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Students' Self-Perception of Their Entrepreneurial Characteristics

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Abstract

In recent years, entrepreneurship has been viewed as a necessary component of engineering education to support the development of an innovative workforce. Engineering entrepreneurship education is seen as a means to develop entrepreneurial mindset and skills that are essential for a successful professional life. In an effort to integrate entrepreneurship education into an already dense curriculum, universities and colleges offer a range of entrepreneurship programming from individual classes, certificate programs, and minors and or majors. With these various options, students have several different pathways to entrepreneurship education. However, research has shown that student demographics influence their participation in entrepreneurship programming. Further, self-efficacy, which is the belief in one's ability, is seen as a key characteristic motivating intent and activity. To continue to understand the factors that affect student engagement in entrepreneurial learning and their development of entrepreneurial skills, we examined students' self-perceptions and beliefs with respect to demographics and background. Specifically, we looked at students' self-perception of entrepreneurial self-efficacy (ESE), creative self-efficacy (CSE), and Risk-taking with respect to gender, family background, class standing, major, previous exposure to entrepreneurship classes, and on their self-identification as entrepreneurial. Survey data was collected from 194 students at a large, Midwest public research university. Independent t-tests were used to look for differences in ESE, CSE and Risk-taking with respect to student demographics and background. Results indicate that men score higher in risk-taking than women. Students with entrepreneurs in the family and students in their third year or higher score higher in some aspects of ESE. Students with previous exposure to entrepreneurship classes score higher in CSE. Finally, students that self-identify as entrepreneurial score higher in ESE, CSE, and Risk-Taking. These results indicate that engineering students hold varying entrepreneurial characteristics based on their background and demographics and that the characteristics assessed are more sensitive to students' self-identification as entrepreneurial than their background and demographics. Implications of the results on the development and implementation of entrepreneurship programming for engineers are discussed.

1. Introduction

Modern engineers are now required to not only be technically adept but are also expected to possess creativity and to lead innovation [1]. Specifically, scholars see creativity, innovation, entrepreneurial knowledge, skills, and mindset as essential skills for the new generation of engineers [2], [3]. Traditionally a domain of business schools, entrepreneurship education has expanded to multiple academic disciplines with this realization that students need new skills that are marketable and valuable [4]. Engineering programs have reconceptualized entrepreneurship education to foster creativity, innovation, and entrepreneurial skills and mindset in engineering students [5]. With over half of ASEE member schools offering some form of entrepreneurship programming, engineering entrepreneurship education opportunities are available to students in the form of individual courses and certificates to more structured options, such as concentrations and minors [6]. In addition to curricular programming, informal and experiential learning opportunities such as co-curriculars, provide another path for students to engage in

entrepreneurship education and gain entrepreneurial skills [7]. These experiences can include being involved in a range of "entrepreneurship-related activities," such as market research and writing business plans to participating in entrepreneurial organizations [7].

When examining these different paths to entrepreneurship education, research has shown that student participation in engineering entrepreneurship programming varies by gender. Women participate at a higher rate in entrepreneurship curricular programs compared to co- curricular programs [8]. Nationality, and GPA also influence the type of entrepreneurship programming in which engineering students engage [9]. In addition to student participation, some of the constructs of interest in engineering entrepreneurship include Entrepreneurial Self-Efficacy (ESE), Creative Self-Efficacy (CSE), and Risk-Taking. ESE, Creativity, and Risk-taking function as key predictors of future entrepreneurial intent and behavior [10]–[12]. Student demographics and background such as gender, previous entrepreneurship experience, entrepreneurship programming, and the presence of role models all influence ESE [11], [13]–[16]. Students' CSE and Risk-Taking are also influenced by factors such as culture, personality, and gender [17], [18] [19].

As the field of engineering entrepreneurship education continues to grow and attract engineering students from different majors and with different levels of entrepreneurial experiences, it is important to understand how engineering students' demographics and background impact their ESE, CSE, and Risk-Taking. Understanding the relationship between various dimensions of these constructs and the demographics and background of engineering students can aid in identifying areas for improvement and inform best practices for entrepreneurship programming targeting these students. This paper contributes to the growing research on understanding the demographics and background factors that impact the learning of engineering students. Specifically, we examined how students' background and demographics such as gender, family background, class standing, major, previous exposure to entrepreneurship classes, and their self-identification as entrepreneurial influence students' self-rated scores in Entrepreneurial Self-Efficacy, Creative Self-Efficacy, and Risk-Taking.

