Cheating in Engineering College Student: Reasons, Techniques, and Mitigations

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Abstract

On August 2020, the main researcher was selected to be part of the Undergraduate Research Program for Honor Students (URP-HS) within the Polytechnic University of Puerto Rico with the assigned topic of cheating (academic dishonesty). The project looked to understand the necessary aspects of Engineering Education and academic integrity within all the Engineering Departments of the Polytechnic University of Puerto Rico, San Juan Campus. To obtain this information, the main researcher, alongside the research team's mentor, created a survey that had demographical, behavioral, and situational questions using the literature review they carried out at the beginning of the project as the basis for them. Also, the research team sent via email the survey to several courses obtained through calculations that represented each type of course provided by all Engineering Departments for the Spring 2021 (SP-21) trimester. Additionally, the hypothesis established by the research team was that the cheating done by the students in the classroom will be less than the cheating they do in the workplace. The survey produced 171 responses from the courses it was sent, and the answers were analyzed. After analyzing the results, the research team provided the recommendations of the creation of a course explaining academic dishonesty, professors and/or teaching assistants providing reminders to students of the contents of this course to their respective courses, the establishment of cheating definitions for each specific course, more utilization of group assignments with a few amounts of students, and more course material containing real-world examples and/or projects. Additionally, the research's hypothesis was not accepted because the results indicated that the cheating done by the students in the classroom was more than the cheating in the workplace.

Introduction & Objectives

Cheating is defined as a deliberative act, in that students make a conscious decision to engage in academic dishonesty (Anderman & Koenka, The Relation Between Academic Motivation and Cheating, 2017). This research looked to understand and quantify the possible amount of cheating currently being done in the Polytechnic University of Puerto Rico, San Juan Campus. To obtain this data the following objectives were established:

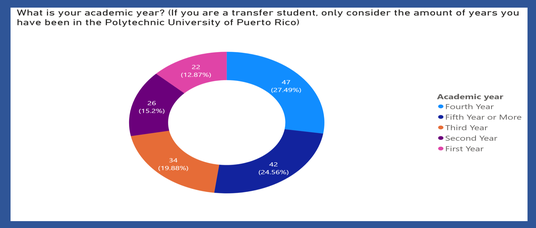
- Why engineering students recur to cheating?
- What methods engineering students use to cheat?
- What tools engineering students use to cheat?
- Is the current cheating the student take part of translates to the workplace?
- How can cheating can be minimized/eliminated?

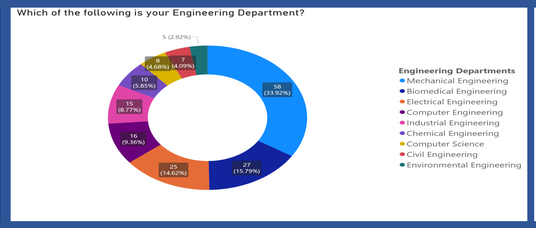
Methodology

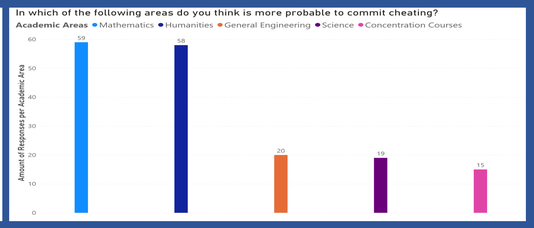
The research project was created using the Survey Research Method, which is a method used to obtain quantitative and qualitative information through giving questionnaires/surveys that the respondents will answer. Due to the limitations and constraints of COVID-19, the surveys were sent via email. To assure the respondent's confidence that the information will not serve to his/her detriment, the research team clearly specified when sending it that the survey is completely confidential, as well as a letter from the Vice-President of Student Affairs of the Polytechnic University of Puerto Rico, San Juan Campus establishing it. To ensure the randomness and accurate selection of courses to receive the survey, the research team divided all individual courses by their respective course codes for the Spring 2021 (SP-21) trimester. After organizing the courses by their respective codes, the total sum for each of them was calculated. Next, each one of these totals was divided by the total number of Engineering courses provided for the SP-21 trimester to obtain a sampling fraction. This sampling fraction calculation was then multiplied by each total of the course codes previously mentioned to obtain the number needed of courses to represent statistically the entire population. The following is an example of the totals and calculations explained:

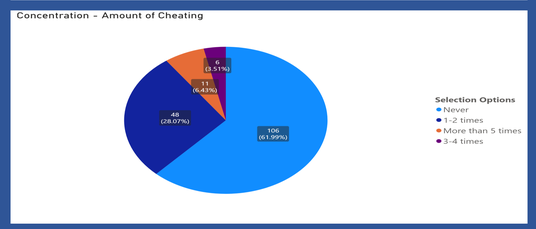
Course Code	Engineering Departments Sample Size (Amount of Course Sections) (n)	Engineering Major Population Size (N)	Sampling Fraction	Sample Amount by Engineering Department	Sample Amount by Engineering Department (Rounded Up)
BME (Biomedical Engineering)	37	402	9.20%	3.405472637	4
CE (Civil Engineering)	26		6.47%	1.68159204	2
CEE (Civil and Environmental Engineering)	10		2.49%	0.248756219	1
ENVE (Environmental Engineering)	14		3.48%	0.487562189	1
COE (Computer Engineering)	23		5.72%	1.315920398	2
CS (Computer Science)	7		1.74%	0.121890547	1
CECS (Computer Engineering and Computer Science)	38		9.45%	3.592039801	4
EE (Electrical Engineering)	60		14.93%	8.955223881	9
IE (Industrial Engineering)	39		9.70%	3.78358209	4
ME (Mechanical Engineering)	75		18.66%	13.99253731	14
ENGI (General Engineering)	44		10.95%	4.815920398	5
CHE (Chemical Engineering)	29		7.21%	2.092039801	3

