ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION

Paper ID #40988

The Role of Core Self-Evaluation in Graduating Engineering Students' Job Search

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The Role of Graduating Engineering Students' Core Self-Evaluation in Job Search

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Abstract
The purpose of this study is to examine engineering students' individual differences as antecedents of their job search behavior and outcomes, with a focus on engineering students' core self-evaluation (CSE), which consists of four traits: self-esteem, self-efficacy, locus of control, and emotional stability. The survey data from 91 KSU graduating engineering students were collected and analyzed. Our findings highlight the importance of providing resources that can help students build positive core self-evaluation and encourage students to take advantage of such resources during their job search process.

Keywords
Job search, self-esteem, self-efficacy, locus of control, emotional stability

Introduction
In 2019, the National Survey of College Graduates estimated that roughly over 4.5 million graduates earned an engineering degree[1]. However, around 800,000 of those graduates were either unemployed or not in the labor force. Additionally, 1 million of these graduates were employed in the non-science and engineering (S&E) field. Studies have shown that in the 2012-2016 period, S&E professionals had a significantly lower unemployment rate compared to the overall workforce. By contrast, in the realm of professional occupations (i.e., lawyers, accountants, dentists), S&E professionals were reported to have a high unemployment rate. The Bureau of Labor and Statistics projects that over the 10-year period between 2016-2026, the science and engineering workforce will see a 11.7% job increase, estimating 8.2 million jobs will be available to S&E graduates and professionals[2]. To interpret post-graduate employment in the engineering field, insights on career readiness during the transition from student to graduate can expose a possible gap between what students learn and what they are expected to know in industry. For example, do students acquire knowledge and skills that satisfy current industry needs as identified by an Industry Advisory Board? Through the transition from student to industry, students are tasked with conducting job searches and engaging in interviews to secure job offers. This may be accomplished independently by students (i.e., researching company websites, job search websites such as indeed.com, etc.) or via the university's Career Placement office, in addition to participating in job search workshops (i.e., resume-building, mock interviews, working with a faculty mentor) sponsored by the university.

Vocational psychologists have studied various factors that contribute to the success of job search. Van Hooft et al.[3] examined the process of job search, determining that it is goal directed and incorporates cognition and behavior to prepare for the job search process. Results in that study

found that attitudinal antecedents towards job search, such as job search self-efficacy and employment commitment were positively related to positive job search behaviors, resulting in job search success. Further insight identified that results of the Core Self-Evaluation (CSE) assessment attributes to the outcome of the job search process[4]. The Core Self-Evaluation (CSE) assessment explores a person's disposition toward their aptitude identified in 4 specific traits: self-esteem, self-efficacy (i.e., generalized belief that one can complete tasks successfully), locus of control (i.e., the degree to which one believes that he or she controls one's outcomes in life), and emotional stability[5]. Research conducted by Judge et al.[4] conclude support for the validity of the four traits in the CSE model; however, leaves a gap to determine whether this model can predict job search satisfaction.

Senior graduating students take on the demanding task of completing senior projects. Completing this task while actively searching for a job requires a high level of motivation and self-control. In a self-regulation process such as a job search[6], a key determinant that could influence the outcomes is Core Self-Evaluation (CSE). Previous research has also noted that the four components of CSE are positively correlated with job performance and satisfaction[4]. In a similar vein, the benefits of CSE can also be observed in a job search context[7] whereby students who had higher levels of CSE also reported higher student satisfaction, life satisfaction, and GPA. Higher academic achievement has been shown to be significantly correlated to factors that are related to higher job performance[8].

The aim of this study is to examine psychological factors that are related to graduating college engineering students' job search outcomes and investigate the effect of CSE has on factors related to job search. The results of this study could be used to inform college administrators how to better facilitate professional development and career management among engineering students.

Methods

This study utilizes a cross-sectional web-based survey conducted via Qualtrics at Kennesaw State University (KSU), Georgia. Data was collected between April 2021 and April 2022. Participants were recruited through a recruitment flyer that was sent to every senior in the Southern Polytechnic College of Engineering and Engineering Technology (SPCEET). After data cleaning, a total of 91 senior engineering students who were actively looking for post graduate jobs voluntarily participated in this survey study. Online written consent was obtained from the participants before responding to the survey questions. This study was approved by the KSU Institutional Review Board (IRB).

