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Analysis of Engineering and Engineering Technology Student Strength Patterns Using StrengthsFinder

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Analysis of Engineering and Engineering Technology Student Strength Patterns Using StrengthsFinder

ABSTRACT

Strengths as measured by Gallup's Clifton StrengthsFinder test have been shown to play a role in workplace success around the world in industry and academia. This research investigated the role Clifton StrengthsFinder strengths play in the classroom success of engineering and engineering technology students in an engineering department within a large, Midwestern, research-intensive, land-grant university. The department teaches students about strengths as part of a required sophomore-level course to help them better understand how to utilize their unique talents to be successful, but limited analysis has occurred on the data. The purpose of this research was to analyze the student strengths data to identify patterns of strengths among the students. The department collected three years of student strengths data that was analyzed to identify differences between gender and type of major in the department. Previous research suggests that there should be no patterns of strengths or best set of strengths for specific majors or on the basis of gender. This research has identified that there are multiple common strengths among students when comparing gender and type of major. Results of this research provide a characterization of student strengths to assist in curriculum development, advising, and engagement and retention applications.

INTRODUCTION

An understanding of an individual's strengths as defined by the Clifton StrengthsFinder (CSF) have been shown to play a role in workplace success around the world in industry and academia (Asplund et al., 2014; Cantwell, 2006; Tomkovick & Swanson, 2014). This research aimed to characterize the strengths of undergraduate engineering and engineering technology (ET) students in a large four-year, public, research-intensive land-grant university. The academic department in this study offers two engineering majors, Agricultural Engineering and Biological Systems Engineering, as well as two ET majors, Industrial Technology and Agricultural Systems Technology. The department hypothesized that students taking the Clifton StrengthsFinder early in their program would help them better understand how to utilize their talents to be successful (Louis, 2012). However, the department has not empirically tested this hypothesis. Before any correlations could be measured between student success and student strengths, a characterization of the student strengths was needed.

This department and institution has completed research studies measuring predictive success and failure factors for students in engineering (Kaleita et al., 2016; Geisinger and Raman, 2013) and engineering technology (Mosher, 2018). Kaleita et al (2016) examined the identification of at-risk students and their likelihood to persist in engineering. Mosher (2018) investigated factors influencing the success, in terms of GPA, of ET students who transferred into their ET program from an engineering program. Both analyses found high school GPA to be an influential predictor, but from there, findings differed. Kaleita et al. (2016) found the ALEKS math placement test significant, particularly with students within specific GPA parameters. Math ACT scores were also found to be a significant predictor. While the model created by Kaleita et al. (2016) provided guidance on how to examine student achievement and the costs of intervention, it did not explain why some students who were classified as "low-risk" left the field of engineering. Nor did the model address how and why some students who are classified as "high-risk" persist and succeed, despite academic, social, and other constraints, suggesting other explanatory variables may be present.

Results from Mosher (2018) investigated the influence of academic predictors such as high school rank, GPA, ACT composite, and math scores on student GPA at graduation. Mosher (2018) found high school rank as a significant predictor, but standardized tests and placement tests were not significant predictors in the regression model. Accordingly, Mosher (2018) found that common factors used to predict



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GPA in engineering students did not have the same prediction patterns with ET students, suggesting there may be other explanatory variables present. One hypothesis is that student strengths explain and predict some of the success of students in both engineering and ET. The StrengthsFinder model posits that people are drawn to things they are naturally good at doing (Rath & Conchie, 2008). Students may be drawn to one major or the other because of a set of natural strengths and abilities that fit within the department. It is thought that CSF strengths can explain some of the differences in predictive factors between the engineering and ET students as well.

Kahu and Nelson (2018), argue that the factor of student engagement has been influential in student retention and success, yet there is substantial variation in the definition, measurement, and statistical methodologies related to student engagement (Fredricks, Filsecker, & Lawson, 2016). One under-explored construct of student engagement is student strengths as measured by the StrengthsFinder. Further, Furlong, Gilman, Huebner, and (2014) and Seligman and Csikszentmihalyi (2000) focus on positive psychology and describe how strengths-based initiatives assist students in the identification of their natural talents to engage in activities that develop their talents and abilities. There is limited research exploring the connection of successful students and their strengths. Potentially, patterns of successful students can be identified by characterizing CSF strengths of current majors. This characterization of majors would allow instructors to develop an understanding of student strengths patterns within a major and provide the potential to develop a curriculum, at the major level, that focuses on the students using their strengths.

