go to because they feel more financially stable when they have a big BAH [basic allowance for housing] coming in. I turned that down. I think that the BAH I am getting at this school is three times lower; it is significantly lower than what I had initially planned. You're basically taking a gamble on yourself at that point. But, that was the path that I chose. That's why there is not an immediate jump where I could just parachute down all nice and relaxed. It still is a long hike. I still have got all this stuff on my back. It is still raining on me, but I feel I'm moving in the right direction.

Although Digi felt a little out of place among the student body, he found a way to participate in the college experience and gain valuable experiences at the same time. I do feel old at [state university] because everybody's 19, more or less, so I am trying to expedite my way through the school and took a lot of classes in the very start. I took a lot of classes and I took a lot of club projects to assess the school and myself, too. I stressed the living hell out of myself to kind of figure out what my capabilities

were. My capabilities and limitations. I just wanted to get that right out of the way in the first place. And so, what I determined was, some clubs, some extracurricular projects, are much more involved than others. And, some classes are much more involved than others. Ultimately, I did start with the three club projects, and now I only have got one.

Club projects are essentially where you learn by doing, you don't get any class credit for it, right, it's just the resume booster. But, what you do get is a sponsor that pays for the materials. Of course they'll say, "I want you to build something that does this." They'll specify or describe what they want the thing to be able to do. And then, your job is to say that you can do it or that you can't do it. If you can do it, you come up with a design and show them this is going to work, essentially. . . This is what we need, here is the cost, here is how we're going to assemble it. We made it safe, all that kind of stuff. And being a club, there's no class requirement, right. Since you get no class credit, essentially you just show up, and you can know absolutely nothing, but you get put on a team that is going to help you figure out a real life scenario kind of thing. And so, that is the purpose of club projects. It is to get real life application and to learn things that maybe your classes don't teach or to apply things that you have already learned through your classes.

One of the things that I'm doing right now is a yearlong project sponsored by [major defense contractor]. It is a collaboration project between [two different universities]. We have to build two aerial vehicles and two ground vehicles that all communicate with each other autonomously to accomplish a mission, essentially. And so, some of these designs are pretty complicated where you have to build an airplane that has no tail. If you have heard of the B2 Bomber, that is what it is, it is called a blended wing. And, we also have to build a vertical takeoff and landing plane like an Osprey. And, we have two ground vehicles. We used to have two underwater vehicles, that was last year, when I was working on underwater vehicles as well. But, they all have all these interesting aspects that, you're not going to take classes as a mechanical engineer that tell you how to make a blended wing or a vertical takeoff and landing

vehicle and few upper division courses on ground vehicle design. You know it's just you saying, "What's the problem? How can I better define this in engineering terms? What are my requirements? What are my limitations?" So, that's the extracurricular stuff that I do. I am currently in one of the leadership positions, and so all of my time is supposed to be spent teaching people and instructing people. You know, assigning people tasks. Unfortunately, because of the way they setup the timeline this year, it also means that I have to spend a lot of time doing a large portion of the tasks myself as well. The extracurricular kind of stuff that I do probably takes up anywhere from 10 hours to 15 hours per week.

So, being sponsored by [major defense contractor], there's pretty much a direct relevance to engineering, not necessarily in the vehicles we build but in the company itself and understanding how things that that company is building or other companies are building are able to influence the field of battle, or are able to provide assets to troops on the ground. *Digi is considering working for one of the defense contractors after he graduates with his bachelor's in mechanical engineering.*

Digi was completed an internship in summer 2019 and has an internship planned for summer 2020 as well. The one this summer, I haven't been there yet, but they sponsor a club at our school so that is how they have been seeing me around all over the place. Last year I worked at a National Laboratory in [city] as a design engineer. We were doing all the unclassified stuff that people wanted done, but they don't have the time to do. That doesn't mean that they are mindless jobs at all. They are extremely challenging. *Digi worked on three projects.* We were designing things that were made for extremely high precision and high tolerance. That was extremely exciting. You call around until you find someone that knows what they're talking about for a specific aspect, because you have no idea and need a subject matter expert. It was pretty exciting, because me and my buddy, it turned out, we basically reinvented an air rotary table. We did that and then the other thing that I worked on was flexures, a mechanism that deflects a certain amount for a given force. It is used for precision movements. I was building something that was adjustable

with minimal parasitic effects. The other thing that I worked on in this group was a bunch of 3D printers, trying to figure out how... when you print something it's really hot, but then it cools off like 200 degrees or 150 degrees. So, you have shrinkage effects and you have a whole bunch of different effects happening at different times because it's not heated uniformly. They wanted us to try and figure out what happens with different materials, what happens with different print sizes, what happens with different shapes, and try and map all that out and how to predict it. Those are what we worked on that summer. That whole journey down the mountain is until I get my first internship and my club projects are successful. I then get used to the school a little bit, I get in the car, and now it's flattened out.

It still is more stressful than when I first left the military. I would say I was just busy all the time. I think that is just how life is going to be, but I'm fine with that. That's why in the end, there are palm trees, there's sun again. I'm on a boat, but it's not like crazy turbulent water. It's more like a smooth sailing kind of thing that I was trying to emphasize. I would say that is pretty much what I was thinking when I was drawing this. Obviously there's stuff I didn't draw on here: people that were helping me out or services that was able to get that were able to lead me down the right path. That'd be a really complicated drawing, with horizon lines and multiple divergent paths. This drawing is a very basic representation of what I think that illustrates the way that I felt over the years.

As part of his plan, he originally picked the community college that had coursework with reciprocity with many courses at a [university] that Digi planned to attend. I went to a community college in the [coastal city]. I was there, it took me five semesters to be able to transfer. I picked a community college because first because I didn't have to take an SAT or ACT. There you can actually apply for a [state] board of governor's waiver; tuition went from cheaper to extremely cheap. You also have more time to learn the material [at a community college]. I will be honest with you, I didn't know how I was going to take school, or how hard my transition was going to be. You know, going from surrounded by people that you sweat with twelve hours a day,

to being out in the middle of nowhere trying to figure things out. I did community college because it is a much smoother transition, is much cheaper, and I get more time to study and more time to think.

So, actually, I was planning on going to [university]. I met some of the Veterans at [community college] and we all seemed to be in a pretty similar boat. A lot of them were all engineering of some sort. This community college was a feeder for [university]. They had a pretty high transfer rate over to [university]. The courses are pretty much the same, it is just an extra week or two for each course at the community college as opposed to the university. But, my friends, when they transferred to [university], they disappeared for a few months because they were so engaged in their studies and they were so stressed about failing a class. Yeah, it really turned me off, and then I also was talking to a few employers. [University] has a laboratory right beside it, the [National Laboratory]. I talked to a head mechanical engineer who said that they don't take interns from [university] as undergrads, even though they are right next to each other. It is counterintuitive. The reason is because mechanical engineers at [university] don't get to go to the machine shop whenever they want. They only get to do it for senior project, more or less. They need special permission. That turned me off. I was just like, "I don't want to be doing analysis and number crunching hours and hours and hours a day getting the theoretical stuff and not know how to make something." I came to this conclusion two weeks before applications were due.

Then, I had to revisit my plan and choose a new plan of attack. So I chose a couple more universities and then I found out from some friends about [state university], a state school. So I applied to all those. Fast forward a bit to March. So state universities, for your applications, you get told a month in advance, as opposed to universities. And then, you actually have to say if you're going to go or not, before you even know if you're getting accepted into a university as opposed to a state school. So its really annoying, but what I was planning on doing was I would accept the [state university], that was the only state school I applied to. I would accept to [state university]. That way if I can't make a decision for the universities, I'm good.

I'll just maybe say, "No never mind to [state university]" if I decide to go to one of the universities.

Well after that, you know a little bit of time goes by, and I find out that one of my close buddies that I spent a lot of time with, in reconnaissance... he ended up becoming a Chief Warrant Officer. He did a Sergeant to Chief Warrant Officer in the Army transition and then started flying helicopters for the 101st Airborne, and their helicopter crashed into the side of a mountain. The funeral was set for the weekend when the university applications came out. I was at the funeral, the funeral was a weekend long kind of thing. And, when I got my [university] acceptance letter, it was 20 minutes after my mom texted me saying that my dad has heart failure and is in the hospital. So, I was like, in a tough mental state already, and just thinking about [university] on its own, or the other universities and hearing how much time people spend studying and not enjoying their lives... Which is kind of mean because I know that a lot of people that go to these other schools, they really like their schools. But, I considered that to be an extremely high stress environment. I don't need high stress environments, especially with everything else going on. So I just basically said, "Nope, this is a sign for me and I'll just keep [state university]."

Yeah, and so my dad is fine by the way. He got a heart valve replaced. He is all good. But still, it was something that I was not... it was just a really shitty time. It was enough to get me to say, this is what I'll choose. I don't necessarily plan things and stick to it like a stone, I always have contingencies. And so, it wasn't like going to [state university] was completely unplanned, but it definitely worked out extremely well, I think. It was tough to choose whether I was going to choose mechanical or electrical because a lot of what I did [in the Marines] was very heavily electrical based. But, the whole, "How does something work? How can I make something better?" kind of thing, that was continually throughout my entire Marine Corps career. *Wanting to focus on how something worked led Digi to decide on mechanical engineering as his major.*

Digi also drew on skills that he developed throughout his Marine Corps career to navigate and succeed through his college. You know how you interact with people, how you plan for things, how you plan your time for a week, how you choose priorities, those kind of things, understanding risk I would say management is predominately what I was able to take with me from my military career and apply directly to school. I would probably argue management is as valuable as much as the confidence in yourself that you get instilled from the military. Because of how I managed and how I planned, because of the military experience, I was able to tackle all the hard stuff, or at least build a good enough foundation that I have a safety net; I didn't have to stress over grades when I transferred unlike my friends. So, like you know, if I get a C in a class, is it life changing? No, because I had already accounted for that with my safety net, it is low impact for me if I do get a C. It is like how you play chess or something like that. Every move that you make has a specific action and a proper time, and that is what the military has taught me. It definitely teaches you to work through hardships and stresses and stuff like that. That was, you know, that was what pushed me into community college to go through courses I had never even heard of in my entire life. And then, to be able to come out with a 4.0 and be able to transfer with it. That was the goal; to work extremely hard on the foundation, get it solidified, so I that I can transfer anywhere I wanted to. And then, when I transferred, I was able to spend more time working with extracurriculars, building things within projects and that kind of stuff, which is what I've been doing here.

Digi indicated that support systems and timely guidance for Veterans can be very important. I just realized this, I was talking with somebody a couple of months ago, before all this Corona Virus stuff happened. He ended up going to the same community college I went to. Ironically, I had typed in the wrong ZIP code or something when I looked up the BAH [basic allowance for housing] rate for the community college. I saw like \$1,500 or \$1,400 instead of \$3,600. Trying to understand the GI bill before you get out is difficult but could have been a financial game changer for me. There are a lot of grey areas unless you talk to a very helpful person from a VA office.

You're really not going to get the questions you need answered because you don't know the questions to ask. When I look at 36 months, I think 36 months. But, as it turns out, its 36 months of 100% specifically school days. Originally, I thought "I don't get a full degree out of this, so when do I start using it and where do I start using it?" I had compared tuition costs and basic housing allowance to get a total cost. "What is this actually going to be providing to me?" When I entered that all in, with the low BAH that I was expecting at that school, I decided not to use my GI Bill. Instead, because I was on all my deployments and stuff, my income was tax free. So, I was able to qualify for the [State] Board of Governors' waiver, which is like a dollar per credit for tuition. That took the tuition out of the cost. Then it was just cost of living. I definitely played it out wrong if I was thinking about maximizing finances and it may have made life a little more stressful than it actually needed to be, but, looking back on it, it may have put me in the right mindset to be in the position I am today.

Also, at my community college, like I said, I pretty much had a packed schedule every single day. Sundays, I got to sleep for eight hours, so that was a bonus. When I got here, I was able to utilize those resources the school had. Obviously along the way, I'll be making friends and stuff. I wrote that in the top right of my map. A major milestone for me is just to have a competitive résumé and a strong friend base. While I was in my classes I was able to make some friends and people that support me. Actually, utilizing the resources at school, specifically the Veteran's Center [at state university] has been pretty pivotal in how much stress I have to deal with; I'm not alone. It turned out to be good timing, because [the community college] had a Veteran Center before I transferred, but then didn't have anyone actually officially staffing it. There was a room, a space, a lounge for students to come into that were Veterans or dependents, but there was no one actually there to greet you, and talk to you, and help you out. Our certifying official was the only one. They had him locked up in some closet, basically. I am not even kidding you. He had no windows. The reason he had no windows is, obviously he is dealing with privacy data. But,

he was down the hall, around the corner, and in the closet. You really don't have any of those resources available to you. So, no one really actually came by before I transferred. We have staff in the lounge now and I believe because we have that personal contact to someone tied to the VA, the Veterans and the dependents and the Veteran center itself is now booming. All schools need a certifying office and someone to staff their Veteran Center.

In the beginning, when I was going to community college, there really wasn't that much at all that was helping me along. I shouldered all of the burden on my own. That is what I thought was the best approach to things. That is probably why the slope kept increasing [on the map], if I am being honest with myself. The summer before I got accepted to the school, I just decided to do a trip. The school was having an international workshop over the summer. It was three weeks. So, I came down here and I stayed in the area to get used to the place. I took advantage of the time here while doing that to just go to the Veterans Center here and talk to the certifying official. And then also, I stopped at the career services center to figure out why the heck I was getting declined for internships.

So, I basically was at their place nonstop for those three weeks. I continued to meet with them pretty frequently throughout. I still meet with them. They've been great, as far as setting me up with people that are also Veterans that are in the same boat. That was the Veteran Center. Having a social group that was my age or had very similar experiences, having the Veteran Center like that was a pretty significant.

There is also a multicultural education program for transfer students. It is just a mix of pretty much everybody. That is another community for to become a part of where you can socialize with other people that are in similar situations as you, and also get them the resources that other students may not have. This might seem contrary to what I said earlier, but I consider getting outside and fresh air to be pretty important for how your academics are, and your lifestyle. This school has a recreation center where you can rent out kayaks and paddles all the other kind of stuff that you need. I guess this isn't really a necessary resource as much, but the

landscape, the mountains by the beach, that will help you to cool off on a stressful day. There's also the transfer center. I really haven't utilized a lot of the resources that are actually available at the school, or at any school really. I don't know if that's just because I was satisfied with what I had and was trying to leave room open for other people, as a stubborn thing. Or realizing that, I am by nature an introvert, so I like to keep a really tight knit group rather than have my fingers everywhere. I think that is ultimately what it comes down to, one or the other. Those are the only school resources that really come to my mind.

I never went to the Veteran's Center in my community college. I didn't use the GI Bill, so I didn't have any communication with their Certifying Official. I actually found it pretty surprising that I didn't meet a single Veteran in any of my classes. I met them outside of class. Now that I'm here, I'm talking to a bunch of people that were also at my community college. I would probably say the most significant impact socially, and as far as use of my GI Bill goes, has been the Veteran Center. For my résumé and stuff, I'm feeling more confident about my ability to get a job with the help of the career services center. And then, of course, all the support from the people that I met that are my friends.

I'd say the success for me is that I have the competitive résumé and a strong friend base. I regard success as an accomplishment of a personal goal or personal milestone that I had set for myself. The impact it has to my character or wellbeing, the more successful I feel. I don't consider accomplishments as anything that has to do with a comparison to others, my personal goals are for my own improvement and I like to reflect on my own personal growth and development and that is where the success lies. Like I said before, you don't really know what is on the other side of the mountain - I separated from the military thinking that I could accomplish something, specifically to get a degree in mechanical engineering, but knowing actually knowing if I could. That is now reality, because I'm done here in the Fall. As I've drawn, it is smooth sailing right now. It is still stressful, but it is nothing I can't manage - it is the uphill fight that is the real battle. The success, I would say, is making it through

all the obstacles to this point. This has been the goal all along. It hasn't been to pass a class.

In my engineering program, I think you're successful when you feel like you're moving in the right direction. I think that even if it's one step, it is successful. I could say that I feel successful because I was able to even just pass design, fluids, and thermodynamics. I think it's more that you feel like you're learning something and that you are more confident in yourself, you know, the big picture. I consider that to be success. I feel like I paved my own path and things worked out. I could talk about every class that I had that was difficult, but you know, I don't really see the significance in overcoming a class as opposed to overcoming the whole self-doubt thing. I was a flunky in high school. I passed one French class with a C, and I didn't even pass the next one, I got a D. And then, I went to my linguistic school and was the honors graduate. That was over a short span of one year. My high school did not have a physics program and I had failed Algebra 2 then, but my success in my military career propelled me into my success in my academic career as I am now graduating with honors in Mechanical Engineering after rigorous mathematics and physics courses. If you were to ask me something difficult about my military experience, I would say the whole thing was. The whole thing, each major thing, or I would say each class with respect to the school, each class you have is difficult, but it is just one step up a big hill. You can be really proud about that step of the hill and that is fine. I know a lot of people like to look at the micro, look at each little step they make, the progression. I just decided that I would rather look at it as how far I've come.

4.4 Ryan

Ryan is a Korean National living in the U.S. As such, conscripted service in the military was a requirement for him to retain his Korean citizenship. I've been here, in the States, for a long time. I graduated high school here, went to my first year

of college here, and then I knew I wanted to keep my [Korean] citizenship. All my family is back in Korea. I know I want to go back and forth. So, military training was a must.

Ryan first came to the U.S. when he was elementary school age, but has been back forth from Korea to the U.S. many times. So, my mom's best friend from middle school immigrated to California. So, I've been back and forth a little bit. I attended elementary school up in [a West Coast town] for two years while my mom is attending community college. She wanted to get like an associate's degree to pursue computer science a little bit more. And then, I came back to Korea to finish my elementary school. And then, part way through middle school, in 2009, I came here to attend high school from 2009 to 2012.

All of my family is back in Korea. I mean, I've definitely been away from my family since I was young. I would go back and forth in between school years and like summer break, and in high school winter break as well, to go visit my family. I know that they definitely sacrificed a lot. The Korean culture is that, you work long hours to make ends meet. Definitely different from the work culture here. For as long as I've known, my parents worked really, really late hours. They're both programmers, so they've made enough money for the two of them together to send me here, although my dad a little bit reluctantly. I know for a fact that my mom doesn't have any money saved up. So, that's also, the you know, like the pressure on the money part. I guess if that makes sense. Yeah, I know because I've always seen them come in and come home super late so I just know how like all of those efforts were to help me thrive. And, my brother thrive. I mean obviously I didn't—may not have understood that at a young age. But, you know, like now that I'm an adult, it's just like, so, incredibly thankful. I'm just happy to be graduating college, I guess.

My mother had influenced me a lot in terms of who I am and what's the type of personality that I have, and like my outlook on life and stuff like that. She's definitely like more of a go-getter type and like just do it kind of like think about things later. Sometimes you just kind of have to like, you know do it. Like you just gotta go for it.

So yeah, that is an important part, which is kind of like, yeah, being out here [in the States]. Um yeah. And, my dad has always been just kind of like quiet on the side, scary person (laugh). Yeah, less so now. Now that I'm an adult, I think we definitely get along well better. My brother is seven years younger than I am, and he's just been, recently he's turning into a young man himself, figuring out life. For the most part, I've definitely been mostly independent here. I'm just here, right, because like it's hard right, even with the calls, it's kind of hard to stay entirely connected I guess.

Although being away from his family was challenging, choosing a college after high school was a relatively straight forward decision for Ryan. I think it's because it had the biggest, the best reputation for the cheapest price for international students. Just talking to my college advisor in high school and just looking at stuff like *U.S. News*, things like that. [This university] had a pretty good reputation on being a solid engineering school. I applied to a bunch of universities. I applied to [different university]. I actually got in. But, it was just the tuition difference was significant. Or at least significant enough where I was like [this university] is the right answer.

At this university, Ryan decided to pursue mechanical engineering because I was good at math, and also because at the time when I was applying for colleges, mechanical engineering was kind of like the thing to do. Now it's like computer science is super popular, right? Like there's definitely trends, as like society progresses, which engineering majors are sought after. At the time it seemed like mechanical was the best option. I wasn't like these other high school students who kind of had an idea what they wanted before going into college. I had no idea what mechanical engineering was, but someone had told me that it's the broadest and most flexible of the disciplines. I guess in terms of what you can do with it. That just seemed like a pretty good choice at the time. I heard that they make money. If I'm being honest with you, I just I grew up with a lot of pressure on money, as being, you know. There are definitely a lot of international students who like their extremely well off. Their parents are extremely well off. But, I think I'm the case where, my mother in particular, she saw that I didn't really fit within a Korean society in terms of like, so

she like made the extra effort to send me over here. There was always that constant pressure of money. So, I knew I wanted something to do with engineering because of what I heard, yeah.

Ryan enrolled in a university program after completing his high school, starting at [state university], instead of going into the military first. Because in high school, I felt that I put in all this effort to go to college. I wanted to see what college was like first, and then I always knew that just from listening stories from other people, like I knew I wanted to go because I also have the option of not going. Right? Just staying out here and hopefully getting a visa, a work visa, or maybe a green card, that was always an option. But I knew I always wanted to go [to do military service], but I knew I didn't want to go after graduating college because I was afraid that I would lose pretty much everything that I've done here and it wouldn't be as smooth of a transition coming back. So yeah. Just wanted to experience college so did that for a year and kind of went back.

All Korean males are mandated to military service as part of their citizenship. [My father] was in the Air Force, and the time he served was a lot longer. He was kind of like military internal police, and a step above because he was doing like military police. He would listen in on calls, pretty much without them knowing. All the Intel work.

Joining the military is part of Ryan's culture. I had heard so much about it. There's a saying that when Korean guys get together all they talk about is like the military because that is just the one thing that they have in common. So, growing up, it's like, you hear a lot of the stories, but I don't think that like particularly motivated me or anything like that. I just kind of accepted it as, you know, it's a fact of life, right. Everyone goes. You've got to go at one point. It's more that, than anything. I think there is definitely something like underlying, I don't want to say stigma, but like, people say that you become a man, right, once you join the military, or at least in Korea. But, besides that, I knew the military would help me become more disciplined. And, I was having a hard time before I left [state university] just

kind of staying focused, attending class. I knew I needed some sort of structure after you know just kind of being on my own and like free floating for such a long time. I knew I needed something to like, I guess, you know, to hold me down and keep me focused, for the most part.

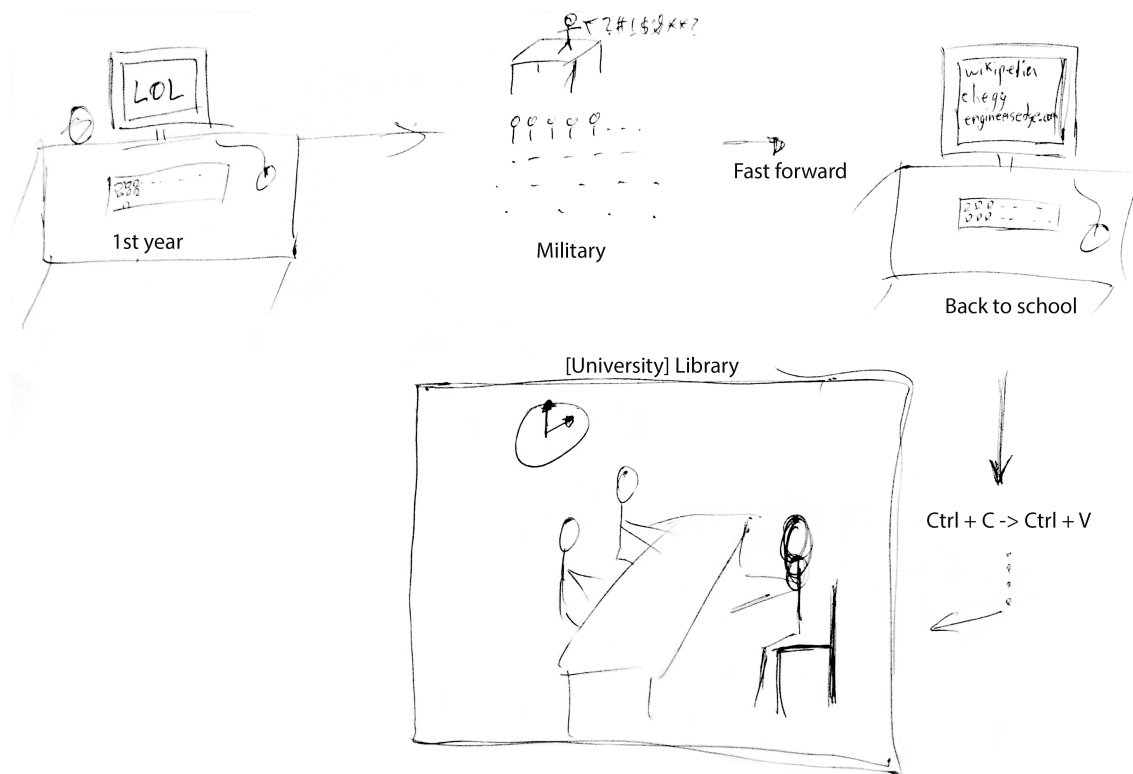


Figure 4.4. Ryan's journey map of a time when he was successful in engineering. This journey map starts in the upper left with a computer on a desk labeled 1st year, and the letters L O and L on the screen. Next is a figure on a platform shouting expletives to a crowd of people, labeled military. The words fast forward lead to a new scene with a computer on desk, labeled Back to School with the following on the computer screen: Wikipedia, chegg, and engineersedge.com. The nextt arrow shows Ctrl+C to Ctrl+V which leads to a picture of three students at a table at the University Library.

So, the first picture (upper left corner of Figure: 4.4) is when I was in first year, when I was sitting in front of a computer all the time, but I was just playing video games, for the most part. I mean it's just like anything else, it's kind of an escape, right? You don't want to do your work. You just want to have fun, I guess. I guess I still like video games. I don't play at all. I haven't even thought about it. I definitely cut it out altogether because I realized during school that it just wasn't a path to success. I define success as the accomplishment of a goal. To me, it's nothing more than whether something has been accomplished or not. That is to say, success and failure has a similar ring to true or false - it's just a conditional statement for me. With that being said, I recognize that success is not necessarily clear cut like true or false - is or is not - as some goals are hard to define with stringent metrics that can be reviewed and checked off later on (like an engineering requirement). Continuing to play video games wasn't going to happen. I had to cut it out altogether. I still enjoy video games. I've always enjoyed video games. So, I guess that was why.

So, my first year I like really, really did not do well in terms of grades. I was skipping class and playing video games and things like that. So very very, very poor grades. And, I know grades isn't like a measure of your success, but it was pretty bad. I realized like I was just letting myself do whatever I want, and just kind of be... I think I was, I don't know if that's, I think I was in some stage of depression. And, I just needed to get out of that. So I felt like I needed that. So yeah, that's why I joined.

Then there's a quick transition to boot camp. That's a scene I'm sure you're familiar with as well, right? It's just someone standing on a platform shouting at you. *Besides mental discipline and maintaining his Korean citizenship, Ryan joined the Korean military to help him get into physical shape as well. He joined the military for definitely discipline and definitely like a more functional body (laugh).* I didn't really play sports in high school. I played some, but I don't think it would be, not even the slightest, comparable to like the military service. And then, the Korean military, because I've had interactions with the U.S. Marines, I've learned that our [Korean]

military system is a lot more physical about making people do physical activity. As well as the U.S. is definitely more about tactics and more specialized in terms of, you know, how do you do your job better, of being a soldier. While we're more focused on, let's just grind you to pulp and like get you in shape. And kind of like that, so it's definitely just discipline was the number one goal. I felt like I needed that. And then two, I wanted to be fit and just like healthier.

I served with the South Korean Marines. I was a guerrilla warfare drill instructor. It was a position that I got selected pretty much straight from boot camp because I was capable of speaking English and they did joint training with U.S. Marines. So, they knew they wanted an English speaking Marine I guess. So, that was a big part to that. I was highly enthusiastic about the position, so I got selected in boot camp. And then, I served technically twenty-one months. The entirety of that time was spent in Pohang in South Korea. I joined the Marines at the end of September in 2013 after my first year at [state university] and then I was discharged June 2015.

As far as boot camp is concerned, the Marine corps boot camp in Korea is a little bit longer, well it's definitely shorter than the U.S. Ours is seven weeks for the Marines and then four weeks for all the other divisions. It's essentially like two weeks of basic, and then the Korean Marines get a little taste of everything. So you do guerrilla warfare training, you do your airborne training, and you do I guess what we call our IBS [inflatable boat small] training, where you're just out in the water throwing small inflatable boats.

So, we do a little bit of that so each category gets like three weeks. And yeah, it's just mostly, one week for shooting, or of course getting familiar with your weapon. But, for the most part, it's a lot of just physical activity. Kind of meant to do what boot camp does, which is kind of whip you into shape, make you a soldier, or at least have you figure out how to take commands. That is definitely new for certain people.

I was really, really into changing my physical appearance and getting in shape. I was very, very motivated, extremely motivated. Most people in Korea, even the people that sign up to be a Marine, I feel like they don't go through like a two month

long training procedure that you set up for yourself to make sure you do okay in boot camp. That's what I did. I would run every day because I was worried that I wouldn't be able to keep up in boot camp. It turns out that wasn't the case. While in boot camp, I would be doing pushups on my own, well actually that's not true, I would be doing pushups with other crazy people next to me during that time. We would be doing pull-ups on the cabinet and stuff. In boot camp, there were 13 platoons with booties, and then each platoon were split into four different squads of 15-20 people. The squad that I was in, we were kind of silly and kind of joking around all the time, but also really motivated so become a marine and look good, become fit and all that. Some of us...you know how they ration you off in boot camp...some of us were eating even less than that and like not taking in carbs and doing pushups at night when you were supposed to sleep and you probably already did like 500 pushups already, just from being hazed. So graduating boot camp was pretty big.

