

UNIVERSITY INNOVATION FELLOWS

2016 Summative Report

BACKGROUND

The University Innovation Fellows (UIF) program activates students as change agents who work to enhance the innovation and entrepreneurship (I&E) ecosystem within higher education institutions across the globe. Now a program of the Hasso Plattner Institute of Design, or d.school, the program was cultivated as an initiative of the NSF-funded National Center for Engineering Pathways to Innovation (Epicenter), which was managed by Stanford University and VentureWell from 2012 to June 2016. What started as an initiative called Student Ambassadors underwent numerous iterations and enhancements until program leaders developed an immersive training and a multi-campus community of practice that equips students with the knowledge, skills, and mindsets to act as strategic thinkers and change agents. The UIF program trains students to become as conversant about the campus ecosystem as their faculty and administrative counterparts. Leveraging a custom, hybrid model that combines experiential online training with in-person events, the program exposes students to design thinking and lean startup techniques, as well as a campus asset mapping tool called the “Landscape Canvas” and knowledge of program models and assets that support I&E in academia. The program also developed and expanded what began as a nation-wide community of participants into a global network.

The UIF program taps students’ intrinsic motivation to learn, draws on their unique interests and passions, exposes them to a broad set of global resources, and helps them hone I&E skills and mindsets. In doing so, the UIF program has systematically empowered teams of students to create new learning opportunities that have exposed thousands of their peers to . What began in engineering departments (because of Epicenter’s focus on undergraduate engineers) spread to Business, Computer Science (CS), and many other disciplines and majors. The program has appealed to a diverse set of schools (i.e. public/private, size etc.), regions across the US, and countries around the globe. As a result, Fellows have reached an equally diverse population of peers to equip them with the skills and mindsets needed to enter the workforce of the 21st century.

Students apply to become University Innovation Fellows either individually or in teams of up to four members (called “Leadership Circles”). They must have a faculty Sponsor and their institutions pay a fee to help cover the cost of the six-week online training and the participation in the Silicon Valley Meetup, an in-person training event. Leadership Circles additionally require a letter of support from the institution’s president or provost. Two cohorts of candidates (Fall and Spring) go through the online training each year, and upon completion of the training deliverables, they are launched as Fellows. Once each academic year, Fellows from the Fall and Spring come together for a three-day Meetup in Silicon Valley, which includes full days of activities at Google, Microsoft and the d.school.

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As of February 2016, 607 students from 143 institutions have gone through the UIF training. These students, known as “Fellows,” acquire knowledge of tools, frameworks, program models, and leadership skills to help them develop an entrepreneurial mindset and creative confidence. Fellows apply these skills systematically as they work with students, faculty, and other stakeholders to expand their campuses’ ecosystems for I&E. Fellows organize events, secure and redesign physical spaces, contribute to course development, and collaborate with faculty and administrators to create new learning opportunities at their schools. Many Fellows go on to influence the national conversation on I&E by organizing regional events, presenting at conferences (including SXSWedu, Open, and ASEE), and participating in national forums such as the fifth-annual White House Science Fair and first-ever White House Demo Day.

Table U-1 provides an overview of the participation in the UIF program over the course of the project.

Table U-1: UIF Program and Participants Epicenter Project Year 2-5 (UIF program years 1-4)

| Participation indicator | Epicenter Funding Year 2 | Epicenter Funding Year 3 | Epicenter Funding Year 4 | Epicenter Funding Year 5 |
|--|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| # of schools with a Fellow (cumulative) | 32 | 82 | 115 | 143 |
| # of schools sponsoring first Fellow | 32 | 50 | 33 | 28 |
| # of Fellows trained in funding year | 34 | 101 | 291 | 324 |
| # of Sponsors | — ¹ | 69 | 181 | 274 |
| # of Leadership Circles | — ¹ | 13 | 30 | 71 |
| Cost for campus to sponsor a fellow | \$5,000 | \$2,000 | \$2,000 | \$2,000 |
| Applicants | — ² | 115 | 197 | 361 |
| Accepted | — ² | 97 | 188 | 344 |
| Did not start or did not finish training | 0 | 9 | 7 | 20 |
| Attended a UIF national meeting | 20 | 88 | 158 | 286 |

EVALUATION QUESTIONS AND INDICATORS

In the fall of 2014, the evaluation team and UIF program team sat down to refine the UIF program logic model. This model provided the basis for the evaluation questions and plan. Although the quality of the evidence collected to help answer these questions varies, in all instances data have been used to inform and iterate program design where appropriate (See Table U-2, below).

