

Academic Recognition of Military Experience in STEM Education

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Executive Summary

Recent calls for increases in science, technology, engineering, and math (STEM) education attainment and veterans' education success have created a platform for examining how veterans with military experience in STEM fields can more efficiently complete postsecondary education and training. The American Council on Education (ACE) military evaluation program provides credit recommendations for military courses that align servicemembers' training with postsecondary curricula and competencies. These recommendations, if accepted as transfer credit, can decrease the time it takes servicemembers and veterans to complete STEM certificates and degrees.

Numerous challenges exist in considering military credit recommendations for postsecondary courses and degrees. The process is complex, requiring an acute understanding of military transcripts and the resources and tools available to assist institutions of higher education in awarding credit for military training. Additionally, misinformation and lack

of awareness regarding the content, scope, and rigor of the ACE review process and resulting credit recommendations create resistance to awarding credit.

Successfully increasing acceptance of military credit recommendations at institutions of higher education can be achieved through public-private partnerships between colleges and universities, federal agencies, workforce development experts, and other key stakeholders using available resources and tools to build degree pathways that accurately map military training to STEM courses. An education campaign about the ACE review process and the value of the resulting credit recommendations will also help eliminate the stigma surrounding credit awarded for prior learning, and boost support among leaders and institutions for increased acceptance of military credit recommendations. This approach will lead to the development of best practices and, ultimately, increases in both STEM attainment and veterans' education success.

Introduction

The passage of the original GI Bill in 1944 signaled a historic investment in our nation's veterans and produced a generation that sparked unprecedented innovation and economic growth. In the decade or so after World War II ended, the GI Bill was at least partially responsible for the college education of 450,000 engineers, 238,000 teachers, 91,000 scientists, 67,000 doctors, 22,000 dentists (McBain, 2008, p.2), and at least a million other individuals.

The recent passage of the Post-9/11 Veterans Educational Assistance Act of 2008 (Dortch, 2012), commonly referred to as the Post-9/11 GI Bill, provides more than 2 million servicemembers, veterans, and their families

the opportunity to attend college on a full-time basis without the financial barriers they would otherwise face. Still, today's veterans face staggering unemployment rates compared with their nonveteran peers, despite the additional skills training and employment experience gained in military service. The number of unemployed veterans is expected to grow significantly as American involvement in conflict overseas draws down and thousands of servicemembers transition out of the military.¹

ACE, the major coordinating organization in higher education, represents more than 1,600 two- and four-year college and university presidents and 200 higher education associ-

¹ "Servicemember" refers to any person serving on active duty, in the National Guard, or in the reserve force. "Veteran" refers to any servicemember separated or retired from active duty, the National Guard, or the reserve force.

ations, and has assumed a leadership role in responding to the needs of student veterans and their families. ACE realizes that, for their postsecondary-education and career ambitions to be achieved, our nation’s veterans will require more than just an investment in affordability.

This paper will describe ACE’s work in

Background

Ironically, as use of the Post-9/11 GI Bill to access higher education has steadily increased, so has the unemployment rate of America’s veterans. According to the U.S. Bureau of Labor Statistics (2013), the unemployment rate for veterans 25 years and older who have served since September 11, 2001, was 8.6 percent in 2012, compared with only 6.8 percent for nonveterans. Further, the unemployment rate for post-9/11 male veterans aged 18–24 was a staggering 20 percent, compared with only 16.4 percent for nonveterans of the same age. While these statistics can be alarming, further research shows promise.

According to the *BLS Spotlight on Statistics: Employment Situation of Veterans* report from the U.S. Bureau of Labor Statistics (BLS) (2010), 45.9 percent of Gulf War-era II veter-