So yeah, that's pretty much it for boot camp. Straight after that, when I was getting my mountain warfare instructor training, that was one-on-one training. The one-on-one training was really rough. It was just constant repelling. It was really, really cold, but I would be sweating all the time. I would literally have sweat condense on my helmet and keep dropping on to me, although it was near freezing and whatnot. That continued for like three weeks. Boot camp for a Korean Marine is like seven weeks so I would say that was like bootcamp condensed into three weeks and even harder. Graduating bootcamp was pretty big deal for me. Graduating [mountain warfare instructor school] was a pretty big deal for me too, finishing that training. I guess there is two times, although I was supposed to do it anyways, I would consider successful, just going through the training. My definition of success (as described above), was not altered or affected by my military experience. However, my military career helped me learn what it takes to succeed and taught me how to be persistent in trying to knock down barriers that would otherwise keep you from succeeding. It gave me grit and discipline, which are necessary characteristics one must have to succeed.

During boot camp when I went to guerrilla warfare training, I applied for the position because they announced that they were looking for spots to be filled, and I thought what they were doing was really cool. They were in their own space, my base, we were separated from the 1st division, which is where we're based off of. We just had our own unit surrounded by these mountains, and it was just like, kind of just felt nice. The instructors seemed really cool and very knowledgeable, so I just kind of wanted to take that route. I wanted to, at first, do special recon, but my mom said she would disown me if I did that. So, I didn't go that route, sadly. And then, you had to apply before going to boot camp to do that. So, I think that it kind of was like the next best thing, I guess, when I thought about it.

We were technically part of the training division. The training division and the Korean Marines are together in Pohang. They are kind of connected, I guess, in the same base. We were separate from that unit but we were technically still part of the training division and it wouldn't just be just booties [people in boot camp] I guess it would also be your trained NCOs and COs (non-commissioned officers and commissioned officers). We would train with U.S. Marines and then we would also do classes that essentially get you your Ranger certification. So yeah, it was a mix of all of that.

Although required military service for Korean males is only about 21 months, Ryan considered staying in the military longer. I definitely considered it when I was there at the time, but I'm really glad that I did not because the path that I would have taken...you can't become a commanding officer unless you do four years of college. And, by the time people have...so my Staff Sergeants or Gunnery Sergeants were just like offering, or not offering, but like trying to convince me to stay, but I felt pretty done. I felt that I've gotten as much as I could have gotten from my military experience by the time everything was kind of coming to an end. I knew I just kind of wanted to keep doing something else with my life other than just being a soldier.

My last few weeks before being discharged... I told myself that I wouldn't be one of those stingy and like messed up seniors that haze their juniors and like hit them

and stuff, and just shit talk them for no reason. I'm really glad, looking back, I never did any of that. I still tried to treat everyone with respect. It's kind of weird to say this, but I had like five people cry out of my squad of eighteen people when I left. As far as I can count, that was the most number of people crying for someone leaving. I feel pretty good about that. I think I did a good job. I would consider that success, although that's such a strange thing to be feeling successful about, not being an asshole and not hazing people. But that was a promise, something that I told myself that I wouldn't do, and I didn't do it.

After coming back to the U.S. from his Korean military service, Ryan did not go immediately back to [state university]. He attended a community college in a different city. In 2013 I attended school at [state university]. And then in 2015, I was back in Korea. And then, ever since I came back, I've been well, I went to Community College for two years, and now I'm back at [state university]. After my service, when I came back I was in [a West Coast town] for a couple years doing community college during, fulfilling some of the lower level requirements. I stayed with my mom's friend from middle school, different friend, who owned a business in [a West Coast town] and she told me I could work part time over the summer. That sounds good. Having a place to stay allowed Ryan to continue his degree progression at the community college and work, saving money.

Referring to his journey map (Figure RyanMap), when I came back, again, I was sitting in front of a computer, but for a different reason. It's strange, maybe it's a little rushed, and I'm not very creative, but when I think about my engineering past, that's kind of what comes to mind. For me, the success came from just sitting down and actually doing the work, like the rest of us.

My favorite activity after coming back would be weightlifting, the Olympic lifting. it just kind of help me stay more disciplined and whatnot. The nice thing about the whole thing was, you can't do too much of it. You're literally too exhausted to continue. There's no easy overdosing for that kind of stuff. Working out and sweating kind of always, how do you put it, clears up your mind. It's tiring, but it freshens

you up, in a sense. That continued for a long time until...it's kind of been a year, like exactly about a year ago, during my spring quarter and things just started to get really busy. I also started getting injuries at the same time. So, for a year now, I definitely haven't had as much weightlifting, or just gym in general, if I'm being honest. It's been really busy.

I just really got into it because...well, I first got into like, you know, the whole fitness thing in the military. I was lean. I was doing a lot of cardio, but then when I got out, I wanted to build muscle, or whatever. And then, as you progress, you want to lift more weights and whatnot, so I got into powerlifting. I started squatting and deadlifting heavy and whatnot. And then, the next transition was Olympic weightlifting, which is like, to me, well no, it is the most technical lifting sport that you can do with like a barbell. That was the final step, I guess. I really just fell in love. It was rewarding because it was both challenging, it wasn't just like a deadlift where you, at certain times, you can just kind of brute force it. But I like that Olympic lifting required some sort of finesse, and I really got into it. So, I guess that was my escape. I was like focused on that for a really long time.

Not only was Ryan able to find an activity that helped him both physically and mentally, Ryan was also able to contribute to a club project. I helped found the [state university] Hyperloop club. It was a club based on the Hyperloop pod competition that SpaceX holds. The Hyperloop concept is essentially like a bullet train inside a vacuum tube. That is the ultimate concept. If Hyperloop was realized, it would be some sort of maglev bullet train inside a vacuum tube that can let you travel from LA to San Francisco very quickly, like 20 minutes or something like that is what they say. SpaceX holds the competition because this was Elon Musk's white paper, or that's how it got attention. Really, the concept was around much before that. SpaceX holds the competition and essentially, it's like a drag race. They have a mile long vacuum tube, and they accept college teams to essentially design, build, and test vehicles, which we call pods, in their mile long straight vacuum tube track. So, that's the ultimate goal.

I helped found the club. So, [state university] has so many clubs and I didn't want to join one of the pre-established clubs because I knew on my résumé that I needed some sort of leadership position to stand out. Just like out of pure chance, pretty much, I was in my intermediate dynamics lab where we do MATLAB. I was asking the instructor, who's a grad student if he knows of any good clubs to join that I can get in on at the ground floor? Pretty much, the guy sitting next to me was like, "Hey, I'm actually starting a club. Nothing's there. Do you wanna join?" I was like, "Yeah, let's do it!" I didn't even know what Hyperloop was at that point. That's how we got started. We helped find the club. The guy sitting next to me was the president, so he handled a lot of the paperwork side things. That's how we got started off.

I was one of the engineering leads. We actually made it as finalists in the 2019 competition. So, that was pretty cool. It took a lot of effort, and it really expanded my... club projects are ways for you to do more hands-on practical engineering outside the theories that you learn in the classroom. Although [state university] kind of prides itself on learn by doing and whatnot, I think that motto really comes from all the club activities, rather than all the labs it's known to have. Maybe if you wanted lab work, you would go to [another university] I think, or something like that. We pride ourselves in having a lot of labs, but what I've heard about [state university] engineers standing out, is like the practical knowledge that you will need once you join industry.

As the propulsion lead I designed... we used an electric powertrain system, it's the same thing that you would find inside an electric vehicle. I essentially helped design that system. I did all of the mechanical design for it, figuring out what kind of power we would need based on what kind of acceleration we want, and what kind of top speed we want, and all that stuff. I did stress analysis and things like that. Then, as team lead, you kind of organize as well. You try and hand out assignments and figure out things for people to do. People like freshmen and sophomores, who just want to get their hands dirty, you kind of figure out what they want to do, or what they can do, and just kind of lead them through it. Although eventually, for

any club activity, the people who don't have as much riding on it, they just kind of start dropping off here and there as the quarter gets busy or as finals come up. So, in the end, you're really just doing the work by yourself, or at least that was the case for me. That was my role.

I guess the Ctrl-c and Ctrl-v [in the journey map], I think I kind of mean, it just kept going. Just every day as a copy and paste, is what I kind of meant to do with that one. You know, you gotta do what you gotta do. Just like every day was a repeat. You just kind of go to the library and sit at a desk and just put in the time. Do the homework and study for tests. It really was repeats of that, for the most part, until I think it was after my first or second quarter at [state university] that I started to make friends. At first, it was just me, but then I found, you know, a bunch of other transfer students at [state university] who kind of have the same drive and motivation. That is when the whole library thing started happening. We were all taking the same classes. We all transferred. We were transfer students, so we're all in a similar boat. At [state university] we always made it a habit of always going to the third floor where they had these longer desks that eight people can sit around. We would just like automatically convene there when we were out of class, needed some time to kill, or mostly just wanted to do homework.

The progression from playing video games to doing homework, preparing for exams, and then doing that continuously, like maintaining that hard-working lifestyle, I think, to me, was a continuous series of success. Just me succeeding the whole time, if that makes sense. I guess I could define getting good grades at the end of the quarter also a success, but when I first came back to school, for me, it was important that I take the time to put in the effort. That activity, in and of itself, even if I didn't get good grades in certain classes, regardless of what the outcome was, the fact that I put in that effort and was satisfied and content. Before I put in all this effort, in the first year or something like, I fully recognized that playing video games until 2 AM or spending the whole night playing video games, that wasn't a really good lifestyle. It was a destructive lifestyle. I shouldn't be doing it. It's not really why I was going

to college. I knew that it was all bad, but I couldn't, for some reason, I didn't put in enough effort to change that lifestyle.

When I came back, the fact that I was actively pursuing a lifestyle where I am trying to reach a goal other than being online playing video games that kind of lifestyle meant success to me. Every day that I did that meant I was doing better than how I was doing, during my first year. That's what I am most proud of and kind of what I attribute success to. Living the lifestyle that you want to live, because for me, I wanted to live a certain lifestyle when I was in my first year, but I didn't, probably because I was depressed. I guess that's kind of what it does to you. The fact that I couldn't do that to me seems like not successful. You're not succeeding in life or whatever. I guess people have their own definitions of success.

If someone else said that their job at college was networking, or whatever, and they spent the whole four years partying, but that was what they came to college to do, and they did that. To me, I would consider their lives successful, in their own terms. So, the way I define my success was getting good grades and then kind of like paving my future as an engineer. Wow. Maybe I'm just trying to boil it down too much. I knew I had to do these things to get a job in the States so that I can stay here. I guess I built my definition of success around that, just maybe the immigrant dream. I have the goal to be financially independent from my parents, "making it" here in the States, and finding a good job and all that. Because if I kept living the life that I was living before, it seemed to me that I would not have gotten anywhere in life and I would constantly depend on my parents or something like that to sustain myself. It doesn't really seem like a fun life. Doing the job that you were there at college to do, for me, that would me it, I think.

Transitioning from the U.S. as a student, to Korea as a Marine, and back to the U.S. gave Ryan unique insights about differences between the military and civilian, and U.S. and Korean society. I think it was an interesting experience for me going from a very open minded and individualistic society, as the United States, to a very not, a very, it's definitely getting more and more individualistic in Korea as well, but

in the military though it's definitely more about the focus on the community and the troop and your unit, and less on the individual. So, the change has definitely been interesting and the change back was also very very interesting. In terms of, yeah, as just someone who is receiving orders, I have to, now I can give myself orders. So, that transition is definitely interesting both in and out, I want to say. That is just something to note. I definitely try to keep the whole kind of go getter mentality alive, and like just like the push hard mentality alive. And, I think that's helped me come a long way. I definitely have my military experience to thank for that I think.

In terms of then just trying really hard at everyday life in terms of like getting better grades improving my grades is a really big [benefit from the military]. I turned it around. And, you know, when I was out, I guess more recently like last quarter, when I was doing all these job applications. It could be quite difficult for international students to find a position in the states. I definitely applied to like two or three hundred different positions. But, like that just keep on going part, it definitely helped keep me sane, I think. Like how I was before, which was like playing video games and like, just staying in my room and things like that to how I am now, I think that's been a big difference. Definitely more focus. More driven. More willing to learn. I actually enjoy learning now and I'm just less of a lazy bum, all in all I think, although sometimes I have my moments. My university experience (post-military) helped me gain more tools to succeed. With grit and discipline as my baseline, I learned that in order to achieve my goals, I needed to be resourceful, punctual, and correct in my assumptions - or at least learn from my mistakes to be right more often. I graduated from college with a job lined up. You've heard the story before, but I wasn't in a good place during my younger years in the United States and my academic performance was crawling on the floor during my first year at [state university]. When I got back from the military, I wanted to pick it back up while making efforts to polish my resume to eventually land a job. And I did! Hence, I was successful. *Ryan graduated this year with a degree in mechanical engineering. He accepted a job offer in [a big U.S. city], working for [multinational conglomerate technology company]. He will be*

able to apply his mechanical engineering degree, working on a project to develop their [delivery system].

4.5 Jay

Jay grew up in Singapore. I spent two years in the Singapore armed forces, the Singapore Army. In Singapore, you are required by law to serve two years after high school. So, all the males who are either on a green card or a citizen of the country have to serve the two years in the Army once they graduate from high school. That's usually right before college for most kids. The only exception that they make is if you are going to be a doctor, a medical doctorate, then they'll let you do your degree first, because they want the doctors in the army.

Going into the military was something I had always planned. Growing up you know you have to do these two years, so most kids would plan their college right after they're done. Whereas my peers who didn't do the Army applied during their 10th and 11th grade years, I only applied during my second year in the Army, basically in the year before I went into college. And there was always a plan. I'd say for most people it's always a plan. It's just that you go two years later than you would otherwise without the Army.

They give you the option to sign on as a full time. So essentially that is your career then, beyond the two years, I'd say not a lot of people do. It gives the option for a lot of people that have very little educational background to make a career. So, I'd say those people are more inclined to signing on to the Army, just because it gives you a career outlook that you did not have before, because you have no educational background. The Army gives you that offering, right? They let you basically have a career without having much in the past. Even if you're say an ex-con, an ex-criminal, you are still able to have a career. I mean you may not be as high ranking as you would normally be, but it still allows you to have a steady income, which is why a lot of people actually go into it, just because they don't have what it takes, or they can't

afford to go to college. On the other side of this, is that a lot of these are scholars. So, the Army gives you scholarships and lets you go to college after two years. You do your four years of college. Then you come back and serve a contract for the next five or six years, which is why you get the scholarship. These guys are usually the guys that are accelerated through the ranks. They end up being the Chief of Army, Chief of each division.

The way [joining the military in Singapore] works is, the first two months is, everyone goes in and does what they called basic military training, (BMT). The first two months, you do all the basics. They start you out with just basic drills. They teach you how to march, they teach you how to be in the military. You're following orders. Coming from high school, you just did what you wanted to. You weren't told to do things. The first couple of weeks you are literally just learning how to march, learning how to be orderly, and then they start you off with some basic hand to hand combat. In the first couple of weeks they give you your rifle. Everyone in the Army is assigned a gun. Then, it's all about handling training, being able to disassemble your gun, assemble it back, basically under a timed circumstance. You do that for about a week. Then it's a lot of just taking care of your weapon. Cleaning it constantly where it is spotless.

Then, you go into doing kind of what they called the high key events. The first of which is you'll train up for your shoot. So, you go through a trainer which is a virtual screen with a replica gun. Eventually once you pass all the preliminary tests, you go to the actual rifle range. You spend about two days there, just getting your marksmanship. So that's one of the first high key events. The next one would be grenade training. So again, you do all the simulations first, and then you go into the actual live grenade throw. While doing all this, there's also lots of other smaller things: you're learning how to dig trenches; you're learning basic survival skills. One of the biggest events that you do in the Army is you go off for a week into a jungle that they have. You're there surviving on your own. They give you a fixed pack of food and then you just have to navigate yourself through it, dig your trenches. You

basically don't sleep; you sleep in the trenches that you dig. And, that's about a week. That's what they call your basic final test, and that's just testing everything you've done in the last two months.

While all that's going on, they also have a lot of classroom-based lectures where they're just teaching you a lot of other skills. But a lot of times, emphasis is placed on learning, not just being outdoors. So, a lot of health stuff is done lecture rooms, they tell you about your rights, your insurance policies, stuff like that. The more general stuff is what you get in a classroom setting.

BMT (basic military training) basically varies anywhere from nine weeks to sixteen weeks, and the way they decide this, is on your fitness level. So, the way it starts out is, six months before you enlist, you go through a full medical screening. They are really good about that. They basically categorize you into different health levels. It is basically your fitness level, and it goes from ABC through E. E is mostly those who are deskbound, so they can't really do any of the physical stuff. C is kind of in between, and A is the fittest of fittest. That is your top 2%, so mostly commandos would be A1L1, which means top physical performers with no medical issues. It goes from ABCDE and F is basically, where F is you're exempt from being in the Army. That's maybe if you have serious issues. I worked with people that were autistic, they were still forced to be Army. You have to have a real reason to get an F, and they are pretty strict about that too.

Based on that, everyone does the first nine weeks of military training, and they also have this thing called obese training. They give you the six months to try and get your obesity down to the required level, but if it's not, then you have to do two extra months of additional training to make sure you're fit enough. The normal person will do nine weeks. If you have to do the extra obese training, it'd be 16 weeks of basic training, essentially. Those two extra months are used just for fitness. When you go in, you go in batches, and everyone in your batch is the same fitness level as you. So, for my case, I had a knee surgery before I enlisted where I tore my ACL, so I was not allowed to do any of the running stuff. But the way the program is designed, I did

everything that everyone else did, except I didn't run. If that meant grenade training, it meant I did all of the grenade training without running. I still had all my combat shoots and had to pass all the tests. I did all that, just by walking and not running for everything that I had to do. The first nine to sixteen weeks, what we called BMT (basic military training), Singapore has an island that they use just for this training. It's called Pulau Tekong Island. Everyone does their basic training there. You are there Monday to Friday. You are only allowed to go home Friday evening, and you come back Sunday night. You're in camp constantly training Monday through Friday, and then you're home for the weekend. And, that's your first two months actually in the Army.

They let you branch off from that based on your education background, your medical fitness, and also how you did in your first two months in the Army. Then they place you across the entire range of divisions in the Army. Whether that's transport, combat, military engineers, whatever that is, they will place you based on aptitude tests, how well you did in school, how well you did as a leader with the group that you're in. The guys that did really well and excelled go to what we call Command School, which would be Officer schools or Sergeant schools. And then, everyone else just gets placed as a regular man, which is what they call it, across any division in the Army. For me that was transport. And then, what happens after that is, once you get posted to your subdivision in the Army, you have to go through their training, which is usually two months. If you're in Command School, the officers go for a further eight months. So, for me, because of my knee surgery and because I have asthma and stuff like that, I couldn't really do anything else, so I was given the role of a clerk, essentially. I worked eight to five in the Transport Headquarters Monday to Friday, but the way the Army is structured is that generally they want you to stay in camp from Monday to Friday.

I am not sure if you really know, but Singapore is like a tiny island. It takes you 45 minutes to get across. So, you can go home basically anytime you want to, but you're required to stay in Monday to Friday, same structure again, and then you go

home for weekend. Just because I was a clerk, the camp that I was in didn't have enough beds, so they didn't want to keep all the guys just working eight to five day jobs to stay in the camp itself if they didn't have the space to do it. But other than that, all your meals are provided. All your health care is provided for your entire time in the Army. The only times you would have to actually spend money is if you went home on the weekend or, once you're posted to your unit, they have something called nights out. Essentially you get to leave the camp, say one of the weekdays in a week, just to go out for dinner and come back if you want to. That is up to each unit. Whatever they pick, whatever they want you to do, you do. Basically, you do what you're told Monday to Friday, and then the weekends are yours. That's kind of how the structure works.

In transport, I worked under division called regimentation and discipline. We were the guys that took care of all the guys that had any kind of military offenses or civilian offenses. Whether that was launching an investigation report internally or keeping track of court martial offenses or even state offenses. So, if they have cases pending in state courts, we have to keep track of that and report it back to the Army. That's kind of what I did. A lot of my job is conducting drug tests. So basically, urine tests. Because we work with HQ, we have all the entire transport division.

So, before I got there, the process was basically nonexistent. It wasn't being done. My ex-boss deleted any emails or phone calls he got about it. When he got replaced by someone else, they obviously weren't okay with avoiding the constant emails. This is something you're supposed to do. The unit is supposed to carry this out. And so, I felt, yeah. So, my process behind it was there is a directive that you have follow, and so I reached out to one of the other units, sister units of ours, who already conduct these tests. I went and spent a couple of days with them to understand what they did and how they did it. I then brought that back to my unit and then implemented that. I think seeing it go from nonexistent to we can do a drug test on anyone at any time it's needed, I think that was one of the more exciting moments. Having pioneered the project, finally seeing it implemented and used on a daily basis even

after I left the service is one of my greatest achievements. I view it a success as it improved efficiency in my military unit. At the same time, it also helped drug abusers rehabilitate and be less reliant on harmful substances. I felt successful in the Army when my Drug Testing regiment was fully implemented and rolled out.

So, one of the things I did was introduce a drug testing regiment for my unit, when I worked in the HQ for the transport division. We were in charge of about two thousand people. We put in place the random drug testing regiment across the board. We would test sections of people. Different units in the Army get tested times, just randomly. But we also implemented a drug testing regiment where ex-convicts of drug abuse, those that just came out of military prison, they had to undergo a regiment for so many other weeks after they've been released, just to make sure they don't get back on drugs. For my unit, I designed the entire program, and so that was what I call "my baby," because I spent about two to three months just working to get that in place and then carry it out for the next year and a half.

Every quarter, we will go to a different unit to conduct a random drug test. On top of that we also had the guys who had been convicted of drug offenses that are on what we call a urine test regiment, where they have to come in every week and constantly be urine tested for six or eight months, once they are released from military prison, which is a temporary barracks. So for my unit, I organized all the drug tests, carried them out, and then I created investigation reports, assigned officers, and then if charges need to be assigned, I'd raise it up to my boss, who'd then raise it up to his boss which would prosecute the case. So, that was essentially my role in the Army.

I did my two years and then now I'm done with the Army. It wasn't for me. I just wanna do...so I don't like being told what to do. I like having my own schedule, having tasks and doing things when I want to get them done. I'm pretty good at sticking to a schedule. The Army helped with that, as talked about earlier, being rigid in your structure. I kind of like going with the flow of things. I'll have my schedule for the next week or so, and I'll get things done, but I get them done at my own pace. I don't like being told, "You have to do this. You have to do this at this

third time.” And also, I don’t like that your thought process is kind of constrained in that you have to do what your superior says, even if you think it’s wrong or it’s not the smartest way or it’s not the most efficient way of doing things. That really bugs me.

Although Jay is no longer on active duty, he is still required to maintain a connection with the Army. So, what they do is every year, you are supposed to go back for two weeks of Reserve training, just to make sure what you’re trained in is still up to date, to make sure you still remember what you are doing. You do this for a maximum of 10 cycles, or up to the age of 50. These two weeks are usually when they basically pay your company your salary, so you are still getting paid whatever you are earning, just that they are reimbursing the company for your time that they are taking away. Right now, I don’t have to go back, because I’m currently studying overseas. If I was back home, I would have to do my two weeks a year.

Jay gained a new perspective about the diversity within his country as a result of his service that he may not have had otherwise. Before going into the Army, I went to a pretty good high school. Everyone is well educated; everyone had education. Not many people had financial trouble or family trouble. Sort of a bubble. Whereas in the Army, you’re basically grouped with people from all sorts of backgrounds: people that don’t have high school education; people that have only been to middle school; you have people that have family issues, money issues, all kinds of troubles. You’re mixed and you learn to cooperate, because these are the guys you’re working with. You work them in your platoon. These guys can come from any background. So, going from that bubble to this [into the Army] was a huge, huge change, because you were used to talking with your friends where everyone was from a similar background. Everyone was pretty okay in life. We don’t really have the struggles that you see, to basically being surrounded by people with these problems. You have to learn to communicate with them. They don’t behave the same way you do. They don’t have the same experience as you do. You have to be able to adapt to what they have and be able to communicate with them, if that makes sense. There is basically a huge

divide of experiences and backgrounds, and you all have to learn to communicate together, you know, to be successful.

I went to a high school that is pretty liberal, so I never really had to... Everyone who was there wanted to be there. You never really were forced into doing something, you were doing it because you wanted to learn. Whereas in the Army, there are a lot of things you don't want to do, but you don't really have a choice. Another example is, you work with people who are far superior to you that may have a much lower educational background. So, the way you see things in a logical way, is not the same way they see things. You might see something a lot more logical than they can, but you can't really talk back to them because they're far superior to you, in terms of ranking. So, you kind of have to bridge that gap, trying not to be rude. But also, if you know something is done a lot easier, a lot simpler in a way that they don't really see or understand, even if you try to explain it to them, you just have to deal with it. You do what they say. Dealing with that was kind of a challenge because often even when you try and explain it to them, they're pretty stubborn in their belief. You just have to do it their way, even though it's longer and may not make sense at times.

So, a lot of people don't look forward to [conscripted military service], just because you're forced to do it. You don't want to do it. The way I looked at it was I had to do it, and somehow still make the most out of what I had to do. There was no point trying to feel bad about it and then go in with a negative mindset. What I wanted to get out of it, honestly just the experiences. I met people who were on... Singapore has capital punishment. So just because of my role, I was handling cases within my unit. I was talking to people who are on death row and who had cases where their possible sentence is 15 years in prison. I spoke to a lot of people that had abused substances, which is why they were currently in detention barracks or in jail or whatever it was. And, I got to see all the backgrounds that they came from. I often contacted their parents as well at a hearing which is kind of interesting. I never grew up around that environment and so seeing that Singapore itself had people who are facing such struggles, was quite an eye-opening experience, I would say. I grew up in a bubble. I

never had friends that had substance abuse problems. I never had friends that were in prison. But I got to see this other side of the nation and how people's lives are completely different. How they have so many other struggles. That just made me appreciate what I had, but also taught me how to communicate with these guys. "How do you get through to these guys?" These guys have basically nothing to lose at that point. You are trying to get them to agree to have a defending officer, which is basically your lawyer in the Army, to talk to them to try and mitigate their case. Just trying to get through to them, get through their parents, this taught me a lot of skills. I would say it helped me with a lot of communication, but also about being a lot more prepared for what's out there in the world. It opened me up.

Before that, you're shielded from the rest of the world, essentially. It's opened me up such that I know these problems exist, I know they are real because I've seen them. Growing up, it was always, "Yeah, it happens," but I never knew kids my age were going through those struggles. I never knew that that was such a big problem, such a widespread problem as well. I know that they're out there and I'm aware about them. I feel like every day, not even consciously, but subconsciously, I am aware that there are people out there who have such struggles who are facing things the way I am. They are different than the way I'm going through life, and so just interacting with people, basically it can be anyone in college, right? College is such a big diverse pool of people. You have all kinds of people. Yet just be aware that not everyone around you may have the same background and upbringing and experiences as you. I think that awareness is not conscious, but it's more subconscious now. Just the way you interact with people, you're not making assumptions, you're not jumping to conclusions, and you're not thinking of things in your shielded bubbly way as you would if you had not seen that part.

Jay spent two years in the Army after high school, opposed to many of his college peers, where he gained experiences that helped him to be better prepared for college. The Army has trained you to work with people who may not look at things the same way you do, which is kind of good. It gives you a much wider holistic approach to

things. Say for example, working in a group now is a lot easier because, one, you can use the communication you have learned with diverse groups of people in group projects a lot easier. Working in teams is a lot easier now because you know how to communicate, but also because you try to understand their viewpoint and not just yours. You take into consideration the way they look at things as well, which just makes it a lot easier to communicate and just be able to interact with people. I think that makes a big difference. The other thing I would say is time management and planning. In the Army, you have to be up at 5:30 every day. You know you have to do this and this. You're a lot more rigid. So, I'd say freshman year, coming in, I had no issues with time management. Compared to my peers who had not been in the Army, just based on what I saw, I did not struggle through my freshman year, but for them it was a massive jump going from high school to college. For me it was just a smooth transition. Where I would say there was a big difference, I had not done anything in the last two years in terms of education wise. The steep climb for me was being able to refresh everything I've learned two years prior to coming into college. The first few months, I had to go back into the textbooks and reread stuff that I actually learned in high school because I don't remember what I did.

College was always something I wanted to do. I don't think it was really a thought process there. It was only I am going to go to college, whether it is right after high school or right after the Army. I applied to ten schools, I believe in the U.S. Of those ten, all of them were engineering schools. [State university] happened to be my top choice of the ones I got into. It was in my top three choices of the ten I applied to. I like being hands-on. I probably didn't know that as much before college as I do now, just based on the classes I've taken. I understand things better if I can see it. So, give me a mechanical system, I'm able to understand that a lot better than a controls class, for example, where you're developing circuits. You can't really see what's happening. It's more of, you know it's happening between things and components. So, I prefer a lot more of their hands-on work. I prefer looking at things, visualizing things so that I understand it better. This is why I chose mechanical engineering, just because it's

a lot broader so it covers a little bit of everything, and it gives you that hands-on, mechanical aspect of it. I couldn't do a major like ECE [electrical and computer engineering]. That just doesn't make sense to me personally.

