NSSE Part 1: Engagement Report

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HIED 840: Evaluating Academic Programs

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April 11, 2021

Background

Volkwein University (VU) is a large master's university who has participated in the National Survey of Student Engagement (NSSE) since 2001. Traditionally, the resulting NSSE data is "used to assess student experience, satisfaction, and institutional environment" through identifying "strengths and weaknesses in student engagement and improve student support" (Penn State University [PSU], n.d.a, para. 3). This report will analyze statistically significant findings resulting from the NSSE first-year student engagement indicator (EI) data. First, a self-comparison will be conducted between VU's 2015 NSSE data and its 2018 NSSE data. "In Spring 2018, a total of 847 first-year students responded to the survey reflecting a response rate of 21%", therefore, "the survey respondents were representative of VU's first-year" student populations (PSU, n.d.a, para 4). It is worth noting that although a response rate of 21% seems low, typically a response rate of about 15% is sufficient to be representative of the population being surveyed (Zhou, 2021a).

Engagement Indicators

What are Engagement Indicators?

Engagement indicators are areas of learning that have been researched to determine what practices promote learning (PSU, n.d.b, p. 5). NSSE is designed to collect, "valid, reliable data about how much [an institution's] students engage in those [high-impact] activities and practices" (NSSE Annual Results, 2019, p. 2). The following figure from NSSE (2018a) distinguishes the four EI themes encompassing the ten EIs NSSE measures (p. 2).

Theme	Engagement Indicator
Academic Challenge	Higher-Order Learning
	Reflective & Integrative Learning
	Learning Strategies
	Quantitative Reasoning
Learning with Peers	Collaborative Learning
	Discussions with Diverse Others
Experiences with Faculty	Student-Faculty Interaction
	Effective Teaching Practices
Campus Environment	Quality of Interactions
	Supportive Environment

Clearly, the EIs measured by NSSE assess various institutional interaction opportunities that a student can become involved in to enhance their educational experience. These engagement indicators are designed to examine key dimensions of student engagement and have each been chosen based on being "rigorously tested both qualitatively and quantitatively in a multi-year effort that included student focus groups, cognitive interviews, and two years of pilot testing and analysis" (NSSE, 2020).

How are Engagement Indicators Measured?

"NSSE reports scores for 10 EIs calculated from 47 questions and grouped within four themes" (NSSE, 2019). Each of the 10 EIs are then scored on a 60-point scale which is used to

produce an indicator score where Never = 0; Sometimes = 20; Often = 40; and Very often =60 (NSSE, 2018a). Therefore, a EI score close to 60 reflects a student who has self-reported substantial participation in areas of meaningful engagement. NSSE assesses ten EIs to provide information to institutions that can guide institutional improvement measures.

Why are Engagement Indicators Important?

Levels of student engagement are reflective of the quality of an undergraduate education (NSSE, 2019). External constituents and governing bodies of an academic institution, such as Federal and State boards, are increasingly demanding proof of the quality of education being provided to students of that institution. This proof can help an institution secure funding from these external constituents, gain institutional prestige, and increase recruitment and future enrollment numbers. Collecting and analyzing valid, reliable data reflective of a student's engagement with their institution allows that institution to conduct self-comparison evaluations of their progress, or lack of progress, between years. It also allows institutions to conduct peer-assessments and benchmarks of their students' engagement and therefore quality of the undergraduate education they are receiving, against the quality of education their peers are providing.

