

Commuter Students' Educational Experiences and Sense of Belonging in the Undergraduate Engineering Community: A Phenomenological Study

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Abstract– The purpose of this study is to describe the “lived experience” of commuter students attending an urban institution. Participants were 28 ethnically diverse students who commuted more than 15 minutes each way to campus. We employed Astin’s Input-Environment-Outcome (I-E-O) model as the conceptual framework to investigate commuter students’ sense of belonging within the undergraduate engineering community. Interview transcripts were analyzed using Creswell’s phenomenological research methodology. Four common themes or “clusters of meaning” were found to play an important role in the development or hindrance of participants’ sense of belonging in engineering. These themes were integrated into the phenomenological “essence” of the participants’ experiences. In this paper, we also offer implications for practice for the *Engineering Educator of 2016* by including suggestions based on these results which may help minimize potential delays in commuter students’ sense of belonging and promote integration into the undergraduate engineering community.

Keywords: Sense of Belonging, Input-Environmental-Outcome (I-E-O) Model, Commuter Students, Phenomenology

MOTIVATION FOR THIS WORK

This project builds on a mixed-methods study conducted by Trenor and colleagues [14] which investigated the educational experiences of 37 ethnically diverse female engineering students attending an urban university where more than 95% of students commute to campus from various areas in a large metropolitan region. The research questions from the prior study related specifically to the relations of ethnicity to students’ educational experiences. One major finding was that participants’ sense of belonging within the engineering community did not vary with ethnicity, and participants generally described a strong sense of belonging, as well as had a high rates of participation in engineering support programs, student-run engineering associations, and other institutional resources. These prior participants specifically noted that early access to support systems was critical in enhancing their sense of belonging within the engineering community at the university. For example, several students recalled specific activities that took place prior to the start of classes their first semester or very early in their first year as being critical in cementing their feelings of inclusion and community. While commuter student status and time spent on campus was not specifically investigated in the prior work, an interesting line of future inquiry was raised by the fact that while participants generally reported a strong sense of belonging, many simultaneously reported time management conflicts due to commuting to campus, balancing their academic life with family obligations (with whom many lived) and off-campus employment.

The students at this university in many ways represent the changing college-going population, which Pascarella [9] summarized when he said “...we can no longer plan an effective research agenda based on the assumption that our undergraduate student population is made up of White undergraduates from middle or upper-middle class homes, ages 18 to 22, attending four year institutions full time, living on campus, not working, and having few family

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responsibilities.” Our research group seeks to study factors affecting traditionally under-represented students’ academic and career choices related to engineering, as well as other students who are at particular risk for attrition from the field of engineering.

The purpose of this study is to describe the “lived experience” of commuter students at an urban university. For the purposes of this work, commuter students were considered to be those students drove more than 15 minutes each way to campus.

RESEARCH QUESTION

How and when do commuter students experience the development of a sense of belonging among the engineering campus community?

THEORETICAL FRAMEWORK AND BACKGROUND

Our work adopts Astin’s Input-Environment-Outcome (I-E-O) model as the conceptual lens for investigating engineering commuter students’ sense of belonging in the campus engineering community. The three basic elements, as defined by Astin [2, p.7] are:

- Inputs (I)–characteristics which a student possesses upon admission to the university
- Environment (E)–environmental experiences to which students are exposed during institutional enrollment: programs, policies, faculty, peers, and educational experiences
- Outcomes (O)– students’ characteristics after introduction to the various environmental factors

Astin’s findings [2] describe eight environmental factors which particularly affect students’ development in college: institutional characteristics, curriculum, faculty, peer groups, residence, major, financial aid, and student involvement. Commuter students experience more stress and participate less in campus activities [2]. In fact, Astin [3, p. 523], summarized the impact of residential versus commuter status by saying, “probably the most important and pervasive [environmental factor] was students’ residence. Living in a campus residence was positively related to retention...it is obvious that students that who live in residence halls have more time and opportunity to get involved in all aspects of campus life.” Student involvement, according to Astin [3, p. 518] is “the amount of physical and psychological energy that a student devotes to the academic experience.” He points out that student *time* is a key (and finite) resource for which educators are constantly competing with other aspects of a student’s life. Other researchers [e.g. 4, 10, 13] have also found that commuter students are significantly less likely than residential students to become involved in campus life, interact with faculty and peers, and in turn, face increased barriers to persistence in college.