2. Background

2.1 Entrepreneurial Self-Efficacy

Self-efficacy is "an individual's belief about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" [20]. Individuals with high-self-efficacy for a given task are more likely to pursue and persist in that task [21]. Self-efficacy is domain and task specific. In the context of entrepreneurship, Entrepreneurial Self-Efficacy (ESE) is a person's belief in their ability to successfully perform entrepreneurship related tasks and launch a successful entrepreneurial venture [22]. Research has shown ESE to be an important predictor of future entrepreneurial intent and behavior [10], [23], [24]. Several instruments to measure ESE are available. However, most of the measurements are empirically underdeveloped and do not capture the various dimensions associated with entrepreneurial activities and skills [25]. The ESE scale used in this study is developed by McGee [22]. Compared to existing ESE measures, McGee's scale is a multi-dimensional measure of ESE that assesses efficacy in specific tasks that are associated with venture creating and development.

Validity and reliability of the scale was also established using a large and diverse sample of both nascent and non-nascent entrepreneurs. The McGee scale includes 19 survey items that measure self- efficacy in the areas of *Searching, Planning, Marshaling, Implementing People, and Implementing Finance. Searching* consists of 3 survey items that measure the ability to identify opportunities. *Planning* consists of 4 survey items that measure the ability to convert ideas to feasible plans. *Marshalling* consists of 3 survey items and involves the ability to gather and assemble resources to implement plans. *Implementing*, measured in two parts, *Implementing People* and Implementing Finances consists of 9 survey items and involves the ability to manage human and capital resources. A list of all the survey items can be found in Table 1.

Researchers have looked at gender differences and the influence of role models on an individual's ESE using various ESE measures. Women are found to exhibit lower ESE and lower entrepreneurial intentions compared to men [13], [26] but more likely to benefit from entrepreneurship education [26]. Similarly, role models are found to have a positive influence on ESE with role models having a stronger influence on women [10]. In the context of engineering, using McGee's measure, individual's ESE is influenced by educational and entrepreneurship experiences with entrepreneurship courses significantly increasing ESE [14], [16]. The presence of entrepreneurs in the family was also found to also positively influence ESE [15]. However, most of the studies examining the relationship between ESE and students' demographics and background are limited, and report aggregated scores. There is a need to understand how self-efficacy in the various dimensions of ESE varies based on the demographics and background of engineering students to help in informing entrepreneurship pedagogy targeting these students.

2.2 Creative Self-Efficacy and Risk-Taking

Creative Self-Efficacy (CSE), similar to ESE, is a person's belief in their ability to demonstrate creativity. Creativity and entrepreneurship are inextricably linked with creativity being a key aspect of entrepreneurship [27]. Creativity is also a key driver for entrepreneurship education and high creative potential is found to be positively associated with entrepreneurial intentions [12]. Similar to Creative Self-Efficacy, propensity to take risks is another important characteristic of an entrepreneur. Risk-taking in the realm of entrepreneurship has been extensively studied and entrepreneurs tend to have higher risk-taking propensity compared to managers [11]. In general, personality traits and mood are found to impact individual creativity with positive mood induction contributing to enhanced creativity in high extraverts [18]. Personality was also found to influence risk-taking behavior with high extraversion and openness linked to higher risk-taking behavior [28]. Gender differences exist with regards to risk-taking with men scoring higher in risk-taking compared to women [19]. Cultural differences in risk-taking were seen in a study with Polish students reporting greater risk-taking than their American counterparts [17]. Entrepreneurship, creativity, and risk- taking are interconnected. However, the literature looking at how these constructs vary based on students' demographics and backgrounds is particularly limited in the context of engineering entrepreneurship. While several methods to measure creativity exist, the Creative Self- Efficacy scale used in this study consists of eight items commonly used to measure student's beliefs in their ability to produce creative ideas and outcomes [29]. Similarly, the Risk-Taking scale used was adopted from a Risk Propensity Scale commonly used to assess tendency to take risks [30]. The scale consists of seven items. In this study, the item "I take risks with my health" was excluded, as it is not relevant to this context.