The Clifton StrengthsFinder

The Clifton StrengthsFinder (CSF) is a tool that individuals can use to inform themselves on how they naturally approach tasks, feel, and behave to identify where to focus their efforts to build on existing strengths to optimize their performance (Asplund, et al. 2014). In other words, strengths are the mastery of someone's natural talents through practice and application (Rath & Conchie, 2008). When individuals understand their strengths, they better understand how they can excel and add value with what they are doing rather than simply meeting expectations (Louis, 2012). The CSF has been used in various ways to better understand the dynamics of the workplace, students, families and individual development of strengths (Asplund et al., 2014).

The online CSF survey tool provides a series of statements related to common situations and asks participants to rank how well the statement describes them. These common situations are then related to one of 34 themes, where each theme is a strength. The themes are ranked from most to least prevalently occurring. The top five themes, or strengths, are provided to the participant at the completion of the survey (Asplund et al., 2014).

Strengths in Education

The CSF in a university educational context can be used in multiple ways to help students succeed and develop throughout their education and beyond. Lopez and Louis (2009) describe the strengths-based education approach as a teaching method that focuses on the positive "strengths" of students, rather than the negative "deficits" of students in terms of how they naturally think, feel and behave relative learning in the course. Cantwell (2006) describes the strengths-based education approach as first identifying their strengths and reinforcing the use of their strengths and talents in the learning environment, which may lead to improved learning outcomes.

The way students solve problems can be identified through their strengths. Although Lopez and Louis (2009) claim student strengths should not have a pattern and are highly individualized, little investigation has confirmed this statement. Student strengths can be used to determine how to better work with the students or guide the students to work together and approach tasks if a pattern of strengths is identified. In large classes, it may not be feasible to learn and understand individual student strengths thus identifying patterns in these classes could provide an understanding of the students in the class. Many factors, including gender, are hypothesized to have a relationship with strengths. Janke et al. (2015) examined gender differences with the CSF and found that there were significant differences of strengths in pharmaceutical students of different genders.

Understanding student strengths may help educators reach beyond the goal of students passing their courses. Schreiner (2010) describes how students thrive in their program rather than merely surviving and graduating through the use of their strengths. In other words, rather than students simply getting through a course, students can become engaged and develop a deep understanding of the content in their courses. The overarching purpose of this paper is to build a foundation for measuring how student strengths influence university engineering and ET students by first characterizing students by strengths. Just as Cantwell (2006) describes the first step of strengths-based education as identifying student strengths, this characterization on a departmental level is a foundation to identify patterns currently and longitudinally.

Strengths in Engineering and Engineering Technology

Previous research has suggested there should be no pattern in strengths or best set of strengths by discipline, rather, strengths are individualized and utilized by people differently when completing a task (Lopez & Louis, 2009; Kahu and Nelson, 2018; Rath & Conchie, 2008). It is common knowledge that students' interests, expertise, and talents motivate them to pursue different disciplines of study. Clifton and Nelson (1992), specifically point out that people are drawn to activities that allow the use of an individual's strengths. The National Academy of Engineering (NAE, 2005) has described this difference in abilities and expertise for engineers as attributes of the "engineer of 2020". Further, Lorimer and Davis (2015) compiled the engineer of 2020's attributes and compared them to the strengths of engineering students to determine "engineering strengths". For example, one of the engineering attributes from the NAE (2005) was "analytical skills" which was translated to "engineering strengths" with the Clifton StrengthsFinder strengths as analytical and restorative. Another case was the NAE (2005) engineering attribute "group work" translated to "engineering strengths" adaptability, includer, and achiever from the CSF. Lorimer and Davis (2015), showed that students with more of their defined "engineering strengths" resulted in higher first year student GPAs. Lorimer and Davis (2015), along with Janke et al. (2015), suggest there is a link between strengths and fields of study, a finding somewhat contradictory to that of Lopez and Louis (2009).

To the authors' knowledge, there has been no research comparing strengths to ET student attributes in the same method as Lorimer and Davis (2015). There have been studies that investigate ET competencies (Doggett & Scott 2013; Jahan & Doggett, 2015); however, none of them have explored the connection to Clifton StrengthsFinder strengths. Further, the Association of Technology, Management, and Applied Engineering (ATMAE), has similar descriptions of ET curriculum programs like that of engineering attributes described in NAE (2015). In the description of the ET programs from ATMAE (2013) similarities and differences between engineering and ET are apparent, suggesting that student strengths may also differ between the two types of majors.