From a young age, Jay knew he wanted to be an engineer. I love cars and so I knew I wanted to work in the automotive industry since I was like 14. I have been watching Formula One since I was twelve, I believe. I was I loved cars as a child. I had over a hundred toy cars I used to play with. I just watched one four-wheeler race on TV, and that happened to coincide with the year that Singapore hosted the first Formula One race. I think I was twelve years old at that point. I went to the first nine Singapore races and the tenth was when I was in college so I couldn't go to that one. But yeah, ever since then I have been a massive motorsports fan. And so, at 14, I pretty much knew I want to work in the car industry. This is the thing I want to go into. From that age, it was always mechanical engineering which is what I am doing right now. [State university] is one of the best schools if you want to go into mechanical engineering anyways. It was one of my top choices.

For me it was always about cars. I love cars. I want to work in the car industry. I am a big fan of motorsports, so Formula One if you know what that is, I basically watch every race that there is. I've worked as a track marshal for a Formula One race that was in Singapore in 2015. So, I always wanted to get involved in anything to do with cars. I want to work in the car industry when I graduate. I have an internship with [automotive supply company]. They build transmissions for cars. I'm in a co-op, so there are three semesters I'll be going to be there.

I'd say it's my first proper engineering internship. What I did last year was more just helping out a company that was starting up. It was a tech startup. They only hired two interns ever. I was one of two interns they hired. I just helped them do basically any work that they needed across the board: from sales to marketing to HR to software. They are a tech company, so most of their engineering is software, which is not really my forte. I was there more to do data analysis. They were just gathering a bunch of data from their employee's standpoint. They went from nine

employees in November of 2018 to two hundred in June of 2019. They wanted a lot of analytical statistics done on people skills and how and why they were or were not retaining talent. That was mainly my job, but I also helped move offices. I just helped out across the board. I was more just helping out around the office, just doing Excel spreadsheets, basic data analysis. I haven't ever worked in a factory. I haven't worked firsthand, where I am using engineering to design something and give it all to manufacturer, where you all work together. I think that that's really important. I'm also working in an automotive OEM manufacturer, and I love cars. I think that seeing that part of the business is going to be a lot of fun, as well as offer a lot of interesting learning opportunities.

So yeah, I'm excited. I think will be exciting. I think the best part about it is being able to apply what you learn in the classroom to the real world. I think that that is where the real learning happens. You can learn a lot of theory. You can do controlled experiments in the lab. But I think physically seeing, I am a physical learner, I need to see things to be able to understand it. I think being able to do that is going to solidify everything I've learned so far. I think that's really important. From what I've heard from friends who have been on co-ops and internships is that working is actually a lot more fun than going to school. I am excited.

And I want to eventually pursue my master's in what they call motorsports engineering. It's a very small niche that they have in a couple of schools here and then a lot of schools in Europe where they basically focus on vehicle dynamics for motor sports in particular. I want to go work on a motorsports team. That is the end goal for me. For me if I get my degree in mechanical engineering, I get a much wider scope of things. Then I can do my master's in a much more specific role that I actually want to work in. So, there is always that thought process. Mechanical engineering will give me the overall breadth that I need. Then I can do something a lot more specific later on.

Jay is also involved in motorsports at his university. I've been on the [state university] formula SAE [Society of Automotive Engineers] team basically ever since

my freshman year. That's where we build a single seater race car that we race in [international competition] every year. I'm on the chassis team we basically build a 4030-steel chassis from scratch every year. So basically, we build a brand-new car every year. This is a single seater race car. We have a Yamaha VR3 engine in the back. On the chassis team, you're basically in charge of putting together the chassis, welding it, and having it ready so that all the other sub-teams can put their parts on it. In terms of sub-teams there are five sub-teams: chassis, aero, drivetrain, powertrain, and electronics, and we have a business team. What we do is we have to design the chassis in CAD [computer aided drafting] initially. We do that over the Summer. Coming in in August and September, we start manufacturing. We build these things called jigs which allow us to hold our tubes in place before we weld it. We have about two hundred of these things. Mainly my job has been designing and manufacturing these jigs that hold the tubes for us to weld them. We used to do them all by hand in the machine shop, so these jigs are essentially like, they're two by fours, but they are one inch by one-inch steel blocks. We mount them to the table so that we can tap and drill in the bottom. They have holes in between where we put U-bolts to hold the tube. We used to make 250 of them by hand in the machine shop. That would take about three other months constantly working. So, this year what I did was I used the [company sponsored] innovation design center where they have these massive CNCs [computer numerically controlled mills]. It would take us an hour to make one jig, now we can do it in 30 seconds. The machine would just replicate that. So that is what we used this year. That has mainly been my project for this past year.

Being on the SAE makes a big difference for, in the classroom, even if you have labs, you don't really get to see something and see how what you learn is applied to real life. You don't get that hands-on experience. I love working hands on. I love putting things together. I take things apart. So, for me it was just natural that I went into this. It lets me apply a lot of theories and experience that I've learned in the classroom through a real setting that you wouldn't get in any of the labs. Labs are

always simulated and created for the purpose lab. You never face real troubleshooting issues. You don't face struggles, budget constraints, any of that. So essentially, it's like having an internship while being in college.

Jay's military experience has helped him specifically in SAE. It is more of the whole structure being organized. We have about sixty people on the team. You have to be organized, to be able to communicate between sub-teams. You are all working on one project, but you're all working on your own components. So, coming together, I'd say it's more the whole. There's no specific example that I have where it's been. Just the way the military has shaped made character has allowed me to work better in a team. It's made you more open to other ideas. It's made you more diverse. It's made you a lot more structured. You can work within a schedule and time frame. You can also be told what to do which is what happens very often with a team. You'll be happy doing it, right? You are not going to be like, "No, I'm not doing that." And you're not going to question "why?" as much, which I'd say is the direct relationship you can get between the two. Other than that, a benefit would be just the rigidity, being able to meet time standards. Being able to get stuff done on time.

I'd say I'm more organized. I can make a schedule and stick to it, whereas there are a lot more, "Yeah, I'll get it done when I get it done." There is no...some of them, not everyone, but some of them don't have...they lack the structure that I'd have otherwise. And also, when delegating tasks, a lot of people haven't really had to do that before. When put into a leadership position, they don't do that well. Their workload builds up, whereas they have other people who are going to do the work for them, they're just not delegating it correctly. For example, my second year on the team, we had a team lead who couldn't really delegate work effectively, so he kept keeping everything to himself, and the work just piled up. It just kept getting delayed and delayed and delayed. Just because there's work to do, but he just thought he'd do it all himself. He wasn't effective at spreading the work out. Whereas being the Army, eventually at some point I had my own understudies that were going to take over my role, so I was very open to delegating work. Even when we ran these drug

tests, I'd be in charge, but I'd have fifteen other people that are helping me out. Being able to assign responsibilities was a key part. I feel like I can do that now, whereas a lot of people don't have that experience yet.

Overall, I'd say the Army helped to open me up and shape me a little bit more to who I'm today, but I'd say, the bigger influences would still be family and your friends. I'd say that is still bigger than the influence the Army has had on me. The Army is just two years of your life, whereas family and friends are your entire life. My friends are a big part of my support system at [this university]. I have a lot of really close friends in engineering and also a lot of friends that are not engineering. I think having that balance is important because you basically spend 8 to 10 hours a day in the ME building working on projects, labs, homework, etc., with these people. And really when you're done with that, yeah, your bigger support system would then be the friends you have and usually those that you made during freshman and sophomore year and it just grows from there. So, I'd say that is the biggest support system that's there. I think that [this university] has a really good support system with the advisors they have and some of the professors as well where if you constantly go to office hours, you end up having a really good bond with your professor. They end up knowing you really well. They are always happy to help you out. Same way with your advisor that you have. You basically have the same advisor for three years in ME. If you ever have a question or you're ever unsure of anything, they are always happy to help. In my experience, with any email sent, it's almost an instant response from them. So, they're always there.

Your friends are your biggest support system for sure. They are always there. You can always talk with them anytime of the day. You usually hang out with most of them anytime you are not doing homework. I think your friends are the ones you engage with most, for me personally. They are also a lot easier to reach out to, right? I room with a bunch of my friends. They are literally in the room next door. If you every need anything, you just go knocking. I'd say it's more of a social support system. The [state university] support system, I'd say the advisors are really good,

just generally. So, if you have more general questions, not a specific subject, you can always reach out to them. In my experience, I've had very good advisors that are always willing to help no matter what the issue is. If you're close with a professor, more on an individual basis, then you also have them to reach out to.

So, I'd say, they've [friends and family] shaped me more, but the Army has taught me things that you wouldn't have gotten otherwise, even skills such as survival skills. You learn how to survive in the jungle on your own, which is not something a lot of people have. It just makes you more resourceful in life. If you face a problem, you don't really stop, being like, "I can't do this." You try and figure it out. I probably don't really realize this, but subconsciously it helps in the way you approach even homework problems. If you can't do something, you are not just going to say, "I don't know how to do this." You've got to try and figure out a way to do it whether it's googling it or researching it or talking to people. So, I feel I am a lot more motivated than I would be otherwise.

When asked to draw a journey map of a time he was successful in engineering (Figure 4.5), Jay said, this is how I felt college has been for me so far. It's just basically me on a bicycle because I love cycling. The sun is there because there is always light at the end of the tunnel. Even though it may be difficult or hard, there's always something bright to look forward to. Freshman year I'd say was relatively easy, therefore it's downhill, not much effort required. Then sophomore year was a lot harder. I did not expect it to be that much harder. I think I was a little bit too comfortable freshman year, and I was a little bit under prepared for what would be sophomore year.

I just think I wasn't challenged enough. I think I came into college where I feel like high school prepared me a lot more for freshman year. I felt like the first year of college was just another year of high school. It felt very comfortable. I wasn't pushed very hard in terms of the way I think, in terms of the way I have to juggle workloads, as well as trying to get everything done, playing my sports and socializing. The juggle to balance all of that was not as difficult freshman year. That's why I

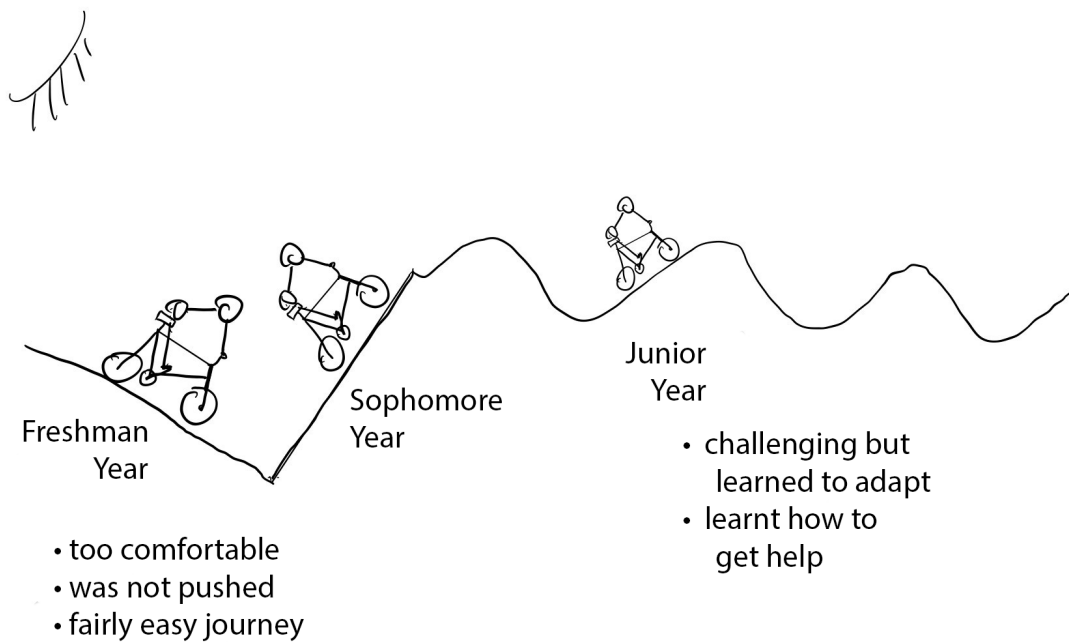


Figure 4.5. Jay's journey map of a time when he was successful in engineering. This journey map starts out with a figure on a bike with a sun at the back, going down a steep slope labeled freshman year (Too comfortable, was not pushed, fairly easy journey). The slope goes immediately up showing Sophomore year. Into the Junior year, the figure is still on a bike going through rolling hills, which in general have a downward slope (challenging but learned to adapt, learnt how to get help).

felt it was more of a downhill slope. I wasn't really stressed out too much. I didn't really have to think about how I was going to spend my time. The workload content itself was not difficult, where most of the things that were covered, I already covered previously in high school, and so, I didn't really have to push myself to go beyond my boundaries to find knowledge that I didn't have. I didn't have to look into research papers or go to professors for answers or any of that. That is why I felt I was a little too comfortable.

I don't think I pushed myself enough freshman year. So, that's my sophomore year is extremely steep. That was the first year you are actually in engineering, where you're taking your discipline's classes. For me it was mechanical engineering. I felt the level of difficulty and the content that was being covered was a lot harder. The pace at which it was being covered, the pace of which you were meant to keep up, was much faster. You had to be on the ball. The moment you start falling behind, it just fills up and snowballs into you being completely behind—being overwhelmed with work, overwhelmed socially, everything. It just adds up once you start. So, I learned that you have to keep upping the pace. You can't keep pushing off homework to the last day. You can't start stuff the day before knowing that you'll get it done, because now work takes 15 hours a week instead of maybe a couple hours just in the afternoon. You have to plan for all of that. You have to account for all of that. Yeah. Professors expect a lot more from you. I guess I thought that that was the biggest difference. The pace and the amount of content that you need to cover was the challenging part. You also had to look for answers yourself. You weren't being spoon fed things where it is easily available. The key learning lesson was that there may not be a right or wrong answer. It's just there's a lot of judgment-based decisions you have to make. There is a lot of assumptions you have to make that previously, especially let's say freshman year or high school, what I had known up to that point was that there's only one answer. There is only one way to do something. Whereas I found that most of the work that you are meant to do doesn't usually have one correct answer. A lot of this work that you do is based on the assumptions that you're supposed to make

to get there. It's more your logic of how you got your answer more than the final answer.

So, I'll just go back a little bit. Most of high school, when I did homework, I'd just sit down with maybe the textbook that was used in that class. The homework with notes, you'd basically be able to figure it out. Doing a little bit of reading, you would be able to solve most questions. I tried that obviously sophomore year, thinking that would work, but the level of difficulty was just much harder, much higher. The answers weren't as easily available. You couldn't just read a section of a textbook and know what they're asking for. Questions were phrased a lot more harder. I'd say the first couple of months, I did not realize there were teaching assistants and office hours and professors' office hours as well that you could go into and schedule times. One, there are professors, TAs, all of that available to help you out, but two, there's also help rooms.

There are other kids working the same problem, and so you can go there with everyone and talk people through what you're thinking and what they think is the right answer and get it done together. I think that played a big part. Previously, I was used to doing homework alone. I didn't like working in a group. I found it a little bit distracting. I guess I didn't find the right way of doing it; but once I figured out this existed and the learning environment was a lot more different where everyone is trying to get work done in a group, I think that's made a big difference to how I've been able to cope in mechanical engineering. Since then, I've basically been doing any of the assignments that are homework usually in groups of people that are also doing the same homework. That way it is much easier to bounce ideas off each other and that way you get explanations a lot easier. You don't have access to the professor 24 hours a day, but you can always talk someone beside you doing the same thing and ask them why they think what you said is right or wrong. I think that makes a big difference.

I think that's where [sophomore year] I learned a lot about myself and how I deal with time management, conflicts, basically managing all my time, balancing

my extracurricular activities as well as my school-based activities. I also learned that there's a lot more help that you can get, so you don't have to struggle with homework alone and you don't have to work alone. You're going to always have people out there to help: professors, TAs, office hours, all of that. I think it was all part of the sophomore journey, figuring out how that works in engineering, how basically you're meant to get your work done. You're not supposed to know the answer to everything. You have to work for it. You're going to have to do some research. You may have to look in a couple of textbooks. So yeah, that was a big surprise. I'd say once I crossed that bridge, even though that's really junior year where there are things that are challenging, but because now I'm a lot more prepared. I know where I can get help and how I can get help.

The rolling hills are hills that are not as steep, so you don't have to overcome as much because I feel I'm in a much better position now. I know how to tackle these things. I know how to go about getting help and go about asking other people how they do things if I ever get stuck. The challenge is still there but the challenges are more keeping up with time commitments, I would say now. There will be periods where there is heavy workload. There is periods with lighter workload. The hills are basically signifying that where overcoming the hills is not the challenging part, just keeping on track. So, you constantly have to balance trying to stay on track. It is just ups and downs, where it's just mainly balancing workload. That's the hardest part. You will ultimately get everything done, it's just there will be times when you're drowning in work. There will be times where you have nice weeks, or you will get a little bit more free time.

I think [the drawing] shows that achieving success is not a linear path. There isn't an easy path either. And you see it in the drawing. I drew the curves above that drop. That is to signify that once you have learned, once you have the experience, it's much easier to accomplish the challenges through learning, through experience, through failure. I believe in the big picture. I think this kind of shows the journey one has to take to achieve success. In the grand scheme of things, every small moment is

only a small moment. Whereas it adds up to make a bigger picture. I think looking at the bigger picture gives you an overview, especially in hindsight in how you've got there. Once you have that knowledge, you're a lot better at conquering the same task. And that is why there is a difference in elevation between the two points.

I think being successful in engineering, especially at [this university], means being open to working with other people. I think it's one of the great things [this university] has is, as long as you know someone's working the same homework may not know them, you have never seen them. When you see that they had the homework up, you could go up to them and ask them a question and they would be more than willing to help you get past if you're stuck or let you know whether you're on the right path. I think that realizing that is one of the biggest things at [this university]. That is what is going to lead you to the most success because being open to explaining to people, being open to receiving ideas from people, being open minded, lets you understand what you're doing better. If I am able to explain and answer questions about a topic, I am learning, then I feel like I have succeeded. There will not be one right answer or one right perspective. There's basically a multitude of perspectives, a multitude of answers, and multiple ways of getting there. For example, there may be, say I'm working in a group where half the group does the question one way, and then the other half has a different way. I think that's the most important part—being able to understand how the other person's doing that same piece of work, how are they attempting it, what is their method of thinking, I think that is what really leads to success because then you're broadening your horizons. You're taking in what other perspectives are. It opens your mind a little bit that way. It also allows you to see their way of thinking which may, or often usually is, a lot quicker way of doing the same problem. You also see that some people like doing work the harder way, even though there's a faster way that they know that they could do, just because the way they think they like to break things down. Say for example, different people are working one piece of homework. One person may have a single page that they used and they had everything done on a single page, whereas one person drew the entire

problem by hand again, detailed, and then wrote down every step. This shows you how people's train of thought is completely different to the way you think. I think that's very important.

Take any of the upper level engineering classes. You can talk about thermo, you can talk about dynamics, statics. I think the biggest thing that's different across the board for everyone is the process people think. For me personally, I like to show every step on my math and show every step in my algebra. It allows me to think in a more logical way, to just be very logical in my steps, whereas I have friends who skip all the basic arithmetic and have the equation and just the answer. And to them, that makes a lot more sense. They don't see the point of writing everything out because they find that tedious. Whereas if you gave me that, I would not understand what was happening to answer the question. I like to see every step broken down. Then again, that is me liking to see all the small steps that make up the big picture. Whereas, some people, some of the basic math, they just completely do that in their head, or do that on a calculator, and just do not put that down.

So, I think in terms of what success is, I think that it's the same. Everyone wants to truly understand what we're studying. Say for example in mechanics, where we're designing cams or designing rotary motion or springs, people are really interested in understanding all the stuff. I think that's the same for everyone. I don't think I've met anyone that just wants to get the work done just to get a degree. Most people are genuinely very interested in what they're learning and are very excited by it. I would say, yeah, that's what I would say. I mean everyone's interests within mechanical engineering are different. There are people that like the systems side of that a little bit more. There are people that like the machine design side a little bit more. Whereas, I would say the military guys like the classes where you can visually see what's happening. So, for example, in machine design, you can visualize the cams you design, the machines you're designing, the linkages that you have. Whereas in a class like controls and systems, where it's more circuit boards and you can't really see

what's happening. I think the military guys like to see. They learn through seeing what's physically happening. I think that they're a little bit better in that aspect.

I define success based on the impact I my actions have made on the world and myself. If my actions were able to teach someone or help them in a way that made their life easier I would see that as a success, or if a program I wrote at my internship made things more efficient for the company then I would view that as a success. The second way I define success is by what I learnt from a process or event. If is spent time working on a code what did I learn personally. If it was some hardship that I faced, it would be what lessons could I take from this and how would I handle things better. I am a big believer of learning and growing from setbacks and thus if I am able to apply something that I learnt I would view that as a success. My definition of success in my academic career would be when I am able to thoroughly explain/teach a concept I am learning to someone else.

4.6 Qualitative Summary

Each of these narratives are discussed in Chapter 7, where they are compared and contrasted. The narratives were co-constructed with the participants, and describe their journey through engineering education and demonstrate through story where they have felt successful and what it means for them to be successful. Additionally, the results from the quantitative portion of the study (Chapter 6) are integrated within the discussion, highlighting how the prominent NCA factors present themselves within these narratives.

5. SVE CONCEPTUALIZATIONS OF SUCCESS

In this chapter, I focus on the conceptualizations of SUCCESS from the SVEs who shared their stories (Chapter 4). Each SVEs' conceptualizations of success are first presented separately. The discussion of the individual is followed by an overall synthesis of all of the participants' conceptualizations to success and connections to the literature.

5.1 Individual Conceptualizations of Success

5.1.1 David

David had a two tiered conceptualization of success, a “job well done” and overcoming doubt. An example of a job well done, was developing a presentation that was valued by not only his commanding officer, but all of the foreign military leaders as well. This appreciation from those he briefed gave David a “sense of relief and success when my commanding officer said, ‘this is good enough to be presented to anywhere from the Iraqis, Australians, Kiwis, to generals and majors in our Army.’” David felt he was successful after putting in a tremendous amount of effort in preparation and rehearsal for the in-briefing that gave the incoming allied military forces the information needed to understand the response to a chemical attack. This job well done made David feel successful not only in this task but in his larger role and at life, in general.

An example of overcoming doubt is illustrated in David’s journey map (Figure 4.1). David struggled through Calculus II, failing the course twice before passing. He had given himself an ultimatum, that if on the third time of taking the course he did not pass, he was going to drop out of engineering. Ultimatums are given

in times where a desired outcome is in doubt. As a result of this ultimatum (and resulting success), David not only learned more about Calculus II, he learned more about himself and how to approach classes. This example provided another way in which David found success in his engineering pathway. A common thread in both of these examples of success is that David had to work very hard to accomplish a goal where he felt successful. Having to work hard to experience success could explain why he may not have done well in Calculus II the first two times that he took the course. He was not challenged by the professor or motivated enough to stay engaged and put in the effort that was required for him to succeed.

5.1.2 Mark

Mark conceptualized success as:

being able to make real, long term goals and achieve them or be satisfied in your effort or progress when/if you decide to adjust those goals for another that may now take precedence.

Mark provided his advancement to E-4 as an example of this definition; he set a goal for promotion and worked diligently to achieve that goal. Another example of his success was shown in his journey map (Figure 4.2). Mark had a long term goal of transitioning from a community college to a university to get his engineering degree. He had to overcome several obstacles along the way, but was able to achieve his goal of transferring to university.

Another facet of success for Mark was having and using the tools necessary to accomplish a goal.

I need more than just get the passing grades in these classes. I want to be able to utilize them in a useful way and to be able to take what I have learned and be given a general pseudo-ambiguous situation...here's a problem, what can you pull out of your own head to find a path from here to a solution? and that be a useful challenge. That's the kind of thing that you would see at the job you will eventually get, where it's not so much

like, “OK, can you use this equation do that?” But like, “hey, here’s a problem. How can we solve this with the knowledge that we have gained along the way.” It’s definitely in much more of an immersive capacity. Being successful is being able to see problems and use all the knowledge that has been gained to find my way through them. How to work with people for common goals. Obviously, you’re not going to be working at a company where you’re solving stuff that’s pointless. They are going to keep you around because they are trying to make a product or reach a goal that is meaningful and useful to both them or humanity, something that is meaningful or profitable. They don’t want just any solution; they want good solutions.

Both having the tools to accomplish a goal, and accomplishing the goal itself was success for Mark.

5.1.3 Digi

Not doing well in high school, and then doing really well in the Marine language school highlights Digi’s conceptualization of success.

I ended up finishing that language school as the honors graduate. For me, from going through high school and kind of going through the motions, and not really giving a crap, and then feeling like I could be more if I applied myself...I never actually had the drive for educational stuff, to actually ask myself, “What if I did try? What if I did try for this, and this, and this? What if I challenged myself in this way?” That was the first validation that I had, being the honors graduate. If I want to do something, I can do it. Everything else is kind of based on that. Once you have inspired yourself, once you have the confidence in yourself, everything else just kind of happens afterwards as part of the same success...I failed French in high school twice, but my teachers [in linguistics school] told me that I was the fourth person to get a score like that in like 30 years. So, that was extremely inspiring for me.

From the above quote, success for Digi was overcoming obstacles and doing better than what he imagined. He had not done well in high school, and he carried this self-expectation with him into the Marine Corps. But in his language program, he was able to work really hard and excel, becoming a top performer, regardless of his past performance. Digi valued this experience as an example of success in his life.

Another example of success for Digi was being able to translate his experiences into job opportunities. Through the club projects and internships, as well as his high GPA, Digi was able to not only secure further internships, but was able to meet with potential employers. As shown in the top right section of his journey map (Figure 4.3), having a competitive résumé was one of Digi's milestones toward his success.

I'd say the success for me is that I have the competitive résumé and a strong friend base. I regard success as an accomplishment of a personal goal or personal milestone that I had set for myself. The impact it has to my character or well-being, the more successful I feel. I don't consider accomplishments as anything that has to do with a comparison to others, my personal goals are for my own improvement and I like to reflect on my own personal growth and development and that is where the success lies. Like I said before, you don't really know what is on the other side of the mountain—I separated from the military thinking that I could accomplish something, specifically to get a degree in mechanical engineering, but knowing actually knowing if I could. That is now reality, because I'm done here in the Fall. As I've drawn, it is smooth sailing right now. It is still stressful, but it is nothing I can't manage—it is the uphill fight that is the real battle. The success, I would say, is making it through all the obstacles to this point. This has been the goal all along. It hasn't been to pass a class.

Although this quote from Digi explicitly discussed having a competitive résumé and friend base as reason for his success, it also further describes that struggling through adversity and accomplishing a goal is strongly related to Digi's conceptualization of success.

5.1.4 Ryan

Ryan provided several examples of success. Ryan defined

success as the accomplishment of a goal. To me, it's nothing more than whether something has been accomplished or not. That is to say, success and failure has a similar ring to true or false—it's just a conditional statement for me. With that being said, I recognize that success is not necessarily clear cut like true or false—is or is not—as some goals are hard

to define with stringent metrics that can be reviewed and checked or later on (like an engineering requirement).

Ryan used his boot camp completion and subsequent mountain warfare instructor training as examples of success. Both of these experiences were challenging for Ryan. He said,

my military career helped me learn what it takes to succeed and taught me how to be persistent in trying to knock down barriers that would otherwise keep you from succeeding. It gave me grit and discipline, which are necessary characteristics one must have to succeed.

Another example of success for Ryan was how he treated his juniors when in the military.

I tried to treat everyone with respect. It's kind of weird to say this, but I had like five people cry out of my squad of eighteen people when I left. As far as I can count, that was the most number of people crying for someone leaving. I feel pretty good about that. I think I did a good job. I would consider that success, although that's such a strange thing to be feeling successful about, not being an asshole and not hazing people. But that was a promise, something that I told myself that I wouldn't do, and I didn't do it.

This quote is again aligned with his definition of success, to set a goal and accomplish it. Ryan also alluded that, to him, success was not, "grades." While Ryan did not define success as this external metric, he did use this as a measurable outcome of academic success because he had set a particular threshold as a goal.

I guess I could define getting good grades at the end of the quarter also a success, but when I first came back to school, for me, it was important that I take the time to put in the effort. That activity, in and of itself, even if I didn't get good grades in certain classes, regardless of what the outcome was, the fact that I put in that effort and was satisfied and content.

Ryan did not need grades to feel successful. Rather, it was the work that he put in, being at his best, that gave him a feeling of success. The pursuit of the goal of

“pursuing a lifestyle” that was constructive toward doing well at college was where he found success.

Jay conceptualized success in three interrelated ways. First, success was the accomplishment of a big project, where he was instrumental in its accomplishment.

Having pioneered the project, finally seeing it implemented and used on a daily basis even after I left the service is one of my greatest achievements. I view it a success as it improved efficiency in my military unit. At the same time, it also helped drug abusers rehabilitate and be less reliant on harmful substances. I felt successful in the Army when my Drug Testing regiment was fully implemented and rolled out.

Developing that program and seeing it work represented success for Jay.

Another conceptualization of success was that success was not achieved instantly but rather was a journey. Jay drew his journey map (Figure 4.5) with a bicycle on rolling hills. Success for Jay

is not a linear path. There isn't an easy path either. And you see it in the drawing. I drew the curves above that drop. That is to signify that once you have learned, once you have the experience, it's much easier to accomplish the challenges through learning, through experience, through failure. I believe in the big picture. I think this kind of shows the journey one has to take to achieve success.

Jay also highlighted that working with people to help him better understand material is necessary for his success.

