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Choosing Between Undergraduate Engineering and Engineering Technology Academic Programs for Student Veterans

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Abstract

Student veterans have a unique opportunity to pursue higher education post-discharge via successive offerings of the G.I. Bill program. Academic program preferences for veteran students have important implications across an organizational field where attention has sharpened on student matriculation, persistence, and retention. Some student veterans may pursue an engineering degree while others may earn a two- or four-year engineering technology degree. Student veterans should be aware of differences in these degrees and the career opportunities in each. Some may put their technical military experience to use in higher education, while others may pursue a radically different educational path. There are numerous activities and processes employed both before student veterans arrive and during their time on campus to ensure they are part of the campus community and to ensure they graduate with an engineering or engineering technology degree within their timeline. These efforts can create a culture of open communication with student veterans and increase engagement of these students with faculty, engineering professionals, and peers to matriculate them into the campus engineering community.

Key Words: veterans, engineering, engineering technology, academic program selection, academic program retention

Introduction

Through the lens of organizational theory, this work examines undergraduate engineering and engineering technology opportunities at The Pennsylvania State University (Penn State), a large, public, research-intensive, state university, in the northeast United States, with respect to program selection and retention ultimately using mixed methods surveys. This paper will inform a more detailed study to gain insight for advising and policymaker efforts to better serve this unique student population. The demand for engineering and engineering technology degrees is expected to increase and large numbers of student veterans will continue to enroll in higher education institutions, necessitating the need for this increased attention on this student subgroup.

Penn State is a land-grant, state institution with multiple campuses geographically dispersed throughout the state. Some campuses offer traditional four-year engineering degrees, while many of the smaller campuses offer a myriad of engineering technology degrees. The availability of engineering offerings is tremendous. However, approximately 25% of the student veteran population attends the main or flagship campus to earn a four-year engineering degree while 75% of the student veteran population attends one of the much smaller campuses, often earning an engineering technology degree.

This paper explores considerations for student veterans in choosing a two-year engineering program versus choosing a traditional four-year engineering program. Two-year technical degrees are typically offered at junior or technical colleges, while the four-year engineering programs are offered at many traditional universities and colleges. This paper will focus on the differences between the two types of institutions and the veterans' backgrounds, priorities, and means to higher education. The student population in this paper refers to student veterans and reservists (and not to their family members).

Higher education and the national drive to support military-connected students is often limited by an insufficient understanding of this diverse student population. Nearly all the veteran education benefits have time limits, financial limits, and proof of satisfactory academic progress for accountability and oversight of limited resources. Many state university campuses may have a Veterans Affairs and Services Office, but they offer many services in addition to information and guidance on education benefits. Some employees may be tasked to organize military appreciation events, provide general campus information, sometimes even childcare, etc. Additionally, the concentration of this knowledge and the services in one building may be inconvenient to some students, especially on large campuses. Some large campuses offer military ally training (e.g., Green Zone Training), short courses aimed at instructors to promote awareness of military and veteran students' challenges and differences from traditional students. However, specific knowledge of the rules and policies of education benefits is often centralized to the staff at the campus advising or Veteran Affairs Office or to a few service-connected individuals in the academic units. Professional advising staff often focus on traditional students and the set curricula. Moreover, professional advising staff experience frequent turnover.

Background

Post-World War II, the higher education landscape evolved in several ways. The growth and importance of higher education was already felt before the war, and there was resistance from elite universities and presidents who believed higher education was a rite of passage for the elite who were gifted and had merit. Higher education became an important priority to improve the quality of life and expand opportunities for the middle class, hence the growth of state colleges and universities along with community or junior colleges. When students were less academically prepared for a traditional baccalaureate degree, students used junior colleges as preparation venues [1]. Elite colleges were sometimes supportive of the junior colleges to meet demand for higher education while simultaneously limiting growth at their elite institutions [2].

World War II veterans were like their civilian peers on campuses in their career goals. Student veterans wanted new courses in business, economics, and engineering and sought changes to humanities courses so they could be more relevant to real life in an industrialized, post-World World II America [3]. Due to the demand of over 2 million veterans seeking bachelor's degrees [4], physical expansion was necessary, resulting in large lecture halls and temporary living quarters on or near campuses [3]. This expansion changed the perception of the

country's population, who now saw that college was not only for the elite, but it was also available and for the average citizen [3] – [5].