¹ Not implemented in Year 2

² Not tracked in Year 2

Table U-2 Evaluation questions, indicators and data sources

| Fidelity of Implementation: to what extent has the UIF program met its objectives? | | | |
|---|--|---|--|
| Objective | Outputs/indicators | Data Source | Quality of Evidence³ |
| 1. Equip students with the knowledge and skills to advocate for I&E (Individual) | # Students participating in UIF program # candidates accepted # candidates trained # Fellows that complete requirements # Fellows that drop out. | Program records | N/A |
| | UIF satisfaction with training components addressing this objective | Post training surveys; annual survey | Moderate-Strong |
| | Demonstrated engagement in the program | Interviews with program leadership to assess strengths and challenges; fulfillment of UIF responsibilities (landscape canvas completion, presentations to faculty, etc.) Attendance at events. Meet-up reports | Strong |
| 1.1 Provide opportunities for engineering students to experience I&E (Peers) | # Students subscribing to Epicenter newsletter | Program records | N/A |
| | # Visitors to the Epicenter website student targeted pages, UIF website and wiki | Program records; web analytics | N/A |
| | # And types of events held by UIFs | Qualitative review of Annual survey | N/A |
| | # Of peers participating (initial level of interest, and ongoing- “Repeating customers”) | Qualitative review of Annual survey | N/A |

³ Quality of evidence is a function of quality of data, methods, statistical analysis and documentation of action.

| | | | |
|--|---|--|-----------------|
| 2. Support student/Fellows to create sustained change that their schools regarding I&E (exposing faculty, staff and institutional leaders) | # Student UIFs trained | Program records | N/A |
| | # and name of campuses with a trained UIF | Program records; Repeat customers; Leadership circles. | N/A |
| | UIF satisfaction with training components addressing this objective | Post training, event and annual surveys | Moderate-Strong |
| 3. Create a national movement that is student-driven and supporting of I & E in higher education (national) | # Applications for UIF from more diverse schools | Program records | N/A |
| | # Interactions and collaborations by Epicenter and UIFs with potential strategic partners | Fellow annual survey | N/A |
| | # Opportunities for UIF participation at national convenings related to I&E | Fellow annual survey; program records | N/A |

Objective 1: Equip students with the knowledge and skills to advocate for I&E (Individual)

| Evaluation Question | Outputs/indicators | Data Source | Quality of Evidence |
|---|---|--|---------------------|
| Do UIFs understand the current I&E landscape on their campus? | Fellows receive appropriate training | Post-training and annual surveys | Moderate |
| | Identification of current opportunities and gaps | Faculty sponsor survey | Moderate |
| Do UIFs understand and embrace their mission as change agents and influences for Fellow students? | Self-report of understanding and engagement, challenges and opportunities; demonstrated effort to act as change agents and influence for Fellow students. | Post-training and annual surveys Focus groups | Moderate-Strong |
| | Increased Innovation Self Efficacy | Surveys; comparison to national data sample | Strong |
| UIFs as champions of I&E become future engineering leaders | Leadership roles | Annual survey | Moderate |

Objective 1.1: Provide opportunities for engineering students to experience I&E (*peers*)

| Evaluation Question | Outputs/indicators | Data Source | Quality of Evidence ⁴ |
|--|--|-------------------------------|----------------------------------|
| Do UIFs generate interest in students being engaged in I&E through marketing and communication | Student participation in I&E activities | Fellow annual survey | Weak |
| | | Longitudinal survey | Weak |
| Do UIFs host events designed to build I&E skills and mindsets? | Student participation in UIF hosted events | Fellow annual survey | Moderate-Strong |
| Do engineering students on UIF's campuses understand the importance of I&E in the educational experience | Student demand for I&E opportunities Student participation | Site Visits | Weak |
| Do engineering students demonstrate the adoption of an entrepreneurial and innovative mindset through engagement in projects and venture activities? | Student participation in I&E events | Fellow annual survey | Weak |
| | UIF report of peer engagement | Fellow annual survey | Weak |
| | Faculty/admin report of student engagement | Site visits Sponsor survey | Weak |
| | Change in campus I&E landscape | Sponsor survey | Weak |
| Do UIFs engage students to become champions of I&E? | UIF report of peer activity | Fellow annual survey | Weak |
| | Faculty/admin report of student engagement | Sponsor survey | Weak |
| | Change in campus I&E landscape | Sponsor survey; Site visits | Weak |

⁴ In this context, evidence is considered "weak" when data collection was conducted indirectly, e.g., Fellows' and Sponsors' reporting changes in levels of activity/engagement of campus; whereas direct measures, e.g., attendance at UIF-hosted events, are considered to be stronger sources of evidence.