5.1.5 Jay

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5.2 Discussion

I found several ways that SVEs conceptualize their success. Success for SVEs seems to be on a continuum from surviving engineering, to achieving small goals, to deep understanding. Within their stories, some SVEs conceptualized success as accomplishing small goals or large goals. For others, success within engineering was surviving. Success was also noted as both more than grades as well as deep learning. Within the stories, having the tools needed to accomplish a goal was also considered success. It is important to consider these different conceptualizations of success from the SVEs because while they may be in line with traditional measures of success (e.g., good grades and retention), they can be much more nuanced. Therefore, these results begin to highlight student conceptualizations of success, but more specifically from the Veteran engineering perspective.

As discussed in Chapter 2, understanding how SVEs conceptualize success will allow for construction of metrics that recognize these conceptualizations of success,

making engineering education more conducive to SVE success. The results discussed below, as they relate to the limited engineering education literature, continue to highlight that traditional measures of success are often not aligned with student conceptualizations of success.

Although little has been written on the conceptualizations of success from the student perspective, these results do share some similarities with the published literature. As discussed in Chapter 2, one study found that students conceptualized success in several different ways (Minichiello, 2016). Minichiello focused on how non-traditional students overcame barriers to their success in engineering. In the Minichiello study, a few students described what success meant to them. Although that study did not focus on conceptualizations of success, these insights show that there are several similarities and differences between the SVEs in this current study and the non-traditional students within her study.

One of the students in the Minichiello study indicated that success for them was “surviving.” This idea of survival came up when Mark discussed his “Hurdles of Motivation” (see Figure 4.2). Mark tried to figure out the balance between school work and outside activities, and at times was struggling. Mark discussed having an internal struggle, asking himself, “Where can I survive, because I have more needs than just getting this degree?” Jay also described success as being a journey, with his map highlighting the ups and downs that come with working towards a goal, and having to work hard with steeper gradients (as shown in his journey map, Figure 4.5) at times.

Another student in the Minichiello study noted that he viewed success as more than just grades. Ryan said this same thing explicitly, but then caveated that statement with grades being success if grades were an individual’s goal. Ryan’s description of success being the accomplishment of a goal was similar to the descriptions of Mark, David, and Jay. As discussed in Chapter 2, grades are a common measure of academic success by researchers and administrators alike, but some students do not feel that grades are representative of their success. It is both possible to perform poorly on an

exam or homework, resulting in a less than desirable grade while still understanding the material. Conversely, it can be possible to perform well on an exam or homework, while not necessarily understanding the material.

This disconnect between grades and success is probably why the same student who said that success was more than grades in the Minichiello study, also said that understanding in engineering, was one of his “biggest successes” (p. 109). Similarly, a different student in the Minichiello study noted that success was more than just grades, but competence in solving engineering problems. Mark identified understanding as success for him as well, discussing the added understanding and mastery gained through his tutoring experiences. This definition of success is consistent with the common adage that students who understand the material better, will perform better academically.

5.2.1 Relationship to Self-Efficacy

Both overcoming doubt and developing the tools necessary to succeed on a set goal are interrelated and connected to self-efficacy. David and Digi described overcoming doubt as another way to achieve success. Others said that success can be just having the tools needed to reach a goal. Digi described tools for success including a competitive résumé and friends. Mark related tools as success as when they are used to accomplish a goal. David also described having tools to get over the walls in Figure 4.1, where getting over the walls involved tools that he had picked up along the way. Both overcoming doubt, and having the tools required to achieve goals is related to overall self-efficacy.

Self-efficacy is a domain specific construct defined as a belief in one’s competence to take the steps needed to achieve a goal (Bandura, 1982). Both overcoming doubt and having the tools necessary to achieve a goal as conceptualizations of success mean that for the David and Digi, the achievement of self-efficacy in and of itself is success. Self-efficacy is largely used as a predictor variable in academic achievement (Loo &

Choy, 2013). Additionally, self-efficacy has been shown to be improved through pre-college experiences such as hobbies and pre-engineering (Fantz et al., 2011). It could be a natural consequence of SVE's experiences within the military and throughout their engineering education that they develop self-efficacy which could further their perceived ability to accomplish goals and experience success.

Hutchison et al. (2006) found that understanding, drive and motivation, and teaming were the top ways that engineering students described as bolstering their self-efficacy. Additionally, Ponton et al. (2001) found that self-efficacy beliefs can be fostered in engineering students by professors, similar to how David's Calculus II professor made him feel he could succeed in passing the course, or as David described, "getting over the wall." The understanding, confidence, and skillsets that are needed for self-efficacy were the tools that David had to help him over his wall. Not only is self-efficacy important for academic success, building self-efficacy for SVEs is in and of itself, success.

5.2.2 Relationship to Identity Based Motivation

In addition to self-efficacy, overcoming doubt and having the tools needed to accomplish goals as conceptualizations of success is also related to Identity Based Motivation (IBM). Having the tools needed to accomplish goals can add a sense of ease to help become an engineer and when experiences are difficult and there is doubt that a goal will be achieved, knowing that persistence will help to achieve that goal will aid in continuing through difficulty. Both the tools and overcoming doubt are related to the three portions of IBM (Oyserman et al., 2017).

First, in action readiness, "identities cue readiness to act and to make sense of the world in terms of the norms, values, and behaviors relevant to the identity" (Oyserman & Destin, 2010, p. 1003). Second, in dynamic construction, "which identities come to mind, what these identities are taken to mean, and therefore, which behaviors are congruent with them are dynamically constructed in context"

(Oyserman & Destin, 2010, p. 1003). Third, in interpretation of difficulty, “ when a behavior feels identity congruent difficulties in engaging in the behavior will be interpreted as meaning that the behavior is important not impossible and, therefore, effort is meaningful, not pointless”(Oyserman & Destin, 2010, p. 1003). These three components work together in a feedback loop, where dynamic construction informs interpretation of difficulty (or ease), which informs action readiness, which then feeds back to dynamic construction (Oyserman et al., 2017). Through this process, one can learn to persevere through the difficulties that align with their identities instead of letting difficulties make one feel that something is, “not worth my time or effort” (Oyserman et al., 2017, p. 141). The descriptions of success from the SVEs in this study seem to implicitly indicate that the identity as a Veteran may help shape future goals of being an engineer and the ability to persevere in this goal even though the journey of engineering education may be difficult.

IBM has been applied to an engineering context which related the engineering identity measures described in Chapter 6 as predictors of future time perspective motivation which is predictive of engineering major interest (Godwin & Kirn, 2020). As discussed in Chapter 6, perceptions of the future was one of the NCA factors where SVEs were higher than their non-military peers. While the Godwin & Kirn (2020) study shows that perceptions of the future is related to engineering major interest, it has also been shown to be one of several NCA factors that are predictive of retention, along with engineering belongingness and engineering identity interest (Scheidt, Major, et al., 2019; Kuzbary et al., 2017).

5.3 Conclusion

This work answers the research question: How do the narratives of undergraduate veteran engineers incorporate their conceptualization of success in their engineering programs? Examining the conceptualizations of success for the SVEs highlighted that although each was Veteran was unique, the conceptualizations of success within

engineering fell on a continuum. Some students noted surviving as success. Others stated achieving both small and large goals meant success. Finally, some students noted deep understanding as success. These conceptualizations of success have theoretical links to both self-efficacy and IBM, but more work is needed to link these conceptualizations of success to a theoretical context. Whether self-efficacy or IBM, the conceptualizations of success of SVEs demonstrate that they may be more likely to persist in engineering.

6. NCA DIFFERENCES BETWEEN SVES AND REMAINING STUDENT POPULATION

In this chapter, I discuss a quantitative approach to understanding SVE success by exploring group differences between students who identify as Veterans and those that do not. I describe how the data were collected for this study, what data were collected, general demographics of the participants within the dataset, and the methods used to answer the research question, What differences, if any, exist in SVEs' non-cognitive factors from non-SVEs'? Results from these analyses are also presented.

6.1 Methods

6.1.1 Data Sources

During the 2018 academic year, NCA profiles of respondents were measured using a previously developed survey instrument (Berger, Godwin, Scheidt, et al., 2018; Scheidt, Godwin, et al., 2018, 2019). The goal of this survey was to characterize student profiles in order to develop and examine particular interventions to support student success in engineering and computing majors. The collaborative project of which this survey is a part, is funded by three linked NSF grants (1626287, 1626185, 162614), which merged the interests of researchers at three campuses in understanding and supporting students with varied non-cognitive profiles. This survey measures non-cognitive attributes that are not routinely measured in engineering populations nor integrated into admission decisions, advising processes, or academic curricula. Prior research indicates that these non-cognitive attributes are important for students' academic success and retention, as described in Chapter 2. However, no studies have

examined a comprehensive set of non-cognitive traits holistically to understand how they influence student success.

The constructs that were described in Chapter 2 and shown in Table 6.1 represent a subset of the total number of constructs that were originally considered for the pilot of the survey through a deliberate and systematic process. The construction of this survey itself was non-trivial (Berger, Godwin, Scheidt, et al., 2018). The research team who developed the survey reviewed literature on factors that relate to student success. Survey items with validity evidence that measured those factors were ranked by the research team based on the relatedness of these factors to student success from prior literature and research interests of the team. As part of this research, the research team negotiated the content of a national survey, suitable for use on each institution's campus as well as with other national partners, to probe more than a dozen constructs collectively describing student non-cognitive attributes. Pilot survey testing ($n = 490$) and pilot data evaluations such as exploratory factor analysis were conducted (Scheidt, Godwin, et al., 2018). This analysis shaped decisions about instruments/items to include in the latest version (Scheidt, Godwin, et al., 2019), all while considering survey length and distribution channels. The survey length went from an anticipated 38 minutes to around 25 minutes for completion as a result. Although the survey was long, it was the first of its kind to use so many different NCA factors that relate to holistic student success.

Highlighting the necessity of using so many different factors, we have performed two separate small studies, one analyzing GPA and another analyzing retention. We found that a subset of ten factors (Conscientiousness, Grit Perseverance of Effort, Engineering Identity Performance Competence, Motivation Expectancy, Test Anxiety, Time and Study Environment, Perception of Faculty Support, Impulsivity, Restraint, and Stress due to frustrations) predicted GPA (Scheidt, Senkpeil, et al., 2018), and a subset of five different factors (Engineering Identity Interest, Meaning and Purpose, Belongingness, Instrumentality, and Perceptions of the Future) were related to retention in engineering (Scheidt, Major, et al., 2019). Without this breadth of unique

factors, we would not have been able to understand that different NCA factors can relate to different success metrics. Each of the factors are described in more detail below.

6.1.2 Survey Instrument

Table 6.1 provides a brief description of each construct as well as key citations for each with full descriptions of the survey items in Chapter 2. I found strong validity evidence for the constructs listed in the table through exploratory and confirmatory factor analysis (EFA and CFA). I conducted EFA using pilot data ($n = 490$) to determine appropriate factor structures and to help decrease the length of the survey by removing items that did not load onto factor for the given population (Scheidt, Godwin, et al., 2018). EFA was conducted using the R function *fa()* with an oblique rotation and a maximum likelihood estimator in R (R Core Team, 2011). CFA (with a different dataset; $n = 2339$) began with the results from the EFA and further reduced the number of items (Scheidt, Godwin, et al., 2019). The final fit indices, considering all factors and items together were: $CFI = 0.935$, $TLI = 0.928$, $SRMR = 0.034$, and $RMSEA = 0.028(90\%CI 0.027/0.028)$. Assessment of face validity for the survey was also conducted (Scheidt, Godwin, et al., 2019). In a separate sample ($n = 115$), test-retest of the 28 factors was conducted over a four week period, with 25 of 28 factors passing (Pearson correlations between responses > 0.70). The three that did not pass were related to Stress (Frustrations, Conflict, Changes), but could have been affected by the global COVID-19 pandemic and are therefore included in this study where data was collected in the Spring of 2018. Overall, with EFA, CFA, test-retest, and face-validity, the constructs used in the survey have strong validity evidence.

For this study, I considered all 28 total NCA factors. I chose to include all of the factors, because while they may not be predictive of retention or GPA in the general population, different factors, besides the 15 listed above, may separate out SVEs from their non-military peers. The validity evidence for each these factors has been

published in greater detail in other prior work (Scheidt, Godwin, et al., 2018, 2019). Cronbach's alphas (measures of internal consistency across items) for all 28 factors ranged from 0.69 to 0.93, where the generally acceptable range for Chronbach's alphas are 0.70 to 0.95 (Tavakol & Dennick, 2011).

The survey also collected some self-reported cognitive factors, including college GPA and SAT/ACT scores. The survey was offered in both paper-based (Scantron®) and electronic (Qualtrics®) formats, and each partner institution used the method best aligned with their delivery logistics.

Table 6.1.: NCA constructs probed on the survey used for this research ($n = 2339$).

NCA factor	Description	Key references
Big Five	Characterizes personality across five dimensions: openness (open to change and new experiences, imaginative, insightful); conscientiousness (reliable, hardworking, trustworthy, dependable, orderly, thorough); extraversion (social, talkative, impulsive, energetic, assertive); agreeableness (cooperative, helpful, likeable, sympathetic, kind); and neuroticism (anxiety, personal insecurity, tension, hostility, irritability). Captures an individual's intensity, direction, and duration towards achieving a goal, the grit scale contains two factors: consistency of interest (staying focused on a goal for a long time) and perseverance of effort (working diligently).	(McCrae & John, 1992; Kauffman et al., 2008)
Grit		(Duckworth et al., 2007; Duckworth & Quinn, 2009)
Meaning and Purpose	A multidimensional construct that conceptualizes a set of values, actions, and goals that interact to create a sustained life purpose.	(Su et al., 2014)
Engineering Identity	Explores in three dimensions: performance/competence beliefs (beliefs about their ability to do well and understand the subject), interest (their enjoyment of and desire to learn the subject), and recognition (their feelings that others see them as the kind of person who can succeed in an endeavor) Gauges individuals' beliefs about their own talents and intelligence. There are two factors within the mindset construct: fixed mindset (talents and intelligence are set and cannot be changed), and growth mindset (talents and intelligence can be cultivated and developed).	(Godwin, 2016)
Mindset	Examines motivation based on how students formulate distant motivational goals and develop long-range behaviors to achieve those goals. Motivation was measured as five constructs: expectancy (belief one will do well in their endeavors); connectedness (tying current tasks to future goals); instrumentality (current tasks are useful for my emerging identity as an engineering professional); value (value of future goals over present goals); and perceptions of future (domain specific valuing of the future).	(Dweck, 2016; De Castella & Byrne, 2015)
Future Time Perspective (FTP)		(McGough et al., 2016)

Table 6.1 continued from previous page

NCA factor	Description	Key references
Test Anxiety (MSLQ)	Determines the degree to which students struggle with the cognitive and emotional aspects of test anxiety	(Pintrich et al., 1991; Credé & Phillips, 2011)
Time and Study Environment (MSLQ)	Determines the extent to which students can effectively manage and regulate their time and location set aside for studying	(Pintrich et al., 1991; Credé & Phillips, 2011)
Perceptions of Faculty Caring (PFC)	Characterizes faculty caring in two ways: empathetic understanding (faculty try to understand students' experiences and challenges) and the perceived faculty support and comfort scale (comfort seeking out and talking with faculty about non-coursework)	(Hoffman et al., 2003)
Self-Control	Characterizes self-control in two factors: self-discipline (showing restraint) and impulse-control (impulsivity).	(Maloney et al., 2012)
Student Life Stress Inventory	Measures student life stress through 5 different dimensions, including stress due to changes (disruption of goals, many changes occurring simultaneously), frustrations as a result of not achieving goals, conflicts (with positive and/or negative options), reactions to stress (sweating, fear, irritability, etc.), and stress support (peer, family, exercise, etc.).	(Gadzella et al., 2012)
Gratitude	Explores feelings of appreciation for someone else in response to receiving benefits that were intentionally provided, especially at some cost to the benefactor.	(McCullough et al., 2004; Froh & Bono, 2011; McCullough et al., 2002)
Mindful Awareness Belongingness	Gauges intentional, purposeful, focused, and nonjudgmental awareness. Determines the level of how essential or being an important part of something a person feels in their engineering program. It is an important factor in STEM education and is considered a basic human need that is dependent on social relationships for fulfillment.	(Rieken et al., 2016) (Maslow, 1943; Kim et al., 2016)

6.1.3 Survey Participants

The survey was distributed to students in engineering programs from 17 ABET accredited institutions in the U.S. Paper-based surveys were digitized, checked for accuracy during the digitization process, and merged with the electronically collected data to develop a complete set of survey responses (2270 electronic, 1470 paper-and-pencil). The data were cleaned to remove respondents whose surveys failed attention checks. This attention check asked participants: “if you are reading this question, mark two.” A total of 1074 responses were removed from the dataset based on the attention checks. Because my study focuses on engineering students, I removed 327 students who identified as computing students. Overall, I include 2339 engineering undergraduates as participants, of these 49 were SVEs.

The sample of students in the survey was one of convenience. Each institution within the sample was recruited based on either prior relationships with the researchers or word of mouth. Faculty at each university administered the survey to populations that they had access to, either at the class level or at the college of engineering level.

The sample includes participants from many different racial, ethnic, and gender identities, although the final sample was primarily White and male. The partner institutions included 2-year and 4-year colleges, as well as primarily undergraduate institutions and PhD-granting institutions. This sample reflects the current demographics of engineering education at the institutions surveyed (Yoder, 2015); however, I acknowledge that this representation may also introduce limitations about the results of this work for traditionally underrepresented students in engineering (Pawley, 2017). The sample included non-native English speakers ($n = 120$), Veterans (see below), and people who identified as having visible or non-visible disabilities ($n = 496$). Respondents spanned the spectrum of engineering majors, with the distribution of majors reflecting national data (Yoder, 2015). Students were mostly in their first year ($n = 1700$), but also represent second year ($n = 319$), third year ($n = 164$), and

fourth year or more ($n = 150$). Gender and racial demographics items (Table 6.3) on the survey allowed respondents to select multiple identities. Participants identified as female ($n = 698$), male ($n = 1604$), and non-binary ($n = 15$). They also identified as American Indian or Alaska Native ($n = 33$), Asian ($n = 356$), Black or African American ($n = 62$), Hispanic, Latinx, or Spanish origin ($n = 395$), Middle Eastern or North African ($n = 58$), Native Hawaiian or Other Pacific Islander ($n = 24$), and White ($n = 1627$).

Within the survey, participants were provided an opportunity to choose more than one Veteran status. As shown in Table 6.2, a subset of participants identified themselves as Veterans ($n = 49$) after accounting for those who selected more than one Veteran type. Of the 2339 participants considered, 7 identified as active duty, 17 identified as reservists, 3 identified as National Guard, 11 identified as newly separated Veterans (within the last 3 years), and 16 identified as “Veteran (Other).” Those that were not considered within this analysis to be Veterans were participants that identified solely as “ROTC” or “Not a Veteran.”

Table 6.2.

Veteran status of participants. Sums greater than total sample size due to participants being allowed to choose more than one option (e.g., Active Duty and Reservist), with 49 total Veterans considered throughout analysis as highlighted in bold.

Veteran Status	Total
Active Duty*	7
Reservist*	17
National Guard*	3
Recently Separated (within last 3 years)*	11
Veteran (Other)*	16
ROTC	49
Not a Veteran	2094
No Response	157

*Considered a Veteran throughout analyses.

6.1.4 Comparing Demographics

Demographics were compared across those who identified as Veterans and those who did not (see Table 6.3). For this analysis, I considered only the demographics where greater than ten students identified as belonging to a demographic (Peduzzi et al., 1996). None of the demographics are mutually exclusive (e.g., students could select multiple racial or ethnic identities). Each of the demographics were modeled as a binary (either identify as a race/gender or not). To compare the differences across the demographics, a χ^2 -test was used. The χ^2 -test is used to test differences in group membership between those that identify Veteran/or not, and those within another demographic. This test is appropriate because group membership comparisons are mutually exclusive. With the different tests, Type-II error becomes a concern. False discovery rate (FDR) correction was applied to p -values to minimize type-II error.

Table 6.3.
Demographics of participants by gender and race. Participants were able to choose between more than one option. Demographics are broken out by Veteran and non-Veteran. *Engineering enrollment percentages are from Yoder (2015) where available.

	Veteran Count		Non-Veteran Count		Engineering Enrollment*	
Gender		[%]		[%]		[%]
Female	1	2.04	697	30.44	21.62	
Cisgender	2	4.08	143	6.24	-	
Male	48	97.96	1556	67.95	78.38	
Transgender	0	0.00	5	0.22	-	
Agender	0	0.00	4	0.17	-	
Gender Queer	0	0.00	6	0.26	-	
I prefer to identify as	0	0.00	19	0.83	-	
Race						
American Indian or Alaska Native	1	2.04	32	1.4	0.43	
Asian	7	14.29	349	15.24	13.85	
Black or African American	1	2.04	61	2.66	5.29	
Hispanic, Latino, or Spanish origin	14	28.57	381	16.64	12.97	
Middle Eastern or North African	0	0.00	58	2.53	-	
Native Hawaiian or Other Pacific Islander	0	0.00	24	1.05	0.20	
White	29	59.18	1598	69.78	63.74	
I prefer to identify as	2	4.08	39	1.7	-	

6.1.5 Comparing Individual Factors

To determine if students who identified as Veterans had different NCA factors than their peers when they entered engineering, I used MANOVA (multiple analysis of variance). MANOVA is appropriate for this analysis because there are multiple dependent variables (the NCA factors) which are assumed to be a function of the independent variable (Veteran status). Using this method to test for differences is appropriate for this work because of the large difference in the number of students who identified as Veterans ($n = 49$) compared with those who did not ($n = 2290$), so long as the Pillai Trace test statistic is used when the homogeneity of variance assumption is met (Ates et al., 2019). Two other assumptions for MANOVA were tested, multivariate normality, and homogeneity of covariance. The assumption of multivariate normality was met, but the assumption of homogeneity of covariance was not. Pillai's trace is a more robust statistic when assumptions are not met.

I considered groups to be different if they were significantly different at the $\alpha = 0.05$ level. A post-hoc False Discovery Rate p -value correction was applied to the χ^2 analysis results. I also use Cohen's d statistic to interpret effect sizes, or the magnitude of the difference between groups, where $0.2 \leq d < 0.5$ is small, $0.5 \leq d < 0.8$ is medium, and $d \geq 0.8$ is large Cohen (1992). Cohen's d also represents the number of standard deviations difference between the two groups. For example, a Cohen's d of 0.92 would represent 0.92 standard deviations difference between two groups, a "large" difference.

6.2 Results

6.2.1 Differences in Demographics

The representation between those who identified as Veterans and those who did not were tested for differences between three demographic variables (male, Hispanic or Latino, and White). Only those groups were chosen because there were greater than

10 participants in these groups. All other demographic variables, as shown in Table 6.3 were not included in this analysis. There were no statistically significant difference in Veteran and non-Veteran representation by race/ethnicity for Hispanic or Latino/a ($\chi^2 = 4.0547, df = 1, p = 0.066$) and White ($\chi^2 = 2.0688, df = 1, p = 0.150$). The only significant difference between those that identified as Veterans and those that did not within the tested demographics was a higher proportion of the Veteran group identified as Male ($\chi^2 = 18.683, df = 1, p < 0.001$). This result is not surprising, as the majority of Veterans are male (United States Department of Veteran Affairs, 2016).

6.2.2 Differences in NCA factors

To test for differences between average NCA factors for those who identified as Veterans and those who did not, first a MANOVA was conducted considering all NCA factors simultaneously. The MANOVA indicated that there were significant differences between the groups on the NCA factors, $F(28, 2310) = 2.66, p < 0.001$. With this result, post-hoc ANOVA for each factor were tested. The results are included in Table 6.4. Veterans were higher in conscientiousness ($d = 0.39, p = 0.041$), meaning and purpose in life ($d = 0.39, p = 0.041$), and perceptions of the future (motivation; $d = 0.49, p = 0.010$). Those that identified as Veterans were also lower in test anxiety ($d = 0.39, p = 0.041$) and reactions to stress ($d = 0.54, p = 0.006$). Overall, the statistically significant differences were small (based on effect sizes of < 0.5) with the exception of the medium effect size for reactions to stress.

Table 6.4.: Post-hoc testing of MANOVA results with individual ANOVA results. Factors highlighted in bold are statistically significant ($p < 0.05$) after FDR correction.

Factor	Veteran		Non-Veteran		Adjusted		Cohen's d	
	μ	SD	μ	SD	p-Value	F(1,2337)		
Neuroticism	2.75	1.41	3.10	1.39	0.084	2.993	0.187	0.25
Extraversion	3.68	1.54	3.86	1.45	0.382	0.763	0.523	0.13
Agreeableness	4.96	1.26	5.28	1.14	0.054	3.708	0.160	0.28
Conscientiousness	5.20	1.28	4.66	1.38	0.006	7.477	0.041	0.39
Openness	5.47	0.89	5.13	1.04	0.023	5.162	0.108	0.33
Grit (Consistency of Interest)	3.74	1.40	3.68	1.16	0.704	0.144	0.730	0.05
Recognition (Eng. ID)	4.71	1.49	5.00	1.25	0.113	2.509	0.198	0.23
Interest (Eng ID)	6.16	0.90	5.89	1.12	0.093	2.817	0.187	0.24
Mindset	2.57	1.54	2.73	1.25	0.392	0.733	0.523	0.12
Mindfulness	4.71	1.61	4.34	1.36	0.055	3.673	0.160	0.28
Meaning and Purpose in Life	5.31	1.67	4.69	1.60	0.007	7.188	0.041	0.39
Belongingness	5.73	1.06	5.44	1.25	0.102	2.670	0.191	0.24
Gratitude	6.03	1.01	5.95	1.02	0.596	0.282	0.695	0.08
Expectancy (Motivation)	5.63	1.12	5.31	1.18	0.057	3.622	0.160	0.27

Table 6.4 continued from previous page

Factor	Veteran		Non-Veteran		Adjusted		Cohen's	
	μ	SD	μ	SD	p-Value	F(1,2337)	p-Value	d
Connectedness (Motivation)	5.88	0.99	5.61	1.12	0.088	2.918	0.187	0.25
Instrumentality (Motivation)	6.18	0.84	5.95	1.05	0.128	2.318	0.199	0.22
Value (Motivation)	4.73	1.39	4.87	1.37	0.498	0.460	0.633	0.10
Perception of Future (Motivation)	6.13	0.94	5.49	1.31	0.001	11.486	0.010	0.49
Test Anxiety	3.60	1.63	4.23	1.60	0.007	7.275	0.041	0.39
Time and Study Environment	4.27	1.37	4.34	1.18	0.663	0.190	0.714	0.06
Social Support from Faculty	5.68	1.58	5.37	1.38	0.121	2.410	0.199	0.22
Empathetic Faculty Understanding	4.64	1.45	4.72	1.22	0.634	0.227	0.710	0.07
Impulsivity	3.44	1.40	3.55	1.27	0.553	0.352	0.673	0.09
Stress due to Frustrations	4.51	1.48	4.78	1.29	0.150	2.073	0.221	0.21
Stress due to Conflict	4.32	1.48	4.64	1.24	0.072	3.246	0.183	0.26
Stress due to Changes	4.08	1.69	4.14	1.67	0.802	0.063	0.802	0.04
Reactions to Stress	3.80	1.58	4.62	1.53	0.000	13.854	0.006	0.54
Stress Support	3.76	1.74	4.27	1.67	0.033	4.557	0.132	0.31

6.3 Discussion and Implications

Comparing those that identified as Veterans and those that did not, two sets of differences were explored, demographics and NCA factors. I found that there were statistical differences in the proportion of Veterans that identified as male, compared to engineering students who did not identify as Veterans. Additionally, Veterans were higher in three NCA factors (conscientiousness, meaning and purpose in life, and perceptions of the future) and lower in two (test anxiety and reactions to stress). This exploration serves to answer the research question: what differences, if any, exist in SVEs' non-cognitive factors from non-SVEs'? The implication of these findings is discussed below.

6.3.1 Differences in Demographics

It is not surprising that a significantly higher proportion of the Veteran's within this sample identified as male. As described in the introduction, 90% of U.S. military Veterans are male (United States Department of Veteran Affairs, 2016). The literature suggests that 73% of Veteran undergraduates are male (Radford, 2011). This higher proportion of Veteran's who identified as male could be explained by a confluence of two separate, but generally high proportion male populations, engineering (Yoder, 2015) and the military (United States Department of Veteran Affairs, 2016). A recent study by the NSF showed that a similar proportion of Veterans who identify as Women achieve engineering degrees (2.2%) than their non-military peers (2.1% Milan, 2018). Additionally, in general, a smaller proportion of Veterans who identify as male graduate with engineering degrees (8.6%) than their non-military peers (12.8%). Considering the overall SVE graduates as a whole, 96% identify as men and 3% identify as women. This NSF dataset did not consider Reservists or those that served in foreign militaries, which my dataset considered, which could help to explain the small differences. Therefore, the sample population is relatively representative of the National population with respect to gender.

6.3.2 Differences in NCA Factors

Conscientiousness

The SVEs in this sample were statistically significantly higher in conscientiousness than their non-military peers ($d = 0.39, p = 0.041$), with a small effect size. As discussed earlier, conscientiousness is one of the Big Five personality traits and was the only Big Five personality trait to be different between Veterans and non-Veterans. Personality traits are generally stable over time (Rantanen et al., 2007). There are many benefits to higher conscientiousness. In a meta-analysis, conscientiousness was found to be linked with academic performance, but not intelligence as measured through ACT/SAT scores (Poropat, 2009). Conscientiousness has been linked with improved leadership grades of Cadets at West Point, suggesting both that the military values conscientiousness and that it is connected to improved leadership (Bartone et al., 2009). Conscientiousness has also been linked with “personal intelligence,” which can be briefly summarized as the ability to understand oneself and the interactions with others and using that information to achieve outcomes (Mayer & Skimmyhorn, 2017). Overall, leadership, personal intelligence, and academic performance are related to higher conscientiousness, all desirable outcomes in students and engineers.

