

MEASURES OF BELONGING IN A CAMPUS STEM COMMUNITY

FIRST2 NETWORK (2022-2024)

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First2 Network is engaged in efforts to double the graduation rate of first-generation students in STEM fields of study. To that end, several higher education institutions in West Virginia have participated in the testing of change ideas toward that goal.

Research has identified feelings of belonging as a factor leading to increased success, especially in first-generation and other underrepresented students in STEM fields.

Through the use of improvement science, a series of Plan-Do-Study-Act cycles incorporating student surveys has yielded information on students' sense of belonging in their STEM fields of study. Our research so far suggests that two of our major activities toward this goal – Campus Clubs and student-faculty social interactions – have been very successful in building this sense of belonging.

First-generation Student Leaders working as part of a First2 institutional team create student-led Campus Clubs focused on connecting first-generation college students in STEM majors to one another (as well as other students and faculty) to increase first-generation students' sense of belongingness in ways that ultimately support overall academic success. Originally club membership focused on the Student Leaders themselves, and provided a platform for them to support each other and to plan events for the larger student body. In recent years, membership has been widened to other STEM students.

Faculty-student social interactions are often conceived and planned by First2 Student Leaders as well and take on a variety of formats. Examples include ice cream socials, faculty panels, bingo nights, improvisational events, and policy discussions.

Effect on feeling of belonging of First2 Campus Club participation

Method. A total of 74 students were surveyed about their participation in First2 Campus Clubs at the end of each semester Fall 2022 through Fall 2024. The surveys asked about students' year in college, status as a funded First2 student leader, how many meetings they attended and whether they attended at least one meeting per semester. Students were also given the opportunity to enter comments as to whether their participation impacted their "sense of acceptance and belonging at college."

Belonging. As part of the survey, students were asked to respond on a 5-point scale how strongly they agreed with 3 statements adapted from the Sense of Belonging in Math scale (see Good, Rattan and Dweck, 2012).

I feel respected in my STEM community.

I feel comfortable in my STEM community.

I feel that I belong in my STEM community.

We looked at the 69 responses that included a response to the belonging questions. Students funded by the First2 Network made up 58 (84%) of these responses; 11 (16%) responses were from students never funded by or never involved with First2 Network. The distribution of student respondents by year in college included freshmen, sophomores, juniors and seniors with a plurality of second year students (Table 1). The data pool includes students who responded to the survey more than once, in different semesters.

Year in College	Number of respondents
Year 1	14
Year 2	28
Year 3	17
Year 4	10

All non-funded students (100%) and most funded student leaders (94%) responded “strongly agree” or “somewhat agree” to all three belonging questions. We looked at whether student’s responses were affected by how many meetings they reported attending during the semester. For each of the belonging questions, the percentage of students who answered “strongly agree” was higher for students who attended at least 3 meetings compared to those who attended only one or two. Students who were more engaged in campus clubs, attending more meetings, were more likely to acknowledge feelings of belonging (Table 2).

