The Florida Senate

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Committee on Military Affairs, Space, and Domestic Security

ATTRACTING STUDENT VETERANS TO SCIENCE AND ENGINEERING DEGREE FIELDS

Issue Description

There is a rising national concern about future challenges and a potential shortage in the U.S. Science, Technology, Engineering, and Mathematics (STEM) workforce, which is suggested to be attributed to the downward trend in student interest in STEM disciplines and the impending retirement of a large number of engineers and scientists during the coming decade. In an effort to mitigate this potential shortage, servicemembers leaving the military have been identified as a potential source of highly motivated, skilled talent that can help address the decline of the technical workforce. A great opportunity exists to tap into the veteran population to encourage veterans to utilize their GI Bill benefits to pursue postsecondary degrees in STEM fields and build upon the technical skill sets gained through intensive military training and experience.

Background

There is widespread agreement that STEM disciplines have become increasingly central to U.S. economic competitiveness and growth.[1] "Today, much of everyday life in the United States and other industrialized nations, as evidenced in transportation, communication, agriculture, education, health, defense, and jobs, is a product of investments in research and in the education of scientists and engineers."[2] Therefore, it is imperative that the U.S. maintain a strong quality STEM workforce to enhance scientific innovation and remain globally competitive.[3]

However, just as there is broad consensus on the significance of STEM disciplines, there is at the same time a national concern about an impending shortage in the U.S. STEM workforce which may impede the abilities of the U.S. to compete in this global economy. Although there are arguments questioning the legitimacy of this claim,[4] federal agencies such as the U.S. Department of Labor (DOL) and the National Science Foundation (NSF) express serious concerns about the future vitality of the U.S. STEM workforce. The NSF maintains that reduced domestic student interest in STEM fields and the large segment of the existing STEM workforce approaching retirement age may threaten America's long-term prosperity and national security.[5]

The DOL calls for a nation-wide collaborative effort across all levels of government, key businesses and non-governmental institutions to address what DOL refers to as the "STEM workforce challenge."[6] In addition, DOL has identified the following trends relating to academic preparation for STEM success:

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[1] U.S. Department of Labor. *The STEM Workforce Challenge: the Role of the Public Workforce System in a National Solution for a Competitive Science, Technology, Engineering, and Mathematics (STEM) Workforce* (April 2007), 1. http://www.doleta.gov/youth_services/pdf/STEM_Report_4%2007.pdf

[2] The National Academies. *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (Washington, DC, 2007), 41, citing to S.W. Popper and C.S. Wagner. *New Foundations for Growth: The U.S. Innovation System Today and Tomorrow* (Santa Monica, CA: RAND Corporation, 2002).

[3] U.S. Department of Labor. *The STEM Workforce Challenge*, 1.

[4] See, for example, B. Lindsay Lowell and Hal Salzman, "Into the Eye of the Storm: Assessing the Evidence on Science and Engineering Education, Quality, and Workforce Demand" (The Urban Institute, Washington, DC, October 2007). http://www.urban.org/UploadedPDF/411562_Salzman_Science.pdf

[5] National Science Board. *The Science and Engineering Workforce; Realizing America's Potential*, (August 2003), 7. http://www.nsf.gov/nsb/documents/2003/nsb0369/

[6] U.S. Department of Labor. *The STEM Workforce Challenge*, 4.

- Many students are not academically qualified to pursue STEM disciplines due to inadequate preparation in math and science or poor teacher quality in K-12 systems;
- Academically qualified postsecondary students are dissuaded from pursuing STEM disciplines due to high tuition or demanding curricula, relatively low salaries in STEM fields compared to other professions, or the absence of role models with whom they can identify; and
- There is low engagement of minority, female, and lower-income students in STEM-related learning, who comprise a growing proportion of the total college-going population.[7]