There are several potential reasons why SVEs had higher conscientiousness. First, higher conscientiousness could be a result of SVEs who choose engineering as a major having higher conscientiousness than other Veterans. Additionally SVEs were shaped by their military experiences. They could have assigned military jobs which aligned with their natural higher conscientiousness that gave them particular kinds of technical expertise, which subsequently created a pathway into engineering. The military environment and culture could also attract personnel with high conscientiousness. Additionally, military retention practices as well as military enculturation practices could attract and shape individuals to have higher conscientiousness. Although personality traits are relatively stable, the military environment, particularly

basic training and into combat scenarios, focuses on training individuals to follow orders and build a collective military identity. This process is significant in the lives of Veterans and may be a significant force in an individual's personality. More work is needed to help better understand this finding.

Perceptions of the Future (Motivation)

One of the stronger effect sizes ($d = 0.49, p = 0.010$) was found for the perceptions of the future factor within the Future Time Perspective (FTP) motivation construct. SVEs were higher in perceptions of the future, which means that they are confident in their engineering major and plan to pursue an engineering career in the future, and this serves as motivation. This motivation can be driven in part by the perception of a future or possible self. "Possible selves represent individuals' ideas of what they might become, what they would like to become, and what they are afraid of becoming, [to include] goals, aspirations, motives, fears and threats" (Markus & Nurius, 1986, p. 954).

This higher level of motivation is linked with many potential positive outcomes. FTP motivation perceptions of the future have been linked to increased retention in engineering (Scheidt, Major, et al., 2019), and is correlated with engineering identity interest (engagement with engineering) and belonging in engineering (Scheidt, Godwin, et al., 2018). From a different set of data, in an SEM model, perceptions of the future are driven by engineering identity as well other facets of FTP motivation to predict interest in an engineering major (Godwin & Kirn, 2020). Taken together, these results suggest that SVEs may obtain increased retention in engineering than their non-military peers, as the SVEs are more driven by their goals of pursuing engineering, but more research is needed.

Meaning and Purpose in Life

The SVEs in this sample were also statistically significantly higher in meaning and purpose in life than their non-military peers ($d = 0.39, p = 0.041$), with a small effect size. Meaning and purpose in life is linked to overall positive psychological well-being and has been cited largely in gerontology (Reker et al., 1987; Zika & Chamberlain, 1992; Pinquart, 2002; Boyle et al., 2009). In addition to being linked to overall positive well-being, in a study of military personnel, meaning and purpose has also been linked to reduced risk of suicide (Bryan et al., 2015). Students with higher meaning and purpose have been found to also believe that education allowed for them to gain the skills they needed to change the world (Henderson-King & Mitchell, 2011). In a different study, higher meaning in life predicted higher subjective happiness in Latina/o students (Cavazos Vela et al., 2015).

As discussed in Chapter 2 and related to the above, meaning and purpose in life is an existential concept centered around finding fulfillment in the purpose of one's life through the attainment of goals and through overall structure and harmony (Zika & Chamberlain, 1992). In general, life purpose has been found to increase with age (Reker et al., 1987). Therefore, the SVEs in this sample could have higher meaning and purpose in life as a result of being older. Another potential reason for the higher meaning in purpose in life could also be related to military enculturation. The military could help service members to find more meaning than their non-military peers by teaching service members to value the accomplishment of mission. Military success, being part of a larger organization, or even survival might also play a role in seeing purpose in one's life. Additionally, positive psychological well-being may help military members with perspective and responses to stress.

Test Anxiety and Reactions to Stress

These two constructs are discussed together because they are similar in theory, even though they are both unique factors. The SVEs in this sample were statistically

significantly lower in both test anxiety ($d = 0.39, p = 0.041$) and reactions to stress ($d = 0.54, p = 0.006$) than their non-military peers, with small and medium effect sizes, respectively. Some students suffer from test anxiety when confronted with an exam. Test anxiety has been described as “students’ worry and concern over taking exams” (p. 119) (Duncan & McKeachie, 2005), and is “assumed to be an indication of the strength of the motive to avoid failure” (p. 975) (Liebert & Morris, 1967). Another way of describing test anxiety is a reaction to the self imposed stress of taking an exam. When confidence in exam performance was low, higher levels of test anxiety can correspond to poor exam performance (Cassady & Johnson, 2002).

It is possible that the reason that the SVEs had lower overall reactions to stress and to test anxiety is perspective. As early in a military career as bootcamp, recruits are placed in high stress situations. They are removed from their family and friends and placed in an environment with limited contact with the outside world among people that they do not know, yet they share close quarters with them. They are forced to adapt to a new culture with different standards, expectations, and ways of speaking, and suffer some form of punishment if they do not comply. Throughout this process, the military members learn about themselves and how to handle stress. While this scenario only describes boot camp and does not begin to get at the stress associated with having to make life and death decisions, it begins to hint at an SVE’s ability to put the stress associated with the university environment, including taking tests into perspective. Additionally, the military provides service members pre-deployment stress tolerance training, acknowledging that the military environment can result in increased stress and that its members are trained to handle it (Taylor et al., 2011).

6.3.3 Summary

Taken together, these differences in NCA factors suggest that SVEs may be better prepared to succeed as engineers. Through their higher conscientiousness, they can follow instructions and strive for timely completion of assignments. With higher

motivation by perceiving their future self as an engineer, they can be more secure and dedicated to their major and studies. The SVEs in this sample also had high meaning and purpose in life, improving their overall psychological well-being and potentially helping them to attain goals. Additionally, they had less test anxiety and lower reactions to stress, helping them to deal with engineering's testing and stress culture (Jensen & Cross, 2019).

As discussed in Chapter 2, one of the tenants of Veteran Critical Theory is to value counternarratives of Veterans. While these findings cannot and do not speak for all SVEs, they begin to provide for a counternarrative to much of the deficit thinking associated with the stereotypical Veteran who is psychologically un-whole. These results suggest that not only do SVEs have lower reactions to stress and test anxiety, they have higher meaning and purpose in life. The SVEs in this sample, while it is possible that they do suffer from mental illness such as PTSD, are able to cope with the stress culture of engineering better than their non-military peers.

6.4 Limitations

Both a finding and limitation of this study is that the military population within the study is mostly male. Therefore, the claims made about the differences between SVEs and their non-military peers can only be interpreted as relating to the SVEs that identified as male. Future work can potentially work to increase the sample size and purposefully recruit female Veterans to help better understand the broader implications of the findings and to help understand the differences between male and female SVEs.

Additionally, a larger sample size of SVEs could help to identify more differences between SVEs and their non-military peers. Openness, and stress support were both significant before applying the FDR correction. This correction was necessary to help avoid Type-II error, but it comes at the cost of potentially masking findings that could be valuable for future work. Additionally, with a larger sample size of Veterans, I

could test for measurement invariance to help determine if the constructs are being interpreted the same across groups.

6.5 Conclusions

Data were obtained on 2339 engineering students from 17 different institutions across the U.S. Demographic and NCA factor data were used to test the differences between demographics and NCA factors for those that identified as Veterans and those that did not. Overall, these results serve to answer the research question: What differences, if any, exist in SVEs' non-cognitive factors from non-SVEs'?

I found that conscientiousness, meaning and purpose in life, perceptions of the future, test anxiety, and reactions to stress were all significantly different for SVEs than their non-military peers. Although the aggregate SVE profile highlighted several differences, the individual profiles (discussed in Chapter 7) demonstrate that each SVE is unique. For example, although reactions to stress was low for the aggregate of SVEs, Mark was above the overall average in this factor, even if marginally. Therefore, although claims can be made about the overall SVE, it is important to not essentialize the entire Veteran population to a single description.

In general, the SVEs in this sample exhibited higher conscientiousness, meaning and purpose in life, and perceptions of the future, and lower test anxiety and reactions to stress. These traits can help to set up SVEs for success in engineering through improved grades and retention, as discussed in Chapter 2. These traits could also help the SVEs to navigate engineering stress culture (Jensen & Cross, 2019). These findings therefore further illustrate the need to recruit and retain SVEs within engineering. Not only do SVEs enter engineering with technical experience, communication, leadership, and other skills, as discussed in Chapter 1, their training and experiences have set them up to better perform in the high stress, high stakes engineering education environment.

7. LINKING NARRATIVES WITH NCA PROFILES

In this chapter, I synthesize the findings from my qualitative and quantitative streams of data to answer the research questions posed. First, I discuss where the prominent NCA factors shown in Chapter 6 present themselves within the SVEs' stories as well as how Student Veteran Engineers' (SVEs) individual NCA profiles are observed within their stories, as applicable. Then, these discussions are synthesized in Section 7.2.

7.1 Individual NCA Profiles

In Chapter 6, I found that conscientiousness, meaning and purpose in life, perceptions of the future, test anxiety, and reactions to stress were all significantly different for SVEs than their non-military peers. For each SVE who participated in the qualitative portion of the study, their NCA profiles are shown in Figures 7.1 through 7.5. The non-SVE profile was omitted from the figures because it was near the overall average ($z\text{-score} \approx 0$) and provided no additional information. In this section, I qualitatively discuss individual NCA profiles and how they relate to the overall Veteran profile. Focusing on the individual, as separate from Veterans as a group is aligned with Veteran Critical Theory (Phillips & Lincoln, 2017) because this practice avoids essentializing Veterans to an average profile (i.e., making the assumption that all Veterans are the same). This discussion highlights the traits of the individuals and how these may be linked to their journeys.

7.1.1 David

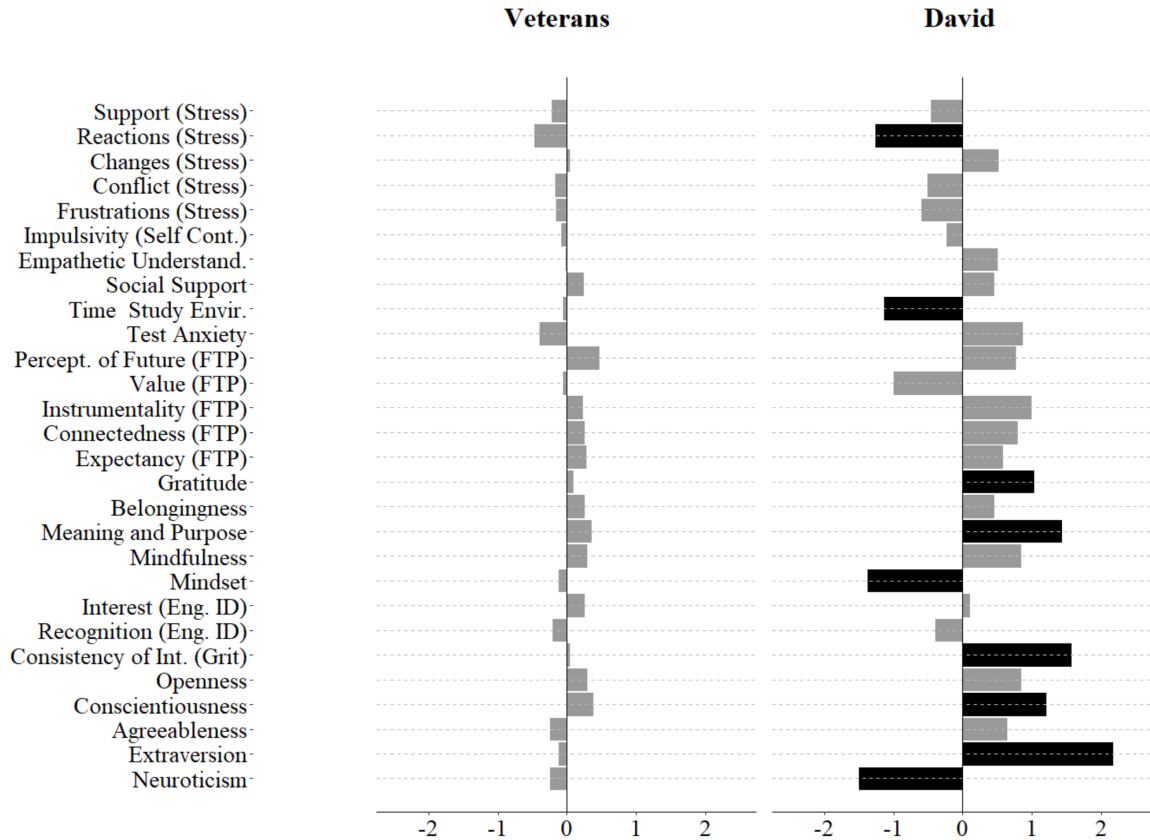


Figure 7.1. David's NCA profile as compared with other SVEs and non-SVEs. Black bars indicate one standard deviation different from the overall mean. Results are shown as averaged z-scores for the Veterans and individual z-scores for the participant.

As shown in Figure 7.1, David's NCA profile is similar in shape (similar in direction) to that of the overall SVE NCA profile. The one NCA factor where David is largely different (both opposite in sign and greater than one standard deviation from the overall mean as noted by the black bars in Figure 7.1) is extraversion (being sociable and outgoing; Ivcevic & Brackett, 2014). In David's narrative in Chapter 4, his outgoing behavior, and the strength he seems to gain from it, is evident when he describes his interaction with several students in his rhetoric and composition course.

In that course, David was able to use his communication skills to bridge a gap between several students in his group. David was really excited when he spoke about being able to get to know each of his group mates and use common interests and languages to help bridge the gap between them, including “bringing [a group mate] out of her shell.” David was able to engage with another student (who David describes as an introvert), and bring them into the group by earning trust through talking about Anime, even though it was only a passing interest of David’s. David described his extraversion as an asset in helping him perform well and create cohesion in group situations.

7.1.2 Mark

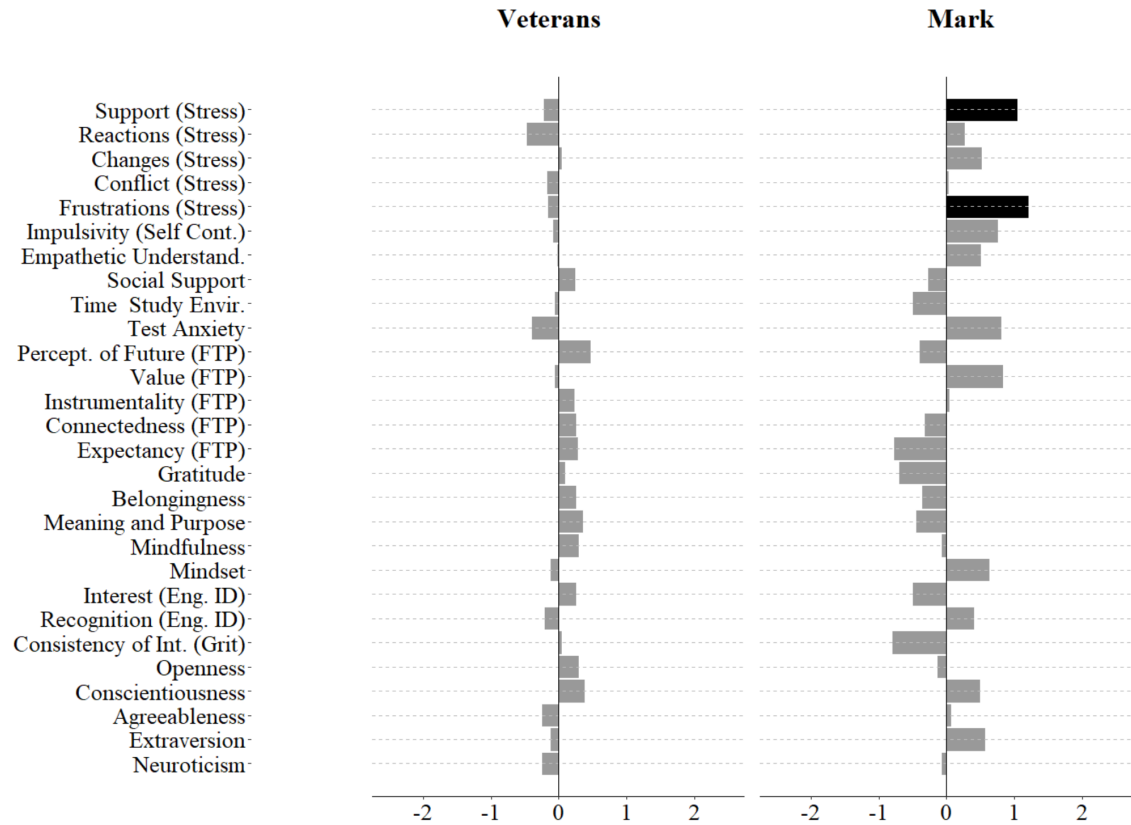


Figure 7.2. Mark’s NCA profile as compared with other SVEs and non-SVEs. Black bars indicate one standard deviation different from the overall mean. Results are shown as averaged z-scores for the Veterans and individual z-scores for the participant.

As seen in Figure 7.2, Mark has a NCA profile vastly different from the average (opposite in sign from the collective of Veterans, and different than the overall mean by greater than one standard deviation) on two factors: stress support and stress due to frustrations. An example of Mark’s overall high stress due to frustrations was when he was first trying to live on his own and go to college.

I just wasn’t really sure where I was going and what I was doing. So, it just didn’t work out for me. Having to pay all my own bills all the sudden

on top of trying to fit all this stuff in, it just didn't, it was just kind of like too much pressure without me having something that I was working towards. I was just kind of rowing the boat in circles and just trying to go through the motions.

Mark experienced stress as a result of both having to go to college and managing the rest of his life.

Another example of Mark's stress due to frustrations was learning how to learn in a formal school context again and finding a balance between school work and outside activities.

As the classes started to get harder, I wasn't getting easy grades. I do value my personal life and my hobbies, but I definitely had to learn that I can't just completely give up everything that I like to do. I would just end up miserable. I am not trying to live to work, I am trying to work to live. This has turned into a balancing act, having to learn to be efficient with my time so that I can include my hobbies and my life, in general, outside of school. Without a balance, I went back and forth a few times. If I would put my head down and do nothing but school; I would just be miserable. I would run into a wall where I just can't do this. I would just shutoff and disappear from my school life for a while. I was having this this internal struggle. "Where can I survive, because I have more needs than just getting this degree?"

Mark was frustrated because he was not getting the grades he wanted when he was doing activities he wanted to do, or was missing out on activities to pursue better grades. It was not until he found a balance between the two goals that he was able to use his activities to help him with stress. Another support for stress for Mark was tutoring. This gave him the opportunity to become more comfortable with the material and engage in deeper learning, both being tutored and serving as a tutor. Providing the tutoring, "was probably one of the best things that I did in my college career, especially for my success and just general happiness and contentment."

7.1.3 Digi

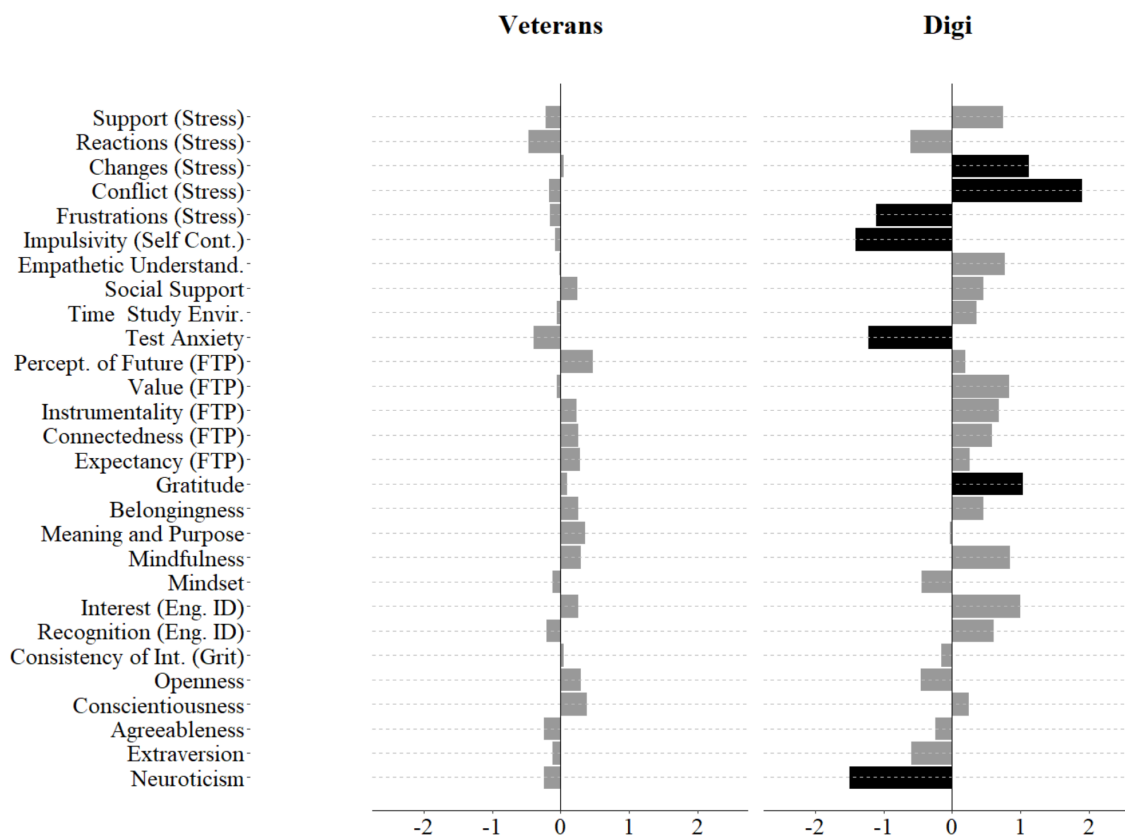


Figure 7.3. Digi's NCA profile as compared with other SVEs and non-SVEs. Black bars indicate one standard deviation different from the overall mean. Results are shown as averaged z-scores for the Veterans and individual z-scores for the participant.

Digi's NCA profile (Figure 7.3) was also similar in shape to that of the overall SVE NCA profile. Digi's profile was different (different in direction and greater than one standard deviation from the mean) on high stress due to conflicts. This dimension is defined as stress being caused as a result of conflicting alternatives. An example of this type of stress within Digi's story is when he was considering where to go to school after community college. He was in conflict about whether or not to attend a more prestigious university where he knew the stress levels would be high, or

whether to attend a university that would be potentially less demanding. Ultimately, after the death of one of his friends and learning about his father's medical condition, he decided on an option that would potentially lower his overall level of stress and give him more time with his family.

Another example of stress due to conflicts was how to deal with his brother. Digi learned how to fight from hanging out with a certain set of friends. These friends gave him an opportunity to learn to defend himself, which gave him loyalty toward them, but when they started to behave in ways that Digi did not want to engage in, he joined the Marine Corps. A further example of stress due to conflicts within Digi's story was the aftermath of the boot camp joke where Digi describes it as a "trying time." Both of these examples illustrate Digi experiencing stress due to conflicts.

7.1.4 Ryan

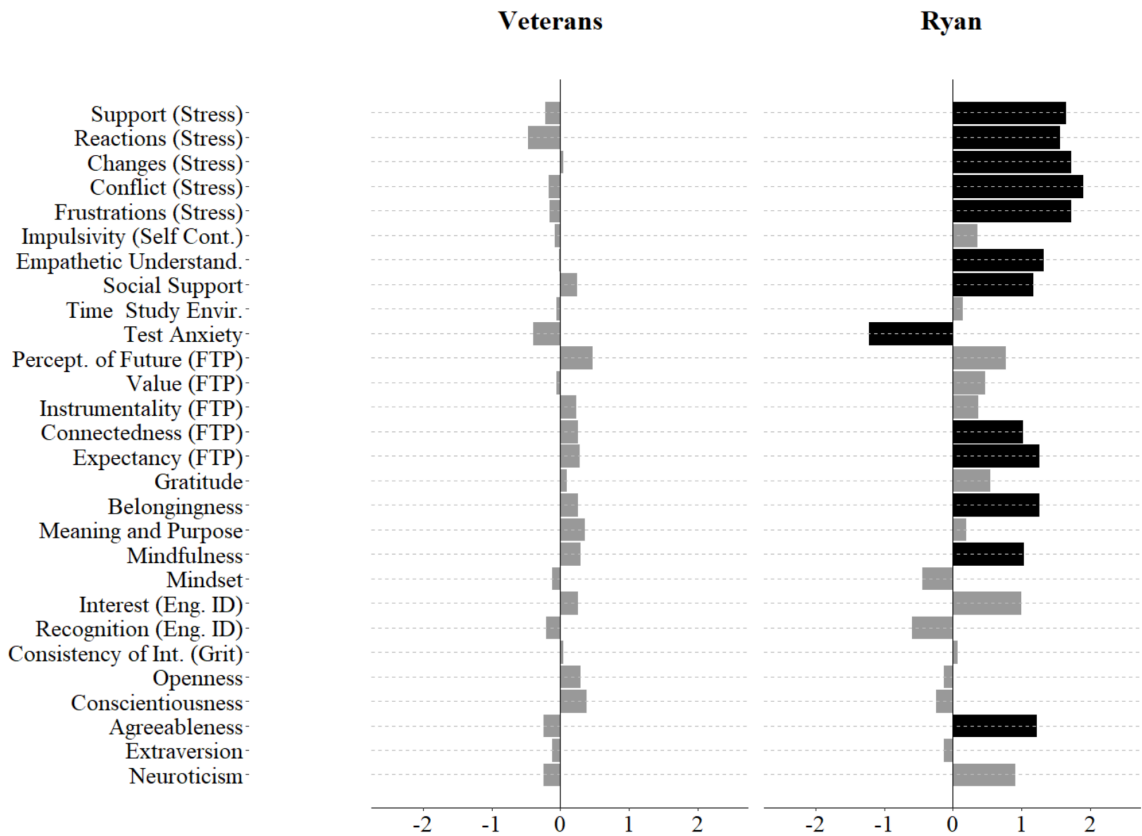


Figure 7.4. Ryan’s NCA profile as compared with other SVEs and non-SVEs. Black bars indicate one standard deviation different from the overall mean. Results are shown as averaged z-scores for the Veterans and individual z-scores for the participant.

As seen in Ryan’s NCA profile (Figure 7.4), Ryan was high on all four dimensions of stress, but also high in stress support and feelings of empathetic faculty understanding as compared to the average SVE NCA profile. An example of stress support was Ryan’s weightlifting. He used this exercise because it “clears up your mind.” Other, indicators of stress and faculty understanding within Ryan’s interview were not present. These factors may be missing from his story because he did not inter-

pret them as particularly salient to describing his journey or may have learned to effectively cope with his relatively higher levels of stress.

Ryan was also higher on agreeableness than other Veterans in this study. An example of Ryan's agreeableness came in his description of his military duties and boot camp. He embraced the new environment and his job within the Marines. He also made friends that he could exercise with outside of the requirements. Additionally, he also described enjoying the location, and the instructors while he was in boot camp. Even though he did not get to do the recon job that he wanted, Ryan described the guerilla warfare training as, "the next best thing." The rest of Ryan's profile is similar in direction, if not magnitude, to the average SVE profile.

7.1.5 Jay

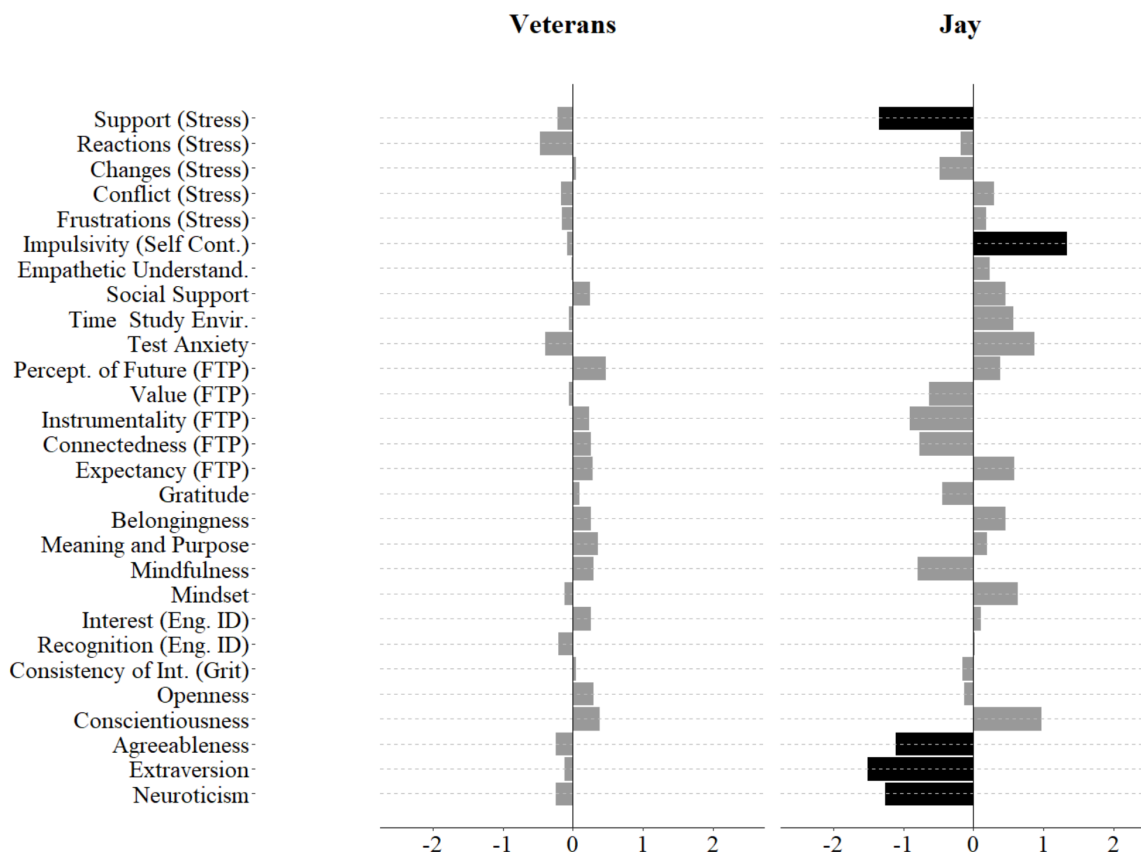


Figure 7.5. Jay's NCA profile as compared with other SVEs and non-SVEs. Black bars indicate one standard deviation different from the overall mean. Results are shown as averaged z-scores for the Veterans and individual z-scores for the participant.