3. Methods

3.1 Research Context

We used a 41-item survey to assess Creative Self-Efficacy, Risk-Taking, and Entrepreneurial Self-Efficacy in 194 students at a large, Midwestern university. In addition to the scale items, the survey included the following multiple-choice demographics and background questions: Do you see yourself as entrepreneurial? (Yes, No); What year are you? (1^{st} year, 2^{nd} year, 3^{rd} year, 4^{th} year, other); What is your gender identity? (male, female, other); What is your major area of study? (biomedical engineering, other: please, specify); Are you an (US citizen, International student, other: please, specify); Is anyone in family entrepreneur? (Yes, No); Have you taken any entrepreneurship classes? (Yes: please specify, No); Have you ever heard of the business model canvas (Yes, No); Have you ever heard of Lean Start Up? (Yes, No). We administered the survey to students (n=142) enrolled in an introduction to biomedical engineering design course over the course of multiple academic terms and to students (n = 52) attending a guest lecture hosted by the Society of Women Engineers at a large research university in the U.S. In total, we collected 172 responses using a paper survey, and 22 responses using an online survey.

3.2. Measures

The dependent measures in our study include Entrepreneurial Self-Efficacy, Creative Self-Efficacy, and Risk-Taking. We used a five-point Likert scale to measure all the survey items in ESE, CSE, and Risk-Taking. For Entrepreneurial Self-Efficacy, we used McGee's [22] Entrepreneurial Self-Efficacy scale to measure self-efficacy with respect to five subconstructs: *Searching* (3 items), *Planning* (4items), *Marshaling* (3 items), *Implementing People* (6 items), and *Implementing Finance* (3 items). We scored all the ESE survey items from "Not Confident at All" to "Very Confident" on a five-point scale. We also scored the eight items in Creative Self-Efficacy [29] and the six items in Risk-Taking [30] from "Strongly Disagree" to "Strongly Agree" on a five-point scale.

The demographics and background questions which are the independent measures in our study include gender, family background, class standing, major, previous exposure to entrepreneurship classes, and students' self-identification as entrepreneurial. Students were divided into groups based on their responses to the multiple- choice demographics and background questions. Based on their response to the yes or no question "Do you see yourself as entrepreneurial?", we separated the students into two groups: those who self-identified as entrepreneurial and those who did not. Similarly, we split the students into two groups, "yes" or "no", based on their responses to the questions, "Is anyone in family entrepreneur?" and "Have you taken any entrepreneurship classes?" respectively. Based on their response to the question about their gender, we grouped the students into male and female. And based on their response to the question about their major, we split the students into biomedical engineering and other groups. Finally, we categorized students in the first and second year of their study as underclassmen and third year and above as upperclassmen. In total we divided all of our six independent variables into two groups each for within group comparison based on the students' responses.

3.3 Data Analysis

We transcribed the paper responses (n = 172) into an online version using Google Forms for data analysis. Due to an error in the formatting of the online version of the survey, we excluded 22 student responses to the Creative Self-Efficacy and Risk-Taking constructs in further analysis. Therefore, our analysis included a total of 194 responses for Entrepreneurial Self-Efficacy and 172 responses for Creative-Self Efficacy and Risk-Taking. We obtained high Cronbach's Alpha values for all the constructs and subconstructs: 0.692 (*Searching*), 0.741 (*Planning*), 0.774 (*Marshaling*), 0.830 (*Implementing People*), 0.875 (*Implementing Finance*), 0.903 (*Creative Self-Efficacy*), 0.797 (*Risk-Taking*), which confirmed the internal consistency of the scale items. Further, we performed single-factor, confirmatory factor analysis individually for each of the constructs to test the validity of the scales used. Based on our confirmatory factor analysis we excluded three survey items from the ESE scale and two survey items from the Risk-Taking scale in further analysis. A list of the survey items along with the Cronbach's Alpha values and factor loading scores can be found in Table 1. and Table 2.

Table 1. Survey items in McGee's Entrepreneurial Self-Efficacy scale. The Cronbach's Alpha and factor loading scores are displayed. Factor loading scores in bold indicate survey items excluded from analysis

Construct	Cronbach's Alpha	Factor Loading	Survey Items
Searching	0.692	0.758	Brainstorm (come up with) a new idea for a product or service
		0.729	Identify the need for a new product or service
		0.487	Design a product or service that will satisfy customer needs and wants
Planning	0.741	0.743	Estimate customer demand for a new product or service
		0.828	Determine a competitive price for a new product or service
		0.655	Estimate the amount of start-up funds and working capacity necessary to start my business
		0.382	Design and effective marketing/advertising campaign for new product or service
Marshaling	0.774	0.779	Get others to identify with and believe in my vision and plans for a new business
		0.758	Network -- i.e. make contact with and exchange information with others
		0.659	Clearly and concisely explain verbally/in writing my business idea in everyday terms
Implementing People	0.830	0.788	Supervise employees
		0.757	Recruit and hire employees
		0.681	Delegate tasks and responsibilities to employee in my business
		0.544	Deal effectively with day-to-day problems and crises
		0.515	Inspire, encourage and motivate my employees