The relationships reported by the above-mentioned researchers between campus residence and student development and retention, additional evidence of the positive relationship between sense of belonging and educational outcomes [7], as well as prior research by Trenor and colleagues relating sense of belonging and to positive educational experiences [14] led us to investigate the current research question.

BACKGROUND

A number of institutions have reported facing challenges engaging engineering students who commute to campus [e.g. 1, 6, 11, 12]. This work seeks to shed light on the potentially distinct aspects of commuter students’ educational experiences using phenomenology, a qualitative research approach which seeks to understand the common experiences of participants related to a particular phenomenon [5]. In this case, we seek to describe the phenomenon of developing a sense of belonging within the campus engineering community for commuter students. By doing so, we hope that the Engineering Educator of 2016 may glean insights into the factors that potentially impact engineering student, developmental growth, and/or academic and career choices, and retention of commuter students.

An important aspect about the engineering curriculum at the university where these data were collected should be noted so that the reader may better understand the results and analysis. While students at this university were required to choose a specific engineering discipline upon admission to the university, at the time of the study, students had three options when enrolling in a first year engineering course: (1) the “default” option was a one credit

hour, large, lecture, based course taught by each engineering department, which was the only exposure the students generally had to engineering coursework during their first semester (2) students who elected to participate in an engineering learning community their first year were enrolled in a team project-based course, and also took math and science courses as a cohort or (3) students enrolled in the University Honors College had the option of enrolling in a team project-based introduction to engineering course their first year at the university, while taking most other courses as a cohort.

PARTICIPANTS

Twenty eight commuter students participated in this study. Seventeen (61%) of the participants were male and 11 (39 %) were female. Participants were majoring in all of the undergraduate engineering degree programs offered at the university. Their round-trip commute times varied from 30 minutes to greater than 90 minutes per day (see Figure 1). Twenty one participants lived with their parents and/or other relatives and six lived with their spouses and/or children. One participant lived with other friends who were not enrolled at the university and one participant did not specify living arrangements.

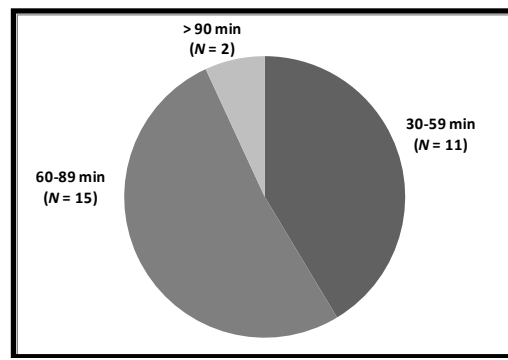


Figure 1. Participants' round trip commuting time.

Participant's self-reported ethnicities were diverse (11% African American or Black, 28.5% Asian, 32% Hispanic, 28.5% White) reflective of the diversity of the engineering student body at the university. Participants ranged from first to fifth year students. A similar number of students were represented from each year.

METHODOLOGY

Creswell [5] describes the purpose of phenomenology as the reduction of individual experiences of a certain phenomenon to a common experience. In this vein, our research goal was to "describe and understand the essence of the lived experience" [8, p.27] of commuter students experiencing the phenomenon of developing a sense of belonging within the engineering campus community. This paper reports on what can be considered to be a rather large phenomenological study, as five to 25 participants are typical [5].