Research Goals

The goal of this research is to identify and characterize the patterns of student strengths in engineering and ET students in an engineering department within a large, Midwestern, research-intensive, land-grant university where a pattern is defined as frequently reoccurring strengths. This research is the first step in using strengths to enhance student education in the department. The specific research questions this research aims to answer are:

- What are the strengths that characterize the students in the department?
- Do students of different genders have different strengths profiles?
- Do students in different majors have different strengths profiles?

METHODOLOGY

Data were gathered from a required departmental course each semester from spring of 2016 to fall of 2018, for a total of six semesters in which students completed the Clifton StrengthsFinder (CSF) with IRB approval. The authors removed all personal identifying information from data set before the analysis. All students who took the CSF in the time frame were included in the data set, with the following exceptions. Any student who had a major outside of the department or had no academic data. There were 848 students on the original list, 21 students were removed as non-departmental majors and one student for not having any academic data. In total, the revised data set included 826 students.

The data set was then split into groups by gender and type of major. These data are summarized in Table 1. The first grouping was departmental students grouped by gender, including 732 males and 94 females. The next split occurred based on the two types of majors in the department: engineering and ET majors. The engineering group resulted in 207 students while the ET group had 619. The data sets were split by engineering and ET majors, then split one final time by gender. The engineering group had 154 males and 53 females, while the ET group had 578 males and 41 females. This study was a characterization of past and present student strengths in one department. Because the goal was to characterize student strengths rather than test effects of strengths, there was no control group of students tested.

Table 1: Characterization groups

Group Number	Group Description	Number of Students	Percent of Total
1	All Departmental Students	826	100%
2	All Male Departmental Students	732	89%
3	All Female Departmental Students	94	11%
4	All ET Students	619	75%
5	Male ET Students	578	70%
6	Female ET Students	41	5%
7	All Engineering Students	207	25%
8	Male Engineering Students	154	19%
9	Female Engineering Students	53	6%

The characterization in this study consists of frequency counts of student strengths to identify the most and least frequent occurring strengths in each of the groups. The frequency count reflects the combined student top five strengths, without regard to the order the strengths. This characterization describes how frequently a given strength occurs in the top five strengths of the students in each group. The top five most frequently occurring strengths were used to assist in relative comparison to individual top five strengths.

RESULTS

The first characterization was of the entire department. The most prevalent strengths of the students were achiever, restorative, adaptability, analytical, and relator. The five least frequent were woo, activator, intellection, developer, and connectedness. There was a clear distinction in the top five most frequent strengths in the department overall. Achiever, restorative, and adaptability occurred most frequently within the department, more than any of the other strengths. There is also a clear gap between the frequency of the top three strengths and those that follow. Figure 1 shows a frequency count of all departmental students' strengths.