The survey took approximately 20-25 minutes to complete and contained 150 items. In addition to demographic questions, participants answered various Likert scale questions. Core Self-Evaluation was measured by a 12-item scale developed by Judge et al.[9]. For each of the four components of Core Self-Evaluation, three questions were provided. Each question was based on a Likert scale ranging from 1 to 7, where 1 = "Strongly Disagree" and 7 = "Strongly Agree". An example of one of these items is, "When I try, I generally succeed." Job Search Self-Efficacy was measured by an 11-item scale developed by Wanberg et al.[10] Each question was based on a Likert scale ranging from 1 to 7, where 1 = "Strongly Disagree" and 7 = "Strongly Agree". An example of one of these items is, "How confident do you feel about the following tasks pertaining to job search: Changing your resume to fit specific jobs?"

Career Exploration was measured by a 14-item scale developed by Stumpf et al.[11]. Each question

was based on a Likert scale ranging from 1 to 5, where 1 = "A Little" and 7 = "A Great Deal." An example of one of these items is, "To what extent have you done the following in the past 3 months? Obtained information on the labor market or general job opportunities in my career area." Job Search Outcomes were measured by two simple free response numerical questions. The first question was "In the past three months, how many professional engineering job interviews have you had?" The second question was "In the past three months, how many professional engineering job offers have you received?"

The control variables used in this study are based on three simple free response items: GPA, how long students had been looking for an engineering job, and how much time the students invested in their job search on a weekly basis. SPSS statistical software was used to analyze the survey data and the PROCESS macro was employed to test the following research hypotheses.

Research Hypotheses

Hypothesis 1: Core self-evaluation is positively related to job search self-efficacy.

One of the four key components of CSE is generalized self-efficacy, which is defined as the judgments an individual makes on his or her capabilities to complete a certain task or achieve a certain level of performance[12]. Individuals with higher generalized self-efficacy will also have higher self-efficacy in specific domains in their life. For example, a student who has high levels of generalized self-efficacy will believe that they can complete any task. Therefore, students with high CSE should also have high job search self-efficacy, which is the belief that they can successfully complete the tasks that lead to desirable employment outcomes[12].

Hypothesis 2: Job Search self-efficacy is positively related to career exploration.

Job Search Self-Efficacy and CSE, as important factors for individual student's mentality, can subsequently motivate their actions. Previous research has provided strong evidence that job search self-efficacy encourages people to engage in more effective job search behavior, such as increased job search efforts and intensity[13]. Facing the uncertainty about obtaining their first professional engineering job, one aspect about job search that may be particularly salient for graduating students is career exploration, which is defined as "the process of eliciting and sustaining one's interest in an environment, thereby encouraging exploration and the acquisition of valuable new knowledge"[8]. Jiang et al.[14] noted that the process of career exploration has four steps: "(1) where one explores, (2) how one explores, (3) how much one explores, and (4) what one explores (i.e., the focus of exploration)". As a motivating factor, self-efficacy helps direct individuals' attention and efforts to goal-related activities and environments. Therefore, students with high job search-efficacy will invest more time and effort exploring career options and opportunities.

Hypothesis 3: Career exploration is positively related to the number of job interviews and job offers that students have received.

Moynihan et al.[15] stated that job search self-efficacy, by influencing more positive job search behaviors, was able to positively influence employment outcomes. This study will further

investigate the relationship between career exploration and positive job search outcomes. Meta-analytic findings demonstrate that career exploration is positively related to students' career decidedness and perceived employability[13], which have been linked to the likelihood of being employed[8,16]. Supporting this view, research has found that career exploration was positively related to job search outcomes, including the number of interviews and job offers received and satisfaction with the employment.

> *Hypothesis 4*: Core self-evaluation is positively related to number of job interviews and job offers through the effects of job search self-efficacy (JSSE) and career exploration.

This study will test a chain mediation model in which CSE is positively related to job search outcomes through the effects of job search self-efficacy and career exploration.

Results

Descriptive Statistics

Demographic information

The gender spread was 74.7% male, 24.2% female, and 1.1% preferred not to disclose. The ethnic distribution for our study was 57.1% White or Caucasian, 17.6% Black or African American, 16.5% Asian, 12.1% Hispanic or Latino, 1.1% American Indian or Alaskan Native, and 1.1% identified as other. We divided the participants into a combination of six different engineering majors. Approximately 35.2% of students were in Mechanical Engineering, 19.8% were in Industrial and Systems Engineering, 17.6% were in Electrical and Computer Engineering, 11.0% were in Civil and Environmental Engineering, 11.0% were in Mechatronics and Robotics Engineering, and 5.5% were in Engineering Technology. The age of the seniors ranged from 20 to 50 years old (M = 25.5, SD = 5.95).