Self-Comparison

Learning Strategies and Student Faculty Interaction

I chose to analyze Learning Strategies and Student Faculty Interaction because these two EIs showed statistically significant differences in their mean values between 2015 – 2018 at VU. The following chart graphically represents these differences.
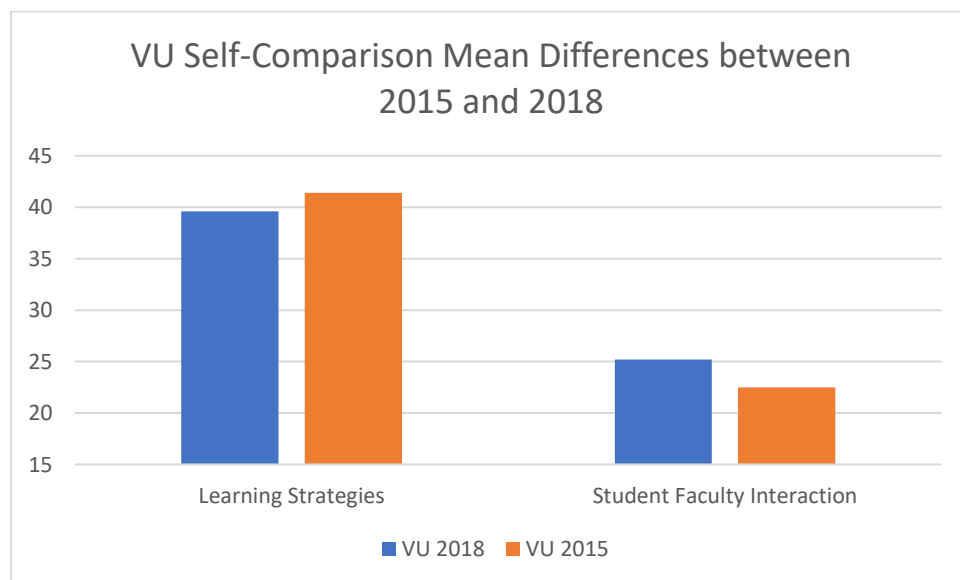
The following table reports specific statistical details supporting this claim, using a two-sample t test for the difference in means.

Learning Strategies	Student Faculty Interaction

Estimation for Difference
 	
  95% CI for
Difference Pooled StDev Difference
-1.800 13.988 (-3.281, -0.319)
 	
Test
 	
Null hypothesis H_0: $\mu_1 - \mu_2 = 0$
Alternative hypothesis H_1: $\mu_1 - \mu_2 \neq 0$
 	
T-Value DF P-Value
-2.38 1374 0.017
	Estimation for Difference
	
	  95% CI for
	Difference Pooled StDev Difference
	2.700 15.390 (1.130, 4.270)
	
	Test
	
	Null hypothesis H_0: $\mu_1 - \mu_2 = 0$
	Alternative hypothesis H_1: $\mu_1 - \mu_2 \neq 0$
	
	T-Value DF P-Value
	3.37 1480 0.001

*Note: I generated these calculations shown in the above table through MiniTab using the NSSE 2018 Engagement Indicator report data.

This confirms that the p-values are less than 0.05, so the differences in the means are statistically significant. However, we must also consider the effect size. The difference in the Learning Strategies means between 2015 to 2018 is a decrease of 1.8, however, on a scale of 0-60 with varying sample sizes and standard deviations it is difficult to determine how large this effect size really is. So, to help us determine the magnitude of the effect size, we must standardize the effect size using Cohen's D. Cohen's d is the standardized effect size between two independent sample means and is calculated by the following formula (Bradburn, 2020):

$$d = \frac{difference\ in\ means}{pooled\ standard\ deviation} = \frac{\overline{x_1} - \overline{x_2}}{Sp}$$

Below is a table summarizing the effect size using Cohen's D.

| Variable	Difference in means	Pooled Standard Deviation	Cohen's D	Interpretation
Learning Strategies	-1.800	13.988	-0.12868	Negative Low Effect
Student Faculty Interaction	2.700	15.390	0.1754	Positive Low Effect

*Note: Course Challenge and Academic Emphasis did have a higher Cohen's D value (around 0.26. 0.29), but I did not choose to analyze these because they were considered "additional items".

I used the same method to analyze the difference in the Student Faculty Interaction means between 2015 to 2018 which showed an increase of 2.700. Therefore, the effect size was relatively low. On the other hand, we must consider the practical implications of the true difference in means, 2.700 and -1.800. For the remainder of the paper, I will offer suggestions under the assumption that these statistically significant differences are large enough to require strategies to address them.