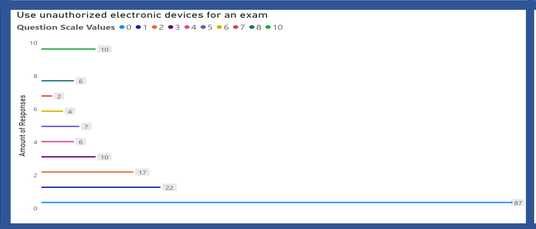
Data Analysis & Results

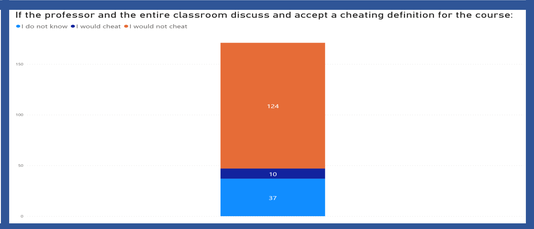


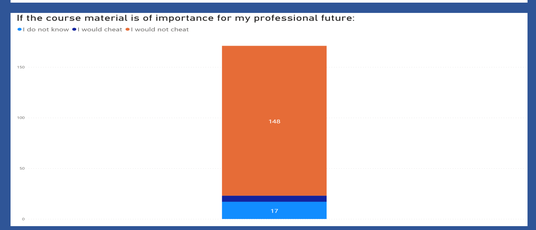


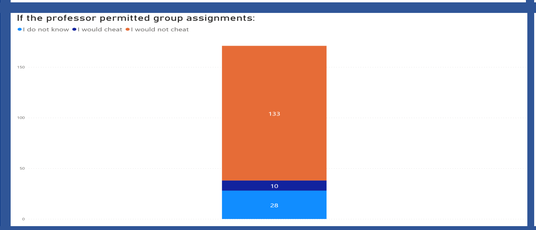


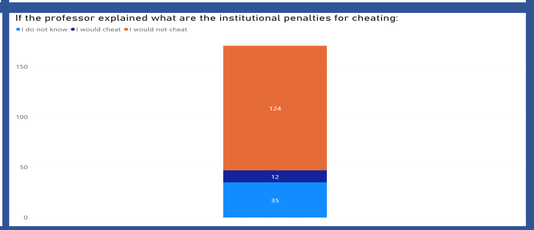












After obtaining all the answers from the 81-question survey, the research team did statistical analysis of the answers to gain insights within each of the 9 Engineering Departments. Because of this, the above results are the ones that most represent the answers obtained by each of the sections within the survey. The results indicate that 49.71% (85 responses) of the students are part of the Mechanical and Biomedical Department, while the remaining responses are Electrical Engineering 14.62% (25 responses), Computer Engineering 9.63% (16 responses), Industrial Engineering 8.77% (15 responses), Chemical Engineering 5.85% (10 responses), Computer Science 4.68% (8 responses), Civil Engineering 4.09% (7 responses), and Environmental Engineering 2.92% (5 responses). The results for the question of academic year establish that 71.93% (123 responses) of the students that answered the survey are in their third (19.88%), fourth (27.49%) and fifth year or more (24.56%). This indicates that most of the students in the survey are in an advanced part of their respective curriculums, such as General Engineering and Concentration courses. The remaining percentages correspond to the first (12.87%) and second (15.20%) year students (22 & 26 responses respectively).

Also, the results of the survey indicate an amount of cheating within all Engineering Departments being approximately between 553 to 833. When seeing the results by the type of course, the order form highest to lowest amount of cheating was Mathematics (126 to 195), Concentration courses (121 to 175), General Engineering (105 to 161), Science (103 to 161), and Humanities (98 to 141). Interestingly, this order is different from the Cheating Probability section because Concentration courses and General Engineering occupy the second and third place, whereas in the other section they occupied the last two spots. In contrast, the Science and Humanities courses occupy the last two spots in this section, but in the Cheating Probability section the occupied the second and third spot. Regarding the top spot, the Mathematics part of the curriculum is in the first spot in this section and in the Cheating Probability section. When analyzing the data looking at it from the point of view by the total of all responses by each type of cheating, the most present type of cheating was using unauthorized electronic devices in an exam with 123 responses, followed by completing an exam using unauthorized help from a classmate and copying another classmate's exam or homework and obtaining credit for it with 67 and 61 responses, respectively. The last two spots correspond to copy and pasting information from the Internet and establish it as their own and paying another classmate to do their own homework or exam with 39 and 3 responses, respectively. The results for the situational questions asked to the respondents in which the institution and the professors, specifically in their classrooms, take certain actions to prevent cheating provided the research team a guide to include in their recommendations as follows.

Conclusions & Recommendations

1. Creation of course when students begin studying in the University early within their first trimester for them to understand the specific honor code of the institution, the consequences and/or penalties associated in not complying with it, how other people are affected by academic dishonesty, the importance of ethical behavior, and the concept and consequences of plagiarism.
2. Professors and/or teaching assistants reminding students of the contents of the previously mentioned course in each of the courses they teach.
3. Establishment of cheating definition for each course by part of the professor and the entire classroom.
4. More utilization of group assignments with a few amounts of students to give an impression of a small classroom working in these assignments.
5. More course material containing real-world examples and/or projects to obtain the benefits of the responses of few cheating in the workplace and not cheating if the material is of importance for the student's professional future.

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