TITLE

Measuring Leadership Practices Among Business and Engineering Students in CETYS Universidad

Dr. Eduardo R. Díaz Gómez: eduardo.diaz@cetys.mx

Dr. Eduardo Durazo Watanabe: eduardo.durazo@cetys.mx

Mtra. Nataly Medina: nataly.medina@cetys.mx

SUMMARY

Leadership development is an important part of the educational experience of undergraduate students, regardless of specific academic discipline. The problem addressed in this study stems from concerns that students across different disciplines do not receive the same level of guidance in terms of leadership development. This gap in leadership may hinder future working professionals as they climb the corporate ladder in their respective organizations and acquire leadership responsibilities. This is an empirical investigation study and was developed following Kouzes and Posner’s five practices of exemplary leadership model (Posner, et. al., 2015). The participants in this study were 59 business and 29 engineering undergraduate students from one private university located in the city of Tijuana, Baja California, Mexico. Surveyed groups report engaging in the practices considered by the S-LPI with about the same approximate range of descriptive statistics ranges. On all five practices measured by the S-LPI, no significant statistical differences were found between the students among all the five categories surveyed.

KEYWORDS

Leadership, Students

INTRODUCTION

Contemporary organizations have become more complex than in the past because of the emphasis placed on innovation and change, something organizational leaders have learned to embrace (Geer-Frazier, 2014). Individuals working in learning organizations perform better in environments characterized by trust, flexibility and empowerment (Kareem, 2016). To embrace complexity can be challenging for any working professional, so it makes sense for educators to help their students develop the skills they will need to be able to work with others and learn to solve problems that might not be readily addressed in isolation.

Leadership development is an important part of the educational experience of undergraduate students, regardless of specific academic discipline (Jenkins, 2013). Grunwell (2015) argued that leadership development in undergraduate students is an important element that characterizes many educational institutions. More specifically, the ability to develop trusting relationships is critical for students who hope to amplify their level of influence over others in organizational settings (Martin, Naylor, Jefferson, David, & Cavazos, 2015). Holland and Piper (2016) noted that educators have a role in promoting trust-based leadership development in undergraduate students, so that these future professionals can be more effective when they enter disruptive organizational settings designed to foster innovation.

The problem addressed in this study stems from concerns that students across different disciplines do not receive the same level of guidance in terms of leadership development. Posner, Crawford, and Denniston-Stewart (2015) evaluated leadership efficacy among Canadian undergraduate students enrolled in Arts (n=901), Science (n=859), Engineering (n=502), Business (n=316), Education (n=132), and Nursing & Kinesiology (n=145). They found that first year engineering students showed statistically significant lower scores across five transformational leadership constructs than students from other majors. These differences disappeared when the students were on their third year (Posner et. al., 2015).

Posner et al.’s (2015) study serves to suggest a gap in leadership capabilities among students from different disciplines exists. This gap in leadership may hinder future working professionals as they climb the corporate ladder in their respective organizations and acquire leadership responsibilities. Brungardt (2011) documented the logical assumption that individuals who had received leadership education showed higher levels across several leadership constructs than individuals who had studied undergraduate programs that did not include leadership training.

Although several studies on leadership have been carried out with undergraduate students as participants (Marra, Rodgers, Shen, & Bogue, 2012; Posner et al., 2015; Carter, Ro, Alcott, & Lattuca, 2016; McKinney & Waite, 2016), there continues to be a need to address claims that students from different academic programs may develop different levels of leadership efficacy (Ward, Yates, & Joon Young, 2015). This study was developed to help educators address this issue. Specifically, the data collected from first year Engineering and Business undergraduate students was analyzed based on Kouzes and Posner’s (Posner, 2012) five practices of exemplary leadership model to determine whether statistically significant differences exist between the two groups. Gender and interest to participate in a mentoring program were also assessed.