Peer Comparison

Introduction to Carnegie Class

The Carnegie Classification of Institutions of Higher Education is a framework used within the United States to assign categories to higher education institutions. Volkwein University is a large master's university, so its peer institutions in the Carnegie Class are also large master's universities. The overall mean comparison between VU 2018 Learning Strategies and 2018 Carnegie Class is shown in the chart below.
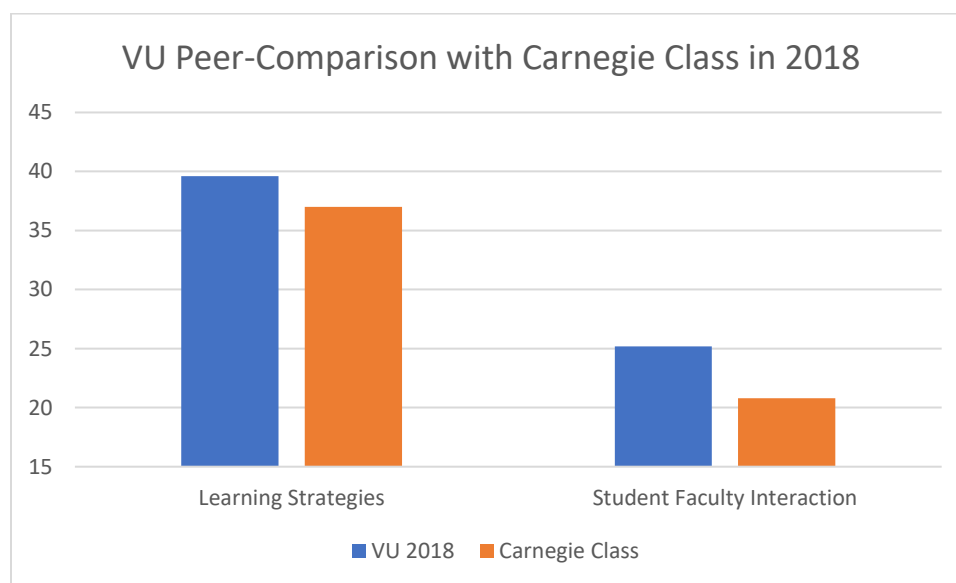

Learning Strategies

Compared to their Carnegie Class, VU scored higher with Learning Strategies with a mean value of 39.6 compared to a mean value of 37.0. This difference of 2.6 is statistically significant with a p-value of lower than 0.001 on a two-tailed test. Furthermore, the median value of VU's distribution of learning strategies is slightly higher than the median value for Carnegie class. However, it appears, according to the box and whisker plot, that the inter-quartile range is significantly wider suggesting that the variation of the data is potentially larger for VU compared with the Carnegie Class. In short, we have a wider spread of data while they have a smaller spread of data which is likely reflective of the larger sample size reflected in Carnegie Class's data.

The overall percentage of VU students and students in VU's Carnegie Class who responded that they "very often" or "often": "9a. Identified key information from reading

