

WIP: An Exploratory Study of NSF-supported Scholars' Career Readiness

Huihui Wang, Steven Davis, Laura Atkins, Lee Ann Clements
Jacksonville University

Abstract

The Mathematics, Engineering, and Physics (MEP) scholars program supported by NSF at Jacksonville University is designed to increase enrollment of students, including those from underrepresented groups, and improve retention of scholars through graduation. Having reached the midpoint of this project, we are exploring better practices for improving our scholars' learning, preparing them for their careers to increase the number of next generation STEM workforce and increasing the number of women and students from underrepresented groups through various curricular, co-curricular and extra-curricular activities. In this paper, we focus on exploring MEP scholars' career readiness using interviews, surveys and Woofound which is a career track software. We will conduct a longitudinal investigation of the study participants' career readiness including both academic readiness and career knowledge as it develops over four years. We will compare MEP scholars' career readiness results with other non-MEP scholars' results which were obtained at our campus career resource center.

Keywords

Career Readiness, Co-curriculum, Extra-curriculum, Qualitative Research Methods, Woofound.

Introduction

Since we received this NSF grant (award number: 1356544) in July 2014, we have recruited 24 scholars. Our retention rates for majors are 75% in general, specifically, 80% from year 1 to year 2, 72% from year 2 to year 3 and 100% from year 3 to year 4. A few programmatic changes have been necessary since we started this program. For example, we expanded the MEP scholar program to include students majoring in computer science which is one key pipeline for the next generation STEM workforce. In addition, the 3+2 engineering dual degree program was transitioned to an in-house, 4-year engineering department that confers BS degrees in mechanical and electrical engineering.

Each year students engage in curricular, co-curricular and extra-curricular activities such as: new student orientations, faculty mentor and scholar meetings, seminars given by visiting scholars, field trips to local engineering companies, movie nights with discussion about relevant science/engineering topics, T-shirt design competition, Halloween party with masks designed by our scholars, and career workshops. Faculty participate in mentor training, and monthly Principle Investigators' (PIs) meetings. The student activities are designed to provide focus and career development while encouraging students to build identities as STEM professionals.

The goal of increasing STEM recruitment and retention to increase the next generation STEM workforce should be enhanced by improving the MEP scholars' learning, and preparing them for

their careers. The PIs have gained important insights from participating in the reflective analysis required for this project, which involves professors from our education and social science departments. Our collaboration has yielded multiple ways to gain understandings of the impacts of the co-curricular and extracurricular activities of the MEP program, as well as of our MEP scholars' career readiness. As we continue this investigation, we will use insights gained from analyzing our preliminary results as we adapt the project framework to all engineering programs.

Theoretical Framework

Given that engineering programs tend toward a competitive social context, an assumption of this project is to begin as early as possible to help students formalize their professional identities as they align with their career choices. In this paper, we focus on exploring impacts of curricular, co-curricular, and extracurricular activities on MEP scholars' career readiness through the lens of the social cognitive career theory (SCCT)¹ combined with vocational choice and personality type theories.

Studies to explore engineering career pathways mainly focused on two aspects: student career plan/choices and early career paths after graduation²⁻⁷. In this project, we define career readiness as consisting of two parts—academic readiness and career knowledge. We will give special attention to indicators of academic readiness and career knowledge which includes demonstrated career interests, choice goals, and choice actions according to research^{8,9} on SCCT theory. The Woofound career readiness assessment tool was selected and serves as our basis for the assumption of this study as we correlate preference and trait theories¹⁰. The Woofound uses data provided by the United States Department of Labor to determine personality traits that lead to success in the 1,100+ careers that we match using the Traitify application. Data for this part of the investigation has been gathered through interviews, surveys, and collection of extensive research literature related to the matching fields¹¹.

Research Method

This WIP paper presents preliminary findings from our exploration of the impacts of MEP program on students' career readiness using Woofound surveys. MEP scholars were asked to engage in self-reflection on their Woofound survey results. Each participating scholar is subsequently interviewed one-on-one and the transcripts and notes from interviews are analyzed for themes that develop for each participant, and across all participants. As the investigation progresses, a mix of qualitative and quantitative methods will be combined to provide better understandings the impacts of the MEP program on scholars' career readiness¹²⁻¹⁴.

Data Collection

Prior to beginning this project, our data collection procedure was approved by the Jacksonville University Institutional Research Board (IRB: 2016-042). PIs met to refine the questions that would guide the study and chose corresponding methods of data collection. The first data set was the Woofound survey, for which each participant signed an IRB-approved consent form agreeing to allow us to present the results, provided participants remained anonymous. The Woofound is conducted as an online, password protected survey at the Jacksonville University Career Resource Center (CRC).

The choice of MEP scholars for the study was based upon a selection process that would provide a diverse group of participants. We examined all possible participants, then invited scholars based on their race, gender, and grade year. Their demographic information is listed in Table 1.

Table 1 Demographic Information of Interviewees

Student	Race/Ethnicity	Gender	Grade	Notes
A	White	F	Senior	Electrical engineering major
B	Asian	F	Senior	Computer science and math majors
C	White	F	Senior	Physic major, and NROTC program (Naval Reserve officers Training Corps)
D	White	M	Junior	Mechanical engineering major and honors program
E	White	M	Sophomore	Mechanical engineering major, and a football player

Findings

Woofound Results are listed in Table 2. The Woofound usually lists top two (in yellow cells in the Table 2) out of seven categories of personality traits for each person. Numbers in the table are percentages of their personality traits.

