A Benefit-Cost Analysis of Offering a Speech Class at Florida Polytechnic University

By: Aaron Kraslow, Dalton Reith, and Sydney Weber

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Abstract:

Florida Polytechnic University students were found to need improvement in terms of their communication skills by the Office of Institutional Research. The purpose of this study, therefore, was to evaluate if a speech class should be implemented through performing a benefit-cost analysis in order to determine what value this class would bring to students. A survey of faculty and a series of analyses were conducted, and it was discovered that the present value gain per student over their lifetime exceeded $47,000. In conclusion, it was decided that a speech class should be offered at Florida Polytechnic University.

Executive Summary:

Students at Florida Polytechnic University have been found to be lacking in their communication skills which presents a challenge to students seeking to find a job once they graduate as communication skills is one of the most sought after skills by employers. These findings present a need at Florida Polytechnic University that must be addressed and this need for better communication skills in students could be met through offering a speech class at the university.

To test these claims, a benefit-cost analysis was undertaken that sought to find how valuable a speech class that could help improve students' speaking skills was. The first step in the benefit-cost analysis was to conduct a survey amongst professors at Florida Polytechnic University that asked them to rate the perceived speaking skills of the students they have encountered while teaching at the university and also to give an idea on the motivation of students in their desire to improve their skills.

From the results of the survey, a baseline of where students fall in their speaking abilities was able to be quantified and estimates of their probabilities of increasing their skills were found. Through using these numbers gained from the survey, an analysis was conducted that looked at the benefits the students of a speech class would receive over their lifetime and the cost that would be incurred to Florida Polytechnic University for hiring speech professors to teach the class.

The analysis showed that there are net benefits to be gained on the order of $23 million across an entire class of students or about $47,000 in benefits to each student. Due to the enormous benefits that could be available to students by simply offering a speech class at Florida Polytechnic University, it is the obvious choice to begin making plans to implement a speech class in the university's curriculum.

Introduction:

Employers tend to value effective communication skills as one of the top skills to look for when recruiting future employees (Association of American Colleges and Universities, 2018). Having effective communication skills is so valuable to employers that studies suggest that employers will pay more for them (Norwood & Henneberry, 2006). Thus, the importance of communication skills and their development cannot be overstated.

Florida Polytechnic University already tackles written communication skills through offering a technical writing class to all of its students. However, they do not offer any classes or extracurriculars that focus for the most part on improving students' speaking skills or their ability to make effective presentations, which is desperately needed partly because engineers and analysts need these skills to be able to share their ideas and findings.

The problem with this, as alluded to above, is that students may be missing out on the opportunity to improve a skill that not only makes them more appealing to recruiters but also that could help make them better off both in their careers and financially. Additionally, Florida Polytechnic may be missing out on an opportunity to have improved employment rates of their graduates which in turn may boost their overall reputation. Therefore, this benefit-cost analysis seeks to determine the benefits students would receive from taking a STEM (Science, Technology, Engineering, and Mathematics) focused speech class.

Literature Review:

To begin, a work titled "Fulfilling the American Dream: Liberal Education and the Future of Work" published by the Association of American Colleges and Universities is a research study that sought to gauge the degree in which business executives and hiring managers believe that college education is important, what learning outcomes are the most crucial for success in today's competitive environment, and how prepared college graduates are in the area of professional development. Perhaps the most notable and applicable finding of this study was the statement that both executives and hiring managers see recent college graduates as "underprepared in the skills and knowledge areas that they deem most important" with the highest rated skill being the ability to communicate orally with only 40 to 47 percent of executives and hiring managers rating college graduates as prepared in this area.

The second article utilized was published in 2017 by The Journal of Research in Business Education and titled "Critical Communication Skills: Developing Course Competencies to Meet Workforce Needs." From this article, the following skills were ranked as the most important in

new hires: general oral communication skills (89% of participants ranked as essential or important), communication with management (84% ranked as essential or important), communication with clients (84% ranked as essential or important), writing skills (81% ranked as essential or important), and general communication skills (78% ranked as critical or important). In addition, it should be noted that of these skills both general oral communication and communication with clients were the only two categories where over 50% of respondents ranked them as essential. When asked about their degree of satisfaction with the presence of these skills in students, only one category saw 50% of businesses respond with satisfaction, which was general oral communication skills. Communication with management only saw 43% respond with satisfaction, communication with clients only received 35%, writing skills received 42%, and general communication skills received 38%.