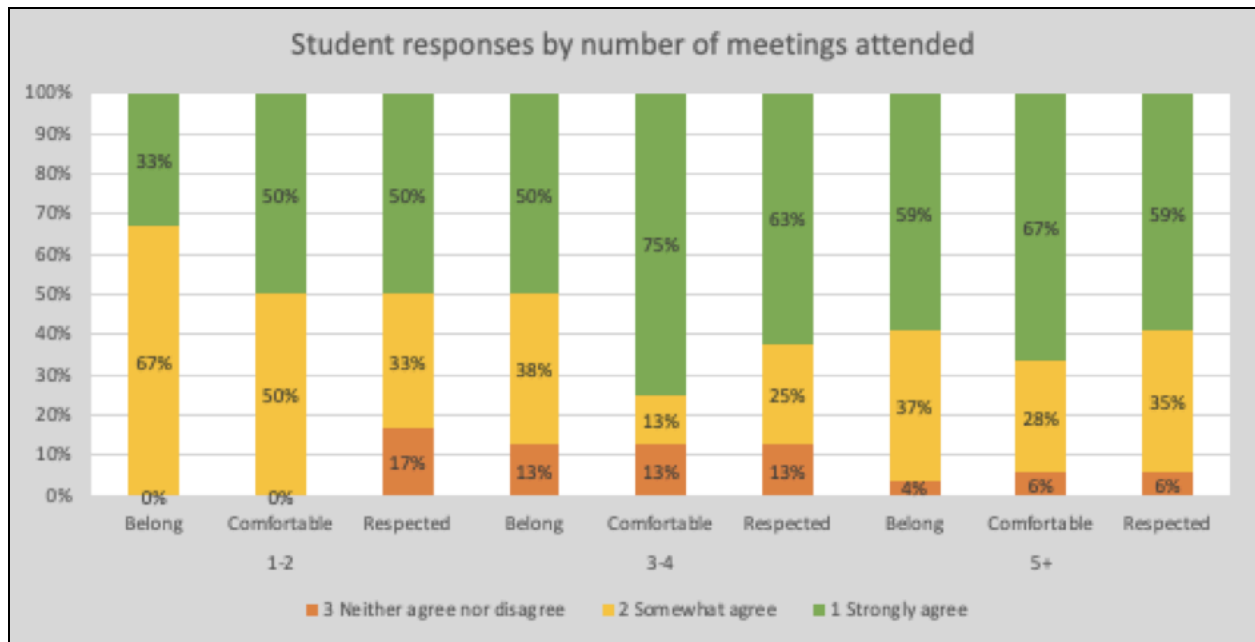


Table 2: Belonging by attendance at campus club meetings

Effect of progress in College. Another variable we looked at was whether student responses were affected by their year in college. Students from year 1 through 4 participated.

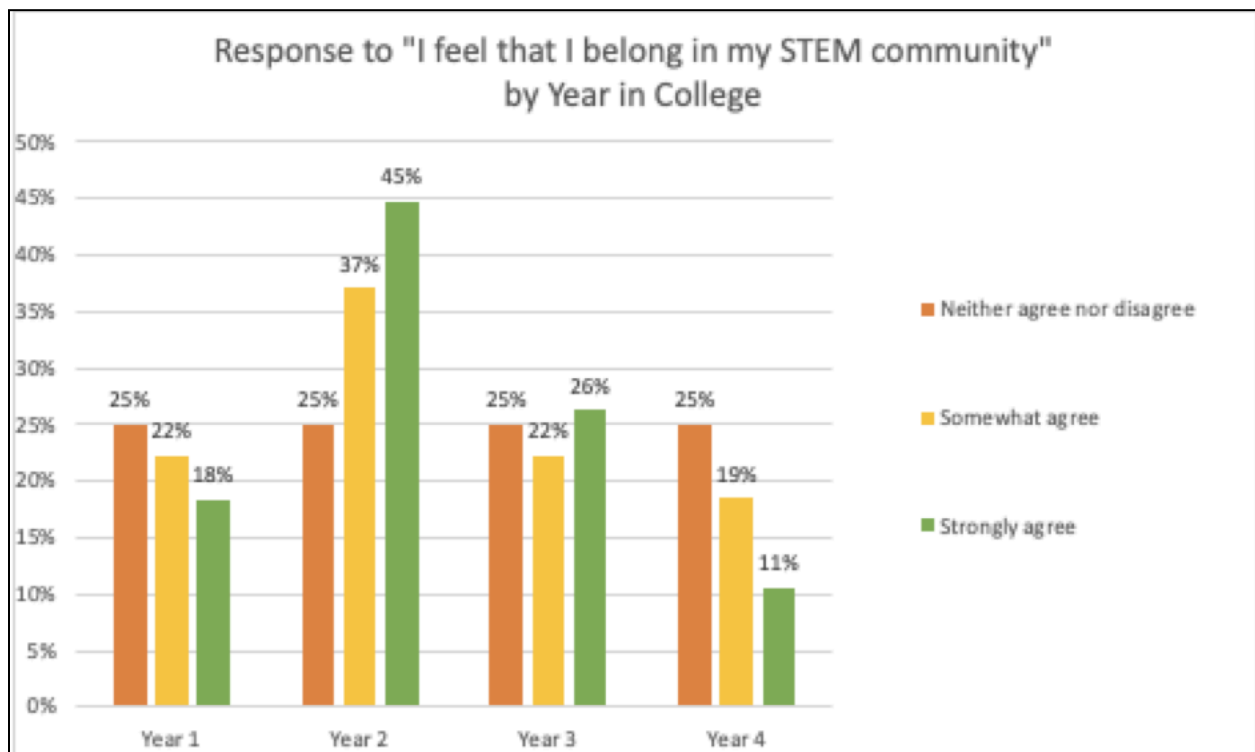


Table 3: Belonging by year in college

Sophomores more often selected strongly agree to the statement I feel like I belong in my STEM community (45%), than freshmen (18%), juniors and seniors (26%, and 11 % respectively). This interesting finding has prompted additional inquiry, and will be investigated in student focus groups later this spring.

Responses to: “In what ways has your experience with your First2 Campus Club this semester influenced your sense of acceptance and belonging at college?”