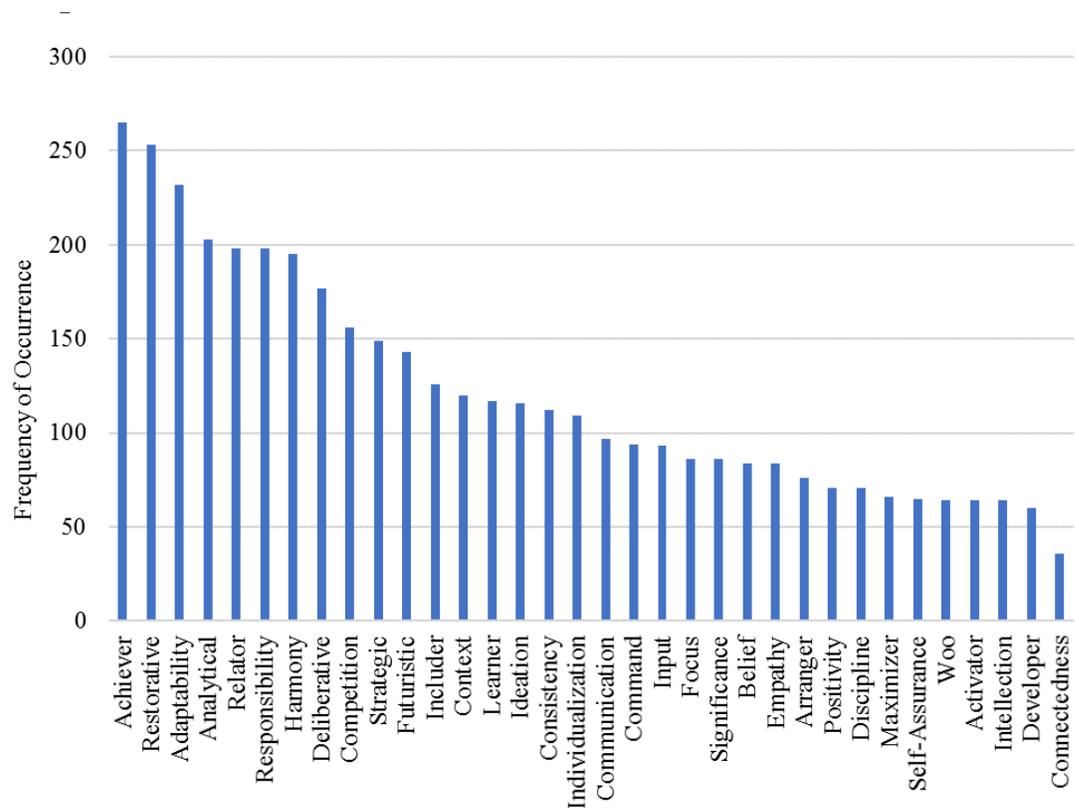


Figure 1. Strengths frequency chart of all departmental students' top 5

The next group of students was all departmental male students. The five most frequently occurring strengths among departmental males were achiever, restorative, adaptability, analytical, and harmony. The five least frequently occurring were discipline, activator, intellection, developer, and connectedness. Though there is a clear distinction between the most and least frequent strengths, interestingly, there is a nearly linear pattern of decrease in frequency of occurrence in the top five strengths of male departmental students. This group of students does not show any clear distinctions or steps in the transition from most to least prevalent strengths that would help identify prominent patterns as it has with other groups

The final departmental group was all departmental female students. The five most frequently occurring strengths were restorative, achiever, responsibility, adaptability, and learner. The five least frequent strengths were maximizer, command, connectedness, self-assurance, and significance. Restorative is a clear most frequent strength among departmental females.

ET majors were the next grouping of students in this research. The five most frequently occurring strengths for ET students were adaptability, restorative, achiever, relator, and analytical. The five least frequent strengths were focus, discipline, intellection, developer, and connectedness. Intriguingly, all departmental ET students again have the same most frequent three strengths as all departmental students. Adaptability, restorative, and achiever are a reoccurring grouping of three that appear to be dominant when viewing students at the departmental and major level. Figure 2 shows a frequency count of all ET students' strengths.