		0.727	Train employees
Implementing Finance	0.875	0.770	Organize and maintain the financial records of my business
		0.972	Manage the financial assets of my business
		0.783	Read and interpret financial statements

The responses to individual survey items were averaged to obtain a representative score for each of the constructs and subconstructs. The data was split into groups by gender (men and women), family background (entrepreneur in the family and no entrepreneur in the family), class standing (underclassmen and upperclassmen), major (Biomedical Engineering and other), previous exposure to entrepreneurship classes (yes or no), and on the student's self-identification as entrepreneurial (yes or no). Separate independent t-tests were performed on each of the constructs and subconstructs to compare the mean differences within the six independent variable groups.

Table 2. Survey items in Creative Self-Efficacy and Risk-Taking scales. The Cronbach's Alpha and factor loading scores are displayed. Factor loading scores in bold indicate survey items excluded from analysis

Construct	Cronbach's Alpha	Factor Loading	Survey Items
Creative self-efficacy	0.903	0.683	I will be able to achieve most of the goals I have set for myself in a creative way
		0.755	When facing difficult tasks, I am certain that I will accomplish them creatively
		0.726	In general, I think that I can obtain outcomes that are important to me in a creative way
		0.735	I believe I can succeed at most any creative endeavor to which I set my mind
		0.804	I will be able to overcome many challenges creatively
		0.744	I am confident that I can perform creatively on many different tasks
		0.709	Compared to other people, I can do most tasks very creatively
		0.724	Even when things are tough, I can perform quite creatively
Risk-Taking	0.797	**0.287**	Safety first
		0.777	I prefer to avoid risks
		0.844	I take risks regularly
		0.508	I really dislike not knowing what is going to happen
		0.547	I usually view risks as a challenge
		0.794	I view myself as a risk-seeker

Results

All of the students who responded to the survey were in an engineering major with 77% (n = 150) of them in biomedical engineering. Eighty-nine percent (n = 172) of the students were third-year or above in class standing. Of all those who responded, 35% were males (n=68) and 65% (n = 126) were females. Approximately 26% (n = 50) of the students had an entrepreneur in the family, and only 13% (n = 25) of the students were previously enrolled in one or more entrepreneurship classes. Thirty-six percent (n = 67) of the students said they considered themselves entrepreneurial. Almost all of the students were U.S. citizens, and five percent (n=10) were permanent residents and international students.

Overall, men scored higher in risk-taking compared to women, but we saw no statistically significant differences in CSE and overall ESE by gender. Student's with entrepreneurs in the family scored higher in the *Planning* subconstruct of the ESE scale compared to students with no entrepreneurs in the family. Upperclassmen scored significantly higher in *Implementing People* compared to underclassmen. Students in Biomedical Engineering scored significantly higher in *Searching* compared to all other majors. Students who have previously taken at least one class on entrepreneurship scored significantly higher in CSE. And finally, students who self-identified as entrepreneurial scored significantly higher in CSE, Risk-Taking, overall ESE and in the *Searching*, *Planning*, and *Marshalling* subconstruct of ESE. A summary of these finding can be found in Table 3 and Table 4.

Table 3. Mean scores of Entrepreneurial Self Efficacy and subconstructs, Creative Self-Efficacy, and Risk-Taking by gender, major, and class rank.

	Gender		**Major**		**Class Rank**	
	Men	Women	BME	Other	Under	Upper
Entrepreneurial Self-Efficacy	3.08	2.98	3.04	2.91	2.81	3.04
Searching	3.50	3.40	**3.53****	3.12	3.20	3.46
Planning	2.37	2.24	2.32	2.18	2.16	2.30
Marshalling	3.30	3.22	3.29	3.12	3.03	3.28
Implementing People	3.50	3.53	3.54	3.43	3.11	**3.57****
Implementing Finances	2.71	2.50	2.54	2.69	2.53	2.58
Creative Self-Efficacy	3.62	3.55	3.57	3.56	3.64	3.56
Risk-Taking	**3.10***	2.76	2.93	2.78	3.04	2.87

***p<0.05, **p<.01**

Table 4. Mean scores of Entrepreneurial Self Efficacy and subconstructs, Creative Self-Efficacy, and Risk-Taking by previous exposure to entrepreneurship classes, the presence of entrepreneurs in the family, and self-identification as entrepreneurial.