Of the 45 students who entered a response to this question:

93% of responses were positive

Examples:

“It’s given me a great community of people with similar goals and interests.”

“Encouraged me to engage in research and networking.”

“I feel much more welcomed and accepted at this college.”

The 3 negative responses were not *entirely* negative:

“It hasn't really influenced my perspective since there isn't a lot of events or get togethers.

Part of it is on me though. I don't have a lot of extra time.”

“I've always felt like I belonged so this hasn't affected me all the much.”

“It really hasn’t.”

Effect of Student-Faculty Social Interactions on Feelings of Belonging

Faculty-student social events, organized and led by First2 Network student leaders are open to all STEM students on campus. These events enjoy a larger audience. These events are documented as First2 Network change ideas, and are therefore subject to measurement.

Method. A total of 208 students were surveyed after they participated in a social event with faculty and administrators between Fall 2022 and Fall 2024. Of those surveyed, 141 responded to a survey that included the three common questions on belonging that were used with the Campus Club surveys. Most of the students surveyed were NOT First2 Student Leaders.

The following guidance was provided in the survey before presentation of the statements:

“STEM community refers to the broad group of people involved in a STEM field, including the students in your STEM courses. We would like you to consider your membership in the STEM community. By virtue of having taken many STEM courses, both in high school and/or in college, you could consider yourself a member of the STEM community at your campus.”

Here are the responses of those 141 students:

I feel respected in my STEM community.

N = 141

Strongly agree	87 (62%)
Somewhat agree	40 (28%)
Neither agree nor disagree	5 (4%)
Somewhat disagree	5 (4%)
Strongly disagree	4 (3%)

I feel comfortable in my STEM community.

N = 141

Strongly agree	98 (70%)
Somewhat agree	32 (23%)
Neither agree nor disagree	4 (3%)
Somewhat disagree	3 (2%)
Strongly disagree	4 (3%)

I feel that I belong in my STEM community.

N = 141

Strongly agree	88 (62%)
Somewhat agree	39 (28%)
Neither agree nor disagree	7 (5%)
Somewhat disagree	3 (2%)
Strongly disagree	4 (3%)

Most students strongly or somewhat agreed with the statements “I feel respected in my STEM community.” (90%), “I feel comfortable in my STEM community.” (93%) and “I feel that I belong in my STEM community.” (90%) (Table 4).

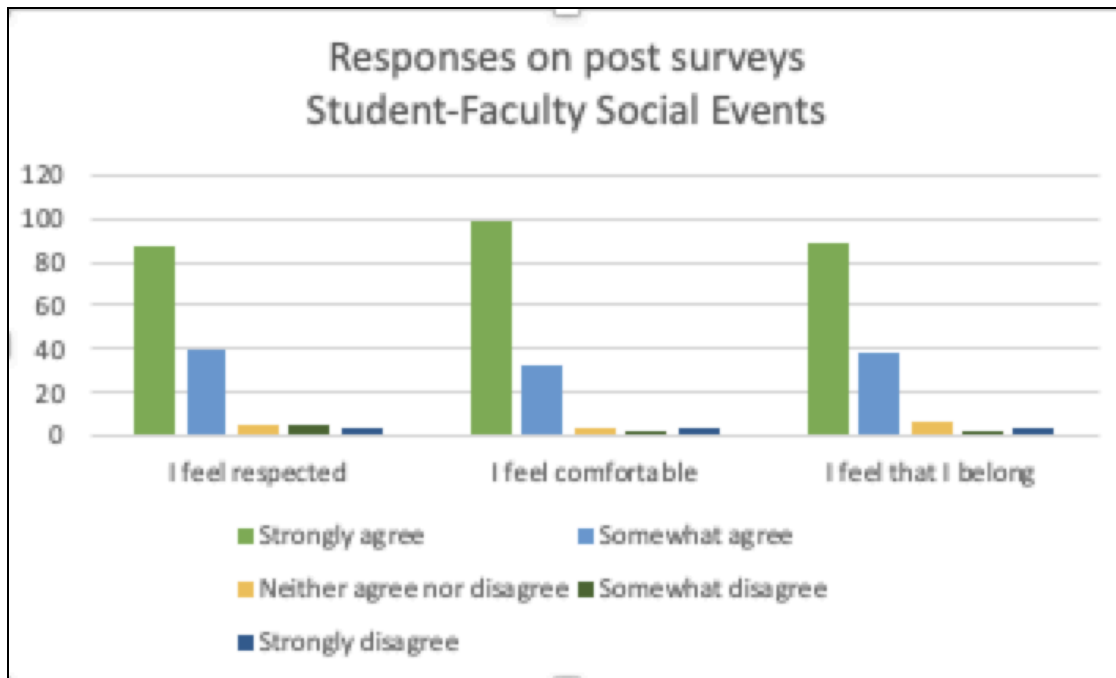


Table 4: Belonging and Faculty-student social events

Non Validated questions related to belonging. A number of the surveys, especially from the earlier semesters, did not include the three validated belonging questions, but *did* ask questions about students’ feeling of comfort speaking and interacting with faculty and administrators. In addition, some of the surveys asked specifically about feelings of connection to their faculty, staff, and other students.

