FROM BATTLEFIELD TO CLASSROOM: FINDINGS, BARRIERS, & PATHWAYS TO ENGINEERING FOR US SERVICEMEMBERS

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Largest expansion of benefits since original 1944 GI Bill

Significantly larger investment than 1985 Montgomery GI Bill (3 years service + $1,200)

Made all servicemembers (i.e., reserves) who serve a minimum of 90 days active duty after 9/10/2001 eligible for educational benefits

Full benefit funded 100% of a public 4-year undergraduate degree: 3 years active duty

Transfer to spouse or children after agreeing to serve 4 additional years—recognizing military duty has repercussions on family’s higher education

Yellow Ribbon Program – university pays difference between Bill benefits and actual tuition & fees
SOME STATISTICS

- FY 2010, 365,640 veterans using post 9/11 GI benefits
- Predictions for 2-3 million separated soldiers transitioning out of the services over the next few years
- 5.5 million Gulf War veterans (service from 2 August 1990 to present); 2.5 million are post 9/11 veterans
Before WWII, college & homeownership were “unreachable dreams”

Peak year of 1947 veterans accounted for 49% of college admissions

By Bill’s end (1956) 7.8 million of 16 million veterans took education or training programs

14 Nobel Prize winners, 91,000 scientists, 67,000 doctors, and 450,000 engineers got their start with GI Bill benefits

HISTORY SPEAKS LOUDLY: WE KNOW THE 1944 GI BILL...

- Expanded US postwar economy, especially in STEM
- Delivered the “Greatest Generation”: veterans formed the backbone of the postwar era when US became a technological powerhouse & global superpower
- US society reaped benefits: democratization of universities, conversion to a nation of home-owners, expansion of middle class from 10-30%; role of STEM innovation in US economic superiority

These developments required 2 linked mechanisms: (1.) the historic 1944 GI Bill which educated 8 million veterans (2.) available, meaningful educational and professional pathways.
POST-9/11 GI BILL: OPPORTUNITIES FOR ENGINEERING SECTORS

1. Women and men of US armed forces = national resource in technical capacity, military training, leadership and team-play mentality $\rightarrow$ backbone for future US technical innovation

2. Amazing diversity of US armed forces $\rightarrow$ diverse pipeline for engineering

3. Critical juncture: newly expanded veterans' benefits enables higher education to serve those who have sacrificed, and veterans gain educationally from the new GI Bill

4. Innovative approach: we have too often approached this problem in non-reciprocal, unidirectional terms not as a dialectical, multi-directional issue: what can we offer veterans, but what veterans can offer university campuses: a lot! Civic duty in action (scholarship in action); leadership skills; discipline; excellence; perseverance; indisputably, the team-work; frankness about vulnerabilities (PTSD); experience; most diverse institution in the country, etc

5. Maximize long collaboration between engineering and government defense sectors: innovative technical research drives economic growth and national security
DATA ABOUT:

A. Engineering, aspirations for engineering, pipeline to engineering
B. Military servicepersons & separated veterans as postsecondary students? Post-9/11 GI Bill use
C. Veteran student needs and supports in the academic context: their recommendations...
D. Pathways: Educational and Career

Findings: 4 Broad Categories
Potential Pipeline: Air Force Enlistees

- **Tuition Assistance**
  - CC of the AF
  - Engineering Degree

- **GI Bill Assistance**
  - Engineering Work Force

✧ Expectation to get degrees throughout service (i.e., CCAF degrees in Applied Science that track AF job): if business or technical, will use tuition assistance funds; if Bachelors while in USAF will do in business or criminal justice or computer networking

✧ Upon separating, give benefits to dependents, or use benefits to get a degree in something completely different than they did in USAF, almost never engineering: Oncology, Finance, Middle Eastern Culture, physicians assistant, business (common).
Potential Pipeline: Air Force Commissioned

1. **Begin with Bachelors Degree**
   - Often in Engineering or International Relations