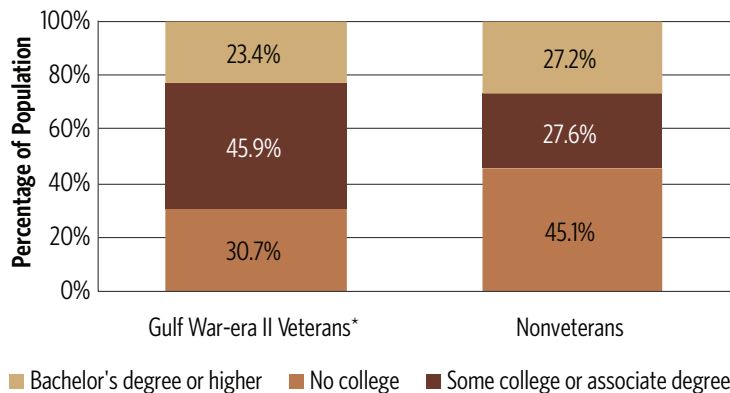
ans² have some college or an associate degree, compared with 27.6 percent of their nonveteran peers. Further, 23.4 percent of Gulf War-era II veterans are college graduates, compared with 27.2 percent of their nonveteran peers. This leaves only 30.7 percent of Gulf War-era II veterans without any college experience, compared with 45.1 percent of nonveterans. Additional data from BLS (2013) show that unemployment rates for veterans with higher levels of education are lower than those for

Solutions to increase STEM education attainment should include a focus on leveraging military experience in STEM fields.

veterans who have not completed a postsecondary credential. This indicates that as post-9/11 veterans return home and begin education and training programs, their risk of unemployment falls.

It is clear that higher education can play a key role in the transition from military to civilian employment, particularly as increased numbers of veterans continue to leverage their Post-9/11 GI Bill benefits to attain postsecondary education. Current work to enhance veterans’ success programs at higher education institutions, existing career counseling at colleges and universities, and

Chart 1. Education Attainment by Veteran Status



Source: U.S. Bureau of Labor Statistics. (2010). *Spotlight on Statistics: Employment Situation of Veterans*.

*Gulf War-era II veterans are considered by the U.S. Bureau of Labor Statistics to be those who served on active duty in the U.S. Armed Forces between September 2001 and the present.

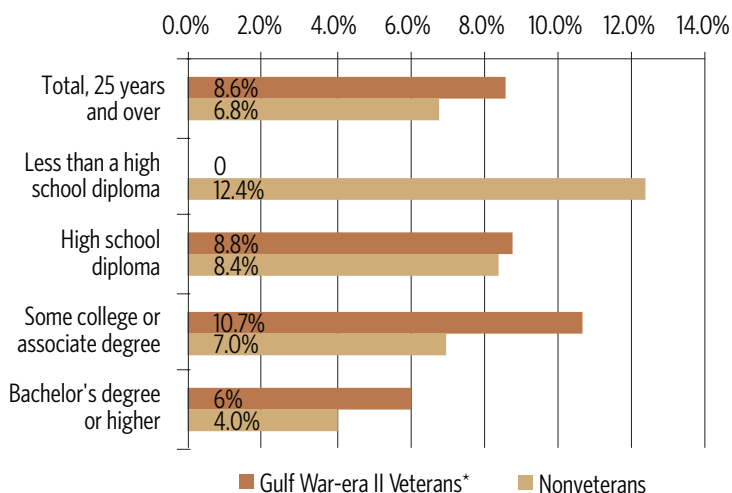
² Gulf War-era II veterans are considered by the U.S. Bureau of Labor Statistics to be those who served on active duty in the U.S. Armed Forces between September 2001 and the present.

transition assistance programs for returning servicemembers provide a platform to increase career training and employment support to veterans. Growing discussions about veterans' unemployment and veterans' education attainment have led to an increased focus on applying military training toward education requirements in postsecondary programs. States such as Oregon have passed bills requiring public institutions to consider military credit for prior learning (Oregon Higher Education Coordinating Commission, 2012). Additional discussions across the nation at both the state and federal level include efforts to increase the acceptance and application of military training toward degree requirements.

At the same time, discussions surrounding educational attainment in STEM fields and projected STEM workforce needs have identified a need to rapidly increase the number of students pursuing STEM education. When coupled with the need to increase veteran education attainment and calls to increase recognition of military experience, it stands to reason that solutions to increase STEM education attainment should include a focus on leveraging military experience in STEM fields.