Jay's NCA profile 7.5 was bit different than the average Veteran profile, with several factors being different in direction and magnitude. However, the only factor that Jay was different in magnitude than the overall population (greater than one standard deviation) and different in direction than other SVEs, was his high impulsivity rating. This finding could be because Jay likes "going with the flow of things." Otherwise, throughout Jay's story, he seemed to present himself as structured and self-controlled, not impulsive.

The above descriptions of the individual NCA factors highlight how although each of the SVEs were relatively similar to the overall SVE population, there are several individual differences. Additionally, there are also several similarities between each of the SVEs and their conceptualizations of success. Both the individual NCA profiles and the conceptualizations of success are further discussed as answers to research questions.

7.2 How Do the Narratives of SVEs' Military and Engineering Experiences Describe the Presence or Development of NCA Factors that Uniquely Position them for Success in Engineering?

As discussed in Chapter 6, the average group of SVEs differed in five NCA factors from their non-military peers. Taken together, these differences highlighted that SVEs may not only be well suited to succeed through persistence and academic success in engineering through their higher conscientiousness and aligned perceptions of the future, but also have overall higher well-being through lower stress and test anxiety and higher meaning and purpose in life. To help to provide salient examples, how these factors manifest within their stories are included below. By examining the quantitative and qualitative data together, a deeper understanding of how the factors are a part of the SVE military and collegiate experience is available.

7.2.1 Perceptions of the Future

Seeing their future self as an engineer was prevalent throughout the SVEs' stories. All of the participants had wanted to be an engineer and had specifically taken actions for many years to help set themselves up to enter and continue within their engineering programs. For example, David's and Jay's childhood dreams of wanting to be an engineer, Digi's and Mark's many years at community college preparing them to transfer to a university that offered an engineering degree, and Ryan's persistence and goals of becoming an engineer even though he struggled to focus during his

freshman year. All of these participants used this motivation of becoming an engineer to persist in their engineering programs. It is worth noting that Mark was lower on this dimension than the average student, which may be evident in his desire to be an engineer more for the financial freedoms that an engineering degree can provide than for just being an engineer.

These examples highlight the specific manifestations of perceptions of the future. Examining this factor at the individual level shows that not only do different SVEs have different perceptions of the future, but also that, although this factor was easily seen within their stories, there are different levels in the way that they responded to the survey. These different levels could be related to their stories.

7.2.2 Meaning and Purpose in Life

Meaning and purpose in life is linked to overall positive psychological well-being. Because this construct is more self-contained and less observable, it is difficult to identify it within the narratives. In the NCA profiles, David, Jay, and Ryan were all above the average, while Digi and Mark were below the average. There are several examples of meaning and purpose in life. David had a desire to pursue an engineering degree to support his career in politics to make a difference in his community. Ryan wanted to both complete his engineering degree and get a job in the United States, allowing him to achieve the “immigrant dream” and “make it” in the United States. Jay knew that he wanted to be involved with motorsports throughout the many years watching the races in person. He set himself up to achieve his goal of pursuing a motorsport specific graduate program through his undergraduate studies and club involvement as well as an internship with an automotive supply company. These examples of long-term goals and dreams gave these three meaning and purpose in life.

7.2.3 Conscientiousness

Being diligent and thorough is a trait that is stressed heavily throughout military boot camps. Mark expressed high conscientiousness when he described his desire to learn material and deeply understand it to achieve a mastery. With the exception of Ryan, the SVEs interviewed all had higher than average conscientiousness. As discussed in Chapter 6, engineering could attract Veterans who are more conscientious or Veterans in general could be more conscientious than general population due to military training. Additionally, this high level of conscientiousness could be so ingrained within the Veteran experience that it was not salient enough to discuss explicitly within the others' stories.

7.2.4 Reactions due to Stress and Test Anxiety

One of the findings from the quantitative work (see Chapter 6) was that the SVEs in this sample had lower reactions due to stress as well as lower test anxiety. These NCA factors were not salient within the stories of SVEs. There are a couple of potential reasons for this. First, because the SVEs were generally low in these NCA factors, they did not come up in the interviews because the SVEs did not see them as either barriers or strengths to their success. Second and alternatively, these factors were not salient within the interviews because they were not specifically probed (more is discussed in the Limitations section). Third, two of the SVEs that were interviewed were higher than average on test anxiety and a different two were higher than average in reactions due to stress. Regardless, neither of these two factors were salient within the stories.

Overall, the three NCA factors that were greater for the SVEs than their non-military peers were present within the stories. These factors (perceptions of the future, conscientiousness, and meaning and purpose in life) within the stories provide concrete examples of what potentially makes many of the SVEs different from their non-military peers. Two factors that were statistically lower for all SVEs were not

salient within the stories. These results not only highlight why SVEs may differ from their peers, but also the value in exploring the individual, learning that the average does not always represent the whole. Additional discussion of how these findings connect with guiding conceptual framework (see Figure 2.1) are discussed in the following section.

7.3 Linking Together Veteran Critical Theory (VCT) and Mixed Methods Research

The design of this dissertation focused on integrating tenants of VCT in design and considerations of the work. This research design contributes to VCT by being the first to focus on the success of SVEs from their perspective while simultaneously highlighting quantitatively NCA factors that contribute to holistic student success. The third tenant of VCT (“Veterans are victims of deficit thinking in higher education” Phillips & Lincoln, 2017, p. 661)) notes that “Programs that focus on student veteran retention and academic success may be using civilian measures that do not accurately gauge student veteran success.” By including the narratives of the SVEs and providing a forum for them to identify what success is to them, this work provides more than just civilian measures for understanding SVE success. Additionally, these results present a method to not essentialize Veterans (tenth tenet), by showing how the individual is different than the group. Finally, by employing member checking (providing an opportunity for the SVEs to choose what is included and to make sure that interpretations within the story were correct), this work is in keeping with the eleventh tenet of VCT, (“Veteran culture is built on a culture of respect, honor, and trust” Phillips & Lincoln, 2017, p. 663). Overall, VCT was the foundation for this research methodology and supported both the quantitative and qualitative data streams and interpretations.

This dissertation, as shown in Figure 2.1, placed the SVEs at the center and showed how their experiences, both within the military and outside of the military, contribute to their conceptualizations of success. Additionally, this research shows

how the NCA factors of SVEs are different than their non-military peers, and that these differences could contribute to their success, but more research is needed to understand both why they are different and if they are directly contributing to SVE success. Finally, this research shows the relationship between the experiences of the SVEs and some of the NCA factors that were different.

Additionally, my findings directly supported several other tenets of VCT. This work presents a counternarrative (fifth tenet) with the qualitative findings, which highlight SVEs as being more holistically prepared to function within engineering education than their non-military peers in five different NCA factors related to holistic student success. The individual profiles show that individual SVEs are not only different from the non-military peers, but are also different from the general profile of their military peers for several NCA factors. This finding of individual Veterans being unique further supports the tenth tenet, that “Veterans cannot be essentialized” (Phillips & Lincoln, 2017, p. 662). Additionally, this research also shows how SVEs “occupy a third space (country) on the border of multiple conflicting and interacting power structures, languages, and systems” (p. 661; tenet four). Two of the participants discussed how they do not fit in with the traditionally younger college student. VCT provided a useful framework to challenge traditional research and deficit framings for SVEs in this work. The framework provided ways to support a critical perspective in both the research design and interpretation of the findings from this mixed methods study. Implications, limitations, and conclusions of this research are discussed in Chapter 8.

8. LIMITATIONS, IMPLICATIONS, AND CONCLUSION

8.1 Summary

Through a parallel convergent mixed method study, this dissertation answered three research questions:

1. How do the narratives of undergraduate veteran engineers incorporate their conceptualization of success in their engineering programs?
2. What differences, if any, exist in SVEs' non-cognitive factors from non-SVEs'?
3. How do the narratives of SVEs' military and engineering experiences describe the presence or development of NCA factors that uniquely position them for success in engineering?

In Chapter 5, I showed that SVEs conceptualized success on a continuum. The SVEs said that success for them was surviving, accomplishing small goals, accomplishing large goals, and achieving deep understanding. In Chapter 4, I show that SVEs are different than their non-military peers in several non-cognitive and affective factors. SVEs were higher in conscientiousness, meaning and purpose in life, and perceptions of the future, and lower in reactions to stress and test anxiety. In Chapter 7, I show that individual Veteran NCA profiles, although similar to the average SVE, are unique. Together, these findings answer the three research questions.

8.2 Limitations

Some limitations of this work include sampling choices and availability. There were a limited number of SVEs that were part of the larger dataset used for the quantitative analyses and recruitment for qualitative work. A limitation of this study

is that the stories are not representative of all U.S. military branches. As discussed in Chapter 1, each of the services within the U.S. have different cultures which may lead to differences in conceptualizations of success and pathways by this socialization. As highlighted by David's and Mark's stories, both U.S. Army Reservists, although some of their experiences are similar, many of them are different. These differences highlight how Veteran experience within the same service is not homogeneous, and there can be even more learned by exploring the experiences of Veterans from all services and components. Therefore, with the limited data pool, I was not able to recruit domestic students from the Navy, Coast Guard, or Air Force, which could have enhanced the overall qualitative work with the differing experiences. Additionally, while it was serendipitous that members of the South Korean and Singapore services were able to participate, it would be valuable to have had other services represented, especially other services with both conscripted and voluntary service, again, furthering the perspectives. Similarly, the sample was one of convenience, and therefore the students came from a limited number of schools. Having broader participation, potentially from private universities or community colleges which were not available for the qualitative recruitment, could add value and additional insights into SVEs' NCA profiles and conceptualization of success. Additionally, all the qualitative responses as well as nearly all of the quantitative responses are from men. Women are a growing demographic within the military and will subsequently be a growing demographic within women SVEs. Overall, this sample may limit the completeness of these findings across all SVEs; however, the rich stories shared and triangulation with the quantitative data provides a robust mixed methods study of SVEs success and pathways in engineering education.

The study design had the qualitative work preceding the quantitative work. This decision was made to ensure that the interviews did not force or prompt the students down any path toward explicit discussions of NCA factors. This design choice led to not being able to identify some of the depth needed to better understand the NCA profiles of the SVEs. Future work can explore these profiles qualitatively, to better

understand, for instance, what it means for an SVE to be both high in stressors as well as high in support from faculty and peers.

8.3 Implications

8.3.1 Engineering Educators

Overall, this work highlights that SVEs can be different from their non-military peers in ways that set them up for particular kinds of success in engineering. Recognizing these differences can provide ways to support SVEs pathways through engineering and acknowledge multiple ways that SVEs can be successful. In general, SVEs may be more well suited to handle the stress associated with engineering (Jensen & Cross, 2019). Another implication of this work is that it highlights the complexities associated with the SVE experience, both inside and outside of school. Their stories illustrate potential disconnects from more traditional students due to age and experiences. Additionally, SVEs may not find value in small assignments that do not directly help them to attain their goals. Understanding that SVEs may need to better understand the big picture or overall *mission* and be able to relate each portion of a course to accomplishing that mission, may improve their experience and performance.

This work also highlights that success can be a continuum for Veterans, where each Veteran conceptualizes success differently. While this work richly demonstrated five different conceptualizations, these narratives likely do not include all possible SVE conceptualizations. Saturation or categorization of all possible ways of conceptualizing success was not a goal of this work. However, these stories provide useful tools that could be used to help SVEs and other student envision success and how to navigate engineering toward that goal. Instructors could ask students to reflect on the following questions: What does success mean for you? What do you want to get out of this course? Someone like Mark may want deep learning and be able to relate the material across courses, whereas someone like David may need to see how the material presented relates to the big picture and therefore may struggle when

they find small tasks not as relevant. Working with individual SVEs to understand their conceptualizations of success and highlighting how what they are doing now can help them reach their goals can potentially promote their action readiness and their self-efficacy.

8.3.2 Engineering Researchers

One consideration for researchers who are exploring Veterans or other military connected individuals is to adhere to the tenants of Veteran Critical Theory (VCT; Phillips & Lincoln, 2017). These tenants are designed to both encourage research of and with Veterans while simultaneously ensuring that the results will be meaningful and accurately represent the Veterans under study. Using VCT shaped the direction of the research (e.g., explicitly having the stories reviewed and edited by the participants and included in full to: value their narratives and counternarratives, highlight their multiple identities, and to allow their voice to be heard to help inform policy) and the ways I interpreted and discussed results (e.g., not only discussing the differences between SVEs and non-military peers as reflective of the sample, but including the individual NCA profiles of select participants and connecting them to their stories to avoid essentializing Veterans overall). While VCT applies specifically to Veterans, these principles can be applied to all research, where possible, to help accurately represent findings under the context where they occur.

There are several other areas for research that are open for deeper exploration. First, it would be valuable to further explore differences in international and domestic SVEs. The stories told by the participants in this study begin to unpack some of these differences, but they also highlight many similarities. A deeper exploration of each of these groups would be valuable to better understand military culture overall as it applies within engineering education. Additionally, further exploration of the intersections of other identities (e.g., student, parent, etc.) with Veteran identities can help to understand more about how Veterans navigate the university environment.

8.3.3 Engineering Administrators and Policymakers

Engineering Administrators and Policymakers need to understand that their SVEs have different experiences and different needs to help them navigate the college experience. It is incumbent upon them to make resources available to these students to allow them to succeed. Some of the interview participants noted that they did not know what to expect, either with their Veteran Affairs (VA) benefits or in what to expect when beginning and navigating through an engineering program. Sharing stories, such as the ones collected as part of this research with incoming students, can not only help them learn about what to expect when they begin their engineering programs, but can allow them to think of questions that are more tailored to their specific needs because they have the necessary context to ask these questions.

One of the support services than many universities offer are “Veteran Success Centers.” Digi’s narrative highlighted that there is great variability in what designates a Veteran Success Center and what services are provided. Additionally, there are differences in how VA certifying officials engage with the Veterans that they serve, and these certifying officials are sometimes attached to Veteran Success Centers. The certifying officials not only process claims to the VA, they help to guide Veterans in how to best utilize their educational VA benefits. As discussed in Chapter 2, there are commonly held beliefs that Veteran Success Centers help students but there is no empirical evidence, so learning how SVEs leverage university resources for success could be a helpful next step.

8.4 Future Work

This work primarily focused on men (as discussed in the limitations), however directed sampling of women can help to better understand how and if their conceptualizations of success are different than their other SVE peers to better support women SVEs entering engineering. Another area for future work is to explore differences between ROTC and other college students. As I was considering the definition

of Veterans, the decision of whether or not to include ROTC participants came up. I made a choice to exclude ROTC students as Veterans because it was both consistent with literature and because the ROTC experience may more closely resemble a traditional student experience. However, to help understand if ROTC students really are different from SVEs or other college students, a similar quantitative study can be performed.

As part of the data collection, participants were given the opportunity to choose more than one option with regard to their Veteran status. Several students selected combinations of different Veteran identities. Those included: two Active Duty and not a Veteran, one Reservist and not a Veteran, one National Guard and not a Veteran, one recently separated and not a Veteran, two not a Veteran and Veteran (Other), one Active Duty and Reservist, three Reservist and ROTC, one Reservist and Veteran (Other), one ROTC and National Guard, and one Reservist and Recent Sep and Veteran (Other). Exploring these different combinations of identities and what they mean to Veterans can help to better understand how Veterans identify themselves for both survey administration as well as contacting students who have a military related identity for certain program eligibility.

8.5 Conclusion

As discussed in Chapter 1, SVEs have great potential to contribute to engineering with the leadership, communication, and technical skills they develop from their military experiences. Raising recruitment and retention of veterans should be a concern for all academic institutions, and one way to potentially help this effort is to understand how student veterans conceptualize success. This dissertation begins to explore how SVEs are different from their non-military peers as well as how SVEs conceptualize success.

The quantitative portion of this convergent mixed methods study highlighted that there were five NCA factors that were statistically different between SVEs and their

non-military peers. Taken together, these differences highlight that SVEs may be more suited to handle engineering stress culture and be more motivated to persist because of their perceptions of the future. Additionally, the SVEs in this sample also had higher meaning and purpose in life, contributing to their overall well-being. Although these factors were significantly different for SVEs in general, this is not true for all SVEs. A unique contribution of this work not only highlights these differences, but also explores the individual NCA profiles of SVEs.

Additionally, this work explores how SVE's conceptualize success within the stories of their experiences. These stories provide context to these conceptualizations of success and show that success, as interpreted by students, can be both different and beyond traditional academic success measures such as good grades, retention, and graduation. Although traditional academic success measures are important, and are in line with the conceptualizations of success for the SVEs, the stories highlighted that success may be more related to the attainment of self-efficacy, the belief that a goal can be accomplished and having the tools needed to accomplish that goal. Therefore, building upon self-efficacy, helping SVEs to not only believe in themselves, but to guide them to the tools and skills they need to meet their goals can help SVEs to succeed and also help them to achieve their academic goals.

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A. SUCCESS SURVEY

CAL POLY

College of Engineering

PURDUE

UNIVERSITY
ENGINEERING EDUCATION



a partnership between California Polytechnic University, Purdue University, and University of Texas at El Paso

SUCCESS

Studying Underlying Characteristics of Computing and Engineering Student Success

Information about this survey

We are interested in your attitudes, mindsets, beliefs, and belongingness in engineering and computing majors. Please select the best choice for each item and answer as many questions as possible. There are no right or wrong answers; just do your best.

Instructions

- You must be 18 years or older to participate.
- The survey will take approximately 25 minutes to complete.
- Completion of this survey will NOT affect your grade in any course in any way.
- We will ask for contact information (email) to enter your name in a raffle (details on back of this sheet) for an Amazon gift card as a thank you for completing this survey. This information is voluntary and will not be shared with any third party.
- If you have questions or concerns, please contact Professor Ed Berger (success-project@purdue.edu).
- You can contact the Purdue University Human Research Protection Program at (765) 494-5942 if you have any questions regarding your rights as a participant.

In this survey, you should interpret statements like "I feel comfortable in engineering" to be inclusive of all engineering and computing majors.

Contact:
Ed Berger, Ph.D., Purdue University
success-project@purdue.edu



This project is funded by the National Science Foundation (NSF), grant numbers: 1626287, 1626148, and 1626185.

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i Please continue to next page

What is the purpose of this study?

Purdue, Cal Poly, and UTEP are collaborating to understand how non-cognitive and affective factors (defined as personality and other innate characteristics and behaviors) impact academic performance of undergraduate engineering students. Understanding this is important, as it will allow the community of educators to better understand the mechanisms of success and failure among their students.

What will I do if I choose to be in this study?

You will be asked to complete a short survey by someone at your institution, no longer than 25 minutes, in which we ask you questions that probe your learning preferences, background information, study habits in different contexts, attitudes, behaviors, personality, and activities during the school year. The survey will be completed on paper.

How long will I be in the study?

Your participation in the study includes completing this survey.

What are the possible risks or discomforts?

The risks of this study are minimal and no greater than any risks you would encounter in daily life. Breach of confidentiality is a risk associated in participating in this study. Safeguards are in place to protect your information. All information will be de-identified prior to sharing across institutions.

Are there any potential benefits?

There are no direct benefits to participating in this study. You may enjoy reflecting about your attitudes about your college experience.

Will I receive payment or other incentive?

All participants who fully complete the survey before the survey closure date will automatically be entered into a drawing to receive one of three \$50 Amazon gift cards at each school. This random drawing will take place promptly after the closure date of the survey, and winners will be notified by email with instructions of how to claim their payment. The odds of winning depends upon how many people complete the survey, but we estimate the odds to be no greater than 2.5%.

Are there costs to me for participation?

There are no costs to you for participating in this study.

Will information about me and my participation be kept confidential?

All digital data files will be stored on the Purdue Data Depot, a digital repository with a level of security appropriate for storage of personal information such as that collected in this study. Only the PI and co-investigators named on this protocol will have access to the data files in de-identified form. Research results will be presented in aggregate form, and all data analysis will be performed on the de-identified dataset. The project's research records may be reviewed by the National Science Foundation and all collaborating institutions' oversight regulatory boards.

What are my rights if I take part in this study?

Your participation in this study is voluntary. You may choose not to participate. Because the data is collected anonymously, after you complete the survey there is no way to remove your data from the data set.

Documentation of Informed Consent

I have had the opportunity to read this consent form and have the research study explained. I have had the opportunity to ask questions about the research study, and my questions (if any) have been answered. By completing the survey, I am expressing my consent to participate in this study. If I desire, I will print a copy of this information form for my records.

Q1. Please choose your current major or the major that you are most likely to choose in the list below. These options may be dependent on your institutional context. Choose the option that BEST describes your major.

- | | |
|--|---|
| <input type="radio"/> Aero/Astronautical Engineering | <input type="radio"/> Environmental / Ecological Engineering |
| <input type="radio"/> Agricultural and Biological / Biosystems Engineering | <input type="radio"/> Industrial Engineering |
| <input type="radio"/> Architectural Engineering | <input type="radio"/> Information Technology |
| <input type="radio"/> Bioengineering / Biomedical Engineering | <input type="radio"/> Manufacturing Engineering |
| <input type="radio"/> Chemical Engineering | <input type="radio"/> Materials Engineering / Material Science and Engineering |
| <input type="radio"/> Civil Engineering | <input type="radio"/> Mechanical Engineering |
| <input type="radio"/> Computer Engineering | <input type="radio"/> Multidisciplinary / Interdisciplinary / General Engineering |
| <input type="radio"/> Computer Science | <input type="radio"/> Nuclear Engineering |
| <input type="radio"/> Construction Management Engineering | <input type="radio"/> Other STEM-related Degree |
| <input type="radio"/> Electrical Engineering | <input type="radio"/> Other non-STEM-related Degree |
| <input type="radio"/> Engineering Physics | <input type="radio"/> Software Engineering |

Q2. What year are you in college?

- ☐ 1st Year ☐ 2nd Year
☐ 3rd Year ☐ 4th Year or Higher

Q3. Are you a transfer student?

- ☐ Yes ☐ No

Q4. How accurately do the following describe you now?

	Very inaccurately							Very accurately	
	1	2	3	4	5	6	7		
a. Often forget to put things back in their proper places	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
b. Have a kind heart	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
c. Make a mess of things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
d. Am quiet around strangers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
e. Keep in the background	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
f. Sympathize with others' feelings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
g. Leave my belongings around	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
h. Feel others' emotions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
i. Don't talk a lot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
j. Have frequent mood swings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
k. Have excellent ideas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
l. Have a vivid imagination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
m. Change my mood a lot	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
n. Am full of ideas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
o. Get upset easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		

Q5. To what extent do you agree or disagree with the following statements:

	Strongly disagree							Strongly agree	
	1	2	3	4	5	6	7		
a. I feel comfortable asking a faculty member for help with a personal problem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
b. Faculty connect relevant topics to my major	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
c. I feel that a faculty member would be sensitive to my difficulties if I shared them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
d. I see faculty members as role models	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
e. I feel comfortable socializing with a faculty member outside of class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
f. I feel comfortable asking a faculty member for help if I do not understand course-related material	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
g. I feel comfortable seeking help from a faculty member before or after class	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
h. I feel comfortable talking about a problem with faculty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
i. I feel that a faculty member would take the time to talk to me if I needed help	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
j. If I had a reason, I would feel comfortable seeking help from a faculty member outside of class time (i.e., during office hours, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
k. I know faculty who are like me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
l. I feel that a faculty member would be sympathetic if I was upset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
m. I feel that a faculty member really tried to understand my problem when I talked about it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		

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SERIAL

	Strongly disagree							Strongly agree						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Q6. To what extent do you agree or disagree with the following statements:														
a. I do certain things that are bad for me, if they are fun	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Pleasure and fun sometimes keep me from getting work done	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Sometimes I can't stop myself from doing something, even if I know it is wrong	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. I often act without thinking through all the alternatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. I am good at resisting temptation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. I have a hard time breaking bad habits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. I wish I had more self-discipline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. People would say that I have very strong self-discipline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not at all							Very much so						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Q7. As a student:														
a. I have experienced frustrations due to delays in reaching my goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I have experienced daily hassles which affected me in reaching my goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I have experienced lack of resources (money for auto, books, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. I have experienced failures in accomplishing the goals that I set	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. I have not been accepted socially (became a social outcast)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. I have experienced dating frustrations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. I feel I was denied opportunities in spite of my qualifications	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not at all							Very much so						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Q8. I have experienced conflicts which were:														
a. Produced by two or more positive options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Produced by two or more negative options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Produced when a goal had both positive and negative options	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not at all							Very much so						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Q9. I have experienced pressures:														
a. As a result of competition (on grades, work, relationships with spouse and/or friends)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Due to deadlines (papers due, payments to be made, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Due to an overload (attempting too many things at one time)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Due to interpersonal relationships (family and/or friends, expectations, work responsibilities)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not at all							Very much so						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Q10. I have experienced:														
a. Rapid unpleasant changes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Too many changes occurring at the same time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Change which disrupted my life and/or goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not at all							Very much so						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Q11. As a person:														
a. I like to compete and win	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I like to be noticed and be loved by all	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I worry a lot about everything and everybody	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. I have a tendency to procrastinate (put off things that have to be done)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. I feel I must find a perfect solution to the problems I undertake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. I worry and get anxious about taking tests	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q12. With reference to stressful situations, I have:

	Not at all						Very much so
	1	2	3	4	5	6	7
a. Experienced physical reactions (sweating, biting fingernails, headaches, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Experienced fear, anxiety, worry, frustration, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Cried, was irritable towards others, separated myself from others, indulged excessively, etc.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Thought about and analyzed how stressful the situations were	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Thought and analyzed whether the strategies I used were most effective	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Engaged in personal support (exercised, meditated, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Sought family support (talked to parents, siblings, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Sought peer support (talked to friends, classmates, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Sought institutional support (attended support groups, visited counseling services, talked with an advisor, visited Dean of Students, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q13. Indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

	Almost never						Almost always
	1	2	3	4	5	6	7
a. It seems that I am "running on automatic," without much awareness of what I'm doing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I rush through activities without being really attentive to them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I do jobs or tasks automatically, without being aware of what I'm doing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. I find myself doing things without paying attention	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q14. How important are the following factors for your future career satisfaction?

	Not at all						Very much so
	1	2	3	4	5	6	7
a. Making money	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Becoming well known	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Helping others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Supervising others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Working with people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Inventing / designing things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Developing new knowledge and skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q15. Please rate the likelihood of you choosing a career in each of the following fields.

	Not at all likely						Extremely likely
	1	2	3	4	5	6	7
a. Academia (higher education)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Engineering/Computer Science (industry)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Entrepreneurship / Start a company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Government / Policy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. K-12 Education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Law	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Medicine / Health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Non-profit / NGO	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i. Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PLEASE DO NOT WRITE IN THIS AREA



Q16. Please respond to each of the following statements to the best of your ability.

Strongly disagree Strongly agree

1	2	3	4	5	6	7
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- a. New ideas and projects sometimes distract me from previous ones
- b. Setbacks don't discourage me. I don't give up easily
- c. I have been obsessed with a certain idea or project for a short time but later lost interest
- d. I am a hard worker
- e. I often set a goal but later choose to pursue a different one
- f. I have difficulty maintaining my focus on projects that take more than a few months to complete
- g. I finish whatever I begin
- h. I am diligent; I never give up

Q17. Please respond to the following items to the best of your ability.

Not at all true of me Very true of me

1	2	3	4	5	6	7
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- a. When I take a test I think about how poorly I am doing compared to other students
- b. When I take a test I think about items on other parts of the test I can't answer
- c. When I take tests I think of the consequences of failing
- d. I feel my heart beating fast when I take an exam
- e. I have an uneasy, upset feeling when I take an exam

Q18. Please respond to the following items to the best of your ability.

Not at all true of me Very true of me

1	2	3	4	5	6	7
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- a. I rarely find time to review my notes or readings before exams
- b. I usually study in a place where I can concentrate on my course work
- c. I make good use of my study time for my courses
- d. I make sure I keep up with the weekly readings and assignments for my courses
- e. I find it hard to stick to a study schedule
- f. I often find that I don't spend very much time on my courses because of other activities
- g. I attend class regularly
- h. I have a regular place set aside for studying

Q19. How are you funding your education (select all that apply)?

- ☐ Help from parents
- ☐ Private student loans
- ☐ Federal student loans
- ☐ Scholarships and/or grants
- ☐ Working (part time or full time)
- ☐ Other (Please describe) _____
- ☐ Prefer not to answer

Q20. Please answer the following with the answer that best describes you.

Strongly disagree Strongly agree

1	2	3	4	5	6	7
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- a. I feel thankful for the opportunity to learn so many new things
- b. I appreciate the things I have learned in my college classes
- c. I am grateful to the professors and other students who have helped me in class
- d. I am so thankful that I'm getting a college education
- e. I am grateful for the people who have helped me succeed in college
- f. If I had to list everything I felt grateful for about my academic experience at my university, it would be a very long list

Q21. Please answer the following with the answer that best describes you.