In order to recruit participants for the study, announcements were sent out via engineering student listservs, and flyers were posted in the engineering buildings. Initially, students were invited to complete a brief demographic questionnaire, which included items related to commuter versus residential status, and time spent commuting to campus. The purpose of the questionnaire was to identify potential participants for semi-structured interviews. A total of 42 students were interviewed—this paper focuses on the 28 students who lived more than 15 minutes from campus (the remaining students either lived on campus or in nearby campus-run apartments). Students who volunteered to be interviewed for the study were compensated with a \$20 cash card for their participation. A semi-structured interview guide focusing on participants' educational experiences and sense of belonging was used (Trenor, et al 2008). With the participants' permission, interviews were recorded and then transcribed.

Following data collection by the second author (Trenor), the phenomenological data analysis for this project was conducted by the first author (Smith) as an undergraduate research project. Consistent with common phenomenological data analysis steps outlined by Creswell (2007, p. 60-62), steps in the analysis process included:

(1) *bracketing* the researchers' own experiences in order to take a "fresh" approach to the data, (2) becoming generally familiar with the data by reading the transcripts, (3) identifying *significant statements* which illustrate the participants' experience of the phenomenon, (4) developing *clusters of meaning*, or themes, from the statements, (5) writing a *textural description* of what the participants' experienced and a *structural description* describing how they experienced it, (6) then writing about the *essence*—a composite description of the phenomenon based on the common experiences of the participants. Given both authors' personal experiences as residential college students, and the second author's professional experiences directing recruitment and retention programs, conducting research and teaching at the university where the data were collected, it was necessary to acknowledge to these experiences and assumptions. A conscious effort was then made to temporarily suspend these assumptions in order to take "fresh approach" to the analysis.

Interview transcripts were analyzed using NVivo8, a qualitative data analysis software program. Statements illuminating aspects of the commuting experience for engineering students were coded as significant statements; a total of 276 significant statements in the 28 transcripts were identified. After all the commuter student interviews were coded, the significant statements were organized into four themes pertaining to commuter student sense of belonging. Textural (the "what") and structural (the "how") descriptions were written [5]. Finally, it was possible, using the significant statements and themes, to write the "essence" of a commuting engineering student's educational experience.

RESULTS

In order to elucidate the chain of reasoning from raw data (interview transcripts) to analysis and conclusions, Table 1 is presented to illustrate moving from the Creswell's second and third methodological steps (moving from identifying significant statements to forming clusters of meaning).

Table 1. Example significant statements and associated clusters of meaning (themes).

Example Significant Statements	Clusters of Meaning
"...I do remember in my freshman and first half of my sophomore year I kind of just did the commuter thing. Came to school, went to class, and then went back home. I didn't stay [on campus] that much." "The first semester it was just coming to school, go to class, [and] go home kind of deal. Definitely the second semester I started spending more time here on campus and especially with people here in engineering, I think that was the second semester." "I wish it was a little more assimilative or more integrated. If you are not in a club then people kind of don't know who you are or they stick to themselves." "I'd say after, well the first two semesters I wasn't in the engineering college, or not much, but I say after the third semester when I started taking more engineering classes, I really got to know the people that I was with. It's been pretty much the same group of people after that, so it's sort of after I'd say my third semester [when I started feeling a sense of belonging]."	<i>Commuter students experienced a delay in development of a sense of belonging within the engineering community.</i>