The next study titled "Show Me the Money! The Value of College Graduate Attributes as Expressed by Employers and Perceived by Students" written by Norwood and Henneberry showed that the monetary value of excellent communication skills was $8,000 when hiring a new graduate, a number that is going to be utilized within our benefit-cost analysis to determine the value that students will be receiving.

The fourth study titled "Understanding University Image: A Structural Equation Model Approach" written by Duarte, Avles, and Raposo gave information on the impacts of reputation on a university. The researchers conducted this study through surveying 1,024 university students and found that the most significant factors in the image formation of a university was the university's social life atmosphere and employment opportunities / students' abilities to find employment after graduation.

Data Sources:

To begin, the team gathered data on how good students at Florida Polytechnic University were at speaking and their motivation to improve their skills by conducting a survey of 24 Florida Polytechnic University professors. Concerning the current ability portion specifically, professors were asked to give a percentage for students who were excellent, good, mediocre, and poor speakers based on their observations. In terms of the motivation portion, professors were asked based on their experiences to state whether 75%, 50%, 25%, or around 0% of students in each category had the motivation to move from above good to excellent, from mediocre to excellent, from mediocre to good, from poor to excellent, from poor to good, and finally from poor to mediocre.

The Fall 2017 Profile published by Florida Polytechnic University that provided information on the demographics of the university including the number of freshmen enrolled at that time which was used in this analysis. The next source used was the course textbook which provided

information on what the real discount rate is. An article by Robert Gordon titled “The Demise of U.S. Economic Growth: Restatement, Rebuttal, and Reflections” was used in conjunction with the course textbook to find a value for the growth rate. The article by Norwood and Henneberry provided a monetary value for good communication skills of $8,000 which was used heavily in the analysis. Finally, the Chronicle of Higher Education was used to find the average salary of speech professors which was used in calculating costs to the university in this analysis.

Analysis:

To determine how beneficial the addition of a speech class to Florida Polytechnic University’s curriculum is, several variables to be used in the analysis were derived. The variables as well as their definitions and values can be seen in Tables 1 and 2 below.

N_g	Number of students classified as being good speakers	137
f_{ge}	Probability of a student improving from being a good speaker to an excellent speaker	0.46
B_{ge}	Benefits of improving from being a good speaker to an excellent speaker	$2666.67
N_m	Number of students classified as being mediocre speakers	177
f_{me}	Probability of a student improving from being a mediocre speaker to an excellent speaker	0.22

Table 1

B_{me}	Benefits of improving from being a mediocre speaker to an excellent speaker	$5333.33
f_{mg}	Probability of a student improving from being a mediocre speaker to a good speaker	0.36
B_{mg}	Benefits of improving from being a mediocre speaker to a good speaker	$2666.67
N_p	Number of students classified as being poor speakers	93
f_{pe}	Probability of a student improving from being a poor speaker to an excellent speaker	0.15
B_{pe}	Benefits of improving from being a poor speaker to an excellent speaker	$8000
f_{pg}	Probability of a student improving from being a poor speaker to a good speaker	0.20
B_{pg}	Benefits of improving from being a poor speaker to a good speaker	$5333.33
f_{pm}	Probability of improving from being a poor speaker to a mediocre speaker	0.28
B_{pm}	Benefits of improving from being a poor speaker to a mediocre speaker	$2666.67

Table 2

To find the benefits to students of being able to speak, the article by Norwood and Henneberry was used as it claimed that an employer was willing to pay a new employee around $8000 dollars more per year if they were proficient in their speaking skills. Therefore, it was assumed that excellent speakers would receive the full $8000 benefit from being a good speaker while those who fell into every other category would receive a fraction of that benefit. Those in the good, mediocre, and poor category were assumed to receive $5333.33, $2666.67, and $0, respectively. These numbers were calculated by assuming that those in the poor category of speakers would receive no benefits as their speaking skills are too bad and those in the good and mediocre categories were assumed to make two-thirds and one-third of the total benefits, respectively. To calculate the benefits a student would receive by improving their skills, the difference of the skill level they improved to and the skill level they were at previously was taken. For example, if a student improved from being a poor speaker to a good speaker, the benefits that student would receive were calculated as