Objective 2: Support student/Fellows to create sustained change in their schools regarding I&E (*exposing faculty, staff and institutional leaders*)

| Evaluation Question | Outputs/indicators | Data Source | Quality of Evidence |
|--|--|------------------------|---------------------|
| Do UIFs demonstrate to faculty and leaders interest for I&E learning opportunities in the curriculum? | UIF present landscape canvas and strategic plan to faculty and admins | Fellow annual survey | Strong |
| | | Faculty sponsor survey | Strong |
| Do UIFs influence faculty adoption of I&E into curricular and co-curricular offerings? | I&E included in more curricular and co-curricular offerings. | Fellow annual survey | Weak |
| | | Longitudinal survey | Weak |
| | | Faculty sponsor survey | Moderate |
| | | Site visits | Moderate |
| Do UIFs catalyze institutional investment in I&E offerings? | Institutional investment in I & E offerings | Fellow annual survey | Moderate |
| | | Longitudinal survey | Moderate |
| | | Faculty sponsor survey | Moderate |
| | | Site visits | Moderate |
| Do UIFs attract outside investment, sponsorship and resources that expand I&E offerings? | Outside investment, sponsorship and resources expand I&E offerings | Fellow annual survey | Moderate |
| | | Faculty sponsor survey | Moderate |
| Do faculty and leaders from UIF schools participate in Epicenter and other I&E events and use the resources? | Faculty and leaders from UIF schools participate in Epicenter and other I&E events and use resources | Faculty sponsor survey | Moderate |
| | | Site visits | Moderate |
| | | Meet up reports | Moderate |
| | | Program records | Strong |
| Do UIFs teach other UIFs how to plan and execute effective change strategies? | UIFs teach other UIFs how to plan and execute effective change strategies? | Fellow annual survey | Moderate |
| | | Longitudinal survey | Moderate |
| | | Faculty sponsor survey | Moderate |
| | | Meetup reports | Moderate |
| Do UIFs become future engineering leaders? | UIFs take leadership roles | Alumni survey | Moderate |

Objective 3. Create a national movement that is student-driven and supporting of I&E in higher education (national)

| Evaluation Question | Outputs/indicators | Data Source | Quality of Evidence |
|--|--|------------------------------|------------------------------|
| Are UIFs invited to attend national convenings? | UIFs participation in national convenings | Program records | Strong |
| | | Fellow annual survey | Moderate |
| | | Longitudinal survey | Moderate |
| Are UIFs engaging with strategic resources? | UIFs secure resources from multiple sources (campus, industry, grants); UIFs create strategic partnerships | Fellow annual survey | Moderate |
| | | Faculty sponsor survey | Moderate |
| Has Epicenter created a tipping point of I&E inclusion in engineering? | UIFs at institutions representing 50% of engineering students in the US | UIF potential reach tracking | Depends on scope of analysis |
| Have strategic resources been aggregated to focus on I&E in engineering alongside Epicenter? | UIFs utilize non-Epicenter and Epicenter resources in their work | Fellow annual survey | Moderate |
| | | Faculty sponsor survey | Moderate |
| | | Site visits | Strong |
| Are there student leaders and voices advocating for I&E at all engineering schools | <i>Beyond the scope of the evaluation</i> | | |

DATA SOURCES

The evaluation relies on data provided by Fellows, Sponsors, the program's internal records, and institutional data culled from ASEE, the Carnegie Foundation, and IPEDS. Typically, the evaluation team would administer surveys after events and training sessions and on an annual basis. In the final year of Epicenter funding, a pre-training survey was sent to Fellows; cohort 8 received a post-training survey, and; all participants received the annual survey with appropriate modules. The survey instruments used are discussed below.