Descriptive statistics and Pearson's correlation coefficients are shown in Table 1. Results with double-asterisks indicate statistically significant results. Consistent with our hypotheses, CSE was positively correlated with job search self-efficacy (r = .61, p < .01), which was positively correlated with career exploration *(*r = .30, p < .01). Additionally, whereas career exploration was positively correlated with number of job interviews *(*r = .43, p < .01), but not number of job offers (r = .21, p = .06), the number of job interviews was positively correlated with the number of job offers (r = .45, p < .01).

Table 1. Means (*M*), standard deviations (*SD*), and intercorrelation of study variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8
1. CSE	4.61	1.08	-							
2. JSSE	3.54	.82	.61**	-						
3. Career Exp.	3.82	.84	.11	.30**	-					
4. # of Job Interviews	2.13	2.46	.06	.13	.43**	-				

5. # of Job Offers	.67	1.06	-.03	.08	.21	.45**	-			
6. CGPA	3.42	.37	.17	.30**	-.11	.17	.05	-		
7. JS Length	7.51	1.32	-.20	-.15	.11	.29*	.03	-.00	-	
8. JS Time	2.32	1.00	.02	.09	.17	.32**	.11	-.07	-.07	-

Note: CSE = Core self-evaluation. JSSE = Job search self-efficacy. CGPA = College GPA. JS Length = Overall length of job search. JS Time = Average time per week spent during job search.

Hypothesis Testing

Figure 1 illustrates a mediation model with two sequential mediators. Noteworthy results from the analysis are mapped from Figure 1 to Table 2. After controlling for college GPA, job search length, and average time per week spent on the job search, CSE was positively related to job search self-efficacy (B = .41, SE = .07, p < .01), supporting Hypothesis 1. Job search self-efficacy was also positively related to career exploration (B = .45, SE = .16, p < .05), supporting Hypothesis 2. Career exploration was positively related to the number of job interviews received (B = 1.15, SE = .31, p < .01), but was not related to the number of job offers received (B = .25, SE = .16, p = .13). Therefore, Hypothesis 3 was partially supported.

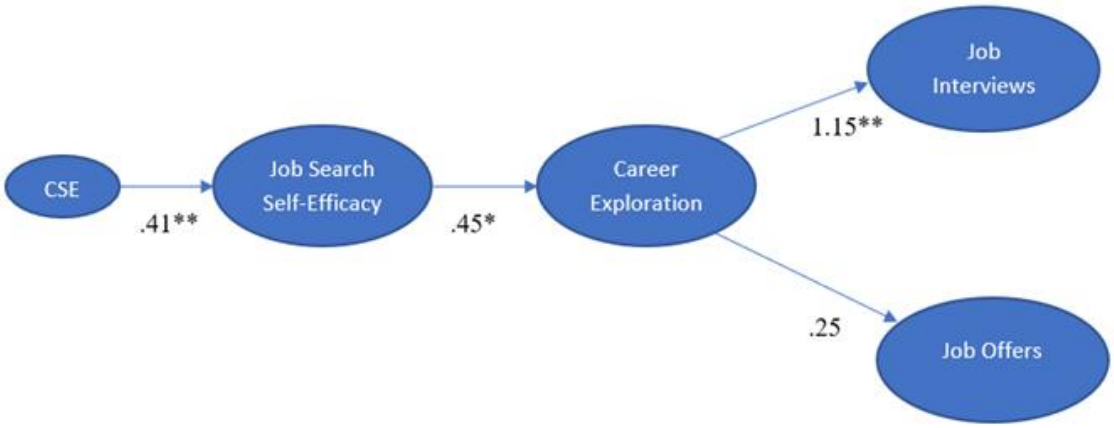

Figure 1: Mediation model with two sequential mediators

Table 2. *Regression Results for Moderated Mediation Tests on the Dependent Variable*

Predictor	JSSE		Career Exp.		# Of Job Interviews		# Of Job Offers	
	B	*SE*	*B*	*SE*	*B*	*SE*	*B*	*SE*
Intercept	.54	.88	2.47*	1.15	-12.33**	3.10	-.89	1.62
CSE	.41**	.07	-.06	.18	.13	.28	-.11	.15
JSSE			.45*	.16	-.22	.43	.08	.22
Career Exp.					1.15**	.31	.25	.16

CGPA	.33	.20	-.31	.27	1.61*	.70	.23	.37
JS Length	-.01	.06	.11	.07	.41*	.20	-.03	.10
JS Time	.05	.07	.11	.09	.75**	.25	.12	.13
R2	.40		.17		.37		.07	

Note: JSSE = Job Search Self-Efficacy. CSE = Core Self-Evaluation. CGPA = College GPA. JS Length = Overall length of job search. JS Time = Average time per week spent during job search.