$$B_{pg} = 5333.33 - 0 = \$5333.33$$

The number of students who fell into each category of speaking skills was found by multiplying the total number of Freshmen at Florida Polytechnic University in Fall of 2017 (Fall 2017 Profile) by the percentage of students who fell into each speaking category according to professors. For example, the survey showed that 28% of students fell into the good speaker category so the number of good speakers was found as

$$N_g = 491(0.28) = 137$$

The probability of a student improving to another skill level was found by multiplying the percentage of students who professors thought displayed motivation to move up to a certain skill level by the percentage of students in that category. For example, 20.83% of professors thought that about 75% of their students could improve from good to excellent, 46% thought that about half of their students could improve from good to excellent, 29.17% of professors thought that about 25% of their students could improve from good to excellent, and 4.17% thought that almost none of their students could improve from good to excellent. Therefore, the probability of a student moving from good to excellent was calculated as

$$f_{ge} = (.2083)(.75) + (.46)(.5) + (.2917)(.25) + (.0417)(0) = 0.46$$

Once the above variables were calculated, the total benefits per student were able to be found by utilizing the equation below.

$$\lambda = \frac{N_g(f_{ge}B_{ge}) + N_m(f_{me}B_{me} + f_{mg}B_{mg}) + N_p(f_{pe}B_{pe} + f_{pg}B_{pg} + f_{pm}B_{pm})}{491}$$

After the benefits received by students was found, the net present value could be calculated by discounting the benefits the students received over their work lifetime and summing up the benefits. This value was then subtracted by the cost of a speech professor multiplied by the number of speech professors required to teach all of the necessary course. This was written mathematically as

$$NPV = \sum_{t=3}^{T} \lambda_t \left(\frac{1+g}{1+r}\right)^t - C_{prof}N_{prof}$$

The variables in the equation are described in Table 3 below.

T	Number of years a person is expected to work on average	46 years
λ_t	Total Benefits per Student	$47,307.04
g	Growth rate	.015

r	Real discount rate	.035
C_{prof}	Cost of a speech professor on average	$60,000/year
N_{prof}	Number of speech professors required to teach the students	8

Table 3

The total benefits per student at any given time were calculated from equation for net benefits described above. The growth rate and real discount rate are both constants that are used to put money into present value. The growth and real discount rates were retrieved from an article by Robert Gordon titled "The Demise of U.S. Economic Growth: Restatement, Rebuttal, and Reflections" and the course textbook (Boardman et. al), respectively. The average salary of a speech professor was found by using the Chronicle of Higher Education to find the average salary for associate professors at public universities. The number of professors needed was estimated by dividing the number of freshmen by the assumed speech class size of 20 students and then dividing that number by how many sections of a class a professor would teach. This came out to approximately 8 professors needed to provide a speech class for all freshmen at Florida Polytechnic University.

After obtaining all of these variables and performing the calculations, it was found that the benefit to all students was $23,277,754.81 while the cost of the professors was found to be $480,000 so the overall net present value of implementing a speech class is $22,747,754.81. The value received per student over their work lifetime was found to be $47,307.04.

Sensitivity Analysis:

To test the robustness of this survey, each of the probabilities used in calculating the benefits and net present value were altered to see how the results would change. Additionally, an uncertainty factor was introduced and modeled to see how big of an impact the numbers gathered from the survey have on the results if they are not reliable. The variables for the number of professors and professor salary did not have a sensitivity analysis performed on them since they represented such a small fraction on the overall calculation and even large changes in these numbers would have had little effect on the results of the analysis. Below is a graph of the net present value per student plotted against the uncertainty factor γ.