With the return of 2 million of service personnel back to mainstream America at the close of World War II, the United States government established the original GI Bill, the Servicemen's Readjustment Act of 1944. The Act initiated a wide-ranging series of benefits and programs to help ease veterans back into American society without burdening the American workplace. The most prominent benefit of the GI Bill was the educational component, but the Servicemen's Readjustment Act included unemployment benefits, business loans, home loans, and training opportunities, allowing the veterans to go to college. After World War II, student veterans used the GI Bill to pursue higher education goals and contributed to the diversity of university and college populations. Since 1944, there have been six iterations of GI Bill educational programs. The most recent one is known as the Post-9/11 GI Bill, which was implemented in the fall of 2009 [6]. Since 2009, the Post-9/11 GI Bill has been a significant investment to support higher education for more than 1.4 million service members, veterans, and their families [7].

Current Education Funding

This section highlights two of the most common ways Student Veterans receive federal funding to pursue their degrees. There is a myriad of programs to assist with disabilities and other special situations, but most student veterans use the following sources. For clarity, tuition assistance is what veterans may use while still in the military whereas the GI Bill is the tool they use once they have exited the military.

Tuition Assistance

The Tuition Assistance (TA) program provides funding for voluntary civilian education programs in support of a service member's professional and personal self-development goals. Such work is done during off-duty times. Courses and degree programs may be academic or technical and can be taken from a variety of sources and modalities to include: two- or four-year institutions on-installation, off-installation, or distance learning. The U.S. Department of Education must recognize the higher education institution. In the TA program, the service branch pays tuition directly to the school, not the service member. TA may be used for:

- Vocational/technical programs
- Undergraduate programs
- Graduate programs
- Independent study
- Distance-learning programs

All service branches and the U.S. Coast Guard offer the TA program to support the users' personal and professional goals. The program is open to officers, warrant officers, and enlisted active-duty service personnel. In addition, members of the National Guard and Reserve Components may be eligible for TA based on their service eligibility (have enough remaining

time on their service contract to complete the course). Some TA recipients may be required to fulfill a short service obligation that can run parallel to their current service obligation. TA only covers tuition and not logistics such as books and course materials, special training fees, retaking the course, or continuing education units (CEUs) [8].

Post-9/11 GI Bill

The GI Bill allows current and former service members pay for college, trade school, technical school, licensing, certification programs, on-the-job training, online schooling, and more. The Post-9/11 GI Bill provides benefits for those who served on active duty or in the Selected Reserve for 90 or more days after 10 September 2001. The GI Bill allows four academic years (36 months) of educational tuition benefits for an approved program up to the cost of the most expensive in-state undergraduate public tuition in the state where the veteran enrolls. Additional tuition at more expensive private schools under the "Yellow Ribbon" program allows participating institutions to share the cost (usually, one to one) with the federal government up to 100% of the expense. Other benefits include:

- A monthly living allowance based on housing costs of the location of the learning institution. Student veterans attending schools online or through correspondence will receive a partial benefit if their entire enrollment is in distance or online learning. The student veteran will receive a living allowance if at least one course is classified as "in-residence."
- International education programs outside the United States are eligible.
- An annual stipend up to $1,000 to cover other education costs (e.g., books, supplies, and fees).
- Up to $2,000 towards one-time licensing or certification testing [9].

Where Veterans Choose to Go to College

Not every higher education institution has the same distribution of student veterans. One study [10] showed that student veterans resemble nontraditional students when choosing college type and degree choices. The study found approximately 12% of student veterans attend private for-profit institutions and 64% attend public institutions – results which are quite different from traditional student enrollment patterns. Student veterans also attend public community colleges at a rate of 43%, and they attend four-year institutions at a rate of 57%. However, 89% of student veterans pursue bachelor's or associate degrees and slightly more student veterans pursue bachelor's degrees than associate degrees. This implies that a fair percentage of student veterans at community colleges continue on to pursue further study at four-year colleges.

