

Students' Sense of Belonging in Undergraduate Engineering

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Abstract

The concept of sense of belonging is variously measured and rarely carefully conceptualized in studies of undergraduate students' persistence and retention in college. Analysis of survey and interview data from students enrolled in a cohort-based, academic and social support program focused on their descriptions of a "local sense of belonging" (SoB) to better understand the experiences and emotions that contribute to students' feelings of belongingness. Quantitative results suggest that students can feel locally connected to peers and university staff without necessarily feeling an overall sense of campus belonging. Qualitative analysis identified three dimensions of local belongingness: **engagement in a small world network, mutuality/mattering, and shared values and interests.**

Rationale for Study

- While previous research has primarily focused on students' feelings of connectedness or isolation within their campus environment (e.g., Hurtado & Carter, 1997; Johnson et al., 2007), some researchers suggest the need to study how sub-environments such as learning communities and cohort-based academic programs for common career interests might contribute to a student's sense of belonging (e.g., Hoffman, Richmond, Morrow, Salomone, 2002).
- A longitudinal evaluation study of the M-STEM academies presented an opportunity to gain a deeper understanding of how students experience such a sub-environment to yield insights about how sense of belonging might manifest in such spaces, and to improve conceptualization and measurement of the concept of sense of belonging.

Methods

- Data for this study come from a longitudinal, mixed methods evaluation study of the M-STEM academies. Data collection began in 2013 and is ongoing.

Research Design:

Interview Component:

- Semi-structured interviews with M-Engin participants.
- Constant comparative analysis to develop themes.
- 4 women and 8 men at the end of Year 1.
- 2 women and 5 men re-interviewed at the end of Year 2.

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Survey Component:

- Web-based survey administered to all M-Engin students and a matched comparison group.

Administered Web-based Survey	2013 Cohort		2014 Cohort	
	M-ENGIN	COE	M-ENGIN	COE
End-of-Year 2 Survey	30	28		
Post-Summer Survey			57	62
End-of-Year 1 Survey			43	62

Data Analysis:

- T-tests to compare students' ratings of institutional sense of belonging components (M-Engin students and comparison group).
- A priori and open-coding to create categories.
- Constant comparative analysis to develop themes.
- Analytical memos to refine themes and advance analysis.

Preliminary Findings

Comparison of Means for Sense of Belonging: M-Engin vs. COE Comparison Group

Variable	Cohort 2013 End-of-Year 2		Cohort 2014 End-of-Year 1	
	M-ENGIN (n=30)	COE (n=28)	M-ENGIN (n=43)	COE (n=62)
	M	M	M	M
Sense of Belonging				
10. I feel a sense of belonging to the University of Michigan.	3.97	3.68	4.02	3.83
11. I feel that I am a member of the UM community.	4.07	3.71	4.14	3.84
12. I see myself as part of the UM community.	4.03	3.82	4.11	3.89
Sense of Belonging Factor Score	4.02	3.74	4.09	3.85

Significance levels: *.05 **.01 ***.001 (Standard Deviation bracketed)

* Note: Likert scale: 1-strongly disagree, 2-disagree, 3- neither agree nor disagree, 4-agree, 5-strongly agree

- The 2013 and 2014 M-Engin cohorts are not significantly different from a comparison group on items assessing institutional sense of belonging.

Descriptive Data for Local Sense of Belonging: M-Engin Cohort 2013

Variable	End-of-Year 1 (n=36)	End-of-Year 2 (n=30)
	M	M
1. I feel a part of the M-Engin student community at the university of Michigan.	4.11	4.1
2. I can rely on the friends that I've met through M-Engin if I need help.	4.22	4.23
3. I can rely on the instructors that I've met through M-Engin if I need help.	3.86	3.8
4. I can rely on the professional staff that I've met through M-Engin if I need help.	4.39	4.3

* Note: Likert scale: 1-strongly disagree, 2-disagree, 3-neither agree nor disagree, 4-agree, 5-very strongly agree

- Students in both M-Engin cohorts scored high, (3.8 or better), on items relating to their relationships with the M-STEM community, reflecting a high local sense of belonging.

Engagement in a small world network

- Readily available source of academic assistance, a means of connecting to other campus resources or events, and as critical to easing their transition to the university.

"You realize where you could go to for help. I think M-STEM really benefits me that I know people now. My network is bigger now because of M-STEM -- purely because of M-STEM."

Mutuality / Mattering

- The building and sustaining of close friendships, mutual support, and a sense of security/trust.

"It's a family pretty much. That's what we consider ourselves to each other; we're just a giant family and we support each other. Whenever one needs help, you help them so that's kind of how everything works."

Shared Values / Interests

- Sense of shared disciplinary/professional interests, work ethic, and identity.

"Also just meeting other people that want to go into the same subject; like in high school, I hadn't met anyone else that wanted to do this kind of engineering. I've met more than a handful of people that want to go into it also."

Discussion and Implications

- Students' accounts of the central role that their M-Engin "family" played in their transition to, and academic success in their engineering degree program, facilitated the development of the concept of a local sense of belonging.
- This local sense of belonging may better explain mechanisms through which cohort-based STEM intervention programs affect student persistence than the global sense of belonging measures used in previous research.
- Further investigation of three dimensions of local sense of belonging and how these may be related. We plan to:
 - 1) Develop survey items based on current findings.
 - 2) Vet survey items with focus groups of M-Engin students .
 - 3) Pilot test revised survey items and conduct factor analyses to identify any underlying structure.
 - 4) Add items to M-Engin surveys to test propositions that the forms of engagement from initial research are related to shared experiences, mutuality/mattering, shared values, identities and ultimately, a local sense of belonging.