

Exploring the Intersection of Veteran Status, Age, and Engineering Study

Catherine E. Brawner
Research Triangle Educational Consultants
Raleigh, NC USA
brawnerc@bellsouth.net

Joyce Main
School of Engineering Education
Purdue University
West Lafayette, IN USA
jmain@purdue.edu

Catherine Mobley
Sociology
Clemson University
Clemson, SC USA
camoble@clemson.edu

Michelle M. Camacho / Susan M. Lord
Sociology / Electrical Engineering
University of San Diego
San Diego, CA USA
mcamacho@sandiego.edu / slord@sandiego.edu

Abstract—Student veterans have become an increasing presence in higher education. We seek to understand the role of the military as a pathway into engineering for student veteran engineers as well as investigate the character and content of their educational experiences. The results of seven focus groups with 29 student veterans indicate that the decision to major in engineering is often, but not always, related to their service. Veteran students are often open with faculty about their veteran status, however they are less likely to reveal it to other students. Veterans believe that their status as a veteran is a significant asset in engineering studies but that their age is less so.

Keywords—veteran students; older students; major selection; faculty-student relationships

I. INTRODUCTION¹

The veteran population holds tremendous promise for expanding and diversifying the engineering workforce. As of Spring 2012, more than 523,000 military personnel had received the 2009 Post-9/11 GI Bill higher education benefits [1]. For many young adults, military service is an important gateway to higher education and a pathway to a secure future in the labor market. These benefits are often the primary reason for enlisting [2]. This study of student veterans in engineering seeks to answer three research questions within the context of the student veterans' identities as a veteran and as an older student:

- 1: How does their veteran status impact their decision to study engineering?
- 2: How do their age and veteran status shape their interactions with faculty and other students?
- 3: How do their age and veteran status affect their experiences in studying engineering?

This work is part of a larger study of veteran students in engineering that has been described elsewhere [3-6].

II. LITERATURE REVIEW

The sociological definition of status refers to a particular position that one holds in society (e.g., parent or veteran). Every status is imbued with certain behavioral expectations (or roles) associated with a particular status. Statuses can be either ascribed (e.g., gender, race, age, etc.) or achieved based on the acquisition of knowledge or skills (e.g., occupation). The ongoing negotiation and enactment of particular statuses within the educational context has important implications for student's integration into their major [7]. This is especially the case for student veterans who have had unique experiences that set them apart from traditional college students, other older students, and society in general. We seek to discover what particular statuses are most important to student veterans, either alone or in combination with others, as they progress through their engineering education.

For example, the "veteran" status is generally an invisible status that students can choose to disclose to others or not. However, their status as an older (non-traditional) student is generally more visible [8]. Older transfers in engineering have been found to be more focused and goal oriented, may have practical experience in related fields, and have a general level of maturity that comes with age that their younger classmates often lack [9]. Research indicates that student veteran educational experiences are more similar to non-traditional students than traditional students, due to the fact that they are generally older than traditional students and have also experienced family milestones (e.g., marriage and parenthood) not experienced by traditional students [10]. This paper distinguishes between veteran status and age as components of student veterans' educational experiences in engineering.

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III. METHODS

Focus groups were held with veteran students in engineering at four universities – Clemson, North Carolina State, Purdue, and the University of San Diego. Students were invited to participate in the study by emails sent through various channels on each campus including engineering advisors and faculty, Veterans Administration (VA) certifying officials, and Student Veterans of America chapters. The focus groups were conducted using a semi-structured format related to the research questions of the larger study [6]. In addition to answering the focus group questions, students were asked to place themselves along continuums that related to their statuses as veterans, transfer students, or older students. We asked how those statuses impact their interaction with faculty and other students and whether they find them to be assets or disadvantages in engineering study.

Preliminary analysis included open coding related to the research questions and discussions among the research team. Quotations have been edited for readability and to remove unrelated digressions. To ensure anonymity, participant comments are reported with a participant identification code that includes institution (A, B, C, or D), focus group participant number, and branch of service.