Fellows Survey

The spring 2016 annual survey was administered to all current and past participants, comprising nine cohorts, with Cohorts 8 and 9 being those trained in the academic year 2015-16 of participants during the month of April. The survey was comprised of eight modules that were offered to Fellows based on

their year in the program. Table U-3 provides the information on the modules and population to respond.

| Table U-3: UIF Spring 2016 survey modules | | |
|--|---|--------------------------|
| Module | Purpose | Population |
| Background | Collect demographic information about participants | All |
| Engineering Majors Survey (EMS) | Questions from the Epicenter designed and launched Engineering Major's Survey to compare UIFs to a national sample of undergraduate engineers for the constructs "innovation self-efficacy" and "Career goals: Innovation work" | All cohorts except C8 |
| Program Experience | To assess the experiences of Cohorts 8 and 9 and any Fellows from prior cohorts who are still undergraduate students. | Undergrads; C8 – C9 |
| LC/multi-Fellows | To assess the value of a leadership circle in making campus based change; to understand the team dynamics of leadership circles. | C6 – C9 |
| Accomplishments | To document the accomplishments of UIFs on their campuses to expand the opportunities for students to engage in I&E through academic and extra and co-curricular activities and to document new resources developed. | C6 – C9 |
| Post-training | To evaluate the online component of the UIF training. Prior cohorts completed this module after training. | C9 |
| Meetup | To evaluate the Meetup component of the UIF training | C8 & C9 Meetup attendees |
| Value of program | To capture the perceived value and satisfaction of the UIF program. | All |

A total of 246 Fellows responded to the survey, yielding a response rate of 40%. There were 89 unique institutions represented in the student respondent population representing 63% of the institutions that have been involved with the UIF program.

| Table U-5: Fellow Spring 2016 Response rate | | | | Total N = 246 |
|--|----------------------------|------------------------------|-------------------------------|-----------------------------------|
| Cohort | # of UIFs in Cohort | # of Survey responses | % of cohort responding | % of total survey response |
| 1 | 19 | 4 | 21% | 2% |
| 2 | 9 | 1 | 11% | 0% |
| 3 | 9 | 3 | 33% | 1% |
| 4 | 21 | 4 | 19% | 2% |
| 5 | 67 | 14 | 21% | 6% |
| 6 | 59 | 14 | 24% | 6% |
| 7 | 122 | 31 | 25% | 13% |
| 8 | 151 | 72 | 48% | 29% |
| 9 | 161 | 103 | 64% | 42% |

Sponsors Survey

The Spring 2016 Sponsor survey was administered to all Sponsors during the same timeframe as the Fellows' survey. Sponsors who were identified as being part of a Pathways⁵ team were administered the survey through a module as part of the Pathways Spring 2016 survey. The survey was designed to capture:

- The perceived value of the UIF program for student development
- The perceived value of the UIF program for engaging students as change agents
- The accomplishments of Fellows and the consequence on the campus
- Satisfaction with the UIF program

There were 90 of Sponsors responding to the survey representing 61 institutions. Sponsors were not asked about any specific Fellow; all Sponsors had at least one Fellow in C1-C9, and many had multiple Fellows and/or Fellows from multiple cohorts.

Institutional Data

Understanding the institutional context is a critical element of the Epicenter evaluation model. It allows for correlations to be drawn between types of institutions and activities and the participants. Table U-4 presents the data used to develop institutional profiles:

| Table U-4: Institutional profile data | | |
|---------------------------------------|---|----------------------------|
| Data Source | Type | Method |
| IPEDS | Standardized data about the type of institution (i.e. size, degrees offered, urbanicity, cost of attendance etc.) | Download |
| ASEE profiles | Undergraduate enrollment in engineering degrees; degrees awarded | Download |
| Fellow survey | Fellows' self- report of accomplishment to change the I&E ecosystem | Condensed survey responses |
| Sponsor Survey | Sponsors' report on the change in the I&E ecosystem | Condensed survey responses |
| Program data | Document the degree of involvement in Epicenter related activities | Epicenter program records |

For each participating institution, a unique set of Institutional-level variables was created through Fellow and Sponsor survey data. Variables were created from the student data by averaging the Fellows' responses, accepting any "yes" response to establishing space, infrastructure or resource and influence, and including all open-end comments. Accomplishments from Fellows in Cohort 9 who were the first and only Fellow on their campus were excluded from the institutional profiles because these Fellows

⁵ See <http://epicenter.stanford.edu/page/pathways-to-innovation> for more details about the Pathways program

were only a few weeks out of training and did not have enough time to deeply affect their campuses. Their responses *are* included in the individual-level results.

