

Co-curricular Engagement of Transfer Students

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Abstract— This is a work-in-progress in the Research category investigating transfer student participation in co-curricular activities. Transfer students at 4-year universities are often considered as secondary-priority students. In this paper, we investigate engineering transfer student participation in co-curricular activities at a predominantly undergraduate polytechnic university. Survey results from Cal Poly in San Luis Obispo, a primarily undergraduate institution on participation in co-curricular activities is presented. We discuss the impact of the COVID pandemic on the survey results, showing that the pandemic has severely decreased participation in co-curricular activities for all students. Survey results also demonstrate a correlation between students to participate in significant co-curricular activities are greater than 20% more likely to attain major-related summer internships than students who do not. Finally, we discuss barriers to co-curricular participation for transfer students, and how the COVID pandemic has impacted this group of students differently than first-time-first-year students.

Keywords—Diversity, Transfer students, Co-curricular, COVID

I. INTRODUCTION

Co-curricular activities for engineering students are important for many reasons. Co-curricular activities give students a healthy social outlet, help prepare students for industry and give students a practical application of in-class learning. Most importantly, in engineering, co-curricular activities help students build their identity as an engineer or computer scientist [1].

This paper investigates the major inequities of transfer student participation in co-curricular activities at Cal Poly, San Luis Obispo which is a primarily undergraduate, 4-year polytechnic university.

This work-in-progress is a part of a greater NSF-funded project called “ENGAGE” (Engineering Neighbors: Gaining Access Growing Engineers) that is one part asset-based mentoring program, one part scholarship program and one part equity program for underrepresented students. In this paper, we share a second year of survey results about student participation in co-curricular and extra-curricular activities. Goals of this survey are to 1) correlate students' participation in co-curricular activities with student success and 2) identify barriers to participation in co-curricular activities for transfer students and other minority populations. This study draws upon survey results from the academic years 2019/2020 and 2020/2021. It should be noted that due to the pandemic and virtual instruction, participation in all outside-of-class activities were remarkably

lower in academic year 2020/2021. Nonetheless, we present results from both of these academic years.

For the purposes of this paper, we define extra-curricular activities as those activities that happen outside of the classroom that are not major-related, and co-curricular activities are those activities outside of the classroom that are no directly related to coursework (such as homework) but use lessons from their major courses in their activities. Examples of co-curricular activities are: Steel Bridge, Formula SAE, and Hackathons, whereas extra-curricular activities could include intramural sports, social Greek organizations, and identity-based clubs.

II. RELATED WORK

Some studies have shown out-of-class activities to have a positive influence on student academic success. These positive activities range from living in a residence hall, academic clubs and faculty-related research projects. Other out-of-class activities, such as athletics, full-time work and involvement in social Greek life may have negative outcomes on student success [8], [9].

More recently, research has been conducted specifically on engineering students' factors for participation in co-curricular and extra-curricular activities as well as positive and negative student outcomes [5], [6], [9]. Lack of time is the top cited factor that prevents students participating in co-curricular activities, followed by cost and lack of knowledge about co-curricular opportunities. Top reasons for participating in co-curricular activities include alignment with personal interests and to gain experiences to improve employment opportunities. Top positive outcomes of co-curricular participation include personal/professional development, communication skills and social engagement. Meanwhile, top negative outcomes of co-curricular participation include reductions in free time, scheduling pressures, increased academic timelines and increased financial cost.

A. Postsecondary Student Engagement (PosSE) Survey Overview

This work draws upon the PosSE survey which is spearheaded by Dr. Denise Simmons at Virginia Tech as part of an NSF CAREER award [5], [6]. Beyond student demographic information, the PosSE survey asks survey respondents to 1) identify the type of out-of-class activities they participate in, 2) what factors promoted and hindered involvement in out-of-class activities (examples: “gain experiences that make me competitive in the job market” vs. “lack of time”), 3) the positive

and negative outcomes from participation in out-of-class activities (examples: “personal development” vs. “academic timeline extended”), and 4) affectual responses about their involvement as a student at their institution. Survey results were published in 2017 based on 133 undergraduate and graduate students from a university in the Mid-Atlantic portion of the United States.