Table 2 Woofound Results

Personality Traits	Student A	Student B	Student C	Student D	Student E
Action-Taker	21.13	84.51	69.68	66.51	63.47
Analyzer	54.36	78.57	33.31	56.18	53.28
Inventor	15.92	43.19	71.31	48.71	36.28
Mentor	42.78	67.28	70.31	62.76	62.13
Naturalist	11.26	32.81	48.4	37.09	59.43
Planner	65.68	84.58	68.01	82.74	29.87
Visionary	37.4	88.36	65.29	82.83	91.29

Participating scholars were encouraged to share their thoughts and comments about their Woofound results. Here we excerpt their comments as follows.

Question: Describe your thoughts/comment about the career survey results in Woofound.

Student A: “I really enjoyed the survey! It was quick and too the point. In a matter of five minutes, your resulting jobs were displayed and ranked based on the percentage of interest you took to the skills involved. I was surprised, but not really, that my top result was a data analyzer!

I did find my actual major on my result list, which is good! The survey helped me to see what career my interests would apply best in!”

Student B: “I thought the survey accurately portraits who I am. I would never admit that I am an outgoing person even though that is how others portray me as. I enjoy details and following routines. Although they were not on top of the career match list, the survey suggested Analysts, Information Technology Project Managers, and Statisticians, which are among the things I considered doing after finishing my education.”

Student C: “I thought the results were interesting, I am an Inventor/Mentor. I really do enjoy being creative and I go out of my way to mentor people. I like being able to help out and share my experiences with others. I do agree that analyzer is the least, I tend to think and plan before I act, and then jump in. I enjoy the doing, more than the planning or reflecting. Therefore I feel that the survey was accurate to me. I did find it ironic that under career matches military was not an option, but that is what I am going into.”

Student D: “It was spot on. It guessed me perfectly.”

Student E: “The career survey suggested that I should be a sales engineer, which is exactly the career I am currently pursuing. That particular position is meant for social engineers who understand how to conduct formal business. There is a growing need for these specifically qualified individuals as a result of the growing technical presence in the business world today.”

Summary and Future Work

This WIP paper explores the emerging insights we have gained about impacts of our NSF-supported MEP program on MEP scholars’ career readiness. The data collected from the first round of administering Woofound surveys serves as the baseline of our findings to date. At this very early stage of the project, we are trying to be cautious to conclude what we found. We started interviewing five MEP scholars to explore what instruments would be the best to measure impacts of the MEP program on scholars’ career readiness. From these five scholars’ results and feedback, we can tell they are all positive about their personality traits in the Woofound results. However, we noticed that the career match was suggested in a broad range. It is not practical for students to figure out what careers they would be likely to pursue from the career match results. While limited, the results provide useful baseline data from the Woofound surveys and help to guide us as we engage in the next phases of the investigation.

In the future, we will design surveys to explore scholars’ career interests and career knowledge in collaboration with our CRC. The second round interview questions will be designed based on the first round questions. Some follow-up questions will be asked to future explore the impacts. Surveys of impacts of the MEP program on scholars’ career readiness will be given to other MEP scholars and some non-MEP scholars in engineering majors. In this case, results maybe will give us some comparisons.

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Huihui Wang

Dr. Huihui Wang, is an assistant professor and the Chair of the Engineering Department at Jacksonville University (JU). As a member of ASME, ASEE, IEEE, Florida Engineering Society, and an advisor of NSPE JU Chapter, she actively participates in conferences, workshops and professional activities. She is Co-PI of two external grants including one NSF grant and one grant from a private foundation. Her current research interests are smart and connected health engineering, cyber physical systems and engineering education.

Name of the paper's Second Author

Place the biographical data about the second author here. **Include additional authors in the same format and manner.**

Laura C. Atkins

Dr. Laura C. Atkins is an Assistant Professor of Sociology at Jacksonville University. She recently oversaw the university's implementation of its Quality Enhancement Plan which focuses on using experiential learning to enhance students' career preparation. Dr. Atkins is also the QEP Assessment Coordinator and Director of Service-Learning programs at Jacksonville University. Dr. Atkins earned her B.A. from University of Wisconsin at Milwaukee and her M.A. and Ph.d.

from University of Illinois at Urbana-Champaign. Her research interests include community, service and experiential learning.

Lee Ann Clements

Dr. Lee Ann J. Clements is the Associate Provost for Accreditation at Jacksonville University. Prior to serving in this role she served for twelve years as the Chair the Division of Science and Mathematics. She received her B.A. in Biology from the University of Virginia, her M.S. and PhD from the University of South Carolina in Marine Science. Her research projects have included investigating the role of metallic pollutants in altering development, the effects of environmental variability on skeletal regeneration, and the effects of ocean acidification on marine organisms. She is also involved in projects that help communicate science to the general public and is one of the creators of The Science Of . . . a web-based video magazine. In addition to her role as Associate Provost Dr. Clements is also the Director of Experiential Learning and a tenured Professor of Biology and Marine Science at Jacksonville University.