For the Sponsor perspective, institutional-level variables were created using the most “positive” response to accomplishment items from Fellows, and using the best available data from the most “knowledgeable” Sponsor (if an institution had multiple sponsors). For the questions relating to Fellows’ success, we preferred the Sponsor with the most Fellows; for the student engagement questions, which were specifically around engineering, we preferred Sponsors who are in engineering departments. In cases where there was no “best” respondent, the most positive responses were used for each item. This was done in consultation with the Pathways evaluation team to ensure Sponsor and faculty data were treated consistently.

Prior Data

The response rate to the 2016 survey was at an historic low, with an overall rate of 40%. (In comparison, the 2015 survey of C1-5 fellows garnered an 82% response rate.) The response rate to the 2016 survey was strongest among those trained in the last year and, as one would expect, weakest among those who had been in the program for a year or more. In some cases, the evaluation team went back to the 2015 annual survey data to garner a more complete understanding of the impacts of the program.

ANALYSIS

Results from the surveys were entered into a data visualization software, Tableau. Three sets of data allowed for an exploration of the Fellows’ and Sponsors’ data and information about the institutions. The evaluation team used this software to understand the trends and relationships between data. A link to this data was provided to the UIF and Epicenter leadership teams to facilitate discussion of the findings. Further statistical analysis relied on SPSS.

ABOUT THE UIF PARTICIPANTS

Fellows

The UIF program attracts a diverse group of participants. Table U-6 provides an overview of the demographics of the Fellows based on survey respondents and/or administrative records:

| Table U-6: Fellow demographics* | | n=618 |
|---|--|--------------|
| Gender identity | | |
| Male | | 65% |
| Female | | 35% |
| Ethnic/Racial identity (<i>Percentages add up to more than 100% as respondents were allowed to check all that apply</i>) | | |
| White | | 55% |
| Asian | | 17% |
| Hispanic / Latino | | 8% |
| African American/African/Black/Caribbean | | 9% |
| Native American/Alaska Native & Native Hawaiian or Pacific Islander | | 2% |
| Family Socioeconomic | | |
| Low/Low-middle income | | 26% |
| Middle income | | 40% |
| High-middle/High income | | 34% |
| Major | | |
| Engineering & Computer Science | | 59% |
| Natural Science & other STEM | | 14% |
| Business/Management and Economics | | 21% |
| Liberal Arts | | 4% |
| Other (Entrepreneurship, Political Science, History) | | 3% |
| Academic status | | |
| Undergraduate** | | 83% |
| Graduate | | 17% |

*Percentages reflect some rounding error.

**Over 70% of undergraduate respondents were juniors or seniors.

Sponsors

Sponsors are a more diverse group in terms of department and position. Table U-7 provides an overview of the Sponsor demographics based on survey and/or administrative records.

| Table U-7: Sponsor demographics | N | % |
|--|----------|----------|
| Department | | |
| Engineering & Comp. Science | 88 | 46% |
| Natural Science/other STEM | 23 | 12% |
| Entrepreneurship & Innovation | 40 | 21% |
| Business/management and Economics | 22 | 12% |
| Liberal Arts | 10 | 5% |
| Other | 8 | 4% |

| Table U-7: Sponsor demographics | N | % |
|--|----------|----------|
| Position | | |
| Professor | 73 | 46% |
| Director | 37 | 15% |
| Professor and Director | 20 | 14% |
| Administrator (Dean, Chair) | 22 | 10% |
| Professor and Administrator | 23 | 14% |
| Other | 7 | 4% |

** Percentages reflect some rounding error*

Nearly half of the spring 2016 responses come from institutions involved in the Pathways program, and 42% of these Sponsors are personally involved in Pathways.