Major findings of Dr. Simmons’s work include finding that minority populations have different incentives and barriers to participation in extra-curricular activities. Some examples include that students from lower-income backgrounds are less likely to participate in extra-curricular activities and that female students are slightly more likely to participate in extra-curricular activities as compared to their male counterparts.

III. METHODS

For our research, we modified the PosSE survey. Our modified survey has been administered twice. The first time we offered the survey in May 2020, we made minimal changes, only slightly changing the categories of extra/co-curricular activities to match the offerings of our campus. Wording in the 2020 survey asked students to rate their extra/co-curricular activities *prior* to the pandemic (which was only just beginning when the survey was administered).

The second time we offered the survey was May 2021, and with more substantial changes. The reason for the changes is our observations from the 2020 survey. First, from our analysis of the 2020 survey, we noticed that it was often ambiguous if an extra-curricular activity counted as co-curricular and relied on the researcher to interpret if an activity was extra or co-curricular. For instance, if a student is a participant in the IEEE student club, are their activities part of the club considered more “social” or extra-curricular? While the researchers on this paper value the social aspects of engineering clubs, we wanted to discern if extra-curricular activities that reinforce lessons learned in the classroom are of particular importance. As a result, for the 2021 survey, we decided to have students rate their own extra-curricular activities as co-curricular or extra-curricular and their level of engagement in their chosen activities (high – greater than 5 hours per week on average, moderate 3-5 hours per week and low less than 3 hours per week on average). A second change in the 2021 survey is we had students self-report GPAs and if the students had attained a summer (major-related) internship or major-related employment in an effort to possibly correlate co-curricular participation with student success. Finally, for the 2021 survey, we removed the affective questions in the original PosSE survey to shorten the survey as we noticed a large number of survey responses were only half complete and open ended comments criticized the length of the survey. The timing of the 2021 survey captured student responses from the heart of the COVID pandemic, and results from the 2021 survey should keep this perspective in mind.

Both surveys were emailed to all engineering and computer science students in the college of engineering at Cal Poly. All survey results were recorded anonymously. The May 2020 survey had 536 responses, where 454 of those responses were

“mostly complete”. The May 2021 survey had 370 responses, 310 of which were “mostly complete”. Demographic breakdown of the original PosSE survey and the responses to our 2020 and 2021 survey are shown in Table 1.

Table 1. Demographics of the PosSE University survey, and the 2020 and 2021 surveys at Cal Poly.

		PosSE University		Cal Poly 2020 survey		Cal Poly 2021 survey	
		N	%	N	%	N	%
Gender	Male	65	49%	223	42%	150	41%
	Female	65	49%	202	38%	146	39%
	Not reported	3	2%	100	19%	60	16%
	Queer/non binary	x		10	2%	14	4%
Race	Asian	21	16%	162	30%	95	26%
	Black	8	6%	0	0%	3	1%
	Hispanic	11	8%	30	6%	23	6%
	White	87	65%	198	37%	173	47%
	Other	6	5%	14	3%	2	1%
	N/A		0%	116	22%	74	20%
Classification	1st year	20	15%	50	9%	51	14%
	Sophomore	19	14%	72	13%	45	12%
	Junior	16	12%	121	23%	91	25%
	Senior	14	11%	178	33%	116	31%
	5 th year +	8	6%	84	16%	37	10%
	Graduate	56	42%	29	5%	30	8%
Major	Science	18	14%		0%		0%
	Technology	6	5%		0%		0%
	Engineering	107	80%	534	100%	370	100%
	Math	2	2%		0%		0%

IV. ANALYSIS OF SURVEYS

In analyzing the surveys, we had several questions. First, we wanted to know what impact the COVID pandemic had on extra/co-curricular activities of students. The COVID pandemic had likely muted participation in extra/co-curricular activities and perhaps disproportionately impacted some students more than others. Second, we wanted to attempt to correlate student success to participation in extra/co-curricular activities?