THEORETICAL FRAMEWORK

Student leadership development among engineering students is important because it can help them experience a more successful educational journey and increase gender diversity. One study concluded that retention rates and diversity in computer science academic programs may be partially improved by providing students with opportunities to express their concerns and address their challenges (Cerf & Johnson, 2016). This is consistent with the work of Marra, Rodgers, Shen, and Bogue (2012) who analyzed data from engineering students who transferred out of their majors. They concluded that non-academic factors like lack of belonging are the main reasons for the decision to leave. Both of these studies may be used to suggest that students enhance their sense of commitment in school when they find opportunities to take charge of their educational experience. Becoming a leader may help them to take a broader approach to their development that encompasses love, growth, and meaning (Stevens, 2011).

Moreover, Anagnos, Lyman-Holt, Marin-Artieda, and Momsen (2014) encouraged educators to embrace co-curricular programs designed to enhance engineering students’ leadership competencies because of the positive impact these competencies can have on their undergraduate experience. Carter, Ro, Alcott, and Lattuca (2016) argued that research on leadership development in engineering fields may serve to justify greater emphasis on communication, teamwork, and leadership training among undergraduate students. Appropriately, Dalton and Crosby (2014) stated that student coaching may help educational administrators improve student retention rates and overall success. These claims were complemented in a study conducted at the University of South Carolina where 92% of students who participated in the coaching program developed by the institution improved their grade point average (Robinson & Gahagan 2010).

Therefore, engineering students’ success seems to be improved by helping them find ways to take charge of their educational process; however, there continues to be issues in engineering majors in terms of gender diversity. Previous research has highlighted the influence of the overall educational experience of female engineering undergraduate students on their prowess in the traditionally male environment of engineering (Marra, Rodgers, & Bogue, 2009). The underrepresentation of women in science and technology fields is due to a combination of factors, which makes this a problem that should be addressed through several approaches (Blickenstaff, 2005).

Denner, Werner, O'Connor, and Glassman (2014) surveyed 741 male and female community college students in the state of California. Their goal was to develop a study that would serve different stakeholders interested in increasing the number of students who pursue computer information systems majors at four-year universities. Denner et al. (2014) found that males who enrolled in computer science courses were motivated by previous experience with gaming applications while female students were more interested in developing the necessary skills to address challenging problems. Dimitriadi (2013) noted that part of the reason why women continue to be underrepresented in promising career fields is that young women often lack the guidance to make an informed career choice.

Coaching and mentoring programs are known approaches to develop leadership efficacy. Özgen, Sánchez-Galofré, Alabart, Medir, and Giralt (2013) analyzed the impact of a program designed to have fourth year engineering students lead groups of first year students though a project management exercise designed to develop leadership competencies. The results of the 360 degree evaluation of the project leaders was considered satisfactory, suggesting that peer-to-peer guidance can be effective. Welsh and Dixon (2016) noted that the success of mentoring programs depends in part on the organizational context that surrounds the mentor-protégé relationship. It is likely that mentees might be more receptive to student mentors with whom they can identify more readily than older or more experienced mentors (Coyne-Foresi, 2015). Moreover, Mentoring in learning organizations is associated with transformational leadership approaches (Klinge, 2015).

Leadership educational programs tend to be enhanced by use of peers in the leadership development process (Haber, 2011). Smith (2010) found a correlations between mentor selection and the Leadership Practices Inventory (LPI) dimension encourage the heart in a study designed to assess transformational leadership in school librarians. Retallick, and Pate (2009) surveyed 532 undergraduate students to identify their perception on the nature and value of mentoring programs. The results from the study may be used to support the claim that undergraduate students appreciate faculty members who behave like mentors, and who help them advance their career objectives.

Enough work has been conducted to suggest that engineering students can enhance their educational experience by developing their leadership efficacy. Educators should strive to help their students take charge of their careers, embrace diversity, and actively seek to engage in leadership development practices. However, there is a deficiency in the evidence regarding comparisons between Engineering and Business undergraduate students. While Posner’s (2012) work documented differences among students from different academic programs, overall leadership survey scores may not suffice to clearly articulate leadership development needs for male and female students and their intentions to participate in mentoring programs.