“I would say probably around the beginning of junior year [was when I started to feel a sense of belonging] because I had been part of ASME [American Society for Mechanical Engineers] for a semester now and had been taking part of some of the activities around school.”	
“Because I didn’t have classes on this side [of campus the first two years]. I never walked over here; I never had a reason to, and I was always stuck over there in the library or the chemistry building ...” “Most friends I usually meet are within [engineering] class.” “Probably [did] not [feel a sense of belonging] until I got into Chemical Engineering classes and actually, you know there were the same students in every class, so I got to know people, whereas before I really, I went to class and I went home, you know, I didn’t stay on campus when I had those general courses because I’d see those people in one course and never see them again.” “... Well so far the people that I hang around with most of them are in my classes and we [our department] basically all know each other, we’ve all had a class together at one point, we’ve all had to work together at some point, so it’s kind of like an extended family.”	<i>Enrollment in engineering courses and programs contributes to a sense of belonging once students gain access.</i>
“I think there is some camaraderie between students because, we’re in there with the same struggles, same work load and everything. Kind of talk to each other and depend on one another to study...” “I’ve come across a few people I know who are probably like graduating in like a semester or two. So from their experiences, from what they’re doing, to help me out, it’s good to know that you have somebody that can help you, that’s in your corner saying hey, you can do it, you know, it’s not a big deal.” “But then becoming part of the [engineering student] organization, I got to be able to better know the other students that were taking it. And it helped in my studying a lot because, just being in that group and being able to ask questions among each other and being able to share that information really helped me. And studying and doing homework and preparing for classes and	<i>Peers in engineering majors are an important source of support.</i>

stuff.	
“I knew there were certain events that are happening at [name of university] and sometimes, I honestly don’t go because I don’t like dealing with the traffic. I wouldn’t like to go to too much trouble to have to fight traffic. So I kind of missed out on certain events and I would have liked to be able to go. I think that’s really the biggest effect that’s had on my experience.” “I’m guessing if I were to live on campus I would do better. I’m guessing, I don’t know. I mean I do, I study a lot, but my assumption is if I were to live on campus and if it’s just a walk away, then it might be just that much faster or better.” “I think the commuting, that was very difficult because you lose so much time trying to commute and then fighting for parking, it is a big issue... I think it did [affect my college experience] because...I do have a [family-imposed] curfew and that 40 minutes travel time does cut down on what you’re able to do on campus or off campus with the social networks that I’ve built.” “I didn’t join [a fraternity] because I commute and it would be pointless. I would have to stay here for all the meetings. He [a friend] asked me if I want to join, I really do but I just don’t think I would be able to be there every single meeting and I would feel bad because I’m not doing what I should do as a fraternity member.”	<i>Commuter student status hindered time and energy necessary for campus involvement.</i>

PHENOMENOLOGICAL ESSENCE

Commuter students struggled initially in their college career to attain a sense of belonging within the engineering campus community, particularly feeling disconnected prior to enrollment in core courses in their major and/or becoming involved in engineering organizations on campus. The initial lack of community and support from peers led to discouragement and frustration on the part of participants. Commuter students cited several reasons for this lack of engagement: spending less time on campus than their residential counterparts, lacking initial awareness of opportunities to get involved in the engineering community, and not taking engineering courses during their first semester or year. Others simply could not justify the value for involvement based on their other commitments or did not understand the benefits of getting involved. Once involved in courses in their major, participants became more aware of opportunities for involvement as they began spending more time on campus for engineering course-related activities. Although some participants reported being aware of such opportunities, some were still unclear about the mission and purpose of the various organizations. Because much of their limited time on campus was spent in class, peer groups were formed primarily through engineering courses and student organizations; this functional support from engineering classmates was the key to social integration and commitment to persist in engineering. Whereas commuter students reported a lack of interaction with peers from general education classes, they described their engineering classmates as “extended family.” Classmates were supportive both academically and emotionally. Commuter students described that peers in their major not only had classes together, but also studied together and

shared many common interests. Classmates at the same academic level provided their peers with a sense of community through commonality of experience in the engineering program. Upperclassmen provided tutoring, advice for long term success in engineering, and encouragement to stick with engineering as a major.

