

Supporting Regional Engineering Demand by Effective Transition of Veterans on Campus

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Abstract

Employers have long valued veteran employees for a variety of skills and qualities such as their ability to work on a team, mission oriented work ethic, and their technical expertise. Growing regional industries have looked upon The Citadel to meet some of their engineering needs through veteran graduates, but demand for engineers is increasing and outpacing the small veteran student population. Veteran enrollment in colleges and universities has increased in the past decades in part to the Post-9/11 G.I. Bill. However, transitioning veterans from a military lifestyle and occupation to an academic lifestyle and civilian occupation can be a significant challenge for some. Connecting veteran students with the support they need is crucial to their continuing success, in the classroom and beyond. Their military experience often develops great skills and persistence, making them effective and well-regarded students. Faculty and traditional students at civilian or military colleges can benefit from these qualities. Once a veteran or active duty student has made contact and then a commitment to attend, there are a number of activities and processes employed both before they arrive and during their time on campus to retain them in engineering and graduate with an engineering degree as quickly as possible. The focus of these efforts are to create a culture of open communication with potential veterans and increase engagement of these students with faculty, engineering professionals, and peers to matriculate them into the engineering profession. The overall goal was met through an effective recruiting program and ensuring the right tools were in place for retention that allowed students to be a part of a dynamic and supportive educational environment inside and outside of the classroom. While each veteran or active duty student has different needs and challenges, all still need information and resources that will help them succeed as well as connect them to the campus community, so that they feel more fully part of the learning environment and can meet their educational goals.

Introduction

The Citadel has a well-known and highly-ranked engineering program. Most recently, it has been rated as one of the top 25 engineering programs, by US News and World Report for Universities that offer a master's degree as the highest degree. It is also ranked the number one University in the south for veteran students. Adapting to a growing student enrollment within any college is difficult, particularly in a financially constrained environment and competing against colleges/ universities that receive more funding and a progressive (versus traditional military) campus climate. Veterans who are leaving the military and considering a second career as well as some active duty students who are enhancing their skillsets are a potential pool of students. These military and former military students can be role models and enhance the engineering education of traditional students as well. Colleges still desire to create a diverse student population and build an inclusive environment with all students to ensure they feel a part of the department/school culture. The undergraduate veteran and active duty student population at this institution has varied between 84 and 150 students in the past five years. This accounts for approximately 4-6% of the undergraduate day students.

The School of Engineering's six year strategic plan (LEAD 2024) includes objectives in retention and graduation numbers. These objectives include; enhancing student retention, expanding veteran, reservist, and active duty engineering enrollment, and enhancing the nontraditional student experience [1]. Armed with the new strategic plan, the School of Engineering leadership team began developing new programs and setting priorities to build a culture of inclusion and resilience to stay in engineering.

The NSF workshop on transitioning veterans to engineering careers provided four main recommendations [2]. These recommendations were:

- 1) To build awareness of engineering careers.
- 2) Develop systems for academic recognition of military experience.
- 3) Provide supportive academic environments.
- 4) Provide support for service members and their families.

Research shows involvement is the best way to help students succeed both in and out of the classroom [3]. Examples include campus activities, socialization, recreation, leadership opportunities, service opportunities and engagement in academic activities with peers. However, this culture of inclusiveness begins before the student veteran arrives, while they are on campus, and extends into workplace employment. Unlike many large universities with support staff to assist student veterans, the institution's faculty are directly involved early in the transition all the way past graduation. Student veterans are part of the overall strategic plan for the School of Engineering. This paper focuses on veteran and active duty students' transition to and from campus life as well as their time on campus.

Background - Student Veteran

There is a large number of student veterans interested in pursuing an engineering degree. Between 2009 and 2013, 8,057 earned an engineering degree while 10,153 earned an engineering technology or engineer related degree using their 9/11 GI Bill. This represents 5.1% of the student population as veteran during this period [4]. Economics is the primary reason older transfer students in engineering choose to return to school and to major in engineering [5]. Student veterans are a special demographic of these older transfer students, and their reasons are very similar. The choice of institution is affected by proximity to current location or close to family, cost and reputation in engineering. Many start their engineering degree at a relatively inexpensive local community college or use their GI Bill benefit to attend a four year school directly. Student veterans with families may need to balance their academic and family lives causing them to make choices about attending full time, part-time, or with a reduced course load; and whether to pursue employment or internship opportunities or graduate sooner and enter the workforce. Some student veterans attended college immediately after high school but left due to poor academic performance and joined the service. Back in college, they are much more focused and academically successful.