IV. STUDY POPULATION

Seven focus groups were conducted at the four institutions during the 2015-2016 academic year. The 29 participants were overwhelmingly male (n=28) and white (n=26). Sixteen participants were between 26 and 30 years old, with six older and seven younger. Twenty had served in the Navy or Marine Corps and most (n=26) had served for 10 or fewer years. Twelve students were majoring in mechanical engineering; five in electrical/ECE; three in chemical, two each in agricultural/biological, civil, and first-year; and one each in aerospace, industrial, multidisciplinary, and nuclear. Jobs held in the service included: Nuclear Machinist Mate, Nuclear Electronics Mate, Explosive Ordnance Disposal, Integrative Avionics, Rifleman, and Hospital Corpsman.

V. FINDINGS

The early results suggest that respondents' statuses and identities may intersect in complex and unexpected ways to provide them with advantages and/or disadvantages in engineering education. The findings presented here are related to our research questions about choosing engineering, interactions with faculty and other students, and impact of age and veteran status on the study of engineering.

A. Choosing Engineering

a) *Military Influence.* Many participants had jobs in the service, such as nuclear machinist mate and aircraft maintenance, that are directly related to engineering generally and the majors that the students chose.

[I] joined the Air Force and got put with avionics....and electrical engineering just seemed like a logical next step after a background in electronics stuff. So, I think that's why I did electrical. [B22 Air Force]

I'm only mechanical because I was a mechanic in the Navy so I figured it would be the easiest transition. [B11 Navy]

In other cases, the military influence on the choice of major was more indirect where students saw that engineering could help improve certain military processes.

[P]robably when I started working on fabricating some pouches for my gear I realized that I really enjoyed designing things, making applications to improve processes. So that's kind of what first piqued my interest in engineering. [A24 Navy]

Other participants, such as an intelligence analyst and infantry rifleman, chose engineering majors that were completely unrelated to their service. Their decision to major in engineering was much more influenced by job security and earning potential.

I had a much simpler reason for choosing chemical engineering. I went on payscale.com, looked at the top ten highest paid degrees and chose the third one from the top. [B21 Army]

But at the end of the day it's about job security and financial stability. And, engineering is one of those where every year I watch the entry-level salary go up, every year the median salary goes up. There's always a need for engineers of various amounts. And every time I check, you know, top ten most needed jobs in America, mine's on the list. [D12 Marines]

Others found their work in the service to be difficult and lacking intellectual stimulation and chose engineering for the challenge and opportunities associated with the career.

It's not so much of the Navy showing me what I wanted to do, but it was more of what I didn't want to do. And, on our level as a deck seaman ... it was just more physical labor, mind-numbing type of work. And so that pushed me away from it and that's why I wanted to pursue engineering because of the challenge. [A11 Navy]

b) *Other Influences.* A few students, particularly those who did not enter school directly upon separating from the service, chose engineering for reasons more related to advancement at their current jobs rather than anything to do with their military experience. In this way, they are more similar to other older transfer students [9] than to other veteran students in this study.

So, I've been a control software engineer at [Company] for five years, and I love being an engineer. So, when my company told me, "Hey, there's a manager position coming available at one of our sister companies and you're the next in line, but you don't have a degree." So, I'm here to get the degree so I can get the manager position. [D13 Navy]

B. Relationships with Faculty

Students were asked how their veteran status influenced their relationships with engineering faculty. They were asked both whether engineering faculty knew that they were veterans and whether they perceived that faculty treated them better or worse than other students because of their veteran status. More than half of the students reported that most faculty know that they are veterans and all of them reported that they were

treated the same or better than other students because of their veteran status.

a) *Everyone Knows I'm a Veteran.* The majority of students who said that faculty know they are veterans indicated this is because they are proactive about telling them.