2. **Earn Master’s Degree**
   - Often in MS in Engineering

3. **Enter Engineering Workforce**
   - Get MBA

- **Tuition Assistance**
- **GI Bill**
Potential Pipeline: Army Enlistees

- Earn credits while in army -> AA degree (sometimes)
- Continue Schooling For Eng. Degree
- Begin career in Engineering

- Commonly used GI Bill for themselves; often talked about aspiration in terms of “training and certification” rather than degrees; especially true of technicians e.g. mechanics
- On the other hand, many who were technically trained sought to change field upon separation and planned to use benefit for this: i.e., business admin, veterinary science, culinary arts, music education, law, criminal justice
- Infantry forces often saw little application of their training to the outside world except for military police, so often intended “to start over again” in international business, advertising, criminal justice.
A & B: SERVICEMEMBERS’ EDUCATIONAL & ENGINEERING ASPIRATIONS, THOUGHTS ON POST-9/11 GI BILL BENEFITS:

1) Education is not necessarily a universal value—enlisted/officer distinction

1) GIs are generally not focused on engineering

2) Military operational specialty (Army: MOS)—lots of specialized, technical training—does not correlate well with technical educational aspirations, specifically engineering, or career goals

3) GIs often reported: disliking their MOS; what they were trained for did not become their job; they liked neither their job nor MOS

1) Streamlining or tracking into very traditional job sectors: Law enforcement

2) Lack of consciousness about their technical expertise, capacity, and training
C: Student Needs and Identified Supports

1) Significant anxieties about campus climate and campus life
2) Educators should presume that all veterans have some degree of PTSD
3) Definite opinions about climate, curriculum, learning style and structure they preferred—much of which mimics military structure, culture, and training habits
4) Concerns about time-frame for completing a degree and whether they would like the occupation they ended up with - not comfortable with uncertain results
5) Wanted universities to do outreach programs at bases—by the time they were separated it was too late
**D: PATHWAYS: EDUCATIONAL AND CAREER**

Engineering and science are at a disadvantage for attracting servicepersons

1) Pathways to post-secondary education are pretty well established – do not tend toward engineering

2) Credits are difficult to transfer from training, AA degrees

3) Little online training in engineering available during the period in service

4) Personnel are inculcated with a training, job-occupation, short course approach to education that does not necessarily set them up for undergraduate engineering
RECOMMENDATIONS

1) Modularize higher education on the model of military training framework, and provide hands-on experiences (emphasize inductive reasoning)

2) Create academic visiting professorships for military instructors

3) Universities/colleges need to take responsibility for educating service personnel on these benefits

4) Servicepersons are thirsty for understanding the difference in quality between colleges/universities, degrees, online degrees, etc. Knowledge of academia is extremely limited and limiting:
   - Specifically, help them understand how to plan to get the education they need to transfer into an engineering program

5) Understand what student veterans can offer campus life and the profession long-term
Questions?
Future Needed Research/Questions we are left with…

1) How to contend with multifaceted, often cultural barriers for postsecondary engineering or even education in general?

2) How to mitigate campus climate concerns?
   - Military visiting professorships and leadership
   - Redress fears of unknown future, knowing exactly what kind of job the degree gets them—“shadow programs” “take your serviceperson to work day”
   - Dying for impartial information – people without an agenda about what would help them educationally?

3) WISE model relevant for researching problems of targeted/supported community (i.e., longitudinal studies, attrition, etc.); understanding how targeted population and its diversity is helpful for campuses

4) Understand what student veterans can offer campus life and engineering long-term: leadership development and skill-sets (particularly in government sector)

5) Diversifying higher education in ways we still do not understand…
As Universities succeed in integrating servicepersons into university life, STEM, engineering, we can ask:

1. Who is the veteran student?
2. Attrition/degree completion studies on veterans
3. Variables/predictors of success
4. Diversity—a different take?
5. STEM leadership (adding value to universities, government, private sector partnerships)
We are not alone in these endeavors...
A&B: Servicemembers’ Educational & Engineering Aspirations, Thoughts On Post-9/11 GI Bill Benefits:

**Air Force (USAF)**
- Expectation to get degrees throughout service (i.e., CCAF degrees in Applied Science that track AF job): if business or technical, will use tuition assistant funds; if Bachelors while in USAF will do in business or criminal justice or computer networking
- Upon separating, give benefits to dependents, or use benefits to get a degree in something completely different than they did in USAF, almost never engineering: Oncology, Finance, Middle Eastern Culture, physicians assistant, MBA (common).