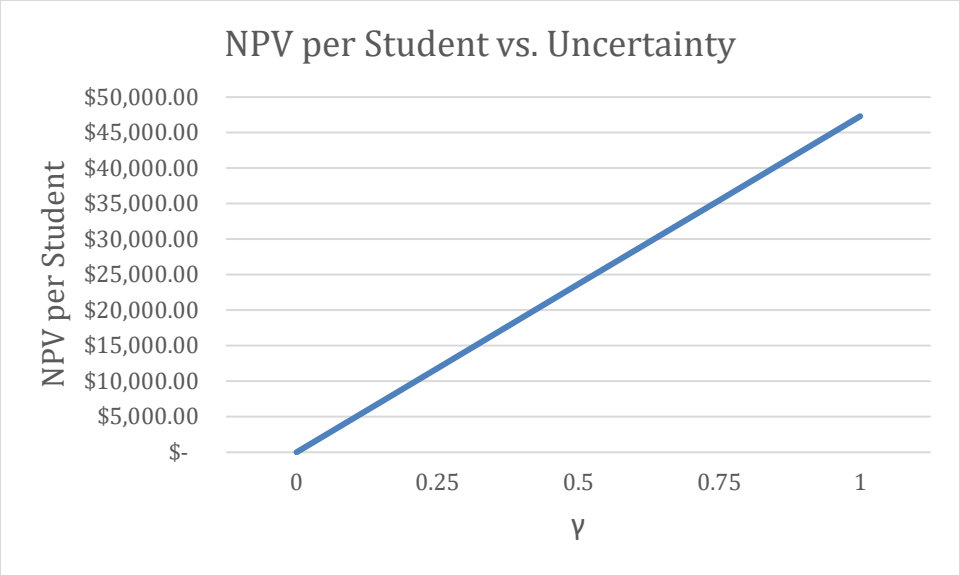

Figure 1

As can be seen from Figure 1, the uncertainty factor has a large impact on the results as should be expected since the net benefits are calculated entirely from survey data. It is important to note however, that even with high uncertainty in the data, the net benefits to students is still positive. Below in Figure 2, a plot of NPV per student vs the probability of moving from good to excellent can be seen.

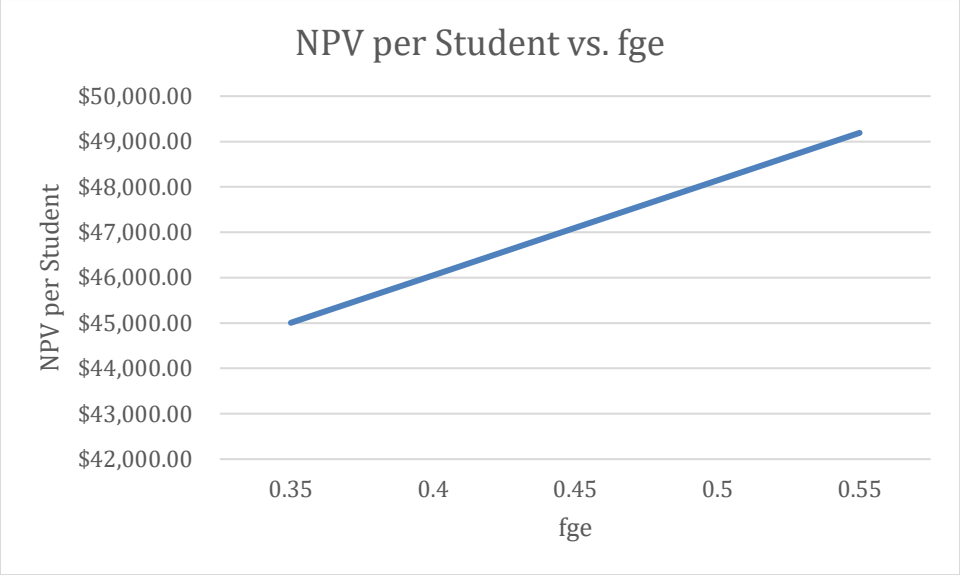

Figure 2

This graph shows how the net present value received per student is affected by changes in the probability of a student moving from being a good student to an excellent student. Figure 2 shows a linear trend and that

the benefits received per student are not highly impacted by changes in the probability. The other probabilities were also plotted as a function of the net present value per student, however, they followed a very similar trend to that seen in Figure 2. As such, the other figures can be seen in Appendix A.

Discussion, Conclusions, and Recommendations:

As displayed in the analysis section, the net benefits realizable from the model created suggested the value of offering a single professional speech development class far outweighed any of the costs associated with the endeavor. The current freshman class would have collectively earned an additional $23.2 million across their entire carriers (which was broken down to about $47 thousand per student) while only costing the university an additional $480 thousand. This additional expenditure primarily emerged from the need to hire new staff to ensure there were enough classes available for every freshman. However, before inferring any conclusion or recommendations, the limitations of the model should be noted.