They all know for me because I'm still in the Reserves so, you know, there are times where I have to miss a class and things like that so ...I'm not just going to take an absence, I'm going to let them know. [D15 Navy]

I always mention it. I don't believe they have any other any way of knowing... when they ask me to "Tell me about yourself." Then I say, "Well, you know, I'm a little bit older, I'm a veteran,"... so they kind of have an idea where you're coming from with that. [B21 Army]

[E]very time I go to a class within the first week I go to the office of the instructor and I tell them essentially, "I'm a veteran," usually if it's like a science or math discipline I'll tell them that I was a nuclear mechanic and then I always tell them I'm a transfer student. [D23 Navy]

b) *No One Knows I'm a Veteran.* While the majority of students believed that most faculty knew that they were veterans, some (11 of 29) indicated that most faculty do not know. For some, it is because they wish to forge an identity separate from their military identity; others simply do not want to be "that guy" who is vocal about his veteran identity:

I think all of us are probably trying to find our identity outside of the military. I don't know maybe some of these guys are in the Reserves, but I'm completely out and so my life goes on past what I had back there... I don't really care whether they know or not. [A22 Navy]

I don't want to be like, "Hi, I was in the military." I don't want to be that guy, so in trying not to be that guy, nobody's going to ask, "Hey, were you in the military?" So it just kind of becomes that it's not really a subject of conversation. [D13 Navy]

c) *Interactions with Faculty.* These student veterans felt that they were generally treated by faculty the same as or better than other students due to their veteran status. A few specifically highlighted aspects of their veteran status that made them believe that it was their professionalism honed by their time in the service that led faculty to treat them particularly well.

[A]s a simple example, sending emails. I've had to send emails in the military to people in much higher rank than me and there is a protocol and a special way you're supposed to do it...And, [faculty] notice things like that...and in little interactions, they notice that there's a level of maturity and professionalism that so often escapes younger people. [D12 Marines]

More often it was difficult for them to parse out whether this treatment was due to their age or to their veteran status. D12 goes on to describe the intersection of veteran status with age as it relates to interacting with faculty generally. When asked whether he attributed his professionalism to his age or his military experience, he replied:

It's both. Because there are older students here that still don't have that...I've had a couple of professors who ... expect more; they don't expect us to miss deadlines. They don't expect us to have late homework, things like that because we should be better at that. But then they also take into consideration the fact that some of us have families and we have to work and things like that. So, that's more of the older part. And then there's the veteran part where, you know, the professionalism comes into play. [D12 Marines]

C. Relationships with Other Students

Whereas most faculty were aware that veteran students were, in fact, veterans, there was a much wider range of responses as to whether other students knew. Student veterans in the "Seaman to Admiral" (STA-21) program (who are part of ROTC) and those still in the Reserves were more likely to indicate others know that they were serving. For the most part, however, the veteran students preferred to maintain their invisibility, again not wanting to be "that guy."

I'm not one of the persons who really brings up my military history unless it gets mentioned or something like that. C13 Navy

[I]t's just not something I bring up in conversation, nor do I want to...like one of the things I was worried about when I got out of the Army was I didn't want to be that guy that started every story, "Well, when I was in the Army..." I didn't want to be that guy. Just blending in, meeting people...I want to be just another person in the crowd. [B21 Army]

The veterans expressed disdain for some of their classmates when, in their opinion, they show disrespect to the faculty.

[I]t could be a combination of military and being older, but I just feel annoyed by a lot of the attitudes in general. Like at the end of a class, if a teacher is still talking, and there's two or three minutes left in the class, you hear tables and bags and people getting up and walking out. It seems really annoying...it's disrespectful. [B11 Navy]

In engineering classes, these veterans often find themselves called on to lead teams by their peers, even if they do not have any more engineering experience than their classmates. In many cases, they attribute this to being older, rather than to being a veteran, but it may also be related to their presence and professionalism.

[W]henver there's an engineering group and you get assigned for a homework group or something, they naturally seem to gravitate towards: "Well, what do you think we should do?" And you kind of divvy out what you expect everybody to do and then bring it together at the end. [B21 Army]

As far as the classes go, once again my teammates...expect more of me; I'm always the person who records and submits the assignment; so I always have more responsibility on the team. [C12 Multiple Branches]

D. Studying Engineering

Nearly all of the participants indicated that being a veteran was an advantage in engineering. Only three students were even neutral on the matter and none considered being a veteran

a disadvantage. The advantages were principally related to their prior training and practical experience and maturity.

a) Training and Practical Experience. Engineering education has a different focus and approach than the on-the-job training that service members receive; however the veterans often found that their training aided their understanding of engineering concepts.