The wording of these questions varied somewhat on different surveys, but all were attempts to answer the question: Did the social event affect students’ comfort and connection with faculty and others. A typical survey question related to comfort asked “How comfortable did you feel speaking to and interacting with faculty and staff at this event?”

Of the 153 responses, 148 rated their agreement on a scale of 1 to 5 or a range of strongly agree to strongly disagree. Five students simply answered “yes,” and these were counted as “somewhat agree.” In all, 91% agreed with the statements about comfort interacting with faculty and staff in their STEM community (Table 5).

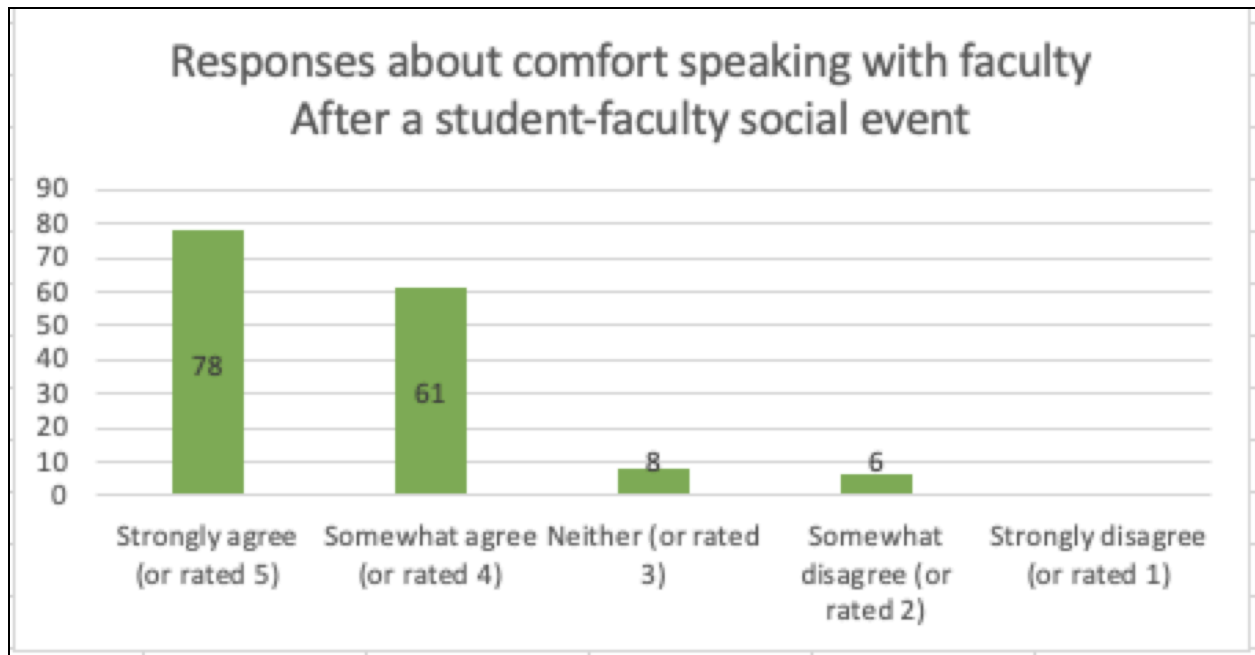


Table 5: Student comfort in speaking with faculty

A typical survey question about connection asked students “How helpful do you think this social event was in connecting you to First2 faculty and Institutional Team?” Some surveys used the term “useful” rather than “helpful.” Some asked for a rating from 1 to 5, others a standard 5-point Likert Agree/Disagree scale. Some used “extremely/very” instead of “strongly” for the scale. Fully 86% of respondents agree or strongly agreed that the social event was helpful in connecting them with faculty and other members of their STEM community (Table 6)