assignments, 9b. Reviewed your notes after class, and 9c. Summarized what you learned in class from course materials" is shown in the chart below (NSSE, 2018a, p. 5). The questions 9a., 9b., and 9c. are the three NSSE questions that assess the EI, Learning Strategies.
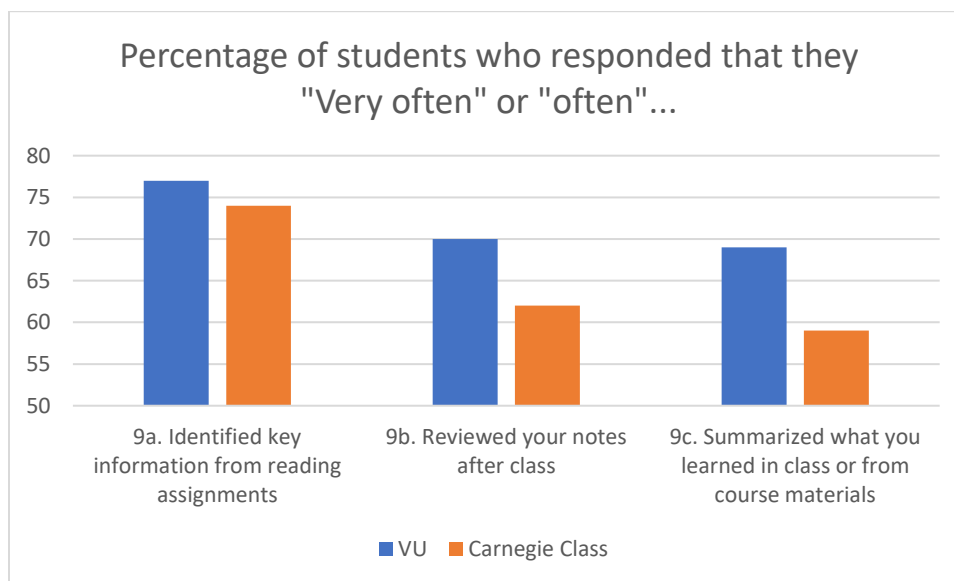
VU outperformed its Carnegie Class by 8 and 10 percentage points respectively of students who responded that they "very often" or "often" "9b. Reviewed your notes after class" and "9c. Summarized what you learned in class or from course materials" (NSSE, 2018b, p. 5). They had a less substantial increase in percentage points for students who responded that they "very often" or "often" "9a. Identified key information from reading assignments" where VU was only 3 percentage points higher than the Carnegie Class (NSSE, 2018b, p. 5).

Overall, VU learning strategies were significantly higher than Carnegie class with a p-value less than 0.05, however the effect size was less than 0.3 in magnitude. On the other hand, student faculty interaction also showed a statistically significant difference with a p-value less than 0.05, but the effect size was at least 0.3 in magnitude indicating a practically significant difference as well as a statistically significant difference.
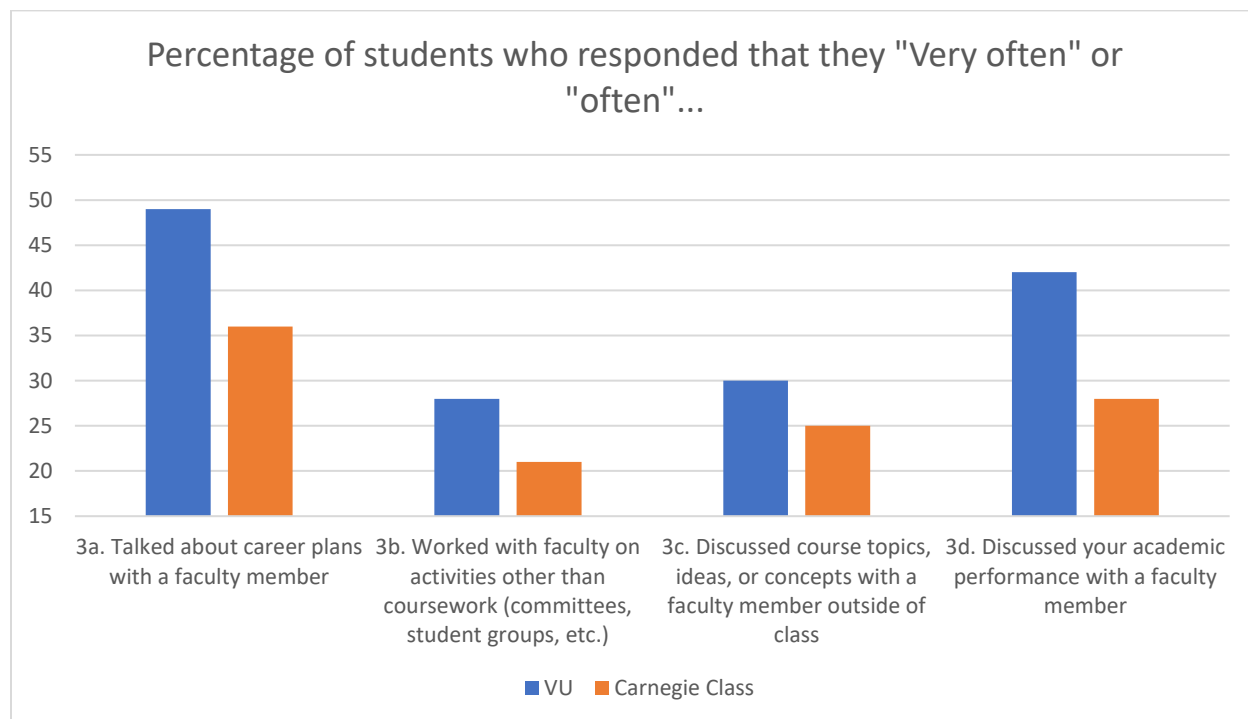
Student-Faculty Interaction