Why Two Year vs. Four Year Institutions

Education centers on military installations offer a variety of transition services to help potential student veterans decide where to attend college and what type of degree or campus. A

two-year institution such as a community college or a junior college can offer some advantages to veterans like cost-effectiveness, smaller class sizes, and more flexible scheduling. However, a four-year institution may provide a more comprehensive academic experience and a wider range of extracurricular activities [11]. Some key points and differences are elucidated in Table 1.

Table 1. Two-Year and Four-Year Institution Comparison

	Two-Year	Four-Year
Cost [12] – [14]	Significantly lower tuition fees compared to a four-year university, making it a cost-effective option for veterans utilizing GI Bill benefits	Higher tuition costs, though some may offer veteran-specific scholarships or reduced tuition rates
Academic Focus [11], [12], [14]	Offers foundational courses and associate degrees, providing a good base for subsequently transferring to a four-year program	More specialized majors and more advanced coursework, often with greater research opportunities
Class Size [13] – [15]	Smaller class sizes, potentially allowing for more personalized attention from instructors	Larger class sizes, especially in introductory courses, which may be less intimate
Flexibility [13], [15], [16]	Often offers flexible scheduling with evening and weekend classes, accommodating veterans with work or family commitments	May have more rigid class schedules, though some flexibility may exist depending on the institution
Campus Life [13], [14], [17]	Typically, less vibrant campus life with fewer extracurricular activities and student organizations	More robust campus culture, with a wider array of clubs, sports, and social events
Transferability [11], [12], [14]	Student veterans must carefully research transfer agreements between community and junior colleges and four-year institutions to ensure their credits will transfer smoothly	

There are potential advantages for student veterans at two-year colleges. The lower cost of attendance can help maximize the GI Bill benefits, and the more flexible scheduling can accommodate work or family obligations. Additionally, many community colleges have dedicated veteran support programs [18].

Four-year universities may allow access to advanced research projects, equipment, and faculty expertise [11], [12], [14] and campus life engagement is different as most universities have a multitude of diverse activities [17]. Student veterans should always research individual institutions and their veteran support services before deciding [11], [15], [18].

What Student Veterans Choose to Study

Student veterans pursuing a technical degree have many options when choosing between engineering technology programs and more traditional engineering programs. As noted in the literature [19], an engineering degree focuses on theory and advanced concepts, while an engineering technology degree focuses on practical applications and hands-on work. Table 2 below offers a side-by-side examination of the differences between engineering and engineering technology.

Table 2. Engineering vs. Engineering Technology

	Engineering	Engineering Technology
Theoretical Versus Practical [20], [21]	Involves in-depth study of advanced mathematics and scientific theories to create new ideas and solutions.	Focuses on applying existing methods to problems, and to using technology, applied science, and mathematics to solve problems
Hands-On Versus Theoretical [22]	Tends to be more theoretical and analytical	Tends to be more hands-on and applications-oriented
Specialization [21], [23]	One can focus on a specific area of engineering, such as aerospace engineering or mechanical engineering	One can focus on a specific area of engineering technology, such as advanced manufacturing or mechanical design and fabrication
Career Paths [20], [22], [23]	Engineers can work in design, research, and in other theoretical roles	Engineering technologists can work as liaisons between engineering and manufacturing teams, or as design and testing partners to engineers

Future Work

This preliminary study will shape future work and will involve student veterans and campus staff and administrators. Although this university is a complex system of a main campus with nearly two dozen smaller campuses, the investigators hope to generalize the factors student veterans consider pursuing a two-year engineering technical degree versus a traditional four-year

engineering degree. Because of the unique characteristics of the subject institution's campus system and the state's rurality, the investigators welcome partnering with other institutions to deepen and broaden their understanding of student veterans' higher education goals.

Conclusion

Given the imbalance of student veterans attending this institution's distributed campuses versus the flagship main campus, the authors would like to better understand student veterans' decision making and the factors involved.

Student veterans are non-traditional students, and review of the extant research literature suggests there is more exploration needed to better understand their engineering degree and school choices, including in view of their positionality as non-traditional students. That said, student veterans have been on college campuses for decades and are not a 'new generation.' The gaps in understanding this population are great compared to the literature on traditional college student populations. Prior research on student veterans points others in the direction to continue investigations and towards better understanding student veterans.

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