STEM*florida*,[8] a statewide council established in 2009 by Workforce Florida, Inc. and Enterprise Florida, Inc. to diagnose the needs of STEM-enabled employers and improve the skills of Florida's STEM workforce,[9] observed that "Florida ranks below most other states in terms of the number of STEM professionals in the workforce, lagging behind states with the largest economies."[10] The most recent data reveals that 2.69% of Florida's workforce is employed in science and engineering occupations, which is lower than the 3.75% national average. Additionally, the average proportion of the science and engineering workforce in the three largest U.S. economies, California, New York, and Texas is 3.88%.[11]

Findings and/or Conclusions

Veterans as a Resource to Offset Potential STEM Workforce Shortage

The NSF has identified the post-9/11 veteran[12] population as a "diverse and qualified pool of future talent for the nation's engineering and science employers," and has spearheaded a movement to spread awareness and to assist academic institutions in developing "programs that will usher post-9/11 veterans into technical fields and shape them into workforce-ready engineers and scientists."[13] Tapping into this skilled and experienced population could prove to be mutually beneficial to both the strength of the U.S. STEM workforce and the post-military success of the targeted veteran population.

This opportunity to encourage veterans to pursue science and engineering degrees is supported by the notion that the skills obtained from military instruction and experience are especially transferable to the technical industries of science and engineering. One study suggests that the significant investment of the U.S. taxpayers in training the U.S. military personnel could prove to have a transformative effect on the U.S. economy with the transition of veterans into technical careers.[14]

To further explore this emerging initiative, the NSF hosted a 2009 workshop entitled *Enhancing the Post 9/11 Veterans Educational Benefit,* which specifically addressed issues relating to encouraging post-9/11 veterans to utilize their educational benefits to pursue degrees in the fields of science and engineering.[15] Subsequently, the NSF awarded research grants to 17 higher education institutions across the nation to develop programs and services aimed at easing the transition of military veterans into science and engineering disciplines.[16]

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[7] U.S. Department of Labor. *The STEM Workforce Challenge*, 2.
[8] STEM*florida* homepage: http://www.stemflorida.net/
[9] STEM*florida* is funded from a one-time $580,000 grant from the Board of Workforce Florida, Inc.
[10] STEM*florida*. *A Snapshot: The State of STEM in Florida* (January 2010), 44. http://www.helios.org/uploads/docs/StateofSTEM_Final.pdf
[11] National Science Board. 2010. *Science and Engineering Indicators 2010*. Arlington, VA: National Science Foundation (NSB 10-01). http://www.nsf.gov/statistics/seind10/pdfstart.htm
[12] A military servicemember who served in the U.S. armed forces for any period of time after September 10, 2001 is typically referred to as a"post-9/11 veteran."
[13] National Science Foundation. *Veterans' Education for Engineering and Science*. (Washington, DC, April 2009), 6. http://www.nsf.gov/eng/eec/VeteranEducation.pdf
[14] Steinberg, L.J., Zoli, C., and Armstrong, N.J. *From Battlefield to Classroom: Findings, Barriers, and Pathways to Engineering for U.S. Servicemembers* (Syracuse University, 2011), 9.
[15] National Science Foundation. *Veterans' Education for Engineering and Science.*
[16] The following academic institutions received a grant from the NSF for Veteran's Education Projects: Georgia Institute of Technology; Virginia Commonwealth University; San Diego State University; University of San Diego; Syracuse University; University of Virginia; Virginia Polytechnic Institute and State University; Mississippi State University; Pennsylvania State

While each of the 17 NSF-funded research grants has a unique objective, they all share the common theme pertaining to student veterans pursuing science and engineering degrees. Examples of the objectives of three of the grant recipients include the following:

- Virginia Commonwealth University will design a system to efficiently and appropriately match military credits and/or occupational experience to engineering course credits at the university level;[17]
- Norfolk State University will create a partnership with local community colleges to pilot the establishment of an innovative program to leverage the community college pathway into the engineering profession; and
- University of Pittsburgh will create a program that targets the enrollment and retention of wounded, injured, and ill veterans in engineering programs.

