

Military Veteran Students' Pathways in Engineering Education (Year 2)

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Susan M. Lord received a B.S. from Cornell University and the M.S. and Ph.D. from Stanford University. She is currently Professor and Chair of Electrical Engineering at the University of San Diego. Her teaching and research interests include electronics, optoelectronics, materials science, first year engineering courses, feminist and liberative pedagogies, engineering student persistence, and student autonomy. Her research has been sponsored by the National Science Foundation (NSF). Dr. Lord is a fellow of the ASEE and IEEE and is active in the engineering education community including serving as General Co-Chair of the 2006 Frontiers in Education (FIE) Conference, on the FIE Steering Committee, and as President of the IEEE Education Society for 2009-2010. She is an Associate Editor of the IEEE Transactions on Education. She and her coauthors were awarded the 2011 Wickenden Award for the best paper in the Journal of Engineering Education and the 2011 Best Paper Award for the IEEE Transactions on Education. In Spring 2012, Dr. Lord spent a sabbatical at Southeast University in Nanjing, China teaching and doing research.

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Dr. Catherine Mobley, Clemson University

Catherine Mobley, Ph.D., is a Professor of Sociology at Clemson University. She has over 20 years experience in project and program evaluation and has worked for a variety of consulting firms, non-profit agencies, and government organizations, including the Rand Corporation, the American Association of Retired Persons, the U.S. Department of Education, and the Walter Reed Army Institute of Research. Since 2004, she has been a member of the NSF-funded MIDFIELD research project on engineering education; she has served as a Co-PI on three research projects, including one on transfer students and another on student veterans in engineering.

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Michelle Madsen Camacho is Professor in the Department of Sociology at the University of San Diego. She formerly held two postdoctoral fellowships at the University of California, San Diego, at the Center for U.S.-Mexican Studies and in the Department of Ethnic Studies. Fluent in both quantitative and qualitative research methodologies, her research uses theories from interdisciplinary sources including cultural studies, critical race, gender and feminist theories. Central to her work are questions of culture, power and inequality. She is affiliated faculty with the Department of Ethnic Studies, Women's and Gender Studies, and Latin American Studies.

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Abstract

Given the diverse backgrounds of veterans, their increasing numbers, and the growing national demand for engineers, the timing is ideal to study the conditions under which student veterans pursue engineering education and the factors that support their success. This project aims to address gaps in the literature on student veterans in engineering through a comparative case study across four institutions: University of San Diego (USD), North Carolina State University (NCSU), Purdue University, and Clemson University. Our research questions include:

1. Why do veterans pursue a Bachelor's degree in engineering?
2. How do military experiences shape student veterans' educational experiences?
3. What are the experiences of student veterans in engineering education?
4. How do institutions support veterans in engineering education?

Our research plan incorporates content analysis of academic policies that student veterans encounter, interviews with key informants on each campus, focus group interviews with student veterans, and in-depth student interviews to elicit rich narratives. The theoretical framework builds on Tinto's student integration model and Schlossberg's adult transition theory. This study has potential for broad systemic impact by diversifying pathways to and through engineering programs, and in capitalizing on the informal and real-world experiences of engineering student veterans.

During the first phase of the grant, our team developed protocols for key informant interviews and interviewed 23 key informants at our institutions. We identified three themes that shape student veteran experiences on these campuses: the presence/absence of key student policies; student support services; and gaps in the provision of such services. At each institution, there has been a heightened emphasis placed on improving services for veterans and the policies that provide the framework for these services. We also identified a few challenges faced and assets brought by student veterans to campus from the perspective of administrators.

We have worked extensively with our distinguished External Advisory Board (EAB) to inform and refine our method. For example, based on their feedback, our qualification survey for our focus group participants was redesigned to be shorter and to use more appropriate military terminology. The student focus groups began in Fall 2015 at USD, NCSU, and Purdue and will continue into Spring 2016 at Clemson.

Project goals

Military veterans hold tremendous promise for expanding and diversifying the engineering workforce.¹ Given the diverse backgrounds of veterans, their increasing numbers, and the growing national demand for engineering professionals, the timing is ideal to study the

conditions under which student veterans pursue engineering education and the factors that offer them the greatest support for success. Increasing the participation of veterans in engineering offers the possibility of enhancing engineering's diversity in many needed dimensions since, compared to civilian students, veterans are more likely to be older, first-generation college students, disabled, African American, or Latino. Yet, little is known regarding the educational pathways and experiences of student veterans into engineering. This project therefore aims to address gaps in the literature on student veterans in engineering through a comparative case study across four institutions: University of San Diego (USD), North Carolina State University (NCSU), Purdue University, and Clemson University.