The collective perspective of the parties given standing in this benefit-cost analysis was a bit narrow. The model primarily applied costs and benefits to students of Florida Polytechnic University and the institution itself. In addition, only the benefits for students and the costs to the university were considered. Other crucial analytical dimensions which should be utilized in future research include: quantifying the costs to students of adding an additional class to their catalog or replacing an existing class in their catalog, quantifying the benefits received by the university, giving firms who hire Florida Polytechnic students standing in model, and then identifying and quantifying all benefits and costs those firms can realize through the further development of soft skills in students. It was considered at the onset of this analysis that there could have been a monetizable, if not intangible, benefits that employers could have received from having new hires that were more proficient at communicating. However, depending on the market the student was entering, the effect of the change would have been minimal to nonexistent for the firm if there was a high degree of competition. It was also noted that some degree of continued development would be needed to ensure the skills introduced were to remain sharp throughout the student's tenure at the university. In addition, while not quantified in this analysis, it would not have been unreasonable to assume that there would have been improvements to the university's reputation that would have accrued benefits as well. The inclusion of this new course could have demonstrated that the university was able to respond to industry feedback and develop a curriculum that is truly reflective of what the modern work environment required from recent graduates.

Some actions could have been taken to ensure the data utilized was a bit more robust as well. The sample size for the survey used to organize

students into proficiency categories and quantify their likelihood to improve was rather small as not all of the teaching staff were able to be reached within the time frame of the analysis. With more time, a more accurate value for benefits attributable to soft skills could have been derived through additional research as well.

Despite these limitations, the model was still more than robust enough to offer some insight and develop recommendations. As stated prior, within the context of the developed model the inclusion of only a single class focused on developing professional oral communication resulted in students earning an additional $47 thousand across the entire lifetime of their careers. Even when run through a thorough sensitivity analysis, the realizable benefits remained consistently significant. In addition, the need for such a class was justified by both Florida Polytechnic's teaching staff and employers of the interns from the university. The staff survey displayed that 55% of the students at Florida Polytechnic University were classified as either mediocre or poor oral communicators by instructors. These results were verified by the university's own "Student Internship Evaluation" which rated students skills based on feedback from firms who took them in as interns. The results showed only 37.4% of respondents classified verbal communication skills as a strength observed in students. While in reality more would need to be done to properly solidify and further develop the skills introduced in a freshman level verbal development course, this analysis shows that the presence of this course served as a significant enough stepping stone to help students realize the additional monetary benefits available to those who have honed soft skills.

Appendix A:

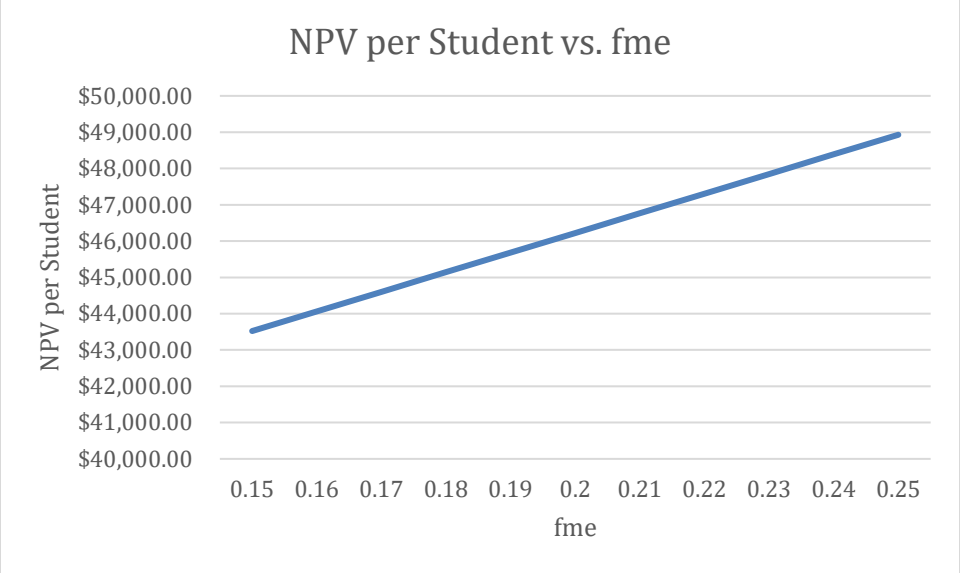

Figure A1

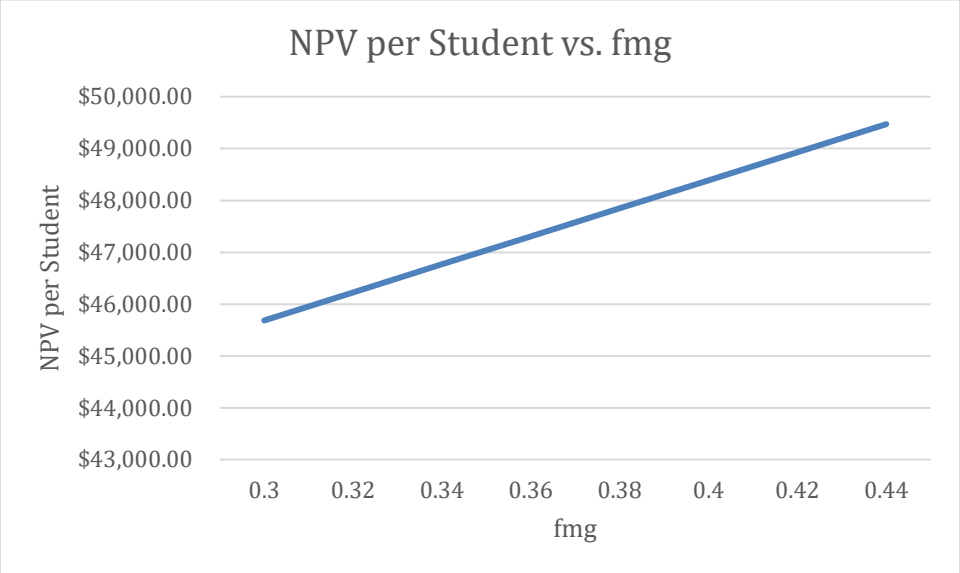

Figure A2

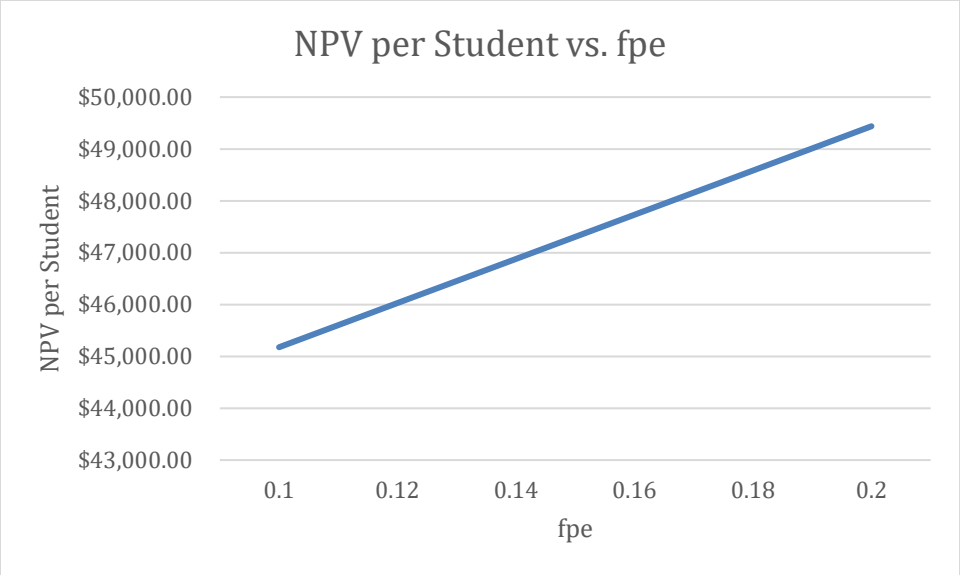

Figure A3

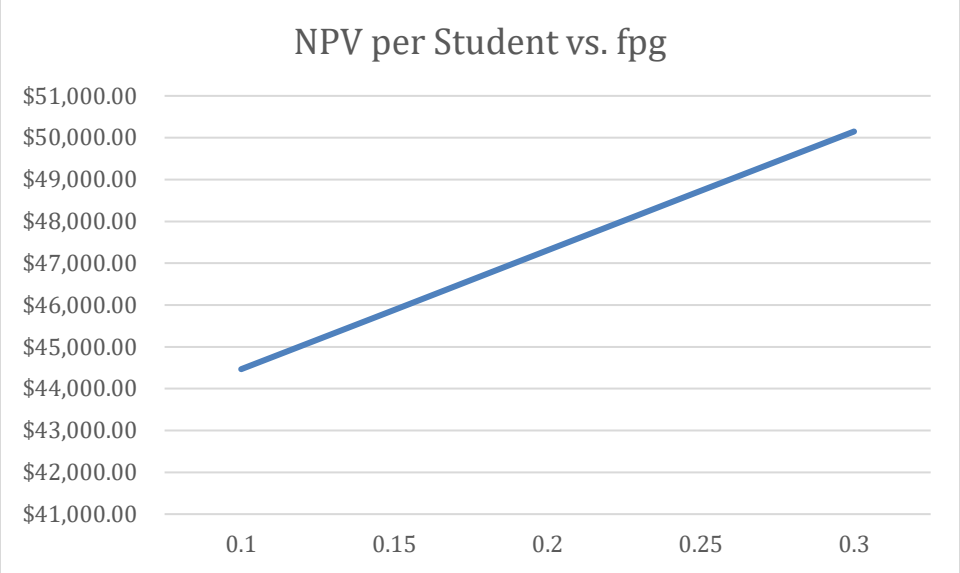

Figure A4

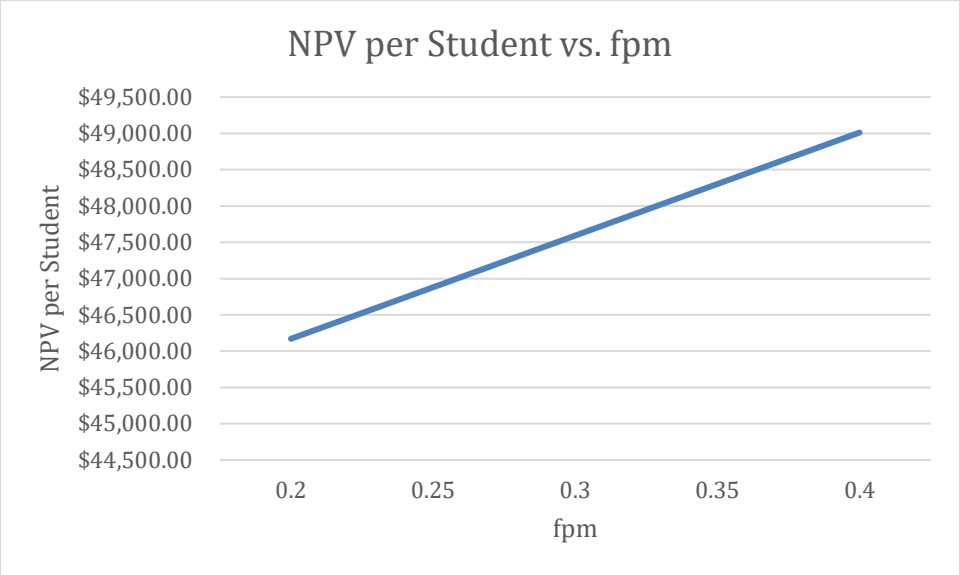

Figure A5

Appendix B:

Please indicate what percent of your students fall into each category for question 1. Please ensure all percentages stated in each question add up to 100%. For the remaining questions, please base you answers off of your experience and observations at Florida Polytechnic University.

1. Please indicate what percent of students at Florida Polytechnic University would fall into each category.

Excellent Oral Communicator	
Good/Above Average Oral Communicator	
Mediocre/Average Oral Communicator	
Below Average/Poor	

2. Of the students in the good/above average category please indicate what percent of them display the motivation to improve into the following category.

	About 75% of students	About half of students	About 25% of students	Around 0% of students
Improve to Excellent	○	○	○	○

3. Of the students in the mediocre/average category please indicate what percent of them display the motivation to improve into the following categories.

	About 75% of students	About half of students	About 25% of students	Around 0% of students
Improve to Excellent	○	○	○	○
Improve to Good/Above Average	○	○	○	○

4. Of the students in the poor/below average category please indicate what percent of them display the motivation to improve into the following categories.

	About 75% of students	About half of students	About 25% of students	Around 0% of students
Improve to Excellent	○	○	○	○
Improve to Good/Above Average	○	○	○	○
Improve to Mediocre/Average	○	○	○	○

Figure B1

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