Hypothesis 4 proposes that job search self-efficacy and career exploration sequentially mediate the relationship between CSE and job search outcomes. As indicated in Table 3, the indirect effect of CSE on the number of job interviews via job search self-efficacy and career exploration was significant (*estimate* = .21, *SE* = .10, *CI* = [.06, .45]). However, the indirect effect of CSE on the number of job offers via job search self-efficacy and career exploration was not significant (*estimate* = .05, *SE* = .04, *CI* = [-.01, .13]). Therefore, Hypothesis 4 was partially supported.

Table 3. *Mediation analysis*

Variable Mediation	Indirect Effect	SE	LLCI	ULCI
CSE-->JSSE--> Career Exp --> # of Job Interviews	.21	.10	.06	.45
CSE-->JSSE--> Career Exp --> Job Offers	.05	.04	-.01	.13

Discussion

On the one hand, our findings indicate that high CSE was an antecedent of positive job search outcomes for engineering students. While CSE only had a singular direct relationship with JSSE (supports Hypothesis 1), JSSE showed a significant relationship with career exploration (supports Hypothesis 2). Whereas Table 1 shows career exploration was significantly related to the number of job interviews students received, our findings did not support the relationship between career exploration and the number of job offers received by engineering job seekers (partially supports Hypothesis 3). However, the number of job interviews was significantly related to the number of job offers received. This emphasizes the positive indirect effect that CSE has on both job search outcomes. Hence, core self-evaluation is significantly related to number of job interviews, but has an indirect relationship to job offers through the effects of job search self-efficacy (JSSE) and career exploration (partially supports Hypothesis 4). To summarize, graduating job seeking engineering students with high core self-evaluation (i.e., having self-esteem, self-efficacy, a sense of control over one's outcomes in life, and emotional stability) tend to have high job search self-efficacy (i.e., believing that one can successfully complete job search tasks leading to desirable outcomes), which leads to high career exploration (i.e., investing more time and effort in exploring career options and opportunities. In turn, high career exploration leads to job interviews, but not necessarily job offers. The conundrum here is that job interviews understandably lead to job offers and this can be achieved indirectly, rather than directly, via career exploration.

Theoretical and Practical Implications

Previous research has highlighted the importance of CSE in areas such as job performance[4] and within academic performance[7]. The present study, however, aims to highlight the importance of CSE during the transition between those two key areas. By examining the underlying mediating mechanisms, we found that students with high CSE were more self-efficacious and explorative during their job search, which explains why they received more job interviews. Our contribution to previous research findings on antecedents of specific job search behaviors[3] links CSE to objective job search outcomes, providing further empirical support in favor of CSE[17]. Our hypothesis about the relationship between career exploration and the number of job offers received was not supported. This could be attributed to a lack of variability in the outcome, as most of respondents received only 0 or 1 job offer by the conclusion of the study period. However, we discovered that there was a significant positive relationship between job interviews and job offers. Therefore, it is likely that career exploration is indirectly related to job offers via job interviews.

The present study reveals how important it is that students and educators alike find ways to improve the CSE of students. Recognizing that the senior year can create a stressful environment for students, colleges should implement systems that structurally develop the CSE of undergraduate engineering students. Previous research has shown that life, school satisfaction, GPA[7], job satisfaction, and performance[4] all improve with the increase of CSE. Therefore, focusing on improving students' CSE will prove beneficial in their lives before, during, and after their job search[5].

Limitations and Directions for Future Research

One of the limitations is a relatively small sample size, with $n = 91$. While the survey was made readily available to every senior in the Southern Polytechnic College of Engineering at Kennesaw State University, just under one hundred students completed the entire survey. Another limitation was that this study used a cross-sectional self-reported survey; hence, it could not draw causal inferences for the proposed relationships. The relationships among self-reported variables could also be inflated due to the common method bias. Finally, the present study did not allow for follow-up with all the students who had already obtained job interviews to see if they ended up receiving job offers after graduating. It is possible that with more time, the data would have supported the second half of the fourth hypothesis. For future research, this model should be tested again, however, using a larger sample size and a longitudinal study following students from before they begin their job search through the completion of their respective job searches. This would allow for improved data accuracy. It is also important to conduct studies including other variables to allow for the possible discovery of additional significant variables that impact the success of graduating engineering students' job search.

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