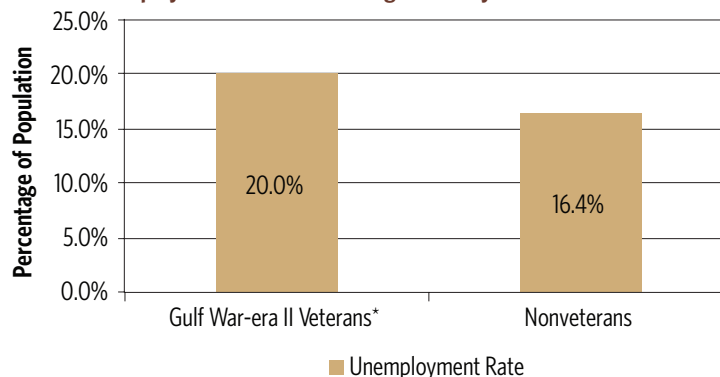
Existing programs and evidence-based research suggest a strategy to ensure that, while veterans take full advantage of their educational benefits, campuses accept the task of helping them succeed through graduation. One significant way an institution can provide this necessary support is through the creation and implementation of institutional policies and procedures regarding the acceptance and applicability of credit recommendations for military experience.^{3, 4}

Chart 2. Unemployment Rate by Education Attainment and Veteran Status
Percentage of Population



Source: U.S. Bureau of Labor Statistics. Employment Situation of Veterans—2012 [news release].
*Gulf War-era II veterans are considered by the U.S. Bureau of Labor Statistics to be those who served on active duty in the U.S. Armed Forces between September 2001 and the present.

Chart 3. Unemployment Rate for Males Age 18-24 by Veteran Status



Source: U.S. Bureau of Labor Statistics. Employment Situation of Veterans—2012 [news release].
*Gulf War-era II veterans are considered by the U.S. Bureau of Labor Statistics to be those who served on active duty in the U.S. Armed Forces between September 2001 and the present.

³ For the purposes of this paper, credit for military training and experience applies only to the U.S. Army, Navy, Marine Corps, and Coast Guard courses evaluated by the American Council on Education (ACE). The U.S. Air Force provides the majority of its training through the Community College of the Air Force, a regionally accredited institution that provides official transcripts without the need for ACE evaluations and credit recommendations. The process for reviewing and awarding credit for Air Force training varies greatly from that of the other branches of service and is not addressed in this paper.

⁴ For the purposes of this paper, credit for military training and experience applies only to military courses reviewed by ACE. ACE also reviews and provides credit recommendations for on-the-job training acquired in many occupations. The occupation review process differs slightly, although recommendations found on the Joint Services Transcript retain the rigor and integrity of the peer-review model.

ACE Military Evaluation Program

During their time in the military, servicemembers receive significant training, both in the classroom and on the job in a variety of career fields, including engineering and technology. This training and experience provides them with rich knowledge and expertise. Unfortunately, without the proper guidance, education, and support, many of these individuals are unable to find jobs commensurate with their years of training and experience. This difficulty translating military experience to the civilian workforce has played a significant role in the high levels of unemployment among veterans.

Founded in 1918 as an emergency council to ensure the United States had a ready supply of technically trained military personnel in World War I, ACE has been actively involved in meeting the postsecondary education needs of America's servicemembers and veterans. Today, ACE evaluates hundreds of military courses and occupations annually for college credit recommendations to bridge the gap between military education and postsecondary curricula.

Since 1945, ACE has held a U.S. Department of Defense (DoD) contract to evaluate military training and experience in order to provide postsecondary credit recommendations for courses and occupations that institutions of higher education can use as a guide when considering military experience for credit toward a credential. In addition to publishing the results of these evaluations in the Guide to the Evaluation of Educational Experiences in the Armed Services, ACE collaborates with the DoD to detail this work on nationally recognized transcripts for members of the Army, Navy, Marine Corps, and Coast Guard. The registries for these transcripts hold the records of more than six million servicemembers and veterans.