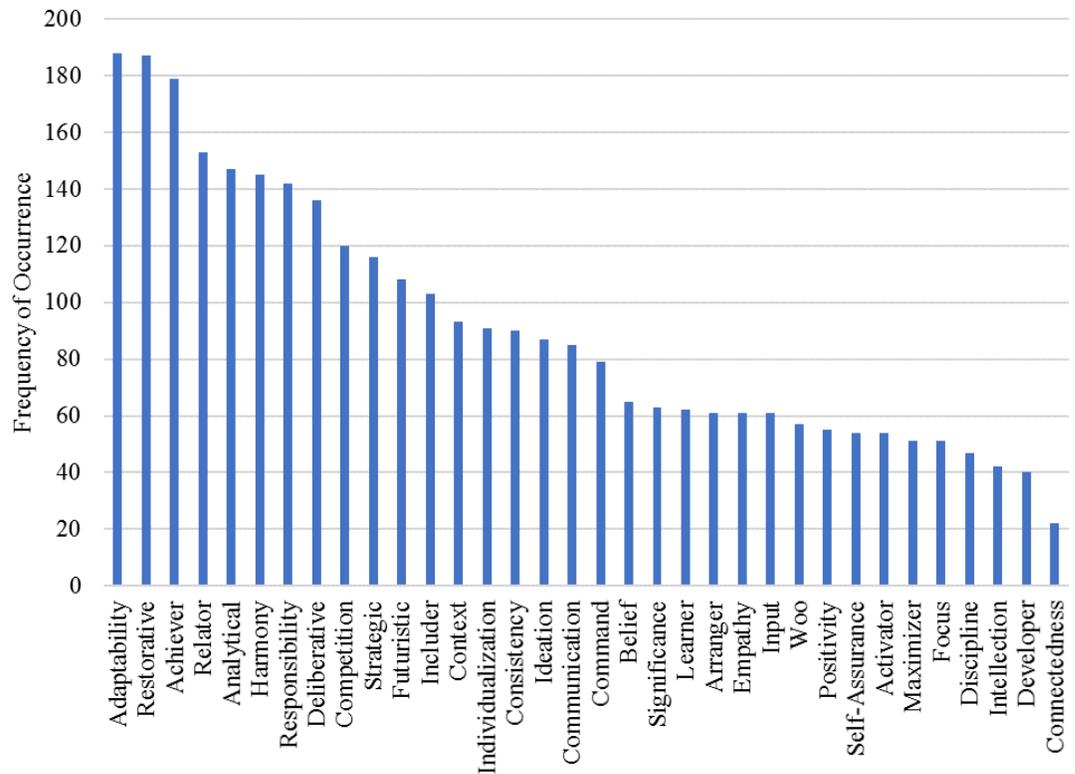


Figure 2. Strengths frequency chart of all departmental engineering technology students' top 5

The five most frequently occurring strengths among the male ET students were adaptability, restorative, achiever, analytical, and relator and the five least frequently occurring strengths among male ET students were focus, discipline, intellection, developer, and connectedness. Though the most and least frequent strengths can be identified in this grouping, there are few clear breaks in the data to separate the most and least frequent.

The five most frequently occurring strengths for female ET students were adaptability, relator, deliberative, responsibility, and harmony. The five least frequent strengths were focus, context, self-assurance, significance, and connectedness. With fewer subjects in this group there are less prominent differences between the most and least frequent strengths. There is, however, a clear difference in the most frequent two strengths, adaptability and relator, and the other strengths.

The final grouping by major type was for the engineering students. Of all engineering students, the five most frequent strengths were achiever, restorative, responsibility, harmony, and analytical and the least frequent five strengths were arranger, activator, communication, self-assurance, and woo, but only woo has a distinct break from the other low frequency strengths. The frequency of strengths among engineering students' top five appears to be a nearly linear decrease from the most frequent to least frequent strength with the exception of the most frequently occurring strength, achiever, which had a large distance between it and the nearest second strength, restorative. Figure 3 shows a frequency count of all engineering students' strengths.

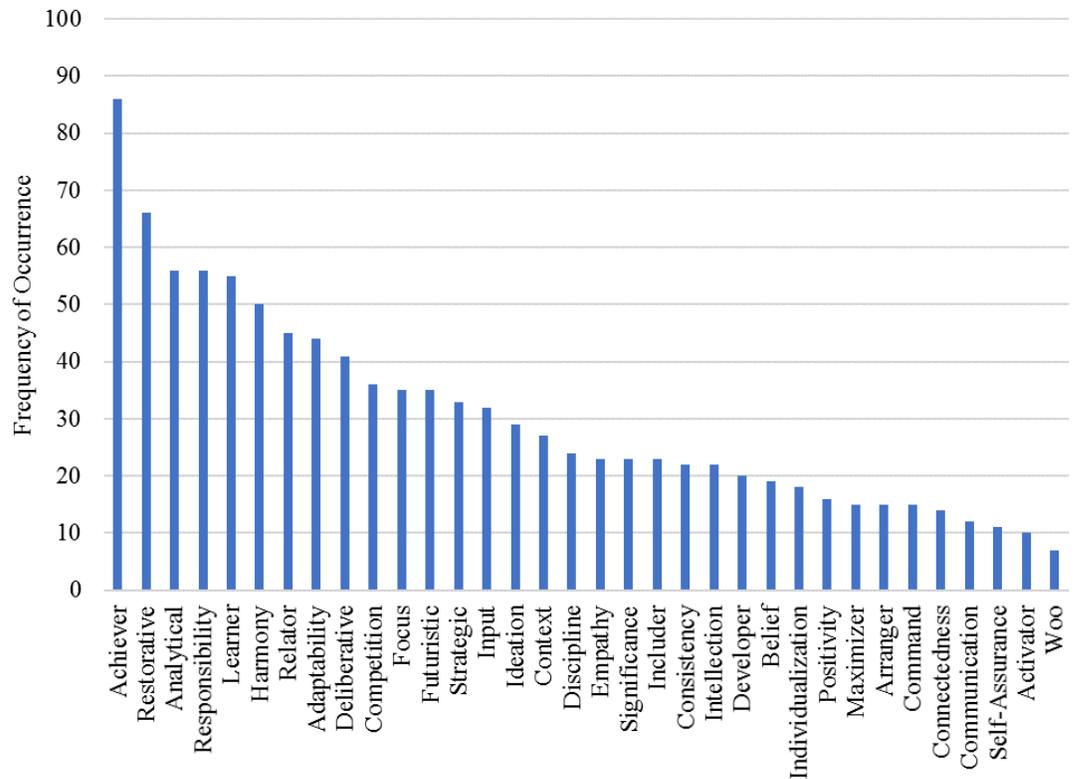


Figure 3. Strengths frequency chart of all departmental engineering students' top 5