	Strongly disagree	1	2	3	4	5	6	Strongly agree
a. I don't think I personally can do much to increase my intelligence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Regardless of my current intelligence level, I think I have the capacity to change it quite a bit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I can learn new things, but I don't have the ability to change my basic intelligence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. With enough time and effort I think I could significantly improve my intelligence level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. My intelligence is something about me that I personally can't change very much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. I believe I can always substantially improve on my intelligence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. I believe I have the ability to change my basic intelligence level considerable over time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. To be honest, I don't think I can really change how intelligent I am	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q22. How many hours per week do you spend on each of the following?

	0	1-5	6-10	11-15	16-20	21-25	25-30	More than 30
a. Working for pay on campus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Working for pay off campus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Commuting to class (driving, walking, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Relaxing and socializing (watching TV, partying, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Providing care for dependents living with you (parents, children, spouse, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. Participating in academic co-curricular activities (engineering/computing competitions such as hackathon and Baja, engineering/computing societies such as ASME or ACM, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h. Participating in non-academic co-curricular activities (organizations, campus publications, student government, fraternity or sorority, intercollegiate or intramural sports, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q23. We would like to know about how you perceive yourself in terms of your perceived experiences. Please indicate your agreement or disagreement with each of the following statements using the scale below:

	Strongly disagree	1	2	3	4	5	6	Strongly agree
a. My life has a clear sense of purpose	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I have found a satisfactory meaning in life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I know what gives meaning to my life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q24. We would like to know about how you feel that you fit in engineering and belong in your engineering community.

	Not at all	1	2	3	4	5	6	Very much so
a. I feel comfortable in engineering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I feel I belong in engineering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I enjoy being in engineering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. I feel comfortable in my engineering classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. I feel supported in my engineering classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. I feel that I am part of my engineering classes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. I feel that my engineering classes are large	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q27. In general, my engineering classes have:

- ☐ < 30 students
☐ 30 - 60 students
☐ 60 - 100 students
☐ > 100 students

Q28. What is your current GPA? (4.0 scale)

	.	
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
	6	6
	7	7
	8	8
	9	9

Q29. To help us estimate the size of the community you come from, please provide your home ZIP Code.

0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

Q30. Please indicate the approximate score you received on the SAT, or that you did not take it.

	200-300	310-400	410-500	510-600	610-700	710-800	Did not take the SAT
a. Math Subtest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Writing Subtest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Critical Reading Subtest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q31. Please indicate the approximate score you received on the ACT, or that you did not take it.

	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32	33-36	Did not take the ACT
a. Math Subtest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. English Subtest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Science Reasoning Subtest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Reading Subtest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q32. What was the primary language of instruction at the institution you attended before college?

- ☐ English
☐ A language closely related to English (Spanish, Portuguese, French, Italian, Romanian, Dutch, Swedish, Afrikaans, Norwegian)
☐ A language different than English (Hindi, Russian, Vietnamese, Turkish, Polish, Thai, Serbian, Greek, Hebrew, Finish)
☐ A language significantly different than English (Chinese, Arabic, Japanese, Korean)

Q33. With which racial and ethnic group(s) do you identify? (Fill in all that apply).

- ☐ American Indian or Alaska Native ☐ Middle Eastern or North African
☐ Asian ☐ Native Hawaiian or Other Pacific Islander
☐ Black or African American ☐ White
☐ Hispanic, Latino, or Spanish origin ☐ I prefer to identify as _____

Q34. Ethnicity. Print your specific ethnicities in the space below.

Example of ethnicities include: German, Korean, Midwesterner (American), Mexican American, Navajo Nation, Samoan, Puerto Rican, Southerner (American), Chinese, etc. Note, you may report more than one group.

Q35. Military status. (Fill in all that apply)

- | | |
|-------------------------------------|--|
| <input type="radio"/> Not a veteran | <input type="radio"/> National Guard |
| <input type="radio"/> Active duty | <input type="radio"/> Newly/Recently separated veteran (within the last 3 years) |
| <input type="radio"/> Reservist | <input type="radio"/> Veteran (other) _____ |
| <input type="radio"/> ROTC | |

Q36. How do you describe your gender identity? (Fill in all that apply)

- ☐ Female
 ☐ Agender
- ☐ Cisgender
 ☐ Genderqueer
- ☐ Male
 ☐ I prefer to identify as
- ☐ Transgender

Q37. How do you describe your sexual identity? (Fill in all that apply)

- ☐ Heterosexual/ straight
 ☐ Asexual
☐ Homosexual/ gay/ lesbian
 ☐ I prefer to identify as
☐ Bisexual

Q38. How do you describe your disability / ability status? We are interested in this identification regardless of whether you typically request accommodations for this disability. (Fill in all that apply)

- | | |
|--|---|
| <input type="radio"/> A sensory impairment (vision or hearing) | <input type="radio"/> A long-term medical illness (e.g., epilepsy, cystic fibrosis) |
| <input type="radio"/> A learning disability (e.g., ADHD, dyslexia) | <input type="radio"/> A mobility impairment |
| <input type="radio"/> A mental health disorder | <input type="radio"/> I do not identify with a disability or impairment |
| <input type="radio"/> A temporary impairment due to illness or injury
(e.g., broken ankle, surgery) | <input type="radio"/> A disability or impairment not listed _____ |

Q39. How would your parent(s)/ guardian(s) describe their gender identities? (Fill in all that apply)

Parent/Guardian #1

- | | |
|-----------------------------------|--|
| <input type="radio"/> Female | <input type="radio"/> Agender |
| <input type="radio"/> Cisgender | <input type="radio"/> Genderqueer |
| <input type="radio"/> Male | <input type="radio"/> They prefer to identify as |
| <input type="radio"/> Transgender | |

Q40. How would your parent(s)/ guardian(s) describe their gender identities? (Fill in all that apply)

Parent/Guardian #2

- ☐ Female
 - ☐ Cisgender
 - ☐ Male
 - ☐ Transgender
 - ☐ Agender
 - ☐ Genderqueer
 - ☐ They prefer to identify as

Q41. What was the highest level of education for your parents/guardians?

Q41. What was the highest level of education for your parents/guardians:	Parent/Guardian #1	Parent/Guardian #2
Less than high school diploma	<input type="radio"/>	<input type="radio"/>
High school diploma/GED	<input type="radio"/>	<input type="radio"/>
Some college or associate/trade degree	<input type="radio"/>	<input type="radio"/>
Bachelor's degree	<input type="radio"/>	<input type="radio"/>
Master's degree or higher	<input type="radio"/>	<input type="radio"/>
Don't know	<input type="radio"/>	<input type="radio"/>

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B. INTERVIEW PROTOCOLS

B.1 Interview 1: Introduction

1. Introduce myself as both a PhD student and a Navy Veteran.
2. From IRB Consent Form - This research project focuses on student veterans in engineering. The purpose of this research is to better understand the experiences of student veterans in engineering. The researcher is also interested in learning about factors that may contribute to student veteran success. Individuals who have served in the military are encouraged to participate. Overall, I would like to enroll six people in this study.
3. Walk student through consent form. Answer any questions. Ensure that consent form is signed before beginning recording.
4. Inform student that I will begin recording the session.
5. Start Interview
 - (a) In order to keep your information confidential, I would like to use a pseudonym.
Is there a pseudonym that you prefer?
 - (b) Tell me about your military career.
 - i. Did you have family or friends in the military?
 - ii. What were you looking to get out of the service?
 - iii. When you first entered, how long were you planning on staying in?
Why is that? Did that change after being in for awhile?
 - iv. Did you have any college before you joined? Why is that?
 - v. Did you have any college during your service? Why is that?

- (c) What did you do during your time in the military, whatever you would like to share?
- (d) Why did you decide to transition out of the military?
- (e) Did you plan on going into college right out of the military? (why?)
- (f) Why did you choose this university?
- (g) Why did you choose your major?
- (h) Why did you decide to enroll in engineering over a different major?
- (i) Is there anything else that you would like to add?
- (j) Do you have any questions for me?

B.2 Interview 2: Success

1. Inform student that I will begin recording the session.
2. Start Interview
 - (a) Present journey maps from Nyquist et al. (1999) and Meyer & Marx (2014) to illustrate journey mapping. Think of time through your undergraduate engineering experience that you had challenges that you overcame to be successful. It can be anything, personal or academic or both. Using a blank piece of paper and a pencil or pen (black and white), draw a picture depicting your experience highlighting a time when you were successful. Start at the events that led up to the experience and describe any challenges or milestones you experienced along the way. You are encouraged to be creative. This exercise is called a journey map and is a way of representing a story graphically. There is no right or wrong way to do this. Every drawing will be unique. I provide several examples below of other students' journey through undergrad or graduate school. We will discuss yours in our next interview, so if there are details that you cannot draw, but you can talk about, that will be totally fine.

- (b) Explain what you just drew.
- (c) Why did you connect the things together like that?
- (d) Why did you focus on this particular time that you were successful? Was this time different than another time?
- (e) What do you think it means to be successful in your engineering program?
- (f) What do your non-military peers think it means to be successful in their engineering programs?
- (g) Switching gears, can you describe a time that you felt successful when in the military?
- (h) What support systems are in place within your community at this university?
- (i) Have you engaged with any of the support systems?
- (j) Is there anything else that you would like to add?
- (k) Do you have any questions for me?

B.3 Interview 3: Member Checking

1. Inform student that I will begin recording the session.
2. Ask if there was anything they remembered that may be important before we get started.
3. Go line by line through the narrative, either me reading it or them reading it (whichever they feel most comfortable with) to ensure that we don't miss anything. Let the participant know that this is the time to:
 - (a) make corrections
 - (b) add clarifications
 - (c) remove anything that they do not want included

This will be done on a privately shared document that they can actively edit in real time.

4. Ask again if there was anything they remembered that may be important before we finish the interview.
5. Is there anything that you think we should include in the document that is not there?
6. Is there anything that you would like removed from the document, for any reason?
7. Do you have any questions for me?

B.4 Supplement

Participants were sent the below email and responses were incorporated into their narratives:

I was going through the transcripts of the interviews and realized that I need a bit more clarification on a few things, specifically how you define success. Can you please answer the questions below, as detailed as possible? You don't have to use the prompts, but I have provided them as a starting point. Thanks!

Please provide a description and example of how you would define success.

I define success as...

and

An example of a time when I was successful was...

Please connect your definition of success with your military career.

For example, in the military I...

or

My definition of success is related to my military experience because I . . .

Please connect your definition of success with your academic career.

For example, when at university I . . .

or

My definition of success is related to my university experience because
I . . .

C. CODE FOR QUANTITATIVE STUDY

```
rm(list=ls())
#work_dir1<- "X:/data/SUCCESS_Data"
input_filenameSurvey<- "X:/data/SUCCESS_Data/SUCCESS_CrossInstitutionalMaster_20200512.RData"
#setwd(work_dir1)

#Brings in the survey data
load(input_filenameSurvey)

dfENG<-SUCCESS_All
#Let's keep only the engineering students in the sample.
dfENG$Q1<-as.integer(as.character(dfENG$Q1))
dfENG$Q1[dfENG$Q1==24]<-NA
dfENG$Q1[dfENG$Q1==22]<-NA
dfENG$Q1[dfENG$Q1==8]<-NA
dfENG<-dfENG[!is.na(dfENG$Q1),]

#Veteran demographic question numerical response
vetStat<-as.integer(as.character(dfENG$Q44))

#Veteran demographic question write-in response
vetStat7<-ifelse(is.na(dfENG$Q44_7.TEXT),"-",dfENG$Q44_7.TEXT)

#Shows responses to veteran status
table(vetStat)

#Shows responses to veteran status fill in the blank
unique(vetStat7)

#Sets veteran status to false when "Not a veteran" or "ROTC" or "Dependent"
isVet<-!(vetStat==1 | vetStat == 4 | is.na(vetStat) | vetStat7=="Dependent")
table(isVet,useNA = "always")

#Notes the number of each veteran status
vetTots<-c(0,0,0,0,0,0,0)
vetType<-c("Not_Vet","Active_Duty","Reservist","ROTC","National_Guard","Recent_Sep","Vet_Other")
for(vetNum in 1:7){
  vetTots[vetNum] <- sum(ifelse(as.numeric(grep(as.character(vetNum),as.character(vetStat),value = TRUE))>0,1,0),na.rm = TRUE)}
as.data.frame(cbind(vetType,vetTots))
sum(vetTots)

#Number of vets in each institution
table(dfENG$school[isVet])

#DEMOGRAPHICS

#This grabs anyone who selected a gender, ignoring if they selected only 1 gender or if they selected multiple
Fg<-ifelse(grepl(1,dfENG$Q45),1,0) #Female
Cg<-ifelse(grepl(2,dfENG$Q45),1,0) #Cisgender
Mg<-ifelse(grepl(3,dfENG$Q45),1,0) #Male
Tg<-ifelse(grepl(4,dfENG$Q45),1,0) #Transgender
```

```

Ag<-ifelse(grepl(5,dfENG$Q45),1,0) #Agender
Gg<-ifelse(grepl(6,dfENG$Q45),1,0) #Genderqueer
Pg<-ifelse(grepl(7,dfENG$Q45),1,0) #I prefer to identify as

AI<-ifelse(grepl(1,dfENG$Q42),1,0) #"American Indian or Alaska Native"
AS<-ifelse(grepl(2,dfENG$Q42),1,0) #"Asian"
AA<-ifelse(grepl(3,dfENG$Q42),1,0) #"Black or African American"
HL<-ifelse(grepl(4,dfENG$Q42),1,0) #"Hispanic, Latino, or Spanish origin"
ME<-ifelse(grepl(5,dfENG$Q42),1,0) #"Middle Eastern or North African"
NH<-ifelse(grepl(6,dfENG$Q42),1,0) #"Native Hawaiian or Other Pacific Islander"
WH<-ifelse(grepl(7,dfENG$Q42),1,0) #"White"
PI<-ifelse(grepl(8,dfENG$Q42),1,0) #"I prefer to identify as"

dfDem<-as.data.frame(cbind(Fg,Cg,Mg,Tg,Ag,Gg,Pg,AI,AS,AA,HL,ME,NH,WH,PI))
colSums(dfDem[isVet==1,]) #Vet Demographics
round(colSums(dfDem[isVet==1,])/sum(isVet)*100,2) #Vet Demographics
colSums(dfDem[isVet==0,]) #Vet Demographics
round(colSums(dfDem[isVet==0,])/(length(isVet)-sum(isVet))*100,2) #Vet Demographics

dfDem2<-as.data.frame(cbind(Mg,HL,WH)) #Only included the demographics where there are greater than 10 in a bucket
colSums(dfDem2[isVet==1,])
colSums(dfDem2[isVet==0,])

gendTab<-table(dfDem2$Mg,isVet)
raceHLTab<-table(dfDem2$HL,isVet)
raceWHTab<-table(dfDem2$WH,isVet)

rownames(gendTab)<-c("Not-male","Male")
rownames(raceHLTab)<-c("Not-HL","HL")
rownames(raceWHTab)<-c("Not-WH","White")

csMg<-chisq.test(gendTab) #X-squared = 18.683, df = 1, p-value = 1.543e-05
csHL<-chisq.test(raceHLTab) #X-squared = 4.0547, df = 1, p-value = 0.04405
csWH<-chisq.test(raceWHTab) #X-squared = 2.0688, df = 1, p-value = 0.1503

round(p.adjust(p = c(csMg$p.value,csHL$p.value,csWH$p.value) ,method = "fdr"),3)

dfDem2a<-as.data.frame(cbind(vet = colSums(dfDem2[isVet==1,]), nonVet = colSums(dfDem2[isVet==0,])))

chiSqDem<-chisq.test(dfDem2a)
chiSqDem # X-squared = 6.7737, df = 2, p-value = 0.03382

library(corrplot)
library(lsr)
corrplot(chiSqDem$residuals, is.cor = FALSE)
contrib <- 100*chiSqDem$residuals^2/chiSqDem$statistic
round(contrib, 3)
corrplot(contrib, is.cor = FALSE)

lsr::cramersV(dfDem2a)

#dataframe for group comparisons
df2<-as.data.frame(cbind(bigN=dfENG$bigN,bigE=dfENG$bigE,bigA=dfENG$bigA,bigC=dfENG$bigC,bigO=dfENG$bigO,
```

```

gritCI=dfENG$gritCI,engIDrec=dfENG$engIDrec,engIDint=dfENG$engIDint,
mindset=dfENG$mindset,mindfull=dfENG$mindfull,meaningpurp=dfENG$meaningpurp,
belong=dfENG$belong,gratitude=dfENG$gratitude,
motExpeng=dfENG$motExpeng,motConeng=dfENG$motConeng,motInsteng=dfENG$motInsteng,
motValeng=dfENG$motValeng,motPFeng=dfENG$motPFeng,TestAnx=dfENG$TestAnx,
TimeSE=dfENG$TimeSE,SocialSupp=dfENG$SocialSupp,EmpathFacUnd=dfENG$EmpathFacUnd,
SelfConImp=dfENG$SelfConImp,stressFrustr=dfENG$stressFrustr,stressConflict=dfENG$stressConflict,
stressChanges=dfENG$stressChanges,stressReac=dfENG$stressReac,stressSupp=dfENG$stressSupp,
isVet,UID=dfENG$UID),stringsAsFactors = FALSE)

df2[1:28]<-apply(X = df2[1:28], MARGIN = 2, FUN = function(x){as.double(as.character(x))})
df2$isVet<-isVet
df2$UID<-dfENG$UID
#Test for normality
lapply(df2[1:28],shapiro.test) # all normal with p < 0.1

#Test for multivariate normality
library(rstatix)
mshapiro_test(df2[1:28]) #multivariate normal
#corrplot.mixed(df2[1:28])

#Test for multicolliniarity
corMatrixNCA<-cor_mat(df2[1:28])
ifelse(corMatrixNCA>=0.75,"TRUE",0) #All correlations less than 0.75

# Test for homogeneity of variance
library(car)

fligner.test(bigN + bigE + bigA + bigC + bigO + gritCI + engIDrec + engIDint + mindset + mindfull + meaningpurp +
  belong + gratitude + motExpeng + motConeng + motInsteng + motValeng + motPFeng + TestAnx +
  TimeSE + SocialSupp + EmpathFacUnd + SelfConImp + stressFrustr + stressConflict +
  stressChanges + stressReac + stressSupp ~ isVet,data = df2)
# Fligner-Killeen:med chi-squared = 0.46105, df = 1, p-value = 0.4971
# Variances are homogenous

# Test for homogeneity of covariance
box_m(df2[,1:28],df2[,29])
#523. 0.0000770 406 Box's M-test for Homogeneity of Covariance Matrices
#Test is significant, therefore, violates the assumption of homogeneity of covariance. Because the groups are unbalanced, will use Pillai's
  multivariate statistic for
#analysing manova results.

res.man <- manova(cbind(bigN, bigE, bigA, bigC, bigO, gritCI, engIDrec, engIDint, mindset, mindfull, meaningpurp,
  belong, gratitude, motExpeng, motConeng, motInsteng, motValeng, motPFeng, TestAnx,
  TimeSE, SocialSupp, EmpathFacUnd, SelfConImp, stressFrustr, stressConflict,
  stressChanges, stressReac, stressSupp) ~ isVet,data = df2)

q<-summary.aov(res.man)
rName<-colnames(df2[1:28])

manRes<-as.data.frame(cbind(rName=rName,Mvet=rName,Svet=rName,Mnonvet=rName,Snonvet=rName,p=rName,f=rName, d
  =rName))

library(effsize)

for (i in 1:28){
  manRes$rName[i]<-colnames(df2)[i]
  manRes$Mvet[i]<-round(mean(df2[isVet==1,i]),2)
  manRes$Mnonvet[i]<-round(mean(df2[isVet==0,i]),2)
  manRes$Svet[i]<-round(sd(df2[isVet==1,i]),2)

```

```

manRes$Snonvet[i] <- round(sd(df2[isVet==0,i]),2)
manRes$p[i] <- -q[[i]]$Pr(>F)[1]
manRes$f[i] <- round(q[[i]]$F value[1],3)
manRes$d[i] <- round(cohen.d(d = cbind(df2[,i]),f = as.factor(isVet))$estimate,2)
}

manRes$pAdj <- round(p.adjust(manRes$p,method = "fdr"),3) #help control for type 1 error without being too restrictive
manRes$p <- round(as.numeric(manRes$p),3)
manRes

summary.manova(res.man)
# Df Pillai approx F num Df den Df Pr(>F)
#isVet 1 0.031205 2.6574 28 2310 5.674e-06 ***

##### Individual Profiles #####
load("Vets.RData") #This is a compilation from several different survey runs that the 5 participants in the qualitative study took
dfVet5 <- vetOUTmattStudy[,1:28]
dfVet5$isVet <- c(TRUE,TRUE,TRUE,TRUE,TRUE)
dfVet5$UID <- vetOUTmattStudy$UID
dfVet5 <- as.data.frame(dfVet5)

#### Vet participant UIDs blinded
davidUID <- "blinded"
digiUID <- "blinded"
jayUID <- "blinded"
ryanUID <- "blinded"
markUID <- "blinded"
#### Vet participant UIDs blinded

t(dfVet5[dfVet5$UID==davidUID,1:28]) - t(df2[df2$UID==davidUID,1:28])
t(dfVet5[dfVet5$UID==jayUID,1:28]) - t(df2[df2$UID==jayUID,1:28])
dfVet3 <- dfVet5[dfVet5$UID!=davidUID & dfVet5$UID!=jayUID,]

df3 <- merge(dfVet3,df2,all=TRUE,by = intersect(names(dfVet3),names(df2)))

df3[,1:28] <- scale(df3[,1:28])

dfVet <- df3[df3$isVet==TRUE,]
dfnoVet <- df3[df3$isVet==FALSE,]

#David
david <- as.data.frame(dfVet[dfVet$UID==davidUID,])

#Jay
jay <- as.data.frame(dfVet[dfVet$UID==jayUID,])

#Ryan
ryan <- as.data.frame(dfVet[dfVet$UID==ryanUID,])

#Digi
digi <- as.data.frame(dfVet[dfVet$UID==digiUID,])

#Mark
mark <- as.data.frame(dfVet[dfVet$UID==markUID,])

##### Plots #####

#Now lets take a look at our new mix where we setup different dataframes for folks solidly in each cluster