The ACE Military Evaluations Program provides institutions with a basis for recognizing military educational experiences in terms of civilian academic credit. This is done by evaluating formal courses, publishing descriptions and academic credit recommendations, and supporting transcript and registry services. Last year, more than 400,000 servicemembers and veterans' transcripts were processed through the Army/American Council on Education Registry Transcript Service (AARTS) and the Sailor/Marine American Council on Education Registry Transcript (SMART) service.⁵

Course evaluations are conducted through a DoD contract at schools and training centers on military installations. Classroom courses that are 45 academic hours or more in length are eligible for review; all programs of instruction are submitted to ACE through a central training authority from each service branch. ACE also reviews some correspondence and distance-learning courses that require firm identification of the student (via photo ID, keystroke software, etc.) in a proctored and controlled environment for assessment.

The commitment to academic integrity begins with course evaluators, who are all college and university faculty members chosen for their training, experience, and knowledge of curricula and instructional methods. To qualify, evaluators must be actively teaching college-level courses at an accredited institution and have a minimum of five years' teaching experience. ACE conducts a formal selection process with a content-review committee to identify the appropriate evaluators for the team. These evaluators represent a wide diversity of disciplines and backgrounds, including work at two- and four-year institutions—both public and private—and their experience being reviewed by different regional accreditation agencies.

⁵ On March 4, 2013, the AARTS and SMART systems combined into one Joint Services Transcript system. Servicemembers from the Army, Navy, and Marine Corps now request their transcripts from the same system, allowing one transcript to reflect all courses taken while in service, regardless of which branch formally offers the training. The ACE Military Guide continues to provide course recommendations based on the branch offering the training.

The faculty evaluators review and validate course materials, such as instructor manuals, student materials and assessments, syllabi, texts, and presentation materials, to determine the content, scope, and rigor of the course and how it aligns with those currently offered at accredited institutions of higher education. To arrive at their recommendations, team members consider a number of relevant factors, which include course content, learning outcomes, level of difficulty, depth and breadth of material, evaluation methods, and applicability to postsecondary programs.

Each course is reviewed by at least three evaluators who must reach 100 percent consensus on credit recommendations and formal documentation. Team members are asked to analyze the alignment of credit recommendations and validate the learning outcomes according to accepted educational hierarchies. Credit recommendations are made at four basic levels: vocational (V), lower division (L), upper division (U), and graduate (G). Faculty evaluators exercise professional judgment and

consider only those competencies and learning objectives that can be equated to postsecondary curricula.

Once credit recommendations have been agreed upon, ACE reviews and compiles the supporting documentation and recommendations in a database the DoD accesses to create the transcripts that servicemembers and veterans provide to institutions. Servicemembers and veterans can then request an official transcript through the Joint Services Transcript (JST) website (formerly the AARTS and SMART websites) be electronically submitted to an institution of higher education for transfer-credit consideration.

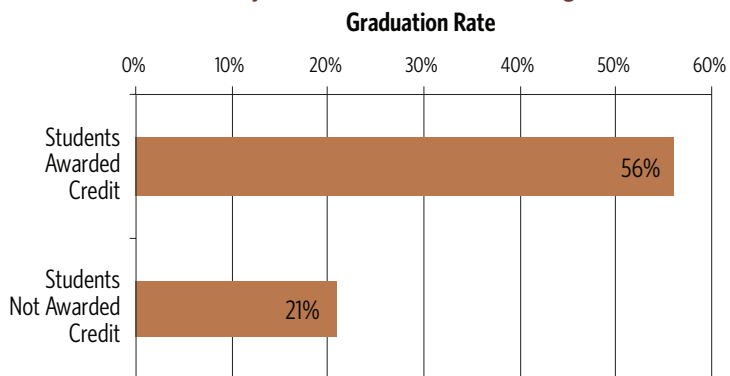
According to Michele Spires, director of military programs at ACE, the Council conducted 40 installation visits and evaluated more than 422 military courses and occupations during fiscal 2012. These evaluations leveraged the expertise of 109 faculty members from 100 diverse academic institutions (M. Spires, personal communication, January 22, 2013).