Achiever, analytical, restorative, harmony, and responsibility were the top five most frequent strengths of male engineering students. The five least frequent strengths were arranger, communication, self-assurance, activator, and woo. For this group, there was a clear most frequent strength of achiever, while the other strengths appeared to decrease in a linear pattern.

Within the female engineering group, the five most frequent strengths were learner, achiever, restorative, responsibility, and input. The five least frequent strengths were self-assurance, significance, communication, command, and includer. There is a clear pattern for the four most frequent strengths within this group: learner, achiever, restorative and responsibility.

Table 2 summarizes the five most and least frequently occurring strengths among each of the groups in this research. In this table there are strengths that occur within and across departmental groups. The most frequently occurring strengths have more patterns across groups than the least frequently occurring strengths. Counts of occurrences for each of the strengths in each of the groups are shown next to the strength.

Table 2. Most and least frequently occurring five strengths in each group

Group Description	Most Frequent Five	Occurrences (%)	Least Frequent Five	Occurrences
All Departmental Students N=826	Achiever	265 (32%)	Woo	64 (8%)
	Restorative	253 (31%)	Activator	64 (8%)
	Adaptability	232 (28%)	Intellection	64 (8%)
	Analytical	203 (25%)	Developer	60 (7%)
	Relator	198 (24%)	Connectedness	36 (4%)
All Male Departmental Students N=732	Achiever	236 (32%)	Discipline	57 (8%)
	Restorative	219 (30%)	Activator	56 (8%)
	Adaptability	207 (28%)	Intellection	52 (7%)
	Analytical	189 (26%)	Developer	44 (6%)
	Harmony	176 (24%)	Connectedness	32 (5%)
All Female Departmental Students N=94	Restorative	34 (36%)	Command	6 (6%)
	Achiever	29 (31%)	Maximizer	5 (5%)
	Learner	27 (29%)	Connectedness	4 (4%)
	Responsibility	27 (29%)	Self-Assurance	4 (4%)
	Adaptability	25 (27%)	Significance	4 (4%)
All ET Students N=619	Adaptability	188 (30%)	Focus	51 (8%)
	Restorative	187 (30%)	Discipline	47 (8%)
	Achiever	179 (29%)	Intellection	42 (7%)
	Relator	153 (25%)	Developer	40 (6%)
	Analytical	147 (24%)	Connectedness	22 (4%)
Male ET Students N=578	Adaptability	174 (30%)	Focus	48 (8%)
	Restorative	172 (30%)	Discipline	41 (7%)
	Achiever	170 (29%)	Intellection	38 (7%)
	Analytical	142 (25%)	Developer	32 (6%)
	Relator	141 (24%)	Connectedness	21 (4%)
Female ET Students N=41	Restorative	15 (37%)	Focus	3 (7%)
	Adaptability	14 (34%)	Context	3 (7%)
	Relator	12 (29%)	Self-Assurance	2 (5%)
	Deliberative	9 (22%)	Significance	2 (5%)
	Responsibility	9 (22%)	Connectedness	1 (2%)
	Achiever	86 (42%)	Connectedness	14 (7%)
	Restorative	66 (32%)	Communication	12 (6%)

Group Description	Most Frequent Five	Occurrences (%)	Least Frequent Five	Occurrences
All Engineering Students N=207	Analytical	56 (27%)	Self-Assurance	11 (5%)
	Responsibility	56 (27%)	Activator	10 (5%)
	Learner	55 (27%)	Woo	7 (3%)
Male Engineering Students N=154	Achiever	66 (43%)	Arranger	10 (6%)
	Analytical	47 (31%)	Communication	10 (6%)
	Restorative	47 (31%)	Self-Assurance	9 (6%)
	Harmony	40 (26%)	Activator	6 (4%)
	Responsibility	38 (25%)	Woo	3 (2%)
Female Engineering Students N=53	Learner	22 (42%)	Self-Assurance	2 (4%)
	Achiever	20 (38%)	Significance	2 (4%)
	Restorative	19 (36%)	Communication	2 (4%)
	Responsibility	18 (34%)	Command	2 (4%)
	Input	13 (25%)	Includer	2 (4%)

Percentages in each group will not sum to 100% as each student has five strengths.