**Army (USA)**
- Commonly used GI Bill for themselves; often talked about aspiration in terms of “training and certification” rather than degrees; especially true of technicians e.g. mechanics
- On the other hand, many who were technically trained sought to change field upon separation and planned to use benefit for this: i.e., business admin, veterinary science, culinary arts, music education, law, criminal justice
- Infantry forces often saw little application of their training to the outside world except for military police, so often intended “to start over again” in international business, advertising, criminal justice.
D: MILITARY-INCULED TRAITS, MILITARY CULTURE AND STRUCTURE: Predictors of Academic Success and Needs? Their Talents?

1) Are these predictors of success? How will they play out in the academy?
2) How can these talents be used in the academy?
3) Many of these traits are valued in the work world; if universities and engineering programs do not recruit veterans and recognize their value, others will:
   - MBA programs
   - Technical programs
   - Online/for profit universities
1. Universities/Deans need to predict numbers, understand student veteran needs, plan programs and supports

2. Tremendous talent & technical training in the all volunteer force which, post-service, will be directed toward other fields: LE, MBA, etc.

3. Challenge: academia lacks familiarity with this population → lost opportunities for universities to play a role in STEM recipients achieving government/public leadership

4. Innovative approach: we have too often approached this problem in non-reciprocal, unidirectional terms not as a dialectical, multi-directional issue: what can we offer veterans, but what veterans can offer university campuses: a lot!
   - Civic duty in action (scholarship in action); leadership skills; discipline; excellence; perseverance; team-work; frankness about vulnerabilities (PTSD); experience; indisputably, the most diverse institution in the country, etc.
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Research Questions

1. Do active duty servicepersons and separated veterans have an interest in using their Post-9/11 GI Bill benefits to pursue engineering?

2. What are their aspirations for engineering fields and career trajectories?

3. What are their needs once they arrive at universities to pursue such degrees?

4. How we might support them in these endeavors?

Mixed Methods

I. **Focus group interviews** (2 moderators + assistants; 5-15 participants)
   - Visited 4 bases and scheduled sessions with SU and local college student veterans
   - 200 unique data points
   - Requested mix of MOS’s, rank, background, technical density
     - Fort Drum (Army): combat troops
     - Fort McGuire (USAF); Fort Dix (USAF) Fort Lakehurst (Navy)
     - Student veterans: 3 sessions at SU; 1 session at OCC

II. **Online survey data** currently collected now via the VA’s point of contacts:
   - Expectation is to reach 500,000 vets
D: MILITARY-INCUSCATED TRAITS, MILITARY CULTURE AND STRUCTURE: Predictors of Academic Success and Needs? Their Talents?

- All aspects of teamwork: team-playing, team building, esprit de corps
- Leadership: training, literacy, knowledge, models
- Discipline: ability to prioritize, achieve under austere circumstances, bracket emotions, put organizational mission and rules above all else
- Perseverance
- Pursuit of excellence
- Respect for diversity
- Structure
- Civic Duty and commitment
STATE OF KNOWLEDGE

DATA

- **Surprising** little data—at national level and across military branches—investigating servicepersons’ (active, separated) educational aspirations, degree programs, completion, post-degree career routes

  - Not Veterans Affairs (VA)
  - Not US Census Bureau/Labor Department
  - Not DoD, Defense Manpower Data Center (DMDC) at the Office of the Secretary of Defense or DoD Personnel & Procurement Statistics
  - Not Dept of Education

- Some data is strong servicepersons and veterans’ experiences with the new Post-9/11 GI Bill (ACE/Rand 2010)