Military Training and Academic Credit

Acceptance and applicability of military training to degree programs has been a key topic of discussion among institutions of higher education. Studies, such as the recent Council for Adult and Experiential Learning report *Fueling the Race to Postsecondary Success: A 48-Institution Study of Prior Learning Assessment and Adult Student Outcomes* (Klein-Collins, 2010), indicate that 56 percent of nontraditional students who are awarded prior-learning credits graduate within seven years. Comparatively, nontraditional students not awarded credit for prior learning have only a 21 percent graduation rate within that same seven-year time frame. This research supports increasing the acceptance of credit for prior learning, such as credit for military experience, when

looking to develop programs that will increase education attainment in postsecondary programs, including STEM certifications and degrees. Acceptance of prior learning credits will not only increase retention and completion

Chart 4. Graduation Rate by Award of Credit for Prior Learning



Source: Klein-Collins, R. (2010). *Fueling the Race to Postsecondary Success: A 48-Institution Study of Prior Learning Assessment and Adult Student Outcomes*. Council for Adult and Experiential Learning.

Acceptance of military credit recommendations and application of those recommended credits toward a postsecondary program is voluntary.

rates, but also decrease time to attainment.

In a process similar to that used for transcripts from institutions of higher education, official military transcripts can be submitted to an institution for consideration of transfer credit. School officials can use the information listed on the transcripts, along with more detailed information regarding the recommended course credit on ACE's online Guide to the Evaluation of Educational Experiences in the Armed Services, to decide whether to accept the recommended credit. The guide lists recommended credit units in academic disciplines as well as required learning outcomes, topics of instruction, and related competencies. These exhibits support the credit recommendation for a certain subject area, and were created to give specific guidance to registrars, deans, and other school officials looking to apply the courses to their institutions' degree requirements.

Along with the information found on the JST transcript and ACE Military Guide, other resources exist to aid institutions in the acceptance of military credit. Organizations such as Servicemembers Opportunity Colleges (SOC) (2013a) exist to promote servicemembers' completion of postsecondary education. Those institutions who wish to be members of the SOC Consortium must agree to the organization's requirement to recognize and use ACE's

Military Guide (2011). The SOC Consortium guide identifies policies about the acceptance of nontraditional credit, particularly military service school and experience credit. In addition to requiring members of SOC to agree to accept some military training as equivalent to credit-bearing coursework, SOC also provides resources to aid institutions with mapping military training to similar courses needed for degree completion (2013b). The SOC Degree Network System (DNS) Credit Evaluation Supplement is intended to guide DNS member institutions in the acceptance and mapping of nontraditional credit to degree requirements. The ACE subject credit terms found in the Military Guide are mapped to SOC course category codes in various academic fields (n.d.).

ACE provides robust reviews of military training and experience, as well as sound credit recommendations that higher education institutions can use to consider how such prior learning may be applicable to their course offerings. However, it is important to understand that this information only provides guidance. Acceptance of military credit recommendations and application of those recommended credits toward a postsecondary program is voluntary—there is no mandatory process or requirement for awarding transfer credit for military experiences. Each institution of higher education has its own set of policies and criteria regarding how much and what kind of credit to accept and apply toward a student's degree progress. Institutions must engage in a highly individualized, resource-intensive process to properly align credit recommendations with their academic curricula to ensure that military training meets their program and course requirements.

Military Training and STEM Education

By mapping specific military training to undergraduate programs, institutions of higher education can identify what coursework remains to be completed for a servicemember to earn a certification or degree. Further, developing programs that leverage military credit recommendations—including modular or bridge courses to meet gaps in military training—not only helps soldiers, sailors, marines, and veterans who are already trained and experienced in STEM fields earn their degree more quickly; it ensures that there are more qualified candidates for employers in those fields. Courses delivered via distance learning would also allow servicemembers to begin their education while still actively serving, further accelerating time to completion. Such courses would be for credit, and therefore students would be able to use DoD tuition assistance and GI Bill funding to pay for their education.

Programs that leverage military credit recommendations help servicemembers and veterans earn STEM degrees more quickly. Just as importantly, they also increase the supply of qualified candidates for STEM employers.