Across all groups in this research, restorative was among the five most frequently occurring. Further, restorative was in the top three most frequently occurring across all groups. There are no other strengths that all groups share in the most frequent or least frequent strengths. Achiever is shared by all groups in the five most frequent strengths except for Female ET students where it is the seventh most frequent strength. Nearly all groups share the least frequent strength of Connectedness. Though engineering students as a whole have connectedness as a least frequent strength, when splitting the engineering students by gender, connectedness is no longer in the five least frequent for either group due to the different sample size of each group. For male engineering students, connectedness moves to the sixth position of least frequently occurring and for female engineering students, connectedness moves to the seventh position of least frequently occurring.

When examining the department, achiever and restorative are the most frequently occurring strengths. Achiever and restorative change between the most and second most frequent when splitting the department by gender. Adaptability is also among the five most frequent strengths in both departmental groups. Finally, male students have analytical and harmony in the most frequent strengths while female students have learner and responsibility strengths among the five most frequent. The only strength in the least frequently occurring category that is shared among males and females at the departmental level is connectedness. Comparing engineering and ET majors reveals restorative, achiever, and analytical as shared most frequently occurring strengths. Among the least frequently occurring, connectedness is the only common strength.

The ET students share three of the five most frequent strengths, adaptability, restorative, and relator, when comparing gender. Males and females differ in that males have achiever and analytical in their most frequent while females have deliberative and responsibility in their five most frequent strengths. Genders share focus and connectedness as the least frequently occurring strengths. Engineering students, when compared by gender, also share three of the five most frequently occurring strengths: achiever, restorative, and responsibility. The engineering groups differ by gender in that males have analytical and harmony while females have learner and input among their five most frequently occurring strengths. Engineering students grouped by gender also share two of the five least frequently occurring strengths, self-assurance and communication.

When observing males across different major types, engineering and ET, they share three of the five most frequently occurring strengths, restorative, achiever, and analytical. Males across major types do not have any common least frequently occurring strengths. When comparing females across engineering and ET majors, two of the five most frequently occurring strengths are shared, restorative and responsibility. Females also share two of the five least frequently occurring strengths, self-assurance and significance. Table 3 provides a summary of each group that was compared and the common most and least frequently occurring strengths identified between the groups.

Table 3. Common strengths between groups

Comparison group	Most Frequently Occurring Shared Strengths	Least Frequently Occurring Shared Strengths
All groups	Restorative	
Departmental: male vs female	Achiever	Connectedness
	Restorative	
ET major: male vs female	Adaptability	Focus
	Restorative	Connectedness
	Relator	
Engineering major: male vs female	Achiever	Communication
	Restorative	Self-Assurance
	Responsibility	
Major only: ET vs engineering	Restorative	Connectedness
	Achiever	
	Analytical	
Male: ET vs engineering	Restorative	
	Achiever	
	Analytical	
Female: ET vs engineering	Restorative	Self-Assurance
	Responsibility	Significance

Finally, within each group, approximately 70% of students possess one or two of the most frequently occurring five strengths from their group. Over 80% of students within each group have two or fewer of the most frequently occurring strengths. There are some students that have four or all five of the most frequently occurring strengths for their group. Approximately one out of seven students from each group do not possess any of the most frequently occurring strengths from their group. Table 4 provides a summary of the cumulative percent of students with zero through five of the most frequently occurring strengths in each group.

Table 4. Cumulative percent of students with five or fewer of the most frequently occurring five strengths in each group

Group Description	5	4	3	2	1	0
All Departmental Students	0.0	0.1	8.5	45.5	85.2	14.8
All Male Departmental Students	0.0	0.3	10.1	43.4	86.4	13.6
All Female Departmental Students	1.1	1.1	12.8	47.9	86.2	13.8
All ET Students	0.0	0.0	8.4	44.7	84.8	15.2
Male ET Students	0.0	0.0	8.3	45.0	85.0	15.0
Female ET Students	0.0	2.4	17.0	41.4	82.9	17.1
All Engineering Students	0.0	1.0	17.4	51.2	84.5	15.5
Male Engineering Students	0.0	1.3	15.6	50.0	87.7	12.3
Female Engineering Students	0.0	3.8	18.9	58.5	92.5	7.5