The following research questions are addressed:

1. Why do veterans pursue a Bachelor's degree in engineering?
2. How do military experiences shape student veterans' educational experiences?
3. What are the experiences of student veterans in engineering education?
4. How do institutions support veterans in engineering education?

Major activities

During Year 1 (Fall 2014-Summer 2015), the project team has been working well together and making progress on all planned tasks. We received IRB approvals for our key informant interviews and student focus groups and interviews.

Interviews with key informants on 4 campuses: This task was scheduled for Fall 2014 and Spring 2015 and is on track. We developed protocols for the key informant interviews and have identified and interviewed 23 key informants at our institutions (USD (3), Clemson (6), Purdue (9), and NCSU (5)). Key informants include professionals supporting veterans in student veteran success centers, financial aid, advising offices, and other student support services. The interviews have been audio-recorded and transcribed for analysis. Preliminary results from these interviews were presented at the 2015 Frontiers in Education conference in October 2015.²

Refine research methodology: This task has been ongoing. Feedback from our January External Advisory Board (EAB) conference call and June EAB meeting has been invaluable in helping inform and refine our method.

Focus Groups at 4 campuses: To recruit students for the focus groups, we will be sending invitation e-mails with a link to an online qualification survey. This survey will provide background information about the student veterans and allow us to select participants for the focus groups. A draft of this qualification survey was presented to the EAB in January 2015. Based on their very valuable feedback, it was redesigned to be shorter and to use more appropriate military terminology. The survey was further refined in response to feedback from our June meeting and will be pilot tested with a handful of student veterans not involved in the study. The survey is now available on Qualtrix and will be customized for each campus as the focus groups are being scheduled.

We developed and presented an initial draft of the interview protocol for conducting student focus groups to the EAB in January 2015. Based on their feedback, we decided that we needed to spend more time developing this interview protocol, conduct more key informant interviews, and continue to read the literature on student veterans. The student focus groups were originally scheduled for Spring 2015 and Fall 2015. Instead focus groups at all campuses began in Fall 2015. In Fall 2015, focus groups were held at USD, NCSU, and Purdue. A focus group is scheduled for early Spring 2016 at Clemson.

Analysis of focus group data. Focus group analysis was originally scheduled to begin in Summer 2015 and go through Summer 2016. Given the change in plans described above, analysis will begin in Fall 2015 as focus groups are conducted and transcribed and analysis will continue through Fall 2016.

Advisory Board meeting: A conference call was held in January 2015 and an in-person meeting was held in San Diego, CA on the USD campus on June 19, 2015. We have worked extensively with our distinguished External Advisory Board (EAB) which includes a recent student veteran engineering graduate, an engineering faculty member who has done research on supporting student veterans, a researcher from the Purdue Military Family Research Institute, a Marine Corps veteran who is an adjunct engineering instructor, a retired Marine Corps Major General who has been active in the national leadership of the Student Veterans of America (SVA), and a retired Marine Corps veteran who has been involved in various educational programs including the Voluntary Education Programs, Transition Assistance Programs, and the State of California Governor's Troops to College Program. The EAB has worked with us to inform and refine our method. For example, to recruit students for the focus groups, we send invitation e-mails with a link to an online qualification survey that collects background information and allows us to select participants for the focus groups. A draft of this qualification survey was presented to the EAB. Based on their feedback, it was redesigned to be shorter and to use more appropriate military terminology.

Dissemination: The dissemination of research results was scheduled for Summer 2015 and Fall 2015. We are right on schedule with this milestone as we presented a paper at the ASEE conference in Seattle, WA in June 2015³ and another one at the Frontiers in Education (FIE) conference in El Paso, TX in October 2015.²

Project team meetings: Our research team has been meeting biweekly via telephone conference to plan, coordinate, and discuss the project elements. Our team met in person on June 14, 2015 in Seattle, WA during the ASEE Annual Conference followed by a joint meeting with the research team and EAB June 19, 2015 in San Diego, CA.

Additional Research Progress

Catherine Mobley attended the NASPA Veterans Conference from February 9-10, 2015 in Louisville, KY. NASPA is an association for Student Affairs Administrators in Higher Education. She attended many sessions and shared materials with the rest of the research team to inform our progress. Several attendees expressed interest in our research project as there are few

discipline-specific studies of student veterans. We are considering the NASPA conference as a venue for future dissemination of project findings to a group of professionals (student affairs administrators) who have extensive contact with student veterans.