Presumably, since co-curricular activities help students build their identity as an engineer/computer scientist, we wanted to see if student participation in co-curricular activities would help students improve their GPA or attain major-related summer internships or post-graduation employment. Third, are the participation rates in co/extra-curricular activities of sub-demographics (gender, ethnicity, transfer vs. first-time-first-year) of our students different, and if so, why? For this paper, we focus only on the transfer student sub-demographic.

A. Overview Impact of COVID on extra/co-curricular activity

The COVID pandemic and the pivot on online instruction had wide-ranging impacts on society, and extra/co-curricular activities were no exception. Out of the 370 survey responses from the 2021 survey, 246 responses said that the pandemic had negatively impacted their participation in co/extra-curricular activities. The survey question on how the pandemic impacted student participation in extra/co-curricular activity had an open-response section. Analyzing the responses, top reasons cited were Zoom burnout (45%), general lack of motivation (12%), lack of time due to online instruction (11%), mental health issues (4%), and having to secure additional paid work (4%). Many responses also indicated that the inability to access campus spaces such as machine shops or dance studios impacted their motivation to participate in club activities. Notably, 6.5% of open responses indicated that the pandemic made it easier to participate in co/extra-curricular activities, often citing the convenience of Zoom.

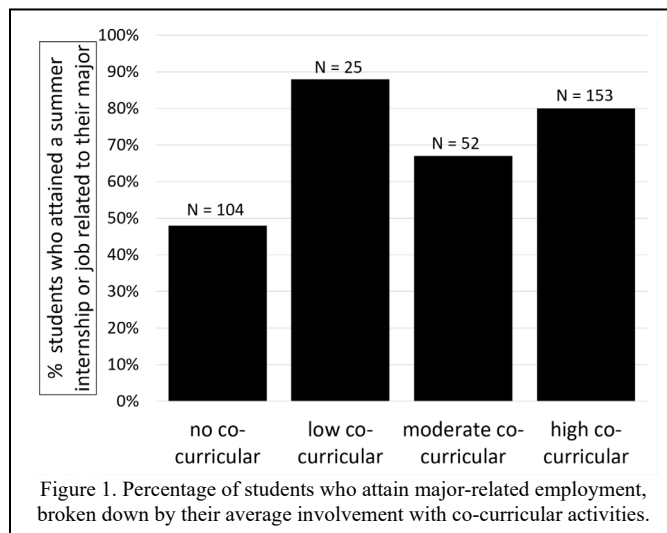
Comparing the results of the 2021 survey to the 2020 survey is problematic because the 2020 did not have COVID-specific questions on the survey since it was issued at the beginning of the pandemic. Also, the comparison of students who participated in co-curricular vs. extra-curricular activities between the 2020 and the 2021 surveys is not uniform, since in 2020 survey, the researchers had to infer if a student's participation in a club (ex: IEEE club) was co-curricular or extra-curricular, whereas in the 2021 survey we asked students to rate their own participation as co-curricular or extra-curricular. Nonetheless, in the 2020 survey, 88% of students claimed some involvement in co-curricular activity and that dropped to 73% in the 2021 survey.

B. Student success and extra/co-curricular activity

From the 2020 survey, we wanted to understand the relative importance of co-curricular activities for students and student success. In the 2021 survey, we asked students to self-report their GPA. This was done for simplicity and to keep the survey responses anonymous. We also asked students to self-report if they have attained a summer internship related to their course of study.

From the 2021 survey, we find that there is a correlation between a students' GPA and their participation with co-curricular activities. Students who rate themselves as moderately or highly involved with co-curricular activities (N=148) self-report a GPA of 3.53 whereas students who rate themselves as less than moderately involved (N=220) with co-

curricular activities self-report a GPA of 3.40. These results are statistically significant (p-value = 0.011, F-statistic of 6.488), however the R2 value is only 0.173 indicating that participation



in co-curricular activity is only a weak contributor to GPA. This would make sense as a student's GPA is the result of multiple factors (class attendance, performance on examinations, lab report writing, etc.).