DISCUSSION

Department Strengths

Surprisingly, the analysis identified common strengths within the department. Six strengths characterize the most students in the department: achiever, adaptability, analytical, relator, responsibility, and restorative. The restorative strength describes people who enjoy and have an aptitude for solving problems. The achiever strength is descriptive of people who feel driven to complete tasks and can work through tough and rigorous activities without fatigue. Adaptability describes people who like to figure problems out as they come along rather than spending energy on anticipating them. Relator describes people who excel at working together with others to complete tasks and that enjoy developing strong relationships with their team. Responsibility is a strength that describes people who take ownership to follow through on what they have committed to. Finally, the analytical strength describes a person who uses data and logic as the preferred evidence for decision-making and problem solving (Rath & Conchie, 2008). In summary, the six most prevalent strengths describe the students in the department as responsible and committed problem solvers who develop strong relationships with those that they work with and can handle variability and change in their lives and careers.

The restorative strength deserves a special note as it appears in all groups. This strength describes a person who has an aptitude for solving problems. People energized by identifying the source of the problem and developing a solution or solutions for it are those with the restorative strength. Upon reflection, the analysis identifying restorative among all groups in the department was not surprising. After all, the department studied as part of this research is an engineering and ET department where all the people are specifically educated on solving problems. The natural talent and desire for solving problems could be what drew the students to the department in the first place.

Characterizing Student Groups by Strengths

When comparing gender differences within the department, males and females shared three of the common top five frequently occurring strengths. The same pattern emerged when comparing genders in the engineering and ET majors. Within each of the majors, engineering and ET males and females shared three of the top five frequently occurring strengths. Though there are some differences in the strengths that each gender possesses, the majority of the top five are the same. This suggests that, within a given major type, there are common strengths regardless of the student's gender that people naturally possess and utilize. When examining differences in a major without considering gender this pattern is further extended.

Upon further examination of the description of restorative by student groups, Rath and Conchie, (2008) explain that the problems that those with restorative strengths enjoy solving can be conceptual or practical, which likely appeals to both major types in the department. The engineering majors would likely focus on more conceptual and theoretical problem solving, while the ET majors would potentially focus more on practical or applied problem solving (Engineering or Technology, n.d.). This finding could partially explain the students who transfer from an engineering to an ET program. The strengths that students have in both groups describe people with an aptitude for solving problems (Rath and Conchie, 2008). Regardless of the major or type of problem, the department is clearly generating problem solvers, as shown in the student strengths across all the groups.

Though strengths do not limit a person from pursuing a specific major or discipline, this research suggests there may be evidence of a strengths pattern in groups of people separated by educational discipline. Just as Janke (2015) was able to identify reoccurring strengths across Midwestern universities when focusing on Doctor of Pharmacy programs and Lorimer and Davis (2015) identified a pattern of strengths for students in engineering, there may be reoccurring strengths for students enrolled in engineering and ET programs as evidence suggests from the large number of common strengths across all the groups in this study.

Lorimer and Davis (2015) found that most prevalent five strengths of engineering students from MacEwan University are competition, restorative, learner, achiever, and futuristic. Three of the five most prevalent strengths of engineering students in this research, achiever, restorative, and learner, match those of the research done by Lorimer and Davis (2015). As more data are collected there appears to be more evidence that strengths could be used to describe groups. This means that the department could develop curriculum and other environments to enhance student knowledge, skills, and experiences with the use of student groups and strengths.

CONCLUSIONS

From this research we can conclude that there are common strengths within a department even when comparing different groups. This is a similar finding to that of Janke et al. (2015), who discovered that five Doctor of Pharmacy programs across the Midwest had three common strengths in each of them. This is also similar to the finding of Lorimer and Davis (2015) who researched engineering student strengths. Students' strengths profiles can be characterized by gender, department, and major but not entirely. Though it is possible to characterize the students in this research by their strengths that does not mean they must possess some or all of the most frequently occurring strengths to be successful. As a whole, there are frequently reoccurring strengths in the groups but individually, students still bring their own unique talents and abilities to each learning task. The individual aspect of this research can be seen in the fact that over 80% of the students in each group possess two or fewer of the most frequently occurring strengths for their group. This research can be used to further develop curriculum and potentially enhance engagement and retention on a broad scale that enhances recruitment and retention. However, when working with students individually or in smaller groups, such as class projects, the variety of strengths would likely be much more variable than that of departmental level. This means that there should be consideration for individual strengths in assessment methods.

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