We have also begun developing the interview protocol for conducting individual student interviews. A similar qualification survey will be used for these interviews as was used for the focus groups. Three pilot interviews have been conducted at USD and transcribed. We will use the findings from our focus groups to further develop the final student interview protocol.

Significant results

From FIE15 Paper

Active military and student veterans navigate engineering education in ways both similar to and different from their civilian counterparts. This Work in Progress describes variation in institutional environments through interviews with campus administrators and inspection of university websites at four institutions. Three emerging themes are identified: 1) the presence/absence of key student policies, 2) variation in student support services, and 3) gaps in provision of such services. Interviews provide data on the challenges faced and assets brought by veterans, from the point of view of administrators. We find that serving veterans is an area of recent and increasing importance to these institutions and that the level of services offered is evolving to include veterans resource centers, training for students and faculty on veterans' issues, and web portals to access veteran-specific information.

Dissemination

We presented an overview of the project at the American Society for Engineering Education NSF Grantees Poster session in Seattle, WA in June 2015 with a paper in the proceedings.³ We presented preliminary findings from our key informant interviews at the 2015 Frontiers in Education (FIE) conference in El Paso Texas in October 2015.²

In Fall 2014, our research project was highlighted at Clemson University's Newsstand: <http://newsstand.clemson.edu/sociology-professor-collaborates-on-nsf-funded-multi-institutional-research-team/> Our research project was also highlighted during the opening of the USD's Veteran Student Success Center in Fall 2014. The President of the university specifically mentioned the grant in her welcome. http://www.sandiego.edu/giving/detail.php?_focus=49349

We maintain regular contact with administrators at our institutions who are responsible for veterans' services to provide them with updates of our findings to assist them with benchmarking and to ensure that we continue to collect and report current information about each campus.

Future Work

For Year 2, the project team will continue biweekly conference calls and plans to continue on the schedule of activities for this project. Specifically, we will

Conduct Focus Groups with student veterans at all 4 campuses (Fall 2015 and Spring 2016)

Analyze Focus Group data once it is available.

Conduct Interviews of Engineering Student Veterans at 4 campuses beginning in Spring 2016.

We also plan to hold a conference call with our advisory board in January 2016 and an in-person meeting in Summer 2016. We are disseminating our work at the ASEE Annual Conference in the new Military and Veterans (MV) Division which will have papers presented for the first time in 2016.⁴ We are also presenting our work in a session at the NASPA Veterans conference in February 2016⁵ and at the Southern Sociological Society meeting in April 2016.⁶

Impact on the development of the principal discipline

This project has impacts on the fields of Engineering Education, Science and Technology Studies, Social Sciences, Ethnic Studies, among others. We employ grounded theory to build a conceptual model for better explaining the educational pathways of student veterans in engineering. This study will have broad systemic impact by diversifying pathways to and through engineering programs, and in capitalizing on the informal and real-world experiences of engineering student veterans. A comprehensive dissemination plan ensures that the findings reach a variety of stakeholders interested in student veterans and engineering education.

The primary impact for Engineering Education is the development of new knowledge illuminating the best practices for supporting veterans in engineering. In 2014-15, we began to develop a deeper understanding of the institutional factors that shape student veteran experiences on our study campuses, in general, and in engineering majors in particular. As we continue to analyze the key informant interviews, we will develop specific recommendations for improving policies and programs for student veterans in engineering and collaterally at the institutions as a whole.

Impact on other disciplines

A goal for this project is to understand similarities among veteran engineering education students across multiple campuses, and also to understand institutional differences. To the extent that we have findings and recommendations that are generalizable to the student veteran population at each institution, for example, policies related to admissions, transfer of credits, etc., all disciplines at those institutions will be impacted.

The impact on the development of human resources

New research is emerging on the pathways of post-9/11 veterans, and our project is contributing to emerging questions. Our preliminary research has begun to elucidate misconceptions about the behavioral characteristics of veterans in higher education, for example, the number of post-

9/11 veterans who have combat-related disabilities. The project aims to improve the accessibility of engineering pathways for veteran and military students by better understanding how technical skills acquired in the military intersect with academic trajectories. Understanding these articulations may allow for the application of military skills to new skill sets, relevant to our increasingly globalized society.

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