Veteran students report the following transitional difficulties [6];

• Translating military skills into a new profession

- Switching focus away from their military experience
- Military skills do not transfer to college credits
- Difficulty using the GI Bill (Late payment of benefits)
- Being older student with differing interests
- Living off campus
- Alienation or isolation

For many student veterans who never attended college, transitioning from the military or from the civilian workforce into a student can be another challenge. They must learn to navigate an institution and its system that concentrates on serving students of a younger age and interest. Undergraduate campus life is not designed for students who commute or have families and other interests away from campus. However, the older student veterans made adjustments to pursue their studies, and institutions should transition student veterans to campus and beyond. This paper discusses some of the activities and organizations at The Citadel to transition and assist this important talent pool of engineers.

Administrator / Faculty Education

Given the challenges mentioned that some student veterans will face, it is not surprising that targeted support can make a big difference in the initial adjustment and success of these students. Administrators and faculty who will interact with the student veteran should be knowledgeable in various resources available for them and sensitive to their differences from traditional students. Selecting faculty advisors, who are veterans themselves to advise all veterans, are excellent resources for these students. They have instant rapport with the students, and since they work with all or most of the student veterans within their programs, they encounter many of the same challenges. That experience helps resolve many problems quickly. Second only to student veteran peers, faculty members will likely have the most interaction with student veterans on campus. A campus wide approach, from administrators to faculty, is necessary to assist these students [7].

Initial Contact

Institution Webpage. The first contact the veteran has with the institution will probably be electronic. The public access webpage should be user friendly, handheld device friendly, and easily searchable. It should have a link dedicated to veteran students and provide contact information for phone follow up.

Recruiting. Due to The Citadel's location near two military installations, active duty members desiring to stay in or return to the area are somewhat familiar with the school. They may still be unsure which engineering program to pursue, but most know. There are two 'Education Open Houses' every year in October and February where several potential active duty and veterans attend. They may have questions on transfer credits, length of program, or just want to know what kind of classes they would take. In the case that active duty students about to exit the military, but cannot attend one of these events, program directors have returned and answered phone calls from Japan, Germany, and Hawaii. Recruiting students by answering questions and developing a plan of study for them quickly develops trust and rapport with the students. Once

these students are in the engineering programs, they become the recruiter. It is not uncommon for an active duty student to bring a future active duty student or veteran to the program director to ask questions and set up a degree plan.

Campus Visit. Active duty students have used leave time to come by the campus and meet with a program director on their own. Many student veterans are already in the area and a campus visit is something all want. Once on campus, the faculty advisor typically reviews the academic program and the upcoming semester's schedule. A walk through of the department area is next, showing a typical classroom, lab, and student work areas to include areas specifically for the non-residential student, normally our active duty or veterans. Students who are not familiar with the campus plan are shown the bookstore, snack bars, administrative buildings to include the Office of Military and Veterans Services, and the gym. As a smaller school, the meeting and tour are usually with the respective department head and sometimes the dean. This helps the student veterans understand that they are important and they are receiving their answers from the leadership at the school. There is virtually no following up on answers when school leadership addresses student concerns.

Technical College Visit. Some student veterans opt to attend the local technical college before enrolling at The Citadel. Program directors visit the local technical college during an engineering seminar class to answer questions and help connect names to faces. Once a year, the technical college will bring the next group of transfer students to the school. Again, there are several veterans in this group, and identifying them to begin the transition is helpful.

ETS / Medical. The Citadel's Counseling Center provides a full range of services to assist students with the stresses/behavioral issues that can come from going away to college. The Counseling Center was originally established to provide easy access for the residential students but has expanded the range of students the center supports to include student veterans. The enrollment adjustments over time at The Citadel allowed veterans and active duty to attend day classes with the traditional students as well as the growing full time evening population. The center supports many veterans with behavioral issues surrounding transitioning out of the military and into a college environment. One of the key reasons for the campus location for the new Veteran Center was its proximity to the Counseling Center. Both are off the beaten path for most students to allow for a more comfortable access to the Counseling Center. In addition to access to regular counseling services, a licensed counselor from the Veterans Administration hospital comes to campus on Thursdays to assist veterans' needs. This makes it convenient for the veteran to access specialized care on campus.

