



Identifying the Relationship Between Sense of Place and Identity and Sense of Belonging in Minority STEM Students

Abstract

STEM (Science, Technology, Engineering, and Mathematics) fields have, historically, been dominated by a generally white male population in all different types of careers. Research (Dancy et al, 2018) has shown that underrepresented groups tend to feel a lower sense of belonging to their STEM communities, and a lower sense of belonging is related to the reduced likelihood of remaining in college and in one's field post-graduation. Research by Becker et al (2018) provides evidence that racial/ethnic identity can contribute to underrepresented students' sense of belonging on campus. Furthermore, students who experience intra-classroom racism also can feel a diminished sense of belonging (e.g., Hunter & MacNear, 2023).

- We used qualitative methods to examine how identity and sense of place can affect minoritized students' sense of belonging.
- Five STEM student participants were interviewed by a PhD investigator using a semi-structured set of questions regarding their sense of belonging on campus.
- Two research team members independently coded the interview transcripts using pre-set codes related to sense of belonging and several descriptions of space/place.
- Results showed students felt a greater sense of belonging when they were in a space where there was a positive communal environment involving the identity of the people inside the space, the interactions occurring in the space, and the functionality of the space.

Introduction

- Minority students are at a disadvantage when it comes to finding success in a STEM field due to the pre-existing barriers such as underrepresentation in all levels of STEM degrees, with the exception of Associate's Degrees (NSF, 2023).
- Belonging is important for college students as it provides an avenue for increased retention in different programs (Rainey et al., 2018).
- Understanding how sense of belonging specifically impacts minoritized students may be useful to strategize on how to decrease the existing gap in minority participation in various STEM fields.
- A sense of place can affect the extent to which a student feels they belong. Social and physical interactions that minority students have in their classrooms can affect their sense of place (Strayhorn, 2023).
- Identity has shown to also impact sense of belonging. Perceptions that one's identity is not represented in a space contributes to a feeling of being disrespected and disregarded. (Becker et. al, 2018, pg. 1).
- This study examines how minoritized students' sense of place and social identities relates to their sense of belonging. More specifically, we examined specific characteristics of the campus spaces (other than residences) in which students felt the greatest and the least sense of belonging.

Elena Wood
Dept. Of Mol, Cell &
Dev Biology
University of Michigan

Mary Herring
Dept. Of
Organizational Studies
University of Michigan

Mia Shin, B.A.
Dept. Of Psychology
School of Social Work
University of Michigan

Angela Ebreo, PhD
Diversity, Research, & Policy
Program
University of Michigan

Methods

- 5 participants of various minority identities were recruited from Michigan Louis- Stokes Alliances for Minority Participation (MI-LSAMP)
- Students participated in an online, recorded interview held on Zoom
- A few relevant questions that were asked include:
 - Please describe the space where you feel you least belong on campus. Is it indoors? What does it look like? What is the major reason for going to this space?
 - Please describe the space where you feel you most belong on campus. Is it indoors? What does it look like? What is the major reason for going to this space?
 - Do you connect these spaces to your identities/STEM communities?
- Transcripts from the interviews were de-identified and checked for errors in transcribing. Team members memo'd and coded the transcripts.
- A set of 13 predetermined codes were used that came from Ramkisson and from discussing frequent patterns that did not have a relevant code.
- Reliability tests were taken after the completion of the coding process to ensure consistency throughout the process.
- After coding was completed, team members discussed code clustering as a means of identifying themes.

Codes and Their Usage

Code Name * = Borrowed from Ramkisson	Code Description
Place dependence *	Functional attachment to a place based on its importance as a setting for specific activities
Place identity *	The connection between an individual's personal identity and the physical environment (memories, interpretations, ideas, feelings, etc.)
Place affect *	Emotional attachments or bond to a place
Place social bonding *	Meaningful relationships occur and are maintained in specific settings
Place satisfaction *	Overall satisfaction, function of visitor satisfaction with different elements of a setting
Sense of belonging	Encapsulates student's relationships with their campus community and others on campus through support, connectedness, mattering, value, respect, and importance.
Negative sense of belonging	Encapsulates a negative student relationship with their campus community
Academic space	Location of the space mentioned is related to academics
Space description- people	Mentions an element of the types of people in the space
Space description- Function	Mentions what purpose the space serves
Space description- Activities	Mentions the various activities that occurs in the space
Space description- Interactions	Mentions the interactions that occur in the space- typically between people
Space description- Visual characteristics	Mentions visual aspects of the space

Results

Three themes were identified from the data via recurring code clusters.

- Visual characteristics of a space impact a sense of place/belonging**
 - Code clusters included "Place satisfaction", "Sense of Belonging", and "Space Description- Visual Characteristics"
 - Several respondents discussed how the visual elements/ activities of a space contributed to how satisfied they were with a space, and thus how greatly they felt they belonged to a space
- The level of representation a student has in a space can affect their sense of belonging to a place**
 - Code clusters included "Space Description- People", "Sense of Belonging", and "Place Identity"
 - Several respondents discussed how they felt they belonged greater in a space where their peers shared a similar identity/ interests.
 - Interestingly, "Negative Sense of Belonging" and "Space Description- people" were also coded when a respondent said that the reason they DIDN'T belong in a space was due to there being a lack of representation of their identity.
- A feeling of inadequacy impacts minority sense of belonging**
 - Code clusters included "Negative Sense of belonging" and "academic space". Prior and subsequent context provided the necessary information to make this connection.
 - Respondents related the space they least belonged to a feeling that they could not succeed academically in that space due to self-identified failures, or the feeling that they are not capable/worthy enough to be there.

Discussion

- The results and subsequent themes that emerged in our study of students attending predominantly white institutions supports existing literature.
- Satisfaction with the characteristics of a space directly correlates with the visual aspects of that space and what types of activities are offered to students there. Visually pleasing elements of a space as well as an inclusion of more leisurely activities can help to increase a student's comfort and connectedness level to a space.
- Universities can contribute to a student's sense of place by incorporating more colorful and vibrant visual elements into academic and social spaces.
- Furthermore, a sense of identity is shown to impact student sense of belonging through the level of representation a student has in a space *What Next?* To better support their minority student population through increased representation, universities can provide spaces for affinity groups to meet and host tabling events that tailor to student's identities and interests.
- Limitations:* A small sample size (n=5) and low initial code reliability were all existing limitations of the study.

References

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Acknowledgement

The research reported here is partially funded by the Louis Stokes New STEM Pathways and Research Alliance- Michigan Louis Stokes Alliance for Minority Participation (MI-LSAMP), Award #2109942, Tabbye Chavous, Principal Investigator. This research is solely the work of the authors and does not represent the views of the National Science Foundation. All authors collaborated throughout the process to produce this research. The poster is submitted to partially fulfill the requirement of the University of Michigan's Undergraduate Research Opportunity Program.