More interestingly, there is strong evidence that students who spend an average of 3 hours or more per week participating in co-curricular activities as one of their top-3 extra-curricular activities is a strong predictor of attaining a summer internship with 91 or 133 (68.4%) students reporting attaining an internship over the summer. For students who report their co-curricular involvement to be less than moderate, only 96 out of 201 (47.8%) students reported securing an internship. Again, these results are statistically significant (p-value = 0.0003).

From our 2021 survey, Fig. 1 shows the percentage of students who attained either an internship related to their major or secured full-time employment related to their major, broken down by their level of participation in co-curricular activities.

C. Transfer students and extra/co-curricular activity

Survey results show that transfer students participate in co-curricular activities at high rates, nearly as much as first-time-first-year (FTFY) students. Overall, 73.8% of FTFY students participate in some sort-of co-curricular activities, whereas 65.6% of transfer students participate in co-curricular activities at a moderate or higher level of intensity according to our 2021 survey. However, since only 22 transfer students took the survey, this data is not statistically significant. From our 2020 survey, 88.3% of FTFY students claimed *some* involvement with co-curricular whereas 75% of transfer students claimed involvement with co-curricular activities.

Transfer students indicate they know the importance of co-curricular activities when compared to FTFY counterparts. Top motivations for transfer students to participate in co-curricular

activities include “to create a positive impact on campus or community”, “fulfill my personal interests and beliefs”, “gain skills that make them more competitive in the job market”, which mirror the responses from FTFY students.

However, transfer students participate in co-curricular activities at lower rates of intensity. Lower intensity of participation of transfer students is attributed to the additional monetary or opportunity cost of participating in co-curricular activities. Lack of time and scheduling difficulties are also highly specified.

Further analyzing the survey data, we find that transfer students are more likely to be working non-major-related jobs, and also spend many more hours at these jobs, possibly causing transfer students to participate in co-curricular activities at lower rates of intensity. Fig. 2 shows the work trends of FTFY students versus transfer students. Overall, transfer students are 9.5% more likely to be working non-major-related jobs than FTFY students. More startling is that transfer students are 21% more likely than FTFY students to be dedicating more than 20 hours per week at these jobs during academic year 2020/2021. This data could be skewed due to the COVID pandemic as it is widely suspected that the COVID pandemic had a disproportionate impact on transfer students versus FTFY students.

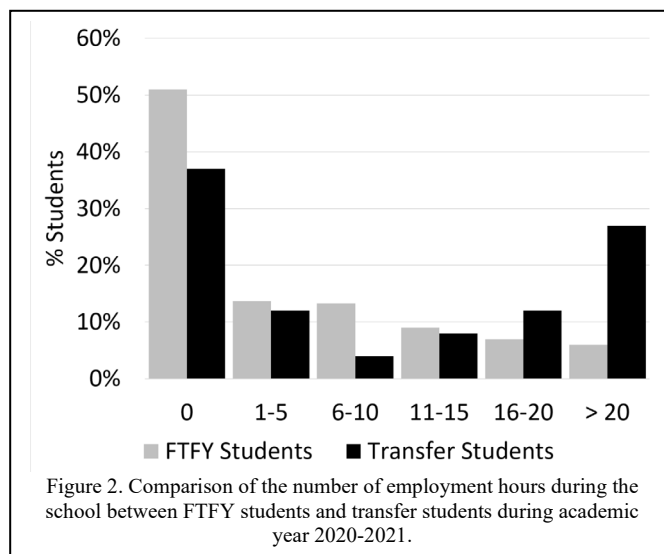
V. DISCUSSION & FUTURE WORK

The negative impact on extra/co-curricular activities may have skewed the analysis of the 2021 survey data. Fortunately, there are two more years on this NSF-funded funded research grant. Additionally, our NSF grant is an S-STEM grant that provides scholarships for transfer students from community colleges. The 2021/2022 academic year is the first year in which transfer students with the scholarships are at Cal Poly. We are interested in seeing if the scholarship money enables transfer students to minimize their employment obligations and if that time that is freed by the S-STEM scholarship improves transfer student participation in co-curricular activities.

