Developing and encouraging engineering professionals within a commuter student population: Understanding commuter student integration

Youngstown State University is a mostly commuter student campus, where a majority of students live at home, have part-time or full-time employment, and must balance other responsibilities outside their academics. Youngstown State University's most significant opportunity for improvement is situated in the area of student integration. Because most students are commuters and are not always on-campus, it is essential to ensure they adequately integrate into campus culture and build a student-learning community of peers. Therefore, the focus of this project is on engineering commuter student integration, and more specifically academic, social, professional, and university integration.

Commuter students make up approximately 85% of the engineering students at Youngstown State University and commuter students represent a large portion of college enrollment nationally [1]. Commuter students have differing constraints than residential students including nonacademic commitments to work and family along with other time constraints for travel [2,3,4]. Commuter students thus face unique challenges that residential students do not face such as developing social connections [5] which is connected to learning and persistence [6]. Commuting negatively effects academic performance [7] and being able to integrate socially [8].

The overarching research question for this S-STEM funded project is: How can a four-year institution help increase the integration and success of engineering commuter students? We adopt an embedded case study approach, which seeks understanding of a larger phenomenon by focusing on specific examples. The phenomenon of interest is how a four-year institution can develop mechanisms to increase the success of commuter students in engineering.

Our *YSU-DEEP-C* program design is grounded in Lee & Matusovich's Model of Co-Curricular Support (MCCS), which situates four main areas in which students are involved within various elements of a university setting: Academic, Social, Professional, and University Integration (AI, SI, PI, and UI). The MCCS was initially based off the Model of Institutional Departure [6] and evolved into a more detailed framework for student support through rigorous qualitative reasearch. To that end, our project based on Lee & Matusovich's MCCS [9] is planned to demonstrate and institute a sustainable model to increase low-income engineering commuter student engagement, persistence, and graduation, through a program of core elements, which combine to provide our students with an empowering, cohesive academic, social, professional, and institutional experience.

Lee & Matusovich's MCCS framework [9], shown in Figure 1, provides the essential schema for our programmatic features, and we very deliberately include building academic, social, and professional integration to ubiquitously integrate support of engineering student engagement, identity navigation, and professional growth, to advance and sustain academic persistence and success to graduation.

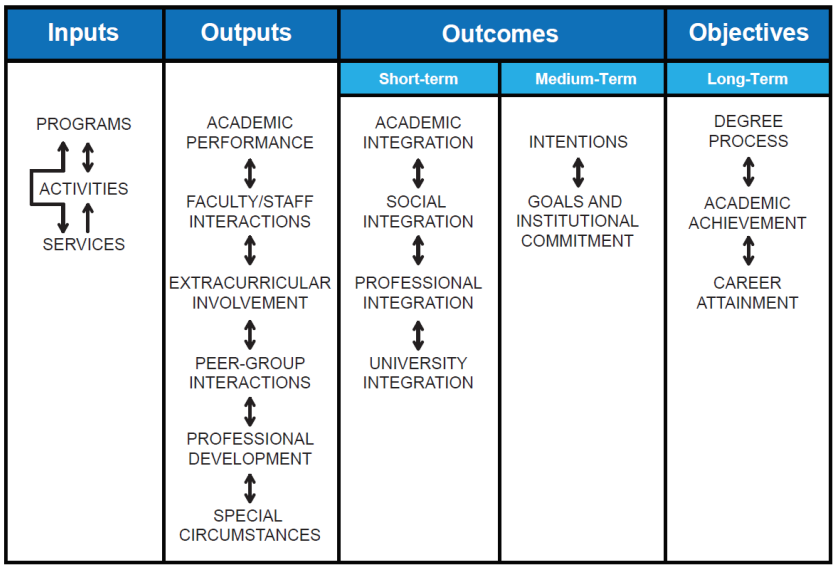

Figure 1: Model of Co-Curricular Support

We focus on two areas of interest to answer our overarching question: (1) the experience of being a commuter student in an engineering curriculum and (2) the integration of commuters within a cohort community. Our project and research are framed using the Model of Co-Curricular Support which highlights four areas of integration: Academic, Social, Professional, University. To understand how the MCCS pertains to engineering commuter students we answer two research questions: (1) How do undergraduate engineering students who commute experience academic and social integration and (2) How do cohort-based student learning communities influence integration for engineering commuter students?

For this work we present findings regarding the academic, social, professional, and university integration of residential and commuter students in engineering. Data was collected in Spring 2021 (n=105) and Fall 2021 (n=100) using the Engineering Student Support Instrument [10]. There was a total of 22 survey questions where each construct had five items except professional integration which had seven items. Results are in Table 1 below. Both the Spring 2021 and Fall 2021 data are shown to highlight any differences between being ‘Online’ and ‘In-Person’ as well as between ‘Residential’ and ‘Commuter’.

A simple t-test was used to determine if there were any group differences between ‘Residential’ and ‘Commuter’ students for each of the integration constructs. There were no significant differences between groups for any of the constructs.

The only construct which had a higher overall mean from Spring 2021 to Fall 2021 was ‘Academic Integration’. This is to be expected as students generally prefer to learn in-person as opposed to online, at least in engineering. However, since the surveys results were from students second semester (Spring 2021) and students first semester (Fall 2021) there may be some bias such as more difficult courses in a student’s second semester compared to their first.

Rationale for social, professional, and university integration having higher, yet no significant differences, overall means is that students being in their second semester were more acclimated to college life.

Table 1: Engineering Student Integration Survey Results Spring 2021 and Fall 2021

	Integration Type Spring 2021 Online							
	Academic		Social		Professional		University	
	Mean	Stdev	Mean	Stdev	Mean	Stdev	Mean	Stdev
Residential (n=39)	4.904	0.79	5.303	0.607	5.132	0.54	5.186	0.661
Commuter (n=66)	4.995	0.835	5.185	0.82	5.03	0.704	5.064	0.604

	Integration Type Fall 2021 In-Person							
	Academic		Social		Professional		University	
	Mean	Stdev	Mean	Stdev	Mean	Stdev	Mean	Stdev
Residential (n=36)	5.078	0.444	5.128	0.721	4.849	0.676	5.133	0.574
Commuter (n=64)	5.103	0.728	5.075	0.911	5.067	0.688	4.903	0.976

Future work will compare previous results to new results to see if new programmatic initiatives had an impact on student integration. For example, as part of this work the School of Engineering is hosting Engineers Week to increase the social and professional involvement of students in February 2022. New initiatives such as this are expected to increase integration throughout the school of engineering.

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