Two successful career-focused programs at community colleges provide models for this type of work:

1. Clackamas Community College (OR) identified the most popular education programs for their student veterans and successfully mapped military training to these programs. The college's extensive work allowed it to build modularized courses for veterans, increase acceptance of credits for military training, and decrease the time necessary to earn licenses, certificates, and associate degrees. In some cases, as few as seven credit hours were all a veteran needed to attain an associate degree in applied science (ACE, 2011).
2. Fresno City College (CA) partnered with the Fresno City Regional Workforce Investment Board and Pacific Gas and Electric Company to develop a program that identified local projected job openings and trained veterans in the skills needed to fill those jobs. The training programs combined academic credit in math and English with focused skills for specific jobs and successfully placed 99 percent of its students within weeks of completion (ACE, 2011).

Colleges and universities offering STEM education could model their programs similarly. For example, a Navy veteran who served as a computer network technician for the Aegis naval weapons system will have the following credit recommendations on his or her official transcript:

- Three semester hours in electronic systems operation and maintenance (L)
- One semester hour in electronic systems maintenance laboratory (L)
- Three semester hours in network fundamentals (L)
- Three semester hours in UNIX system administration (L)

Institutions offering a degree in computer engineering may be able to map these recommendations to their degree plan, allowing this Navy veteran to receive transfer credit for courses such as electrical circuit analysis and lab, introduction to computer networks, and/or various technical elective requirements.

Careful review of military credit recommendations and related competencies and comparison to course requirements would be needed to ensure the veteran demonstrated all required knowledge, but this model would decrease the number of courses a veteran would need to take to complete a related degree program, supporting student veteran retention and success in STEM fields.

Barriers to Acceptance

As institutions consider whether military credit recommendations may be applicable to their degree programs, they face a number of challenges that must be overcome to successfully leverage the tools and resources available. The process for reviewing military transcripts and making transfer-of-credit decisions is complex and involves numerous considerations. Like other students who bring transcripts to an institution for consideration, servicemembers' transcripts vary greatly, even among those who held similar occupations in the military. For example, Navy information-systems technicians and Army information-technology specialists receive different training, while Army information-technology specialists who trained in 2001 received different training than those who trained in 2012. Recommendations are also made for leadership training, advanced skill training, and other military schools (such as airborne or air assault training), so that even two Army information technology specialists who initially trained side by side are likely to have differing transcripts, depending on the progression of their military careers. This means institutions cannot generically map a set of recommendations from a particular military occupation to certain courses without having to constantly examine additional or evolving training with each transcript they see.

Additionally, military training is vastly different from academic instruction, in that the military trains to complete particular missions, rather than to cover the full breadth of academic subjects. Military programs also are not traditionally segmented by material or length, leading to credit recommendations from one military course for multiple disciplines and varying levels of credit. One military course might generate ACE credit recommendations of two credit hours in one discipline, one credit hour in another, four credit hours in a third, and three credit hours in an advanced course. While military competencies taught may meet part of the requirements for an academic course, gaps

may exist between military recommendations and the competencies needed to pass a course at an institution of higher education. This may lead, for example, to veterans needing to take a full three credit-hour course to meet program requirements, even if they have some training in that particular field. An Army medic may have a two credit-hour recommendation in anatomy and physiology without a laboratory component but the institution may only teach a four credit-hour course in anatomy and physiology and require a laboratory component for many degrees. Should this student need anatomy and physiology to complete a degree, he or she might be required to take the full course with a lab to meet the academic requirements set by the institution.

Bundling recommendations and competencies can lead to increased acceptance of transfer credit.

When considering military credit recommendations for transfer of credit, an institution must also consider the program of study a student has entered and the course requirements for that program. Whether a servicemember or veteran is staying in a field similar to that of his or her military training or moving to a new career path will affect how credit recommendations can apply to an individual's transcript. Further, servicemembers who have completed numerous courses in one field may have acquired the necessary competencies to complete a postsecondary course, but these recommendations may be spread across different military course evaluations. Therefore, institutions need to consider the full breadth of a military transcript, taking a holistic approach rather than considering only one segment of the servicemember's training. Bundling recommendations and competencies can lead to increased acceptance of transfer credit.