Academics Before Arrival. Some student veterans have concerns about their preparation for college level courses, especially if they have been away from school. Many times, student veterans want to see what kind of material they will encounter or need to sharpen some math skills. Often, these veterans want to save their GI Bill benefits for the actual degree program, and some programs do not have flexible semesters to start the program (courses offered once a year). One program director suggests enrollment in free, Massive Open Online Courses (MOOCs). The MOOCs can be a valuable resource to individuals transitioning into the academic environment, such as military service members who are completing their time in service and want to attend higher level education institutions. There is no direct evidence that MOOCs affect

veterans transitioning to college; however, this resource may contribute to veteran transition in the future [8].

On Campus

Veterans Center. The Citadel has attracted veteran students for a number of years, and expanded the college's services through the Office of Military and Veterans Services to veterans and their dependents. The Office of Military and Veterans Services is a part of the Office of Financial Aid and Scholarships and is dedicated to assisting service members, veterans, and their dependents in managing their veteran educational benefits. The office is responsible to interpret, explain, and administer VA regulations. The Office of Military and Veterans Services also explains the many educational opportunities available on campus to include: graduate college, evening undergraduate, active duty day undergraduate, returning veterans, and online programs.

The Veterans Center, which is open to all campus day and evening veterans, includes; kitchen, lounge, and study room equipped with WiFi. The space is designed to foster social interaction and community-building with the use of trending technology.

The campus also has a chapter of The Student Veterans Association, which was created in order to facilitate a supportive environment for veterans transitioning into a student civilian environment. The goal is to connect student veterans through social functions, intramural sports, academic support, and mentor leadership.

The Citadel is a member of the Yellow Ribbon Scholarship program and is ranked by U.S. News and World Report as the No. 1 Best College for Veterans in the South.

Veteran Specific Activities. The Veterans Center does a great job in hosting and scheduling several activities for the veterans each year. Veterans are typically older and do not live on campus like the traditional student population at The Citadel. The Veterans Center hosts hunting and fishing trips, Happy Hour Meet and Greet off campus, and monthly Lunch and Learn speakers.

Active Duty Military and Veteran Lounges in Department Areas. The traditional day students are part of a residential program with their dorms centrally located between the academic building extremes. However, each department has used limited available space to establish locations for veterans and active duty military to use as a base of operations: study, eat lunch, and visit between classes. These students in concert with the department head have added refrigerators, microwaves, and coffee pots to improve the availability of comfort items as they push to complete their undergraduate degrees in three years (time line for active duty military and many using their full GI Bill). This relatively simple accommodation has had a significant effect on the quality of student life. These spaces are now being used by a number of the active duty military and veteran students throughout the day. Traditional students have even received tutoring from the student veterans in the lounge rooms. This effort to meet basic needs and help the military student feel wanted has helped in the recruiting of additional students with a military background. Moreover, these spaces are almost a necessity for the active duty and veteran students who may have several hours between classes or may take an evening class due to scheduling conflicts. Again, the traditional students can easily return to their dorm rooms since the day student population is nearly 100% residence living.

Academic Support Programs. Veteran and active duty students are currently filling a critical role at The Citadel as tutors through the Supplemental Instruction Program. With high demands on traditional student time, veterans and active duty students fill approximately 20% of the instructor positions. These individuals assist students often when the instructor is unavailable and can help traditional students who have missed classes due to athletics or other trips as well as those who are academically deficient in specific courses. Likewise, for struggling student veterans, Supplemental Instruction is available for them, but most receive academic help from other veterans informally.

Advising. Many of the engineering programs link veterans and active duty students with a faculty member who is also a veteran. All students must see their academic advisor at least twice a year to ensure the student knows the classes to register for each semester and advise on career goals and other opportunities. Veteran and active duty students are no different. Faculty advisors must ensure their career goals and academic preparation are aligned. When asked, veterans identify accessibility to faculty as the most impactful academic factor that helped them. If their instructor is not available, they know they can ask another instructor for academic help. Modeling this comraderie and assistance within the faculty mirrors the military environment that was part of their lives. In particular, a recent report noted effectiveness of academic advising on their initial enrollment and college experience [9].