VU has a higher student faculty interaction rate than Carnegie class schools overall with a higher median value. VU also has a higher lower-quartile, higher upper-quartile, higher maximum and minimum.

The mean student faculty interaction for VU is 25.2 which is significantly higher than Carnegie class's mean which is 20.8. The p-value for this difference in means is less than 0.001 on a two-tailed test with an effect size of 0.31. This is a large enough effect size to signify that the effect difference is meaningful in the practical sense.

The overall percentage of VU students and students in VU's Carnegie Class who responded that they "very often" or "often": "3a. Talked about career plans with a faculty member, 3b. Worked with faculty on activities other than coursework (committees, student groups, etc.), 3c. Discussed course topics, ideas, or concepts with a faculty member outside of class, and 3d. Discussed your academic performance with a faculty member" is shown in the

chart below (NSSE, 2018a, p. 7). The questions 3a., 3b., 3c., and 3d. are the four NSSE questions that assess the EI, Student-Faculty Interaction.

Percentage of students who responded that they "Very often" or "often"...

In particular with student-faculty interaction, VU out performed Carnegie Class by 13 percentage points of students who responded that they "very often" or "often" "3a. Talked about career plans with a faculty member" and item "3d. Discussed your academic performance with a faculty member" where VU outperformed their Carnegie Class by 14 percentage points (NSSE, 2018a, p.7). VU also outperformed their Carnegie Class in percentage of students who responded that they "very often" or "often" "3b. Worked with faculty on activities other than coursework (committees, student groups, etc.)" and "3c. Discussed course topics, ideas, or concepts with a faculty member outside of class" by a lower number (NSSE, 2018a, p.7).

Overall Peer Comparison

NSSE does not rank institutions, but they do provide comparisons of VU's students against NSSE Top 50% composed of "institutions with average scores placing them in the top 50% of all 2017 and 2018 NSSE institutions" and NSSE Top 10% composed of "institutions with average scores placing them in the top 10% of all 2017 and 2018 NSSE institutions (NSSE, 2018a, p. 9). It is worth noting that, "most of the variability in student engagement is within, not between, institutions" (NSSE, 2018a, p. 9). This is important to acknowledge because most variability in student engagement is seen within an institution rather than between institutions, meaning all institutions have students with engagement levels below average, including those in the top 10% (NSSE, 2018a).

When VU's EI, Learning Strategies for first-year students, is compared to NSSE's Top 50%, the difference in means (39.6 – 39.5) was found to be statistically insignificant at the 5% significance level with a low effect size of +0.01. This suggests that the difference in means are

significantly and effectively equivalent, thus earning a checkmark to indicate that our university is achieving similar results on this EI.