Of interest is the relative importance of extracurricular versus co-curricular activities. When students participate in co-curricular activities, the assumption is that they are building their identity as an engineer (“I can see myself doing this for a living”) in addition to the social benefits of belonging to a community that they may gain from participating in an extracurricular activity. How important is the identity-building aspect for students to thrive in the engineering profession?

The survey results correlating student participation in co-curricular activities at moderate or higher levels with attainment of a summer internships is very impressive. Students with significant co-curricular experiences reporting attainment of summer internships 20.6% higher than those students who did not participate in significant co-curricular activities. How this builds a student’s identity / self-efficacy as an engineer is only compounded by the industry internship and could be an

important first step as a practicing engineer or computer scientist. In the next iteration of the survey, questions such as, “do you believe that your involvement in co-curricular activities played a (large) part in getting your summer internship”?



VI. CONCLUSION

Survey from 2021 results indicate that student participation co-curricular activities are important, especially regarding attainment of major-related employment. Yet, co-curricular participation for transfer students is lower than first-time-first-year students. Additional work is needed to verify the significance of these findings in the light of the pandemic.

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REFERENCES

- [1] M. Stuart, C. Lido, J. Morgan, L. Solomon, and S. May, “The impact of engagement with extracurricular activities on the student experience and graduate outcomes for widening participation populations,” *Active Learning in Higher Education*, vol. 12, no. 3, pp. 203–215, Oct. 2011, doi: 10.1177/1469787411415081.
- [2] K. Meyers, C. Pieronek, and L. McWilliams, “Engineering Student Involvement: Comparison of Two Dissimilar Institutions,” presented at the 2013 ASEE Annual Conference & Exposition, doi: 10.18260/1-2--19533.
- [3] R. Yu and D. Simmons, “Synthesis of Engineering Undergraduate Students’ Out-of-Class Involvement,” presented at the 2015 ASEE Annual Conference and Exposition, doi: 10.18260/p.24787.
- [4] E. Massoni, “Positive Effects of Extra Curricular Activities on Students,” (2011) *ESSAI*: Vol. 9 , Article 27.
- [5] D. Simmons, E. Creamer, and R. Yu, “Involvement in Out-of-Class Activities: A Mixed Research Synthesis Examining Outcomes with a Focus on Engineering Students” *Journal of STEM Education: Innovations and Research*, v18 n2 p10-16 Apr-Jun 2017

- [6] D. Simmons, Y. Ye, N. Hunsu and O. Adesope, "Development of a survey to explore out-of-class engagement of engineering students" (2017). *International Journal of Engineering Education*. 33. 1213-1221.
- [7] P. Terenzini, E. Pascarella, and G. Blimling, "Students' out-of-class experiences and their influence on learning and cognitive development: A literature review" (1996). *Journal of College Student Development*, 37(2), 149-162.
- [8] K. Hernandez, S. Hogan, S., C. Hathaway, and C. Lovell, "Analysis of the literature on the impact of student involvement on student development and learning: More questions than answers?"(1999). *Journal of Student Affairs Research and Practice*, 36(3), 158-171.
- [9] A. Hernandez, L. Moore, G. Doig, " Student Perceptions about Participation in Co-curricular Engineering Projects - an Institutional Study at Cal Poly San Luis Obispo" (2019). *Conference Proceedings, - Hawaii International Conference on Education*, pages 895-920.
- [10] [10] D. Simmons, N. Hunsu, O. Adesope, "Enabling Multi-Dimensional Measurement of Student Engagement in Engineering Learning Environments" (2019). *International Journal of Engineering Education*, Vol. 35, No. 6(A), 1827-1838