Institutions

There are 143 unique institutions in the evaluation team's Epicenter database. Table U-8 summarizes the characteristics of these institutions.

| Table U-8: Institutional Characteristics* | n=143 |
|--|--------------|
| Pathways involvement | |
| Pathways | 51 |
| <i>Pathways '14</i> | 12 |
| <i>Pathways '15</i> | 25 |
| <i>Pathways '16</i> | 14 |
| Non-Pathways | 92 |
| Admission Rate (college selectivity) | |
| 0-25% | 13 |
| 26-50% | 32 |
| 51-75% | 64 |
| 76-100% | 29 |
| Public/Private | |
| Public | 81 |
| Private | 62 |
| Highest Degree Offered | |
| Associate's degree | 1 |
| Bachelor's degree | 6 |
| Master's degree | 10 |
| Post-master's certificate | 4 |
| Doctor's degree | 122 |

** Percentages reflect some rounding error*

The responding Sponsors and non-responding Sponsors come from institutions with different involvement in the UIF program. Table 6 shows the characteristics of institutions from which responding Sponsors come and those that are not represented in the Sponsor data.

EVALUATION FINDINGS

Motivation

Fellows join the program for a variety of reasons, but the most recent results show UIFs are primarily excited to make change on campus. Fellows, especially those from business majors, are also looking to gain skills and knowledge they can use in their careers. The third most common reason students join the UIF program is to expand their academic and professional networks.

Champions on campus

Sixty-percent of UIFs consider themselves champions of I&E on campus, which is slightly higher than the 55% reported on the 2015 annual survey. Sponsors agree, with 74% reporting their Fellow is a champion on campus. Nearly 90% of Sponsors consider themselves to be champions of I&E.

Objective 1: Equip students with the knowledge and skills to advocate for I&E (Individual)

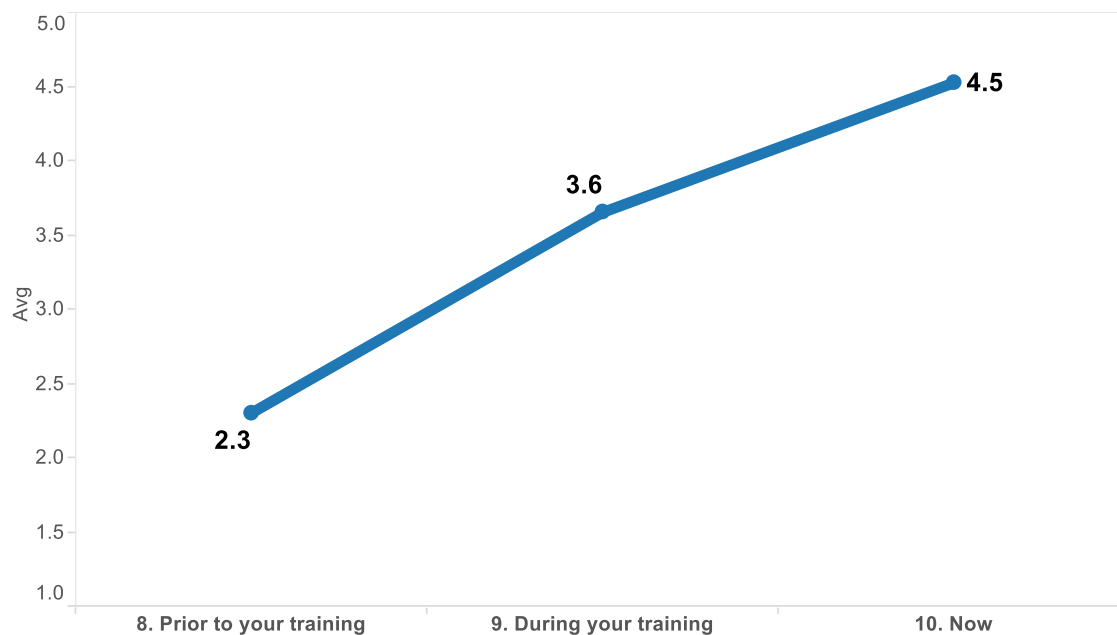
In each of years 4 and 5 the UIF program more than doubled. In year 5, more than 300 additional students joined the UIF program, bringing the total number of Fellows to 607 (as of Spring '16). Students come to the program through a rigorous application process, creating a natural self-selection. Most students who complete that application process (which includes partnering with a Sponsor, identifying a potential source of funds, and completing an interview) are accepted into training as candidates, and most candidates successfully complete training and are launched as Fellows.