On the other hand, the EI learning strategies at VU had a significantly lower mean rating when compared to the NSSE Top 10%. The difference in mean value (39.6 - 41.6) for Learning Strategies between VU and NSSE Top 10% was statistically significant with a p-value of less than 0.001 and an effect size of -0.14. Because the mean difference is significant with a relatively high (greater than 0.1 magnitude) effect size, we conclude that the difference in means is significantly and effectively lower when compared to the NSSE Top 10% in the EI category of Learning Strategies for first-year students.

VU's EI, Student-Faculty Interaction, for first-year students which when compared to the NSSE's Top 50% showed an insignificant difference in the means (25.2-24.3) at the 5% significance level with a low effect size (0.06). Therefore, VU's student-faculty interaction rating is insignificantly and effectively equivalent to the NSSE's Top 50%, thus earning a check mark.

When VU's student-faculty interaction rating is compared to NSSE's Top 10%, the difference in means (25.2 - 27.4) was found to be statistically significant with a p-value of less than 0.001. The effect size was -0.14 which suggests that the effect size was large enough to conclude that VU's mean rating is significantly and effectively lower than NSSE's Top 10%.

Recommended Actions to Improve Student Engagement

Learning strategies

According to NSSE (2020), Learning Strategies are important because:

College students enhance their learning and retention by actively engaging with and analyzing course material rather than approaching learning as absorption. Examples of effective learning strategies include identifying key information in readings, reviewing notes after class, and summarizing course material. Knowledge about the prevalence of effective learning strategies helps colleges and universities target interventions to promote student learning and success.

Unfortunately, VU's NSSE survey reports that in first-year students learning strategies have decreased at a statistically significant level from 2015 to 2018. The university should respond to these results by first notifying the faculty and staff of the decrease and the definition and importance of learning strategies according to NSSE. First-year course instructors should be encouraged to imbed several assignments within their courses that require students to synthesize information from readings and course notes. This simple measure should increase first-year student engagement with the EI of Learning Strategies.

Student Faculty Interaction

According to the NSSE (2020), Student-Faculty Interaction is a key engagement indicator because:

Interactions with faculty can positively influence the cognitive growth, development, and persistence of college students. Through their formal and informal roles as teachers,

advisors, and mentors, faculty members model intellectual work, promote mastery of knowledge and skills, and help students make connections between their studies and their future plans.

The VU NSSE survey reports that the first-year student perception of student faculty interaction has increased at a statistically significant level from 2015 to 2018. Faculty should be informed of this positive growth and praised for their increased interaction with students. It is important to mention that student-faculty interaction does not need to be lengthy to be meaningful to the students.

Considerations

It is possible that these results are related to each other, but it is surprising that learning strategies have decreased, given that the average student is exposed to more non-faculty related resources available to help them understand challenging materials without the need to attend to attend office hours or communicate directly with faculty members. The decrease in learning strategies coupled with the increase in student faculty interaction could be a result of increased use of the internet to supplement learning. Students are more likely to reach out to faculty personally because of the prevalence of electronic communication techniques such as e-mail. These methods of direct communication are convenient, familiar, and effective. It is also likely that students are not using the traditional learning strategies that previous first-year students took advantage of due to the fundamental differences in student input qualities resulting from the technology boom in the last 20 years.

The survey question order is possibly not randomized. There was no mention of question randomization on the NSSE website. Due to the length of the survey, it is possible that the accuracy of participant responses may vary between question 1 and question 21. In future surveys, questions 1-21 should be randomized to balance out the possible effects of response bias.

<div align="center">

Conclusions

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Overall, of the engagement indicators I have chosen, Learning Strategies showed a slight decrease from 2015 – 2018 and Student-Faculty Interaction showed a slight increase between these years at Volkwein University. These changes were statistically significant, yet their effect sizes were relatively low. For the self-evaluation, it would be worthwhile to investigate potential reasons why these EIs have changed at a statistically significant level. However, these changes are not too alarming considering comparisons against peer institutions which revealed that VU outperformed the Carnegie class at a statistically significant level of 0.05. In general, it seems like VU is doing a good job, but might need to be cautious regarding potential decreases in Learning Strategies.

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