Many of the NSF-sponsored research projects are still a work-in-progress, in which there are no results to report. However, some grant recipients are beginning to expose initial findings and announce plans for upcoming programs. For example, Eastern Washington University (EWU) received a $150,000 NSF award in October 2010 to develop a Bachelor of Science in Electrical Engineering degree program specifically designed for military veterans. EWU recently went live with a website[18] that introduces the program and announces that the program will commence in spring 2012 with approximately 15 students.

Other Non-NSF Sponsored Veterans to STEM Degree Initiatives

Like the NSF, Tennessee Valley Corridor, Inc. (TVC)[19] has also recognized an opportunity to capitalize on the maturity, technical training, and hands-on experience of veterans to help fill the STEM workforce gap and keep the nation technically competitive. To that end, TVC established the "Vets to the Valley" initiative,[20] which consists of the "America's Veterans to Tennessee Engineers" program and the Non-Traditional Emerging Workforce in Science, Technology, Engineering, and Mathematics (NEW-STEM) program. These two programs seek to attract military veterans to STEM degree fields and successfully transition them into the STEM workforce.

America's Veterans to Tennessee Engineers[21]

The University of Tennessee System and other participating universities and community colleges have entered into a memorandum of agreement with corporations and other supporting organizations to support the America's Veterans to Tennessee Engineers program. This program provides an opportunity for military service members to complete an engineering degree in Tennessee, and upon graduation, attain employment with one of Tennessee's leading companies. This program specifically targets active duty military members who are completing their military service, or military reservists, who desire a career as a nuclear, chemical, mechanical, civil, or electrical engineer. Students selected for this program are provided assistance in attaining part-time employment or internships, receive support from community sponsors and academic mentors, and are guaranteed a job upon graduation.

University; Norfolk State University; University of Pittsburgh; Eastern Washington University; Kansas State University; University of Kentucky; Flathead Valley Community College; Texas Agricultural and Mechanical University; and University of Washington.

[17] American Society for Engineering Education, 2011 Conference.

[18] EWU Bachelor of Science in Electrical Engineering website: http://www.ewu.edu/CSHE/Programs/VEEI.xml

[19] The Tennessee Valley Corridor, Inc. is a non-profit 501(c)(6) regional economic development organization with representation from the following states: Alabama, Kentucky, North Carolina, Tennessee, and Virginia.

[20] The Tennessee Valley Corridor. Vets to the Valley Initiative homepage: http://www.tennvalleycorridor.org/ventures/new-stem/opportunity.html.

[21] America's Veterans to Tennessee Engineers program homepage: http://www.y12.doe.gov/jobs/stem/

NEW-STEM[22]

NEW-STEM targets newly-separating or recently retired servicemembers who have training, experience, or previous coursework in engineering, mathematics, or science to pursue a technical degree the University of Alabama in Huntsville, Alabama. While pursuing their degrees, NEW-STEM students participate in a paid internship program offered by a participating private sector company or federal agency located in the Huntsville area. Upon graduation, participants receive priority consideration for a full-time position with the organization they interned with during their schooling.

The New Post-9/11 GI Bill Offers Greater Benefits than Previous GI Bill Programs

When it comes to student financing for higher education, veterans are at an advantage compared to traditional college students, due to the exceptional financial assistance available to veterans from the U.S. Department of Veterans Affairs. Since the enactment of the Servicemen's Readjustment Act of 1944, commonly known as the GI Bill of Rights (GI Bill), the Federal government has demonstrated its commitment in supporting the pursuit of higher education for veterans.