	Previous Entrepreneurship Classes		Is Anyone in Family Entrepreneur?		Self-identified as Entrepreneurial	
	Yes	No	Yes	No	Yes	No
Entrepreneurial Self-Efficacy	3.19	2.98	3.1	2.98	**3.27****	2.89
Searching	3.55	3.41	3.33	3.47	**3.76****	3.25
Planning	2.51	2.25	**2.58****	2.19	**2.55****	2.16
Marshalling	3.46	3.21	3.53	3.22	**3.60****	3.06
Implementing People	3.70	3.49	3.61	3.49	3.63	3.47
Implementing Finances	2.74	2.55	2.68	2.54	2.80	2.49
Creative Self-Efficacy	**3.89****	3.51	3.62	3.55	**3.86****	3.41
Risk-Taking	3.08	2.86	3.02	2.85	**3.27****	2.68

***p<0.05, **p<.01**

Discussion and Implications

We found significant group differences in ESE, *Searching, Planning, Marshalling* subconstructs of ESE, CSE, and Risk-Taking based on self-identification as entrepreneurial. We found significant differences in Risk-Taking by gender and significant differences in CSE by previous exposure to entrepreneurship classes. Further, we found that major, class rank, and presence of entrepreneurs in the family significantly impact the *Searching, Implementing People,* and *Planning* subconstructs of ESE respectively.

Biomedical engineering students scored significantly higher in the *Searching* subconstruct of ESE compared to all other majors. The *Searching* subconstruct measures confidence in identifying unique opportunities and developing ideas. Biomedical engineering is a multidisciplinary field by nature and biomedical engineering students are exposed to various areas of knowledge to address interdisciplinary problems[31], [32]. Therefore, it is possible that BME students feel more comfortable moving between multiple disciplines and areas of knowledge, and thus are more adept and confident at identifying opportunities compared to students in non-biomedical engineering majors. Understanding how students' majors influence self-efficacy in the five areas of ESE can help educators design programming that addresses the needs of engineering students with different technical backgrounds and expertise. Further, developing interdisciplinary competency might aid students' in the opportunity identification process of entrepreneurship. Future research should examine how competency in different content areas may contribute to ESE and more specifically to identifying opportunities.

Higher scores in the *Planning* subconstruct of ESE were found for students with entrepreneurs in the family compared to students with no entrepreneurs in the family. The *Planning* subconstruct of ESE is concerned with the initial stages of business creation and measures one's confidence in translating ideas into a business plan. Having 'role models' could contribute to one's confidence in pursuing entrepreneurship because of proximity to support about this process [33]. Further,

social models serve as a source of self-efficacy by modelling experiences that people with perceived similarity to the models can use to vicariously judge their own capabilities for success [20]. This result however is contradictory to the findings from a previous study in engineering students where the authors found the presence of family role models to be a significant predictor of scores in the *Searching* subconstruct but not the *Planning* subconstruct [15]. Our results indicate that the presence of family role models does not affect students perceived ability to identify unique opportunities but rather affects their self-efficacy belief concerned with translating their ideas into a business plan. Future work should look at the family background of nascent entrepreneurs to better understand the influence of presence of entrepreneurs in the family

Implementing People measures confidence in ability to manage and balance business relationships with the people that are part of a venture. Upperclassmen in our study scored higher in *Implementing People* compared to underclassmen. Upperclassmen in our study consisted of students in the third year or above in their degree and graduate students while underclassmen consisted of first- and second-year engineering students. Therefore, most of the upperclassmen are likely to have engaged in project-based courses compared to the underclassmen and thus are more likely to have experience with managing group dynamics and delegating tasks. This suggests that the entrepreneurial programming needs of engineering students might differ based on how advanced they are in their majors. Compared to students in their third year and above in their degrees, first- and second-year students might benefit more from entrepreneurial training that places emphasis on working in groups and delegating tasks.