RESEARCH QUESTIONS

To help narrow the gap in the literature regarding engineering and business students, the following research questions needed to be addressed:

1. Are there statistically significant differences in S-LPI mean scores between engineering and business undergraduate students in the sample?

2. Are there statistically significant differences in S-LPI mean scores between male and female undergraduate students in the sample?

3. Are there statistically significant differences in S-LPI mean scores between students who desire to engage in mentoring programs and students who do not?

METHODOLOGY

This study was developed following Kouzes and Posner’s five practices of exemplary leadership model (Posner, et. al., 2015). This model has been recognized as one of the most widely used transformational leadership frameworks (Northouse, 2016). The study was designed as post facto research, an approach where participants are not manipulated, but the relationship between the dependent and independent variables is analyzed to address the research questions (Abbott & McKinney, 2013).

 The participants in this study were 59 business and 29 engineering undergraduate students from one private university located in the city of Tijuana, Baja California, Mexico. All participants were enrolled in their freshman year. The students were approached with consent by their program coordinators. Additionally, students were asked to sign an informed consent form where it was clearly stipulated that they may decline from participating in the study without consequence.

 Consistent with the nature of the study, which was designed to measure transformational leadership construct, the participants were given the Student Leadership Practices Inventory (S-LPI) in its paper form. Posner (2012) analyzed S-LPI data from 77,387 respondents and noted that this leadership instrument consistently produced adequate measures of validity and reliability. However, perhaps due to the relatively small sample size, only one construct (inspire a shared vision) scored acceptable Alpha Cronbach coefficient (see Table 1). The low reliability coefficients in four out of the five leadership constructs represent a limitation for the present study, but partial conclusions may be taken from the inspire a shared vision construct.

Table 1

*S-LPI Alpha Cronbach Coefficients*.

|  |  |
| --- | --- |
| S-LPI Constructs | Alpha Cronbach Coefficients  |
|   |   |
| Model the way | .575 |
| Inspire a shared vision | .732 |
| Challenge the process | .696 |
| Enable others to act | .591 |
| Encourage the heart | .569 |

 The data analysis phase was developed using independent samples t-tests to compare mean scores for each construct and describe the relationships between dependent and independent variables set forth for the study to address the research questions. The process of analysis was assisted by the use of Statistical Package for the Social Sciences (SPSS) software.

INVESTIGATION DEVELOPMENT

To determine whether statistically significant differences were present in S-LPI mean scores between 29 engineering and 59 business undergraduate students in the sample, independent sample t-tests were calculated. The result was that there were no statistically significant differences between the two groups (see Table 2).

Table 2

*S-LPI Mean Scores for Business and Engineering Students.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S-LPI Constructs | Students | *M* | *SD* | *t* | *p* |
| Model the way | Business | 23.1356 | 3.19190 | -.051 | .959 |
| Engineering | 23.1724 | 3.12900 |
| Inspire a shared vision | Business | 22.8983 | 3.65162 | -.198 | .844 |
| Engineering | 23.0690 | 4.09644 |
| Challenge the process | Business | 22.7627 | 4.07828 | .193 | .847 |
| Engineering | 22.5862 | 3.93262 |
| Enable others to act | Business | 24.6949 | 3.11976 | -.089 | .930 |
| Engineering | 24.7586 | 3.28041 |
| Encourage the heart | Business | 23.7627 | 3.44583 | -.983 | .327 |
| Engineering | 24.4828 | 2.69418 |

To determine whether statistically significant differences were present in S-LPI mean scores between the 56 male and 32 female undergraduate students in the sample, independent sample t-tests were calculated. The result was that there were no statistically significant differences between the two groups (see Table 3).