Priority Registration. Veterans have the ability to register for courses one week before the traditional student population. With a small campus and limited number of course offerings, this is a great benefit for veterans. Many have other obligations such as family or childcare scheduling, so giving veterans the opportunity to mesh their schedule with their personal lives makes a difference. The traditional student population are not commuters like the veterans. The traditional students almost entirely live on campus. Veteran priority does not prevent any traditional students from taking courses – there are always enough openings.

Engineering Career and Networking Expo. The Citadel's Engineering Career and Networking Expo is a career fair event held every fall semester. It provides transitional opportunities for the engineering seniors, and career development opportunities for the underclass students to learn about engineering careers. Typically dozens of interested companies set up booths to meet the students, collect resumes, and discuss job and internship possibilities. To help students prepare for the expo, classroom and individual instruction by the The Citadel's Career Center is provided prior to the event. These sessions discuss resume building, how to approach a company, and how to prepare for a job interview. Many of the companies attending the Expo are Department of Defense related or do work for the federal government. They actively seek veterans since many still have a security clearance or can quickly obtain one. Some companies recruit veterans to help them meet specific recruiting goals.

Professional Mentoring. Twice each year an effort is made to connect students with professional mentors. The Citadel hosts two dinner banquets to introduce students to local engineers who are interested in sharing their experience and providing advice to the students. Some mentors specify

veterans, especially if they are veterans themselves. Some will use the event to recruit interns for their temporary needs in their organizations.

Capstone Leadership. One of the easily observed and experienced aspects of veteran students within the classroom is their performance within these high stress teams both as members and leaders. The Citadel has documented previously the anecdotal impact of the veterans within capstone teams [10], but last year the faculty began to assess leadership of each team member, especially the assigned leader during each grading period, of the capstone team as part of the leadership program at The Citadel. The peer assessments of each member of the team over the semester quantifies the leadership impact these veterans have on the success of each team they are part of.

The Comprehensive Assessment of Team Member Effectiveness (CATME) tools from Purdue University for peer evaluation uses a normalized average score for each student [11]. CATME rounds scores 0.95 -1.00 up to 1.00 and limits scores above 1.05 at that value. The School of Engineering was required to assess leadership based on the seven leadership characteristics identified at The Citadel's Leadership Center (Table 1). One department was using CATME to assess individual performance and contribution in the senior capstone. All of the engineering departments implemented a modified CATME survey to assess these seven leadership principles, directly asked of each team member in the survey.

	Leadership Attribute
1.	Leads with humility; creates conditions for the team to succeed as a whole.
2.	Embraces a true, authentic self; develops and leads according to a principle-based leadership philosophy.
3.	Acts and speaks with courage; performs critical leadership functions to overcome resistance leading to positive change and outcomes.
4.	Develops and values people and resources; exhibits characteristics of a global citizen and displays desire to openly serve.
5.	Empowers and holds others accountable; delegates authority, allows others to optimize unique abilities leading to beneficial results of the collective team.
6.	Respect others by building trust and learning from mistakes; demonstrates inclusive leadership traits that embraces diversity, creates security, opportunity and fulfillment.
7.	Serve others before self; expands outreach and engagement with broader community.

The data from 129 students was included in this study. A standard five-level Likert Scale (Table 2) was used to assess the level of agreement or disagreement for the leadership attributes for each team member. The rating scale is a normal set of responses used at The Citadel for student surveys. Results were averaged within four - ten person teams with a group average per member and without the self-assessment average.

Table 2:	Assessment Scale
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Strongly	Disagree	Neutral	Agree	Strongly
Disagree				Agree
1	2	3	4	5

The following assessment first looked at the normalized scores of the individuals with and without self-assessment to see if there was any personal bias, either positive or negative. This gave the instructor a broad picture of group dynamics and overall idea of who was a performer and those that needed to improve. The assessment then went further and looked at the individual leadership characteristics produced by the institution's leadership center in order to target specific areas of improvement for individuals. Peer feedback uses social comparison theory. Social comparison theory suggests that we make better assessments of others and ourselves when we make relative comparisons. Relative comparisons involve comparing several people and ourselves at the same time when providing ratings [12].

The normalized score of the leadership characteristics from the traditional student population and veterans was normalized to 1.00. Peer assessment of the veterans with the veteran's self-assessment was 1.04 and without their self-assessment was 1.07. A t-test shows that results were not statistically significant between the data with or without the veteran self-assessment. However, the standard deviation was 0.06 and 0.07, respectively for the data sets. This shows that veterans were noticeably different in senior design, in a positive way. It is clear that veterans were exercising valuable leadership skills that made a difference in their teams. Overall, they were modest as the team assessment of them was higher than the assessment that included their own assessment.