Fellows are overwhelmingly positive about the training and work they have done on campus. The UIF model of success requires Fellows to develop knowledge and skills, to increase their own commitment to making change on campus, and to influence the students, faculty and administrators on their campuses in an effort to expand I&E offerings. Survey questions around these three items are used to better understand the Fellows' experience in the program. Though survey responses have remained remarkably consistent, and positive, over the course of the program, a response rate of under 50% introduces the possibility of response bias for the most recent two cohorts.

Knowledge and skills

Fellows showed gains in their understanding of the current I&E landscape on their campus. Figure U-1 shows the change in understanding between starting the program, after the training, and currently. A matched-pair t-test shows that students demonstrate a statistically significant change in knowledge ($p < .001$) between the start of the program and the online training, and again between the training and now. This suggests that the time on campus during which they're applying what they learned during the on-line training is an essential part of the program. During this time they are typically active in the national UIF community and can turn to the program leadership for assistance as needed.

Figure U-1: Fellow change in **understanding** the current I&E landscape on their campus (N=381)

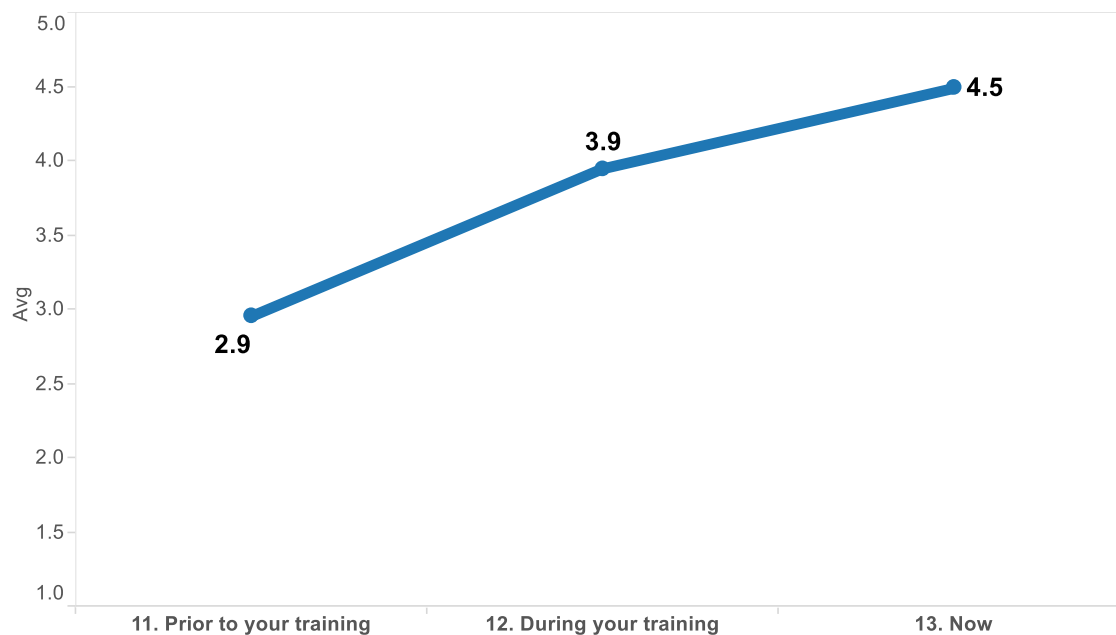


Sponsors corroborate the finding that Fellows increase knowledge and skills with two thirds agreeing that Fellows understand the current landscape either very well or extremely well

Commitment

Fellows increased their commitment to serving as change agents on campus through this program. Excitement to make change on campus was the most common reason Fellows decided to join the program (43% listed it as the most important reason and 83% had it as a top-three choice). Though 12% were “very committed” at the start of the program, 63% report being very committed now. Figure U-2 shows the change in commitment over the course of the training. A matched-pair t-test shows that students demonstrate a statistically significant change in commitment ($p < 0.001$) between the start of the program and the online training, and again between the training and now, again suggesting that the time in which they apply their learning reinforces their commitment.

Figure U-2: Fellow change in **commitment** to making change on their campus (N=381)



Sponsors corroborate this finding with 76% agreeing that Fellows are either very or extremely committed to making change on campus. Of note, 86% of Sponsors also self-identify as champions of I&E on their campuses, which is an asset to the students trying to make change.