The original GI Bill has been updated twice– once in 1984, which came to be known as the "Montgomery GI Bill" and finally, more recently in June 2008 when Congress passed the Post-9/11 Veterans Educational Assistance Act. The Post-9/11 Veterans Educational Assistance Act, otherwise known as the Post-9/11 GI Bill, offers an unprecedented level of educational benefits to nearly 2 million individuals who have served in the U.S. armed forces since the attacks of September 11, 2001.[23]

Individuals with active duty service after September 10, 2001 who serve a period of 90 aggregate days or serve a period of 30 days and receive a disability discharge are eligible for the Post-9/11 GI Bill benefits,[24] which include the following:

- Tuition and fees[25]
- Monthly Housing Allowance[26]
- Books and Supplies Stipend[27]
- Yellow Ribbon Program[28]
- Rural Benefit
- Licensing and Certification Tests

Since implementation, the Department of Veterans Affairs has provided just over $5.7 billion for the Post-9/11 GI Bill to fund education expenses for about 381,000 veterans, service members, and their dependents through fiscal year 2010, and estimates it will provide almost $8 billion in fiscal year 2011.[29]

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[22] NEW-STEM flyer: http://www.tennvalleycorridor.org/library/cms/File/APS-11%20N-S%20Flyer%20Rev%2015%20FINAL_Nov%2012%202009.pdf

[23] RAND Corporation. Research Brief. *How Military Veterans Are Using the Post-9/11 GI Bill and Adapting to Life in College* (2010). http://www.rand.org/pubs/research_briefs/RB9560.html

[24] Individuals are eligible while on active duty after serving a period of 90 days.

[25] Individuals are eligible for the lesser of the following: actual tuition and fees charged; or tuition and fees charged for full-time undergraduate training at the most expensive public institution of higher learning in the state where the student is enrolled.

[26] Monthly housing allowance is issued directly to the student, is equivalent to the Basic Allowance for Housing for an E-5 with dependents, and is determined by the zip code of the school where the student is enrolled.

[27] Individuals may receive a book and supplies stipend of up to $1,000 per academic year.

[28] The Yellow Ribbon Program allows institutions of higher learning in the U.S. to voluntarily enter into an agreement with the VA to fund tuition and fee expenses that exceed the highest public in-state undergraduate tuition and fee rate in their state.

[29] U.S. Government Accountability Office. *Veterans' Education Benefits: Enhanced Guidance and Collaboration Could Improve Administration of the Post-9/11 GI Bill Program* (May 5, 2011), 1. http://www.gao.gov/new.items/d11356r.pdf

Florida Supports a High Veteran and Military Presence

Florida has a substantial presence of military personnel and veterans as the home to 20 major military installations, 58,000 active duty military personnel, and almost 12,000 Florida National Guard members. Additionally, Florida has the third largest population of veterans in the nation with more than 1.6 million, behind California and Texas.[30]

In addition to supporting the third largest veteran population in the nation, Florida has a substantial presence of post-9/11 servicemembers and veterans. The Florida Department of Veterans Affairs (FDVA) estimates that approximately 192,000 servicemembers and veterans who have served during Operation Iraqi Freedom, Operation Enduring Freedom, and Operation New Dawn claim Florida as their home of record.[31]

Figure one illustrates the age ranges of veterans who reside in Florida, in which the age range of 60-64 years of age has the highest concentrated veteran presence with 213,877. It is important to note that there are almost 127,000 veterans who fall within the age range of 18-34. Although this chart does not offer higher education attainment data, it is, however, obvious that there is a large concentration of "college age" veterans who may be interested in pursuing higher education, either at the undergraduate or the graduate level.

FIGURE ONE
TOTAL VETERANS IN FLORIDA BY AGE GROUP[32]

AGE	# VETERANS		AGE	# VETERANS
<20	407		**55-59**	137,016
20-24	18,036		**60-64**	213,877
25-29	49,367		**65-69**	167,944
30-34	59,167		**70-74**	141,294
35-39	68,960		**75-79**	154,120
40-44	99,812		**80-84**	134,732
45-49	130,094		**85-89**	92,570
50-54	144,286		**90+**	39,196

As the fourth largest state in the nation, Florida offers a broad range of opportunities for those pursuing higher education, with 39 public colleges and universities and 29 private, not-for-profit colleges and universities. Consequently, veterans interested in utilizing their GI Bill benefits have a vast selection in deciding on an institution to attend in Florida.