Commuter students who described more involvement and time spent on campus also reported a stronger sense of belonging. Yet, commuter students overall faced time and energy barriers that they felt hindered their involvement in campus and engineering-specific activities. Commuter students' interactions on campus were often limited by family responsibilities, time, and energy. Driving between the college campus, home (and in many cases work) on a daily basis consumed large portions of the commuter students' days. Therefore, participants felt that their schedules were more constrained than their on-campus peers. In a few cases, students shared a family vehicle and therefore could not attend special events outside of their normal class schedule due to limitations in transportation. In general, commuters reported that they had less time to schedule meetings, classes, and group work than their classmates who lived on campus—this was especially true for those participants who also worked off campus. Some tired commuter students found that working on campus not only provided additional interaction with professors and peers but eliminated significant travel time and scheduling conflicts associated with off campus jobs.

Some commuters felt there were aspects missing from their college experience but were unable to articulate what these aspects might be and how to fill the void. Some said they were disappointed in college life but could not identify what was missing. Other participants did not actually desire social integration in the engineering community, saying that they were focused on academics and did not see “social” aspects of college as complementing or contributing to their educational experience in engineering. Others with self-described “reserved” personalities and/or strong family commitments were also less likely to desire a sense of belonging within the engineering community. These students preferred to live at home for the financial and emotional support they received there from family, and felt that being less involved on campus meant that their grades would not suffer as a result of multiple non-course commitments.

DISCUSSION

It is our intention that the use of the qualitative phenomenological research tradition will allow the reader to gain a better understanding of the lived experiences of engineering students who commute to campus, and the phenomenon of developing a sense of belonging within the campus engineering community. By examining the results of this study through the lens of Astin's I-E-O model [2] and considering commuting as an environmental factor which can potentially affect engineering students' educational experiences and development via student involvement [3], we note that there are several potential implications for practice for the Engineering Educator of 2016.

First, however, we compare results from this study to Trenor and colleagues' prior work [14], which examined the relations of ethnicity to female students' educational experiences. The quantitative phase of the previous study found that participants reported relatively high levels of sense of belonging and no differences in ethnicity in barriers, social supports, or sense of belonging. The open-ended qualitative portion revealed that among additional barriers not accounted for in the quantitative study was commuting to campus. The results from our current work study support Trenor and colleague's [14] previous claim that commuting to campus served as a barrier for engineering students. A major finding of the previous work was that participants' sense of belonging contributed to positive learning experiences and eased the transition to college. In contrast to the current work, the prior study's participants reported high levels of involvement, particularly in the women-in-engineering program, the engineering learning community and the Honors College. In particular, collaborative learning experiences during their first year on campus and events prior to or at the very beginning of their first semester were cited as helping to cement students' sense of belong in the engineering community early in their college life. The results from the prior study demonstrated that *when accessed early*, these pedagogical and programmatic mechanisms were successful in promoting sense of belonging and enhancing engineering students' educational experiences. In the current sample, however, many participants reported *delayed access* to pedagogical and programmatic mechanisms which have been shown to encourage peer group interaction, hence delaying a sense of belonging within the engineering campus community for those participants.

IMPLICATIONS FOR PRACTICE FOR THE ENGINEERING EDUCATOR OF 2016

Astin [2, p. xxii] stated that “the single most important environmental influence on student development is the peer group. By judicious and imaginative use of peer groups, any college or university can substantially strengthen its impact on student learning and personal development.” Our results (current and past) reflect the premise that social

integration through peer groups greatly impacts students' sense of belonging in the campus engineering community, which has been shown to be positively related to student development and retention. We posit that because engineering curricula generally require team-based assignments, the environmental effects of commuting are likely to be even more pronounced in engineering compared to other fields.

We offer the following implications for practice for the Engineering Educator of 2016 based on this and prior work on commuter students:

- Offering a cohort experience for first year students—this could be accomplished through a team-based engineering course(s), learning community, or other institutional program such as women-in-engineering programs
- Communicating early and often with students prior to coming to campus about opportunities for involvement in peer groups and the *value* of those experiences, and following up with activities such as peer mentors, engineering organizations fairs, or separate commuter student orientations
- Providing physical spaces for commuter students to congregate while on campus
- Making efforts to accommodate scheduling difficulties by offering evening or online office hours.

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BIOGRAPHICAL INFORMATION

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