```

```

#Clu1ZMeans<-colMeans(clu_dat[class==1,])
#Clu2ZMeans<-colMeans(clu_dat[class==2,])
#Clu3ZMeans<-colMeans(clu_dat[class==3,])
#Clu4ZMeans<-colMeans(clu_dat[class==4,])
#Clu5ZMeans<-colMeans(clu_dat[classMix==5,])

x<-c(1:28)
veTMeans<-as.data.frame(cbind(x=x,y=colMeans(dfVet[,1:28],na.rm = TRUE)))
noVetMeans<-as.data.frame(cbind(x=x,y=colMeans(dfnoVet[,1:28],na.rm = TRUE)))
davidMeans<-as.data.frame(cbind(x=x,y=t(david[1:28])))
markMeans<-as.data.frame(cbind(x=x,y=t(mark[,1:28])))
digiMeans<-as.data.frame(cbind(x=x,y=t(digi[,1:28])))
ryanMeans<-as.data.frame(cbind(x=x,y=t(ryan[,1:28])))
jayMeans<-as.data.frame(cbind(x=x,y=t(jay[,1:28])))

rownames(veTMeans)<-colnames(dfVet[,1:28])
rownames(noVetMeans)<-colnames(dfVet[,1:28])
rownames(davidMeans)<-colnames(dfVet[,1:28])
rownames(markMeans)<-colnames(dfVet[,1:28])
rownames(digiMeans)<-colnames(dfVet[,1:28])
rownames(ryanMeans)<-colnames(dfVet[,1:28])
rownames(jayMeans)<-colnames(dfVet[,1:28])

colnames(davidMeans)<-c("x","y")
colnames(markMeans)<-c("x","y")
colnames(digiMeans)<-c("x","y")
colnames(ryanMeans)<-c("x","y")
colnames(jayMeans)<-c("x","y")

y<-veTMeans$y
laby<-rep("SVEs",length(x))
Adf1<-as.data.frame(cbind(x,y,laby))
Adf1$x<-as.numeric(as.character(Adf1$x))
Adf1$y<-as.numeric(as.character(Adf1$y))

y<-noVetMeans$y
laby<-rep("Non-SVEs",length(x))
Adf2<-as.data.frame(cbind(x,y,laby))
Adf2$x<-as.numeric(as.character(Adf2$x))
Adf2$y<-as.numeric(as.character(Adf2$y))

y<-davidMeans$y
laby<-rep("David",length(x))
Adf3<-as.data.frame(cbind(x,y,laby))
Adf3$x<-as.numeric(as.character(Adf3$x))
Adf3$y<-as.numeric(as.character(Adf3$y))

y<-markMeans$y
laby<-rep("Mark",length(x))
Adf4<-as.data.frame(cbind(x,y,laby))
Adf4$x<-as.numeric(as.character(Adf4$x))
Adf4$y<-as.numeric(as.character(Adf4$y))

y<-digiMeans$y
laby<-rep("Digi",length(x))
Adf5<-as.data.frame(cbind(x,y,laby))
Adf5$x<-as.numeric(as.character(Adf5$x))
Adf5$y<-as.numeric(as.character(Adf5$y))

y<-jayMeans$y
laby<-rep("Jay",length(x))

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Adf6<-as.data.frame(cbind(x,y,laby))
Adf6$x<-as.numeric(as.character(Adf6$x))
Adf6$y<-as.numeric(as.character(Adf6$y))

y<-ryanMeans$y
laby<-rep("Ryan",length(x))
Adf7<-as.data.frame(cbind(x,y,laby))
Adf7$x<-as.numeric(as.character(Adf7$x))
Adf7$y<-as.numeric(as.character(Adf7$y))

dfAll<-rbind(Adf1,Adf2,Adf3,Adf4,Adf5,Adf6,Adf7)
dfAll$x<-as.numeric(as.character(dfAll$x))
dfAll$y<-as.numeric(as.character(dfAll$y))
dfAll$laby<-as.character(dfAll$laby)

#####
xAxlabs<-as.character(c("Neuroticism","Extraversion","Agreeableness","Conscientiousness","Openness",
      "Consistency_of_Int.(Grit)","Recognition_(Eng_ID)","Interest_(Eng_ID)",
      "Mindset","Mindfulness","Meaning_and_Purpose","Belongingness","Gratitude",
      "Expectancy_(FTP)","Connectedness_(FTP)","Instrumentality_(FTP)","Value_(FTP)",
      "Percept._of_Future_(FTP)","Test_Anxiety","Time_Study_Envir.," "Social_Support",
      "Empathetic_Understand.," "Impulsivity_(Self_Cont.)","Frustrations_(Stress)",
      "Conflict_(Stress)","Changes_(Stress)","Reactions_(Stress)","Support_(Stress)"))
xAxlabs2<-as.character(as.numeric(c(1:28))*0)
hj1<-ifelse(Adf1$y<0,1.1,-.2)
hj2<-ifelse(Adf2$y<0,1.1,-.2)
hj3<-ifelse(Adf3$y<0,1.1,-.2)
hj4<-ifelse(Adf4$y<0,1.1,-.2)
hj5<-ifelse(Adf2$y<0,1.1,-.2)
hj6<-ifelse(Adf3$y<0,1.1,-.2)
hj7<-ifelse(Adf4$y<0,1.1,-.2)

SDblackColor<-1

library(ggplot2)
library(ggpubr)

grey_scale4<-grey.colors(n=5,start=0,end=.6)
grey_scale2<-grey.colors(n=2,start=.6,end=.0)
grey_scale4<-c(grey_scale4[1],grey_scale4[3],grey_scale4[2],grey_scale4[5],grey_scale4[4])
plot_shape4<-c(0,1,2,5,4)

Adf1$laby<- as.factor(ifelse(abs(Adf1$y)>=SDblackColor,paste(as.character(Adf1$laby),"Big",sep = " "),as.character(
  Adf1$laby)))
plt1<-ggplot(data = Adf1, aes(x=x,y=y,colour=laby,group=laby,fill=laby))+
  geom_col()+
  geom_vline(xintercept=1, linetype="dashed", color = "grey")+
  geom_vline(xintercept=2, linetype="dashed", color = "grey")+
  geom_vline(xintercept=3, linetype="dashed", color = "grey")+
  geom_vline(xintercept=4, linetype="dashed", color = "grey")+
  geom_vline(xintercept=5, linetype="dashed", color = "grey")+
  geom_vline(xintercept=6, linetype="dashed", color = "grey")+
  geom_vline(xintercept=7, linetype="dashed", color = "grey")+
  geom_vline(xintercept=8, linetype="dashed", color = "grey")+
  geom_vline(xintercept=9, linetype="dashed", color = "grey")+
  geom_vline(xintercept=10, linetype="dashed", color = "grey")+
  geom_vline(xintercept=11, linetype="dashed", color = "grey")+

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geom_vline(xintercept=12, linetype="dashed", color = "grey")+
geom_vline(xintercept=13, linetype="dashed", color = "grey")+
geom_vline(xintercept=14, linetype="dashed", color = "grey")+
geom_vline(xintercept=15, linetype="dashed", color = "grey")+
geom_vline(xintercept=16, linetype="dashed", color = "grey")+
geom_vline(xintercept=17, linetype="dashed", color = "grey")+
geom_vline(xintercept=18, linetype="dashed", color = "grey")+
geom_vline(xintercept=19, linetype="dashed", color = "grey")+
geom_vline(xintercept=20, linetype="dashed", color = "grey")+
geom_vline(xintercept=21, linetype="dashed", color = "grey")+
geom_vline(xintercept=22, linetype="dashed", color = "grey")+
geom_vline(xintercept=23, linetype="dashed", color = "grey")+
geom_vline(xintercept=24, linetype="dashed", color = "grey")+
geom_vline(xintercept=25, linetype="dashed", color = "grey")+
geom_vline(xintercept=26, linetype="dashed", color = "grey")+
geom_vline(xintercept=27, linetype="dashed", color = "grey")+
geom_vline(xintercept=28, linetype="dashed", color = "grey")+
#geom_text(aes(label = cluSigTab3$c1), vjust = .5, hjust = hj1, color = "black")+
theme_classic() +
xlab("") +
ylab("") +
geom_hline(yintercept = 0) +
scale_x_discrete(breaks=1:28,labels=colnames(df2[,1:28])) +
scale_x_continuous(breaks=1:28,labels=xAxlabs2) +
scale_y_continuous(breaks=-2:2) +
coord_cartesian(ylim=c(-4,4)) +
scale_fill_manual(values=grey_scale2)+
scale_color_manual(values = grey_scale2)+
theme(axis.title.x = element_text(color="black",size = 32,face = "bold"),
      axis.text.x = element_text(color="black",size=20,angle = 0,hjust = 0.5,vjust = 0.5),
      axis.title.y = element_blank(),#element_text(color="white",size = 32,face = "bold"),
      plot.title = element_text(color="white",hjust = 0.5),
      panel.background = element_rect(fill="white"),panel.grid = element_line(color = "white"),
      #axis.text.x = element_text(colour="black",size=22,angle = 90,hjust = 1,vjust = 0.5),
      axis.text.y = element_blank(),#element_text(colour="white",size=20,angle = 0),
      axis.line.y = element_blank(),
      axis.ticks.y = element_blank(),
      legend.title = element_blank(),#element_text(colour="black", size = 26, face='bold'),
      legend.text = element_blank(),#element_text(colour="black", size = 22, face='bold'),
      legend.position="none",
      legend.title.align=0.5,
      text=element_text(family="serif")) +
coord_flip(xlim = 1:28.,ylim = -2.5:2.5)
plt1

Adf2$laby<- as.factor(ifelse(abs(Adf2$y)>=SDblackColor,paste(as.character(Adf2$laby),"Big",sep = ""),as.character(Adf2$
laby)))
plt2<-ggplot(data = Adf2, aes(x=x,y=y,colour=laby,group=laby,fill=laby))+
geom_col()+
geom_vline(xintercept=1, linetype="dashed", color = "grey")+
geom_vline(xintercept=2, linetype="dashed", color = "grey")+
geom_vline(xintercept=3, linetype="dashed", color = "grey")+
geom_vline(xintercept=4, linetype="dashed", color = "grey")+
geom_vline(xintercept=5, linetype="dashed", color = "grey")+
geom_vline(xintercept=6, linetype="dashed", color = "grey")+
geom_vline(xintercept=7, linetype="dashed", color = "grey")+
geom_vline(xintercept=8, linetype="dashed", color = "grey")+
geom_vline(xintercept=9, linetype="dashed", color = "grey")+
geom_vline(xintercept=10, linetype="dashed", color = "grey")+

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geom_vline(xintercept=11, linetype="dashed", color = "grey")+
geom_vline(xintercept=12, linetype="dashed", color = "grey")+
geom_vline(xintercept=13, linetype="dashed", color = "grey")+
geom_vline(xintercept=14, linetype="dashed", color = "grey")+
geom_vline(xintercept=15, linetype="dashed", color = "grey")+
geom_vline(xintercept=16, linetype="dashed", color = "grey")+
geom_vline(xintercept=17, linetype="dashed", color = "grey")+
geom_vline(xintercept=18, linetype="dashed", color = "grey")+
geom_vline(xintercept=19, linetype="dashed", color = "grey")+
geom_vline(xintercept=20, linetype="dashed", color = "grey")+
geom_vline(xintercept=21, linetype="dashed", color = "grey")+
geom_vline(xintercept=22, linetype="dashed", color = "grey")+
geom_vline(xintercept=23, linetype="dashed", color = "grey")+
geom_vline(xintercept=24, linetype="dashed", color = "grey")+
geom_vline(xintercept=25, linetype="dashed", color = "grey")+
geom_vline(xintercept=26, linetype="dashed", color = "grey")+
geom_vline(xintercept=27, linetype="dashed", color = "grey")+
geom_vline(xintercept=28, linetype="dashed", color = "grey")+
#geom_text(aes(label = cluSigTab3$c1), vjust = .5, hjust = hj1, color = "black")+
theme_classic() +
xlab("") +
ylab("") +
geom_hline(yintercept = 0) +
scale_x_discrete(breaks=1:28,labels=colnames(df2[,1:28])) +
scale_x_continuous(breaks=1:28,labels=xAxlabs2) +
scale_y_continuous(breaks=-2:2) +
coord_cartesian(ylim=c(-4,4)) +
scale_fill_manual(values=grey_scale2)+
scale_color_manual(values = grey_scale2)+
theme(axis.title.x = element_text(color="black",size = 32,face = "bold"),
      axis.text.x = element_text(color="black",size=20,angle = 0,hjust = 0.5,vjust = 0.5),
      axis.title.y = element_blank(),#element_text(color="white",size = 32,face = "bold"),
      plot.title = element_text(color="white",hjust = 0.5),
      panel.background = element_rect(fill="white"),panel.grid = element_line(color = "white"),
      #axis.text.x = element_text(colour="black",size=22,angle = 90,hjust = 1,vjust = 0.5),
      axis.text.y = element_blank(),#element_text(colour="white",size=20,angle = 0),
      axis.line.y = element_blank(),
      axis.ticks.y = element_blank(),
      legend.title = element_blank(),#element_text(colour="black", size = 26, face='bold'),
      legend.text = element_blank(),#element_text(colour="black", size = 22, face='bold'),
      legend.position="none",
      legend.title.align=0.5,
      text=element_text(family="serif")) +
coord_flip(xlim = 1:28,ylim = -2.5:2.5)
plt2

Adf3$laby<- as.factor(ifelse(abs(Adf3$y)>=SDblackColor,paste(as.character(Adf3$laby)," Big",sep = ""),as.character(Adf3$
laby)))
plt3<-ggplot(data = Adf3, aes(x=x,y=y,colour=laby,group=laby,fill=laby))+
geom_col()+
geom_vline(xintercept=1, linetype="dashed", color = "grey")+
geom_vline(xintercept=2, linetype="dashed", color = "grey")+
geom_vline(xintercept=3, linetype="dashed", color = "grey")+
geom_vline(xintercept=4, linetype="dashed", color = "grey")+
geom_vline(xintercept=5, linetype="dashed", color = "grey")+
geom_vline(xintercept=6, linetype="dashed", color = "grey")+
geom_vline(xintercept=7, linetype="dashed", color = "grey")+
geom_vline(xintercept=8, linetype="dashed", color = "grey")+
geom_vline(xintercept=9, linetype="dashed", color = "grey")+

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geom_vline(xintercept=10, linetype="dashed", color = "grey")+
geom_vline(xintercept=11, linetype="dashed", color = "grey")+
geom_vline(xintercept=12, linetype="dashed", color = "grey")+
geom_vline(xintercept=13, linetype="dashed", color = "grey")+
geom_vline(xintercept=14, linetype="dashed", color = "grey")+
geom_vline(xintercept=15, linetype="dashed", color = "grey")+
geom_vline(xintercept=16, linetype="dashed", color = "grey")+
geom_vline(xintercept=17, linetype="dashed", color = "grey")+
geom_vline(xintercept=18, linetype="dashed", color = "grey")+
geom_vline(xintercept=19, linetype="dashed", color = "grey")+
geom_vline(xintercept=20, linetype="dashed", color = "grey")+
geom_vline(xintercept=21, linetype="dashed", color = "grey")+
geom_vline(xintercept=22, linetype="dashed", color = "grey")+
geom_vline(xintercept=23, linetype="dashed", color = "grey")+
geom_vline(xintercept=24, linetype="dashed", color = "grey")+
geom_vline(xintercept=25, linetype="dashed", color = "grey")+
geom_vline(xintercept=26, linetype="dashed", color = "grey")+
geom_vline(xintercept=27, linetype="dashed", color = "grey")+
geom_vline(xintercept=28, linetype="dashed", color = "grey")+
#geom_text(aes(label = cluSigTab3$c1), vjust = .5, hjust = hj1, color = "black")+
theme_classic() +
xlab("") +
ylab("") +
geom_hline(yintercept = 0) +
scale_x_discrete(breaks=1:28,labels=colnames(df2[,1:28])) +
scale_x_continuous(breaks=1:28,labels=xAxlabs2) +
scale_y_continuous(breaks=-2:2) +
coord_cartesian(ylim=c(-4,4)) +
scale_fill_manual(values=grey_scale2)+
scale_color_manual(values = grey_scale2)+
theme(axis.title.x = element_text(color="black",size = 32,face = "bold"),
      axis.text.x = element_text(color="black",size=20,angle = 0,hjust = 0.5,vjust = 0.5),
      axis.title.y = element_blank(),#element_text(color="white",size = 32,face = "bold"),
      plot.title = element_text(color="white",hjust = 0.5),
      panel.background = element_rect(fill="white"),panel.grid = element_line(color = "white"),
      #axis.text.x = element_text(colour="black",size=22,angle = 90,hjust = 1,vjust = 0.5),
      axis.text.y = element_blank(),#element_text(colour="white",size=20,angle = 0),
      axis.line.y = element_blank(),
      axis.ticks.y = element_blank(),
      legend.title = element_blank(),#element_text(colour="black", size = 26, face='bold'),
      legend.text = element_blank(),#element_text(colour="black", size = 22, face='bold'),
      legend.position="none",
      legend.title.align=0.5,
      text=element_text(family="serif")) +
coord_flip(xlim = 1:28,ylim = -2.5:2.5)
plt3

Adf4$laby<- as.factor(ifelse(abs(Adf4$y)>=SDblackColor,paste(as.character(Adf4$laby),"Big",sep = ""),as.character(Adf4$
laby)))
plt4<-ggplot(data = Adf4, aes(x=x,y=y,colour=laby,group=laby,fill=laby))+
geom_col()+
geom_vline(xintercept=1, linetype="dashed", color = "grey")+
geom_vline(xintercept=2, linetype="dashed", color = "grey")+
geom_vline(xintercept=3, linetype="dashed", color = "grey")+
geom_vline(xintercept=4, linetype="dashed", color = "grey")+
geom_vline(xintercept=5, linetype="dashed", color = "grey")+
geom_vline(xintercept=6, linetype="dashed", color = "grey")+
geom_vline(xintercept=7, linetype="dashed", color = "grey")+
geom_vline(xintercept=8, linetype="dashed", color = "grey")+

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geom_vline(xintercept=9, linetype="dashed", color = "grey")+
geom_vline(xintercept=10, linetype="dashed", color = "grey")+
geom_vline(xintercept=11, linetype="dashed", color = "grey")+
geom_vline(xintercept=12, linetype="dashed", color = "grey")+
geom_vline(xintercept=13, linetype="dashed", color = "grey")+
geom_vline(xintercept=14, linetype="dashed", color = "grey")+
geom_vline(xintercept=15, linetype="dashed", color = "grey")+
geom_vline(xintercept=16, linetype="dashed", color = "grey")+
geom_vline(xintercept=17, linetype="dashed", color = "grey")+
geom_vline(xintercept=18, linetype="dashed", color = "grey")+
geom_vline(xintercept=19, linetype="dashed", color = "grey")+
geom_vline(xintercept=20, linetype="dashed", color = "grey")+
geom_vline(xintercept=21, linetype="dashed", color = "grey")+
geom_vline(xintercept=22, linetype="dashed", color = "grey")+
geom_vline(xintercept=23, linetype="dashed", color = "grey")+
geom_vline(xintercept=24, linetype="dashed", color = "grey")+
geom_vline(xintercept=25, linetype="dashed", color = "grey")+
geom_vline(xintercept=26, linetype="dashed", color = "grey")+
geom_vline(xintercept=27, linetype="dashed", color = "grey")+
geom_vline(xintercept=28, linetype="dashed", color = "grey")+
#geom_text(aes(label = cluSigTab3$c1), vjust = .5, hjust = hj1, color = "black")+
theme_classic() +
xlab("") +
ylab("") +
geom_hline(yintercept = 0) +
scale_x_discrete(breaks=1:28,labels=colnames(df2[,1:28])) +
scale_x_continuous(breaks=1:28,labels=xAXlabs2) +
scale_y_continuous(breaks=-2:2) +
coord_cartesian(ylim=c(-4,4)) +
scale_fill_manual(values=grey_scale2)+
scale_color_manual(values = grey_scale2)+
theme(axis.title.x = element_text(color="black",size = 32,face = "bold"),
      axis.text.x = element_text(color="black",size=20,angle = 0,hjust = 0.5,vjust = 0.5),
      axis.title.y = element_blank(),#element_text(color="white",size = 32,face = "bold"),
      plot.title = element_text(color="white",hjust = 0.5),
      panel.background = element_rect(fill="white"),panel.grid = element_line(color = "white"),
      #axis.text.x = element_text(colour="black",size=22,angle = 90,hjust = 1,vjust = 0.5),
      axis.text.y = element_blank(),#element_text(colour="white",size=20,angle = 0),
      axis.line.y = element_blank(),
      axis.ticks.y = element_blank(),
      legend.title = element_blank(),#element_text(colour="black", size = 26, face='bold'),
      legend.text = element_blank(),#element_text(colour="black", size = 22, face='bold'),
      legend.position="none",
      legend.title.align=0.5,
      text=element_text(family="serif")) +
coord_flip(xlim = 1:28.,ylim = -2.5:2.5)
plt4

Adf5$laby<- as.factor(ifelse(abs(Adf5$y)>=SDblackColor,paste(as.character(Adf5$laby),"Big",sep = ""),as.character(Adf5$
laby)))
plt5<-ggplot(data = Adf5, aes(x=x,y=y,colour=laby,group=laby,fill=laby))+
geom_col()+
geom_vline(xintercept=1, linetype="dashed", color = "grey")+
geom_vline(xintercept=2, linetype="dashed", color = "grey")+
geom_vline(xintercept=3, linetype="dashed", color = "grey")+
geom_vline(xintercept=4, linetype="dashed", color = "grey")+
geom_vline(xintercept=5, linetype="dashed", color = "grey")+
geom_vline(xintercept=6, linetype="dashed", color = "grey")+
geom_vline(xintercept=7, linetype="dashed", color = "grey")+

```

```

geom_vline(xintercept=8, linetype="dashed", color = "grey")+
geom_vline(xintercept=9, linetype="dashed", color = "grey")+
geom_vline(xintercept=10, linetype="dashed", color = "grey")+
geom_vline(xintercept=11, linetype="dashed", color = "grey")+
geom_vline(xintercept=12, linetype="dashed", color = "grey")+
geom_vline(xintercept=13, linetype="dashed", color = "grey")+
geom_vline(xintercept=14, linetype="dashed", color = "grey")+
geom_vline(xintercept=15, linetype="dashed", color = "grey")+
geom_vline(xintercept=16, linetype="dashed", color = "grey")+
geom_vline(xintercept=17, linetype="dashed", color = "grey")+
geom_vline(xintercept=18, linetype="dashed", color = "grey")+
geom_vline(xintercept=19, linetype="dashed", color = "grey")+
geom_vline(xintercept=20, linetype="dashed", color = "grey")+
geom_vline(xintercept=21, linetype="dashed", color = "grey")+
geom_vline(xintercept=22, linetype="dashed", color = "grey")+
geom_vline(xintercept=23, linetype="dashed", color = "grey")+
geom_vline(xintercept=24, linetype="dashed", color = "grey")+
geom_vline(xintercept=25, linetype="dashed", color = "grey")+
geom_vline(xintercept=26, linetype="dashed", color = "grey")+
geom_vline(xintercept=27, linetype="dashed", color = "grey")+
geom_vline(xintercept=28, linetype="dashed", color = "grey")+
#geom_text(aes(label = cluSigTab3$c1), vjust = .5, hjust = hj1, color = "black")+
theme_classic() +
xlab("") +
ylab("") +
geom_hline(yintercept = 0) +
scale_x_discrete(breaks=1:28,labels=colnames(df2[,1:28])) +
scale_x_continuous(breaks=1:28,labels=xAxlabs2) +
scale_y_continuous(breaks=-2:2) +
coord_cartesian(ylim=c(-4,4)) +
scale_fill_manual(values=grey_scale2)+
scale_color_manual(values = grey_scale2)+
theme(axis.title.x = element_text(color="black",size = 32,face = "bold"),
      axis.text.x = element_text(color="black",size=20,angle = 0,hjust = 0.5,vjust = 0.5),
      axis.title.y = element_blank(),#element_text(color="white",size = 32,face = "bold"),
      plot.title = element_text(color="white",hjust = 0.5),
      panel.background = element_rect(fill="white"),panel.grid = element_line(color = "white"),
      #axis.text.x = element_text(colour="black",size=22,angle = 90,hjust = 1,vjust = 0.5),
      axis.text.y = element_blank(),#element_text(colour="white",size=20,angle = 0),
      axis.line.y = element_blank(),
      axis.ticks.y = element_blank(),
      legend.title = element_blank(),#element_text(colour="black", size = 26, face='bold'),
      legend.text = element_blank(),#element_text(colour="black", size = 22, face='bold'),
      legend.position="none",
      legend.title.align=0.5,
      text=element_text(family="serif")) +
coord_flip(xlim = 1:28.,ylim = -2.5:2.5)
plt5

Adf6$laby<- as.factor(ifelse(abs(Adf6$y)>=SDblackColor,paste(as.character(Adf6$laby),"Big",sep = "" ),as.character(Adf6$
laby)))
plt6<-ggplot(data = Adf6, aes(x=x,y=y,colour=laby,group=laby,fill=laby))+
geom_col()+
geom_vline(xintercept=1, linetype="dashed", color = "grey")+
geom_vline(xintercept=2, linetype="dashed", color = "grey")+
geom_vline(xintercept=3, linetype="dashed", color = "grey")+
geom_vline(xintercept=4, linetype="dashed", color = "grey")+
geom_vline(xintercept=5, linetype="dashed", color = "grey")+
geom_vline(xintercept=6, linetype="dashed", color = "grey")+

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geom_vline(xintercept=7, linetype="dashed", color = "grey")+
geom_vline(xintercept=8, linetype="dashed", color = "grey")+
geom_vline(xintercept=9, linetype="dashed", color = "grey")+
geom_vline(xintercept=10, linetype="dashed", color = "grey")+
geom_vline(xintercept=11, linetype="dashed", color = "grey")+
geom_vline(xintercept=12, linetype="dashed", color = "grey")+
geom_vline(xintercept=13, linetype="dashed", color = "grey")+
geom_vline(xintercept=14, linetype="dashed", color = "grey")+
geom_vline(xintercept=15, linetype="dashed", color = "grey")+
geom_vline(xintercept=16, linetype="dashed", color = "grey")+
geom_vline(xintercept=17, linetype="dashed", color = "grey")+
geom_vline(xintercept=18, linetype="dashed", color = "grey")+
geom_vline(xintercept=19, linetype="dashed", color = "grey")+
geom_vline(xintercept=20, linetype="dashed", color = "grey")+
geom_vline(xintercept=21, linetype="dashed", color = "grey")+
geom_vline(xintercept=22, linetype="dashed", color = "grey")+
geom_vline(xintercept=23, linetype="dashed", color = "grey")+
geom_vline(xintercept=24, linetype="dashed", color = "grey")+
geom_vline(xintercept=25, linetype="dashed", color = "grey")+
geom_vline(xintercept=26, linetype="dashed", color = "grey")+
geom_vline(xintercept=27, linetype="dashed", color = "grey")+
geom_vline(xintercept=28, linetype="dashed", color = "grey")+
#geom_text(aes(label = cluSigTab3$c1), vjust = .5, hjust = hj1, color = "black")+
theme_classic() +
xlab("") +
ylab("") +
geom_hline(yintercept = 0) +
scale_x_discrete(breaks=1:28,labels=colnames(df2[,1:28])) +
scale_x_continuous(breaks=1:28,labels=xAxlabs2) +
scale_y_continuous(breaks=-2:2) +
coord_cartesian(ylim=c(-4,4)) +
scale_fill_manual(values=grey_scale2)+
scale_color_manual(values = grey_scale2)+
theme(axis.title.x = element_text(color="black",size = 32,face = "bold"),
      axis.text.x = element_text(color="black",size=20,angle = 0,hjust = 0.5,vjust = 0.5),
      axis.title.y = element_blank(),#element_text(color="white",size = 32,face = "bold"),
      plot.title = element_text(color="white",hjust = 0.5),
      panel.background = element_rect(fill="white"),panel.grid = element_line(color = "white"),
      #axis.text.x = element_text(colour="black",size=22,angle = 90,hjust = 1,vjust = 0.5),
      axis.text.y = element_blank(),#element_text(colour="white",size=20,angle = 0),
      axis.line.y = element_blank(),
      axis.ticks.y = element_blank(),
      legend.title = element_blank(),#element_text(colour="black", size = 26, face='bold'),
      legend.text = element_blank(),#element_text(colour="black", size = 22, face='bold'),
      legend.position="none",
      legend.title.align=0.5,
      text=element_text(family="serif")) +
coord_flip(xlim = 1:28.,ylim = -2.5:2.5)
plt6

Adf7$laby<- as.factor(ifelse(abs(Adf7$y)>=SDblackColor,paste(as.character(Adf7$laby),"Big",sep = "" ),as.character(Adf7$
laby)))
plt7<-ggplot(data = Adf7, aes(x=x,y=y,colour=laby,group=laby,fill=laby))+
geom_col()+
geom_vline(xintercept=1, linetype="dashed", color = "grey")+
geom_vline(xintercept=2, linetype="dashed", color = "grey")+
geom_vline(xintercept=3, linetype="dashed", color = "grey")+
geom_vline(xintercept=4, linetype="dashed", color = "grey")+
geom_vline(xintercept=5, linetype="dashed", color = "grey")+

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geom_vline(xintercept=6, linetype="dashed", color = "grey")+
geom_vline(xintercept=7, linetype="dashed", color = "grey")+
geom_vline(xintercept=8, linetype="dashed", color = "grey")+
geom_vline(xintercept=9, linetype="dashed", color = "grey")+
geom_vline(xintercept=10, linetype="dashed", color = "grey")+
geom_vline(xintercept=11, linetype="dashed", color = "grey")+
geom_vline(xintercept=12, linetype="dashed", color = "grey")+
geom_vline(xintercept=13, linetype="dashed", color = "grey")+
geom_vline(xintercept=14, linetype="dashed", color = "grey")+
geom_vline(xintercept=15, linetype="dashed", color = "grey")+
geom_vline(xintercept=16, linetype="dashed", color = "grey")+
geom_vline(xintercept=17, linetype="dashed", color = "grey")+
geom_vline(xintercept=18, linetype="dashed", color = "grey")+
geom_vline(xintercept=19, linetype="dashed", color = "grey")+
geom_vline(xintercept=20, linetype="dashed", color = "grey")+
geom_vline(xintercept=21, linetype="dashed", color = "grey")+
geom_vline(xintercept=22, linetype="dashed", color = "grey")+
geom_vline(xintercept=23, linetype="dashed", color = "grey")+
geom_vline(xintercept=24, linetype="dashed", color = "grey")+
geom_vline(xintercept=25, linetype="dashed", color = "grey")+
geom_vline(xintercept=26, linetype="dashed", color = "grey")+
geom_vline(xintercept=27, linetype="dashed", color = "grey")+
geom_vline(xintercept=28, linetype="dashed", color = "grey")+
#geom_text(aes(label = cluSigTab$S1, vjust = .5, hjust = h1, color = "black"))+
theme_classic() +
xlab("") +
ylab("") +
geom_hline(yintercept = 0) +
scale_x_discrete(breaks=1:28,labels=colnames(df2[,1:28])) +
scale_x_continuous(breaks=1:28,labels=xAxlabs2) +
scale_y_continuous(breaks=-2:2) +
coord_cartesian(ylim=c(-4,4)) +
scale_fill_manual(values=grey_scale2)+
scale_color_manual(values = grey_scale2)+
theme(axis.title.x = element_text(color="black",size = 32,face = "bold"),
      axis.text.x = element_text(color="black",size=20,angle = 0,hjust = 0.5,vjust = 0.5),
      axis.title.y = element_blank(),#element_text(color="white",size = 32,face = "bold"),
      plot.title = element_text(color="white",hjust = 0.5),
      panel.background = element_rect(fill="white"),panel.grid = element_line(color = "white"),
      #axis.text.x = element_text(colour="black",size=22,angle = 90,hjust = 1,vjust = 0.5),
      axis.text.y = element_blank(),#element_text(colour="white",size=20,angle = 0),
      axis.line.y = element_blank(),
      axis.ticks.y = element_blank(),
      legend.title = element_blank(),#element_text(colour="black", size = 26, face='bold'),
      legend.text = element_blank(),#element_text(colour="black", size = 22, face='bold'),
      legend.position="none",
      legend.title.align=0.5,
      text=element_text(family="serif")) +
coord_flip(xlim = 1:28,ylim = -2.5:2.5)
plt7

plt0<-ggplot(data = Adf1, aes(x=x,y=y,colour=laby,group=laby,fill=laby))+
  geom_col()+
  theme_classic() +
  xlab("") +
  ylab("") +scale_x_continuous(breaks=1:28,labels=xAxlabs) +
  scale_y_continuous(breaks=-2:2) +
  coord_cartesian(ylim=c(-4,4)) +
  scale_fill_manual(values = as.numeric(grey_scale2)*0)+

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scale_color_manual(values = as.numeric(grey_scale2)*0)+
theme(axis.title.x = element_text(color="white",size = 32,face = "bold"),
      axis.text.x = element_text(size=20,angle = 0,hjust = 0.5,vjust = 0.5),
      axis.title.y = element_text(color="black",size = 32,face = "bold"),
      plot.title = element_text(color="black",hjust = 0.5),
      panel.background = element_rect(fill="white"),panel.grid = element_line(color = "white"),
      #axis.text.x = element_text(colour="black",size=22,angle = 90,hjust = 1,vjust = 0.5),
      axis.text.y = element_text(colour="black",size=20,angle = 0),
      legend.title = element_blank(),#element_text(colour="black", size = 26, face='bold'),
      legend.text = element_blank(),#element_text(colour="black", size = 22, face='bold'),
      axis.line.y = element_blank(),
      axis.line.x = element_blank(),
      legend.position="none",
      legend.title.align=0.5,
      text=element_text(family="serif")) +
coord_flip(xlim = 1:28.,ylim = -.1:1)
plt0

dfEmpty <- data.frame()
pltSpace<-ggplot(dfEmpty) + geom_point() + xlim(0, 1) + ylim(0, .1) +
  theme_classic()+
  theme(axis.title.x = element_blank(),
        axis.text.x = element_blank(),
        axis.title.y = element_blank(),
        plot.title = element_blank(),
        panel.background = element_blank(),
        axis.text.y = element_blank(),
        axis.line.x = element_blank(),
        axis.ticks.x = element_blank(),
        axis.line.y = element_blank(),
        axis.ticks.y = element_blank(),
        legend.title = element_blank(),#element_text(colour="black", size = 26, face='bold'),
        legend.text = element_blank(),#element_text(colour="black", size = 22, face='bold'),
        legend.position="none",
        legend.title.align=0.5,
        text=element_text(family="serif"))
pltSpace

grppltDavid<-ggarrange(pltSpace,pltSpace,pltSpace,pltSpace,plt0,plt1,plt3,plt2,
  labels=c("", "Veterans", "David", "Non-Veterans", "", "", "", ""),
  font.label = list(color="black", size = 24, face='bold',family="serif"),
  label.x = 0.,label.y = .5,
  widths = c(1.0,1,1,1),
  heights = c(.2,1.1),
  nrow = 2,ncol = 4, align = "h",common.legend = TRUE)
grppltDavid

grppltMark<-ggarrange(pltSpace,pltSpace,pltSpace,pltSpace,plt0,plt1,plt4,plt2,
  labels=c("", "Veterans", "Mark", "Non-Veterans", "", "", "", ""),
  font.label = list(color="black", size = 24, face='bold',family="serif"),
  label.x = 0.,label.y = .5,
  widths = c(1.0,1,1,1),
  heights = c(.2,1.1),
  nrow = 2,ncol = 4, align = "h",common.legend = TRUE)
grppltMark

grppltDigi<-ggarrange(pltSpace,pltSpace,pltSpace,pltSpace,plt0,plt1,plt5,plt2,
  labels=c("", "Veterans", "Digi", "Non-Veterans", "", "", "", ""),
  font.label = list(color="black", size = 24, face='bold',family="serif"),

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label.x = 0.,label.y = .5,
widths = c(1.0,1,1,1),
heights = c(.2,1.1),
nrow = 2,ncol = 4, align = "h",common.legend = TRUE)

grppltDigi

grppltJay<-ggarrange(pltSpace,pltSpace,pltSpace,pltSpace,plt0,plt1,plt6,plt2,
  labels=c("", "Veterans", "Jay", "Non-Veterans", "", "", "", ""),
  font.label = list(color="black", size = 24, face='bold',family="serif"),
  label.x = 0.,label.y = .5,
  widths = c(1.0,1,1,1),
  heights = c(.2,1.1),
  nrow = 2,ncol = 4, align = "h",common.legend = TRUE)

grppltJay

grppltRyan<-ggarrange(pltSpace,pltSpace,pltSpace,pltSpace,plt0,plt1,plt7,plt2,
  labels=c("", "Veterans", "Ryan", "Non-Veterans", "", "", "", ""),
  font.label = list(color="black", size = 24, face='bold',family="serif"),
  label.x = 0.,label.y = .5,
  widths = c(1.0,1,1,1),
  heights = c(.2,1.1),
  nrow = 2,ncol = 4, align = "h",common.legend = TRUE)

grppltRyan

save(grppltDavid,grppltDigi,grppltJay,grppltMark,grppltRyan,file = "vetPlots.RData")

```