Post Graduation

Job Transition. Many of the student veterans have fewer courses to take when they are seniors and may take an internship their last year. This gives them an advantage over the traditional student who cannot devote that many hours to a potential employer. Many of the veterans have settled in while attending The Citadel and are less willing to relocate. The institution is near two military installations and the VA Hospital is less than a mile away. However, the region is growing and the demand for engineers is healthy. Many employers look to the veterans for their military work experience and perhaps a current security clearance. Additionally, the veteran has maturity and other experiences unlike the traditional student. Advisors and program directors who know the veteran student population can easily match them to companies who want a new teammate who is technically proficient and willing to work.

Graduate School. Some student veterans do not stop at the undergraduate level. Several have continued or returned for a graduate degree in engineering or project management. Advising veteran students of these opportunities helps them transition to another phase. Some may decide early enough to enter into a 4+1 accelerated master's program, while others may enter the workforce for a few years and return. In either case, student veterans are enhancing their skills and knowledge base, meeting their higher education needs, and opening opportunities for their future.

Effect of Transition Efforts

Enrollment. As shown in Table 3, the programs that have been initiated have had the desired effect of improving recruiting and retention. Once a student is successful through the gateway courses at the institution, 82.5% graduate in four years and 92-95% graduate within six years. Six years ago and prior to the veteran transition efforts described in this paper, the success rates were 74% in four years and 89% in six years. The key to overall retention is retaining incoming students in significant numbers. The decrease in active duty numbers is a direct result in the drawdown of forces that began in 2013-2014 which directly decreased the number of students within the Seaman to Admiral naval and marine students going to school. Based on our discussions with these students, there appears to be some correlation between active duty and veteran numbers. Many of the active duty who are pursuing commissioning through attending school at The Citadel talk to local veterans or those they served with about their experience, which indirectly recruits other enlisted veterans to The Citadel.

Most of the programs mentioned previously were initiated to help build a positive culture, build community between diverse groups of students, and provide focused activities for select underrepresented groups in engineering. The veterans who are in our first year engineering courses have noted that these activities developed for the first year residential students have been extremely beneficial to their transition into or back into the college and civilian sector.

Student Type	2008- 09		2010-		-		-		2016-	-	
	09	10	11	12	13	14	15	16	17	18	19
Active Duty Students	10	16	24	22	19	14	10	13	9	8	9
Veteran Students (Day & Evening)	2	1	12	16	20	42	43	37	33	30	30
Total	12	17	36	38	39	56	53	50	42	38	39
Percentage in Engineering	2.4	3.4	7.2	7.6	7.8	11.2	9.4	8.1	6.3	5.5	5.9

Table 3: Veteran Enrollment

Conclusions

Developing a better understanding of the veteran transition to engineering reveals a variety of issues of importance to the engineering community. The veteran transition represents an opportunity to grow the number of engineering graduates to meet increasing demand. This opportunity can be furthered when schools expand the pool of veteran students. Many of the activities and programs at the institution where veterans and active duty students are involved are successful due to direct or indirect involvement of the veteran and active duty students. In many of the aforementioned activities, student veterans are leaders and making a difference, setting the example among traditional students. Their ability to organize, plan, and execute is a model for the traditional student population. Their transition to the academic institution is deliberate.

Each student veteran has individual needs and the faculty can help transition each student to maximize his or her potential. As the US, and the world, need more engineers, one way to narrow that gap is to recruit and retain veterans that matriculate on campuses wanting to be engineers. They are not always prepared academically, but faculty can provide the necessary assistance and transition to improve eventual success. The Citadel has used a multi-prong integration approach for all students that focuses on organizations, activities, assistance, and mentoring. Veteran students should receive the transition assistance to the institution as well as their transition after graduation.

Future work includes correlating the relationship between the transition services and academic experiences of student veterans. The campus has many services available and opportunities for student veterans but their effectiveness is unknown. An in-depth review as suggested by Molina and Morse [9] will provide a better understanding of the effectiveness of these services on military members and veterans. This information can help the institution leverage resources to create a more positive academic experience for military and student veterans.

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