In Physics II, I understood the basics of how to analyze a DC or AC circuit, the very basics. In chemistry, I understood some basics about water chemistry and acid-base chemistry. And going into thermo, I understood a little bit about cycles and fluid dynamics. I've already looked at Bernoulli's and stuff like that, so it kind of gave me a basic intro to a lot of different things, which I thought was really, really helpful. [B11 Navy]

Higher-level training, such as nuclear power school in the Navy or explosive ordnance disposal (EOD) in the Army and Marine Corps, offered students an introduction to and relevance of many of the more abstract engineering concepts.

I think it's just because of my training that I had through the Navy. ... material that they are going to be talking about in my engineering classes [isn't] brand new. So, I feel like I have that advantage over other students. [B12 Navy]

With the EOD school, they taught us a lot, like the mechanics of the fuses, or the fluid dynamics of explosions, and they taught us a little bit of the chemistry of explosions, and a little bit about electronics. So, there's a lot of technical stuff that is popping back up again in my classes. [D22 Army]

EOD school and other training also taught students problem-solving skills that transferred well into engineering study.

I can definitely say in the EOD field [there's] a lot of complex problem-solving and you have to be creative a lot of the time in the way you do things." [A21 Marines]

The discipline and focus that the students developed while they were serving is also a skill that has stood the students in good stead during their studies. Most of these students treat school like a job and are focused on their schoolwork.

Attention to detail, distilling out crucial information versus stuff you don't really need to know, especially for when you're getting ready for a test is, you know, certainly helpful. And forming those habits of being disciplined in your studies, going to bed early, waking up early, you know, not drinking too much every night, things like that, I mean it has helped. ... that could just be being older but that having military experience certainly helps as well. [B21 Army]

A few also indicated that, perhaps unlike other students, they do not find engineering study to be stressful, compared to their military experience.

I found out I had an exam the night before - I forgot about it, and was I stressed? No. I was like, "Oh, I guess I've just got to study." So I just did a late night study, show up, and boom. I've dealt with so much stress in the military. Like to the point of being sick physically...that, school work? That's not worth getting stressed over. [A14 Navy]

b) Veteran Status vs. Age. While being a veteran was uniformly considered to be an advantage, and for a third of the participants, a "huge advantage" in engineering, being older, while generally considered to be an advantage, was not as strongly so, and for some was considered a disadvantage because of the difficulty of balancing school and family.

I feel like that for me the being older has more so to do with the family and balance thing. 'Cause I mean, studying is awesome, but at the end of the day, I still need to be a parent and make sure I'm making time to teach him and spend time with my son. [B11 Navy]

The technical training in the military...was a good foundation for what we're learning now. ... The other side of that coin is that for me being an older student. I've got a wife, two kids. My wife works. The GI Bill isn't enough to support a family of four. You just can't do it. [D11 Air Force]

E. Discussion and Conclusions

This work in progress has shown that for military veterans who had significant technical responsibilities as part of their service, engineering is a logical next step in their career. The training that they received gives them a practical understanding of undergraduate engineering coursework that many of their non-veteran peers lack. Recruitment campaigns that target separating service members in those sorts of jobs could diversify engineering education with veteran students and yield many future engineers. Service members with less technical responsibility in their military jobs may be more attracted to engineering by messages related to financial opportunities and job security in engineering fields.

Veteran students' relationships with faculty and other students are influenced in large part by their age in addition to their veteran status. These veterans are more likely to proactively tell their faculty members about their veteran status than they are to tell other students. Most of the veterans also considered their service to be an advantage in engineering study because of their prior training, where applicable, and because of the discipline that was instilled in them during their service. While age was also considered an advantage in engineering study for many participants, balancing school duties with the family and work responsibilities that come with age was considered a disadvantage for some. In this way, they reflect the same experiences as other older students in engineering [9].

F. Further Research

Further research will include in-depth interviews with student veterans in engineering to explore how their achieved statuses (e.g., parent, spouse, and combat veteran) interact with their ascribed statuses, such as race, gender, and disability. We will explore how services and programs for those separating from the military can be improved both by the military and by the universities.

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