In addition to challenges mapping military credit recommendations to education programs, institutions face barriers to developing programs due to a lack of awareness and understanding. Myths about acceptance of recommended military credit include the fear of losing institutional or program accreditation through accrediting boards such as ABET because of a perceived loss of control of academic rigor. While academic rigor is of significant importance to accrediting bodies, an institution receives accreditation “when it complies with the criteria, policy, and procedures upon which an ABET (or other accrediting body) review is based” (ABET, 2011). No ABET requirement prevents an institution from applying transfer credit or credit for prior learning toward degree requirements. Institutions wishing to increase acceptance of transfer credit can work with accrediting bodies to develop a policy on acceptance of prior learning that demonstrates a careful consideration of how credit recommendations align with course curricula and that is in line with

the criteria of the accrediting bodies, helping to ensure that an institution will not lose its accreditation.

Institutions are often wary of accepting military credit recommendations because of assumptions that credit for prior learning places focus on quantity over quality of education, and lowers the value of institutions’ education. Credit for prior learning is sometimes viewed as “putting pressure on colleges to lower the bar for a degree or credential” (Fain, 2012). Including military credit recommendations in these discussions arises from a general lack of understanding of the evaluation process as a peer-review process. Faculty at institutions worry that military training does not meet the academic content, scope, and rigor of post-secondary curricula, leading to a resistance to accepting credit recommendations. In fact, it is current faculty who are reviewing the military training and providing the credit recommendations—an important piece of the process that ensures military credit recommendations are up to appropriate standards.

Opportunities for Development

A two-pronged approach to developing programs for mapping military credit to STEM education will rapidly enhance opportunities and ultimately lead to increased STEM attainment. First, partnerships need to be developed among institutions of higher education, relevant federal agencies, workforce development organizations, relevant associations and foundations, and other key stakeholders to explore military STEM occupations. Examining the education and training servicemembers receive, how the training aligns with STEM curricula, and what gaps exist between military training and workforce needs will lead to the development of STEM programs that leverage military training, decreasing time to attainment for military veterans and increasing engagement and retention in STEM fields.

Development of these programs will only be effective if leadership and faculty at institu-

Partnerships need to be developed among institutions of higher education, relevant federal agencies, workforce development organizations, relevant associations and foundations, and other key stakeholders to explore military STEM occupations.

tions of higher education buy into the concept of applying military credit recommendations toward degrees. Communications campaigns aimed at eliminating myths and stigmas surrounding military credit recommendations and application toward degrees must also be a part of this plan. Such campaigns will help faculty and administrators at colleges and universities understand the benefits of leveraging

credit for prior learning—including military credit recommendations—and the tools available for developing policies and procedures for applying credit to degree plans. This will encourage institutions to develop programs that leverage military credit recommendations. Ensuring that faculty and academic officers understand the evaluation process as a peer-review system and value the content, scope, and rigor of credit recommendations will further increase support. Finally, working with regional and programmatic accrediting bodies to ensure that institutions understand

how to create transfer-credit policies that do not jeopardize accreditation status will help eliminate barriers to success.

Ensuring that faculty and academic officers understand the evaluation process as a peer-review system and value the content, scope, and rigor of credit recommendations will further increase support.

Conclusion

The acceptance and application of military training to degree programs is not an easy task to undertake for any institution of higher education. Reviewing transcripts, mapping military credits to degree programs, and calming the fears of educators afraid of losing academic integrity and accreditation with the acceptance of military credit are all relevant issues.

The strong academic rigor and integrity behind ACE's reviews of military training and experience provide institutions with tools to engage and retain a population already experienced in STEM fields.

Still, the strong academic rigor and integrity behind ACE's reviews of military training and experience provide institutions with tools to engage and retain a population already experienced in STEM fields. Acceptance of this credit, when done properly, does not take away from the value of a degree, but can create an opportunity for a student veteran to complete a degree in a timely fashion. The presence of veterans can also provide significant value to other students in a classroom setting, given the experience and training veterans bring with them from their time in service. These veteran students will enter the workforce with prior experience in the field and the postsecondary education necessary to make them remarkable employees who make significant contributions to STEM fields.

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