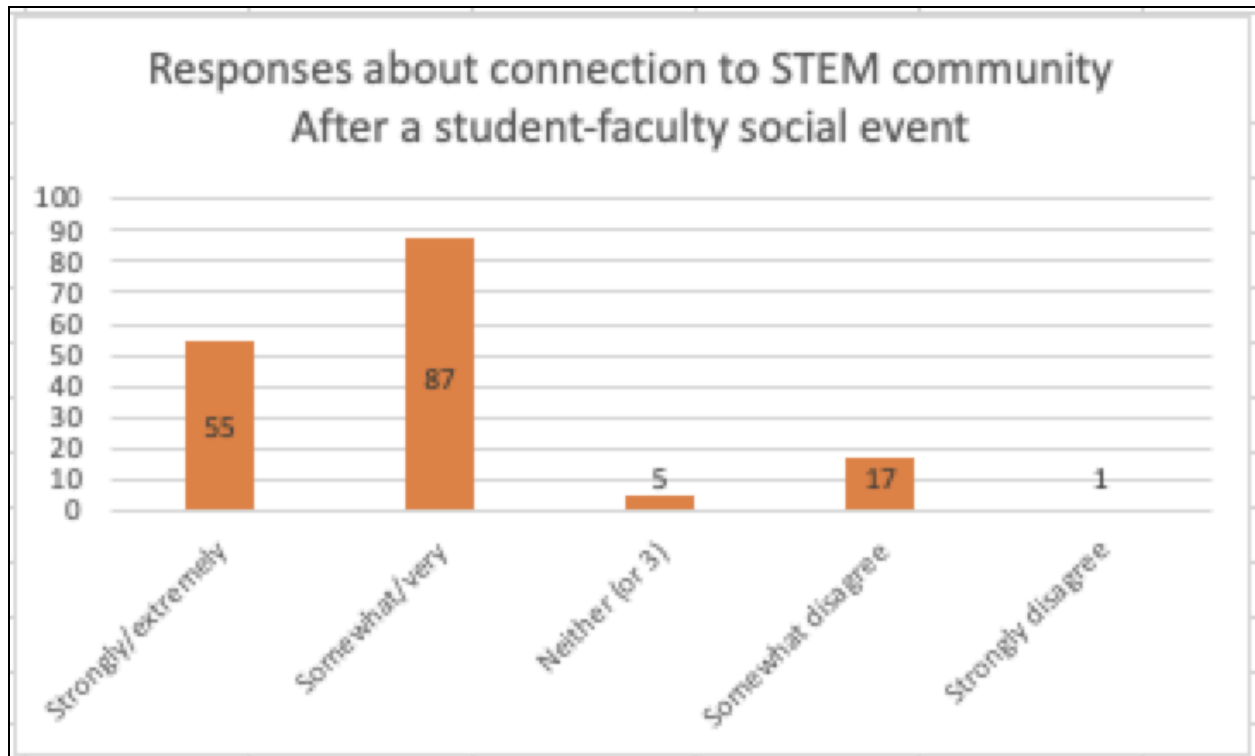


Table 6: Students' connection to the STEM community.

Future student-faculty-administration collaboration. The primary goal of these student-faculty social events was to increase student's sense of belonging in the STEM communities. As a secondary goal, we hoped students' increased feelings of comfort would lead to more formal meetings between students, faculty and administrators. We asked this learning question:

“To what extent does this type of social event facilitate scheduling future meetings between students, faculty, and administrators to collaborate around removal of systemic barriers to first-generation students' success in STEM courses of study?”

To explore the likelihood of future meetings, we began asking students on the post-event surveys how likely they would be to participate in such meetings. Of the 43 responses we have collected so far, 41 (95%) expressed likelihood to participate in a future meeting. The remaining 2 responses were “neither agree nor disagree.”

Limitation of this study.

First2 Network campus clubs and social events aim to change the STEM culture on our college campuses, and **improve** students' sense of belonging in a STEM Community. In order to promote continuous improvement, campus teams document club activities, and social events,

sharing their results with others in the Network. A significant hurdle for our teams has been in collecting data. Although participation in faculty-student social events has been quite large, the survey response rate has been quite low. In early years, data was captured by sending invitations to complete surveys after the event had concluded. More recently, these events attempt to collect survey responses during the event itself. In early years, per-post surveys may have been used. These have been replaced with reflective post surveys.

SUMMARY

The stated goal of the First2 Network is to double the graduation rate of first-generation students in STEM fields of study.

Research shows that increasing feelings of belongingness, especially in first-generation and other underrepresented students, can lead to higher success in their STEM fields. Our research so far suggests that two of our major activities toward this goal – Campus Clubs and student-faculty social interactions – have been very successful in building this sense of belonging.

RESOURCES:

Current student-faculty event post survey:  [Student-Faculty Social survey 2025.03.pdf](#)

Campus Club retrospective survey:  [Campus Club Retrospective survey 2025.pdf](#)