Innovation self efficacy

Fellows who are engineering majors in their junior or senior year can be compared to a similar set of junior/senior engineering majors that were part of the Engineering Majors Survey (EMS).⁶ One of the key constructs of the EMS measures students' confidence in various skills and abilities related to innovation, or "innovation self-efficacy" (ISE). The Fellows enter the UIF program with the same sense of ISE as the general population, but their career goals are more focused on innovation (See Table U-9).

| Table U-9: UIFs compared to national sample: ISE and Career Goals | | | | |
|--|------|---|----------------------------|----------------|
| | | UIF Jr. and Sr. Engineering majors | National sample | p-value |
| Innovation self-efficacy- pre (N=84) | Mean | 65.6 | 64.3 | 0.414 |
| | SD | 14.8 | 18.7 | |
| Career goals- pre (N=82) | Mean | 75.8 | 63.1 | < 0.001 |
| | SD | 16.1 | 19.7 | |

Students who go through the UIF program, i.e., Fellows, develop a stronger innovation self-efficacy. Table U-10 shows the ISE scores of UIF participants as compared to a national sample. The students are not statistically different upon entry into the program, but after training and some time on campus

⁶ For more information on the EMS see <http://epicenter.stanford.edu/page/engineering-majors-survey>

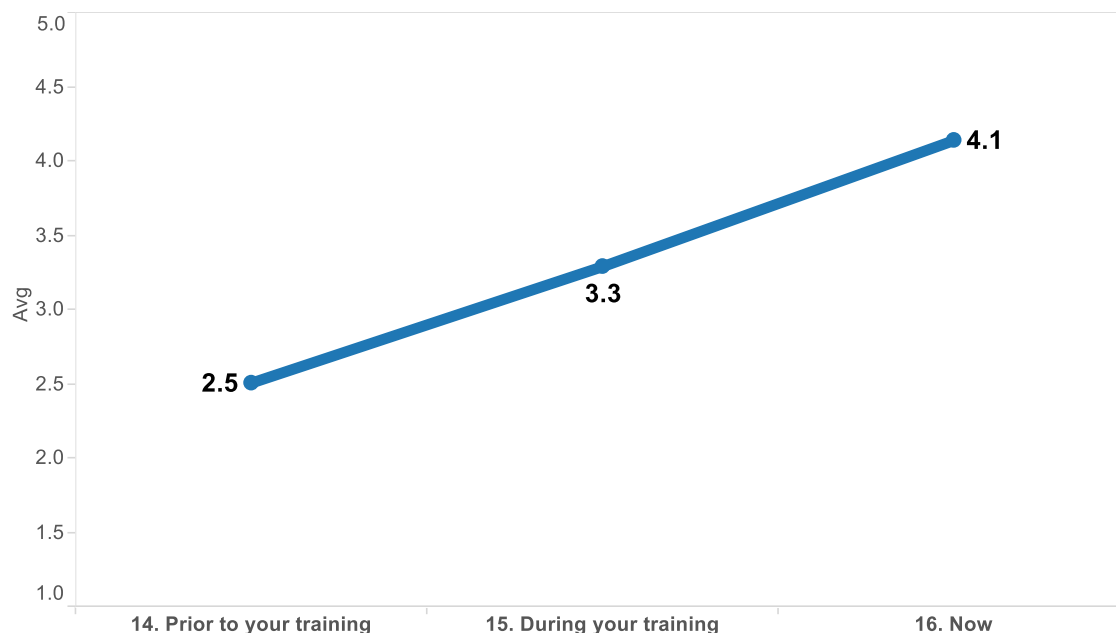
implementing their ideas, they have made an enormous leap demonstrating that it is the program that is responsible for this growth ($p < 0.001$).

| Table U-10: UIFs compared to national sample - Innovation self-efficacy- | | | | |
|--|------|--|-----------------|---------|
| | | C8&9 UIF Jr. and Sr. Engineering majors | National sample | p-value |
| Pre (N=84) | Mean | 65.6 | 64.3 | 0.414 |
| | SD | 14.8 | | |
| Post (N=50) | Mean | 80.0 | | < 0.001 |
| | SD | 13.9 | | |

Objective 1.1: Provide opportunities for engineering students to experience I&E (Peers)

Once Fellows are prepared to become change agents on campus, it is expected that they will work to provide opportunities for their peers to experience I&E. Fellows create opportunities on campus both to expose (e.g., TEDx, lectures, and workshops) and to engage (e.g