Figure two illustrates the number of student veterans who attended a State University System of Florida (SUS) institution for the 2010 summer and fall semesters.[33] The University of West Florida, the University of Central Florida, the University of North Florida, the University of South Florida, and Florida State University reported the highest concentration of student veterans within the SUS at the time the data was recorded. Additionally, it is important to note that during the 2010-11 academic year approximately 36% of student veterans receiving GI Bill benefits were enrolled in science and engineering degree programs within the SUS, and 64% were enrolled in non-science and engineering degree programs.[34]

[30] Florida Department of Veteran Affairs. *2010 Annual Report*, 6. http://www.floridavets.org/pdf/ann_rprt_10.pdf
[31] Id.
[32] U.S. Department of Veterans Affairs. National Center for Veterans Analysis and Statistics. Table 1L: *Veterans by State, Age Group, Period, Gender, 2000-2036*. NOTE: These are projected estimates based on 2007 data.
[33] E-mail correspondence with SUS staff. June 27, 2011.
[34] E-mail correspondence with SUS staff. August 16, 2011.

FIGURE TWO VETERAN POPULATION IN STATE UNIVERSITY SYSTEM				
INSTITUTION	**UNDERGRAD**	**GRADUATE**	**UNCLASSIFIED**	**TOTAL**
FAMU	13	4	-	17
FAU	433	53	14	500
FGCU	154	16	8	178
FIU	606	145	13	764
FSU	927	254	40	1,221
NCF	2	-	-	2
UCF	1,071	169	11	1,251
UF	376	349	21	746
UNF	936	99	7	1,042
USF	1,326	242	41	1,609
UWF	702	212	73	987
TOTAL	**6,546**	**1,543**	**228**	**8,317**

Florida Colleges and Universities Expressly Interested in Attracting Veterans to STEM Fields

While there are no current efforts at Florida institutions within the SUS, the Florida College System, or the Independent Colleges and Universities of Florida which focus specifically on attracting veterans to STEM disciplines, representatives from the institutions expressed significant interest in further exploring the initiative.[35]

Some institutions support existing STEM outreach programs which could be expanded to specifically target veterans, and some STEM outreach programs already include veterans as part of the outreach target population. For example, Daytona State College has established *STEP* (Science and Technology Enhancement Program), a program which encourages more non-traditional students to participate in STEM disciplines. According to Daytona State College staff, STEP does not specifically target military veterans, however, veterans are included in the non-traditional student population that the program targets.[36]

Additionally, there is some concern among institutions about the challenges associated with identifying veterans in a college or university, making it difficult to target veterans to inform them of STEM opportunities.

Options and/or Recommendations

Increasing the number of scientists and engineers in the U.S. will address the problem of the loss of a significant workforce and its negative impact on the long term prosperity and national security. Veterans are an ideal pool of students to populate the colleges and universities in the STEM fields. Florida, with its significant veteran population, is ideally suited to educate this much needed workforce through its State University System's 11 universities. Attracting student veterans to science and engineering degree fields will provide significant employment for the returning veterans during this time of economic crisis.

Based on the foregoing information, the Legislature has the following options:

- Encourage the Florida Department of Veterans Affairs to coordinate with the SUS and the Florida College System to create a systematic approach to identify veterans or departing servicemembers who may be qualified or interested in pursuing a STEM discipline;
- Encourage higher education institutions in Florida to establish a position at each institution which would be responsible for STEM outreach services targeting veterans;
- Launch a statewide awareness campaign to educate veterans on their potential for success in STEM career fields; and

[35] Although as a whole the respondents reported that there are no specific efforts in attracting veterans to STEM disciplines, many did however make reference to other ongoing initiatives targeting student veterans at Florida colleges and universities.
[36] E-mail correspondence with Daytona State College staff. August 2, 2011.

- Encourage government, universities and colleges, and industry to form partnerships and create collaborative programs to attract veterans to STEM degree fields, ensure academic success during STEM studies, and provide assistance in obtaining internships and full-time employment upon graduation.