Implementing Finance measures confidence in obtaining and managing financial resources. There were no significant differences in the *Implementing Finance* subconstruct between any of the groups we examined. However, all the participants in our study scored on the lower end in the *Implementing Finance* subconstruct compared to other dimensions of ESE. Most engineering students are not exposed to the financial and business aspects of engineering and product design through the curriculum of their engineering majors. Therefore, based on our finding, we recommend educators create more opportunities for engineering students to learn about the financial and business aspects of venture creation as it relates to engineering. This can help bridge the knowledge gap associated with commercializing ideas.

Students who answered “yes” to “Do you see yourself as entrepreneurial?” scored higher in overall ESE as well as in the *Searching*, *Planning*, and *Marshalling* subconstruct of ESE compared to students who answered “no”. This is a noteworthy finding as it indicates that students who feel like they are entrepreneurial tend to have higher ESE. According to Bandura [20], “development of a sense of personal efficacy requires more than simply producing effects by actions. Those actions must be perceived as part of oneself”. The importance of the self in entrepreneurship learning has to be further examined to understand how students’ perceptions of themselves influence their self-efficacy. Some previous research suggests that pedagogy that provides knowledge about entrepreneurship alone is insufficient for developing entrepreneurial competency. If the goal of entrepreneurship pedagogy is to enable students to act entrepreneurially, then the development of an entrepreneurial identity must also be facilitated in entrepreneurial programming [34]. In fact, some scholars have theorized the ways in which entrepreneurship education may serve as an identity workspace [35]. Entrepreneurial identity

construction can be facilitated by programs that incorporate a learning through engagement in entrepreneurship approach. Providing students opportunities to explore aspects of self through activities such as storytelling and self-reflection that require students to analyze and reflect upon critical incidents can aid in identity negotiation and construction [34]. Entrepreneurial identity construction is also a social phenomenon and thus happens through social engagement with critical stakeholders [36]. Creating experiences for students to frequently engage mentor and stakeholder networks can aid students in shaping their entrepreneurial identities [36].

Finally, we found gender differences in risk- taking, with men scoring higher in risk-taking compared to women. We also found significant differences between the CSE scores of students who previously took at least one entrepreneurship class and students with no prior enrolment in entrepreneurship classes. Specifically, students who have previously taken at least one class on entrepreneurship scored significantly higher in CSE. However, it is hard to determine if this difference is the result of entrepreneurship programming or due to selection bias. It is possible that students with higher CSE are more likely to opt into entrepreneurship programming as a means to explore their creative potential. Finally, similar to the group differences observed for ESE, students who self-identified as entrepreneurial scored significantly higher in risk-taking and CSE compared to students who did not self-identify as entrepreneurial. Students who see themselves as entrepreneurial also see themselves as risk-takers and have higher creative self-efficacy beliefs. It is not clear how students' sense of self and their beliefs about their abilities are interconnected and influence each other. Perceptions of self-efficacy are also developed and influenced by social persuasions and social models that often signal whether a person is able to succeed at a given task [20]. Stereotypes, gender-based expectations as well as structural systems of support all influence an individual's self-efficacy and risk-taking behaviors. Therefore, when considering demographics-based differences in measure such as self-efficacy and risk-taking, it is equally important to focus on the environmental and structural factors that might influence these measures in addition to pedagogy.

Conclusion

There is an increasing interest and demand for engineering entrepreneurship programs. With this increase, there is a need to understand the influence of engineering students' demographics and backgrounds on the factors that impact student participation and success in entrepreneurship programming. Our works in this paper provides some preliminary understanding of how Entrepreneurial Self-Efficacy, Creative Self-Efficacy, and Risk-Taking vary based on demographics and background factors such as gender, family background, class standing, major, previous exposure to entrepreneurship classes, and engineering students' self-identification as entrepreneurial. By using McGee's measure of Entrepreneurial Self-Efficacy, we were able to further identify how self-efficacy in the specific areas of the entrepreneurial process differs by demographics and background. Understanding the relationship between various dimensions of these constructs and the demographics and background of engineering students can aid in identifying areas for improvement and inform best practices for entrepreneurship programming targeting these students. The data for our study was collected at a large, midwestern, research-focused university. So, the group differences observed in our study might vary across institutions. In addition to observing group differences in specific areas of ESE, our work indicates that students who see themselves as entrepreneurial have higher levels of ESE, CSE,

and Risk-Taking compared to students who don't see themselves as entrepreneurial. Future work should focus on understanding the importance of self in entrepreneurial learning and how this might affect students' self-efficacy.

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