Table 3

*S-LPI Mean Scores for Male and Female Students.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S-LPI Constructs | Students | *M* | *SD* | *t* | *p* |
| Model the way | Male | 23.0357 | 3.00281 | -.439 | .662 |
| Female | 23.3438 | 3.44177 |
| Inspire a shared vision | Male | 23.3036 | 3.56202 | 1.148 | .254 |
| Female | 22.3438 | 4.12396 |
| Challenge the process | Male | 22.9464 | 3.83486 | .747 | .457 |
| Female | 22.2813 | 4.32722 |
| Enable others to act | Male | 24.4821 | 3.51098 | -.919 | .361 |
| Female | 25.1250 | 2.40631 |
| Encourage the heart | Male | 23.8929 | 3.11990 | -.411 | .682 |
| Female | 24.1875 | 3.43077 |

 To determine whether statistically significant differences were present in S-LPI mean scores between the 52 students who responded that they would like to participate in a mentoring program and 34 students who responded that they would not like to participate in a mentoring program, independent sample t-tests were calculated. The result was that there were statistically significant differences between the two groups in the enable others to act construct (see Table 4).

Table 4

*S-LPI Mean Scores for Interest on Mentoring Programs.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| S-LPI Constructs | Students | *M* | *SD* | *t* | *p* |
| Model the way | Interested | 23.7115 | 3.20745 | 1.736 | .086 |
| Not interested | 22.5294 | 2.89446 |
| Inspire a shared vision | Interested | 23.5962 | 4.04998 | 1.855 | .067 |
| Not interested | 22.0588 | 3.25615 |
| Challenge the process | Interested | 23.2692 | 4.01524 | 1.469 | .146 |
| Not interested | 21.9706 | 3.99610 |
| Enable others to act | Interested | 25.3462 | 2.84146 | 2.360 | .021 |
| Not interested | 23.7353 | 3.44928 |
| Encourage the heart | Interested | 24.4615 | 3.28073 | 1.565 | .121 |
| Not interested | 23.3529 | 3.10310 |

FINAL WORDS

Surveyed groups report engaging in the practices considered by the S-LPI with about the same approximate range of descriptive statistics ranges. On all five practices measured by the S-LPI, no significant statistical differences were found between the students among all the five categories surveyed. Nor gender -male vs female, school -business vs engineering showed differences in relation to model the way, inspiring a shared vision, challenge the process, enable others to act, and encourage the heart. The exemption was in the enable others to act construct, where students who noted that they would be interested in participating in a mentoring program scored statistically significantly higher than students who noted that they would not be interested in participating in a mentoring program.

 Because of the relatively low reliability coefficients in four out of the five construct in the S-LPI, the results should be taken with caution. Only one construct, inspire a shared vision, yielded reliable conclusions that could support the notion that engineering and business students in the sample exhibit the same levels of leadership efficacy. The same can be said for the gender variable. This result is in line with studies that show no gender differences on leadership practices like the one by Posner & Brodsky (1994) . Other studies show only minor differences like the ones of Carless (1998), Adams & Keim (2000) and Komives (1994). This paper adds to the literature on leadership among students in general Núñez, El Homrani & Martín (2012); Castejón, Cantero & Pérez (2008) and engineering and business students in particular Kass & Grandzol (2011); Cox, Cekic & Adams (2010) and Laglera, Collado & de Oca (2013).

Since leadership is an attribute that for this particular study shows no differences, an argument can be made in relation to the relevance of developing this kind of behavioral skills for scholars regarding their studies orientation, since organizations value leadership as one of the key elements to hire professionals Rubin & Dierdorff (2009). As noted before, the results from this study cannot be generalized due to the use of a purposive sample. Additionally, reliability coefficients for four out of five constructs were relatively low. However, the study represents a first effort to better understand the need for undergraduate students, particularly those enrolled in engineering programs, to make a stronger effort to develop their leadership skills. Based on a comparison with a cohort of business students, there is not enough information to state that engineering students exhibit lower levels of leadership efficacy.

Future investigation can address a bigger sample of students and comparison with other institutions in order to get a more relevant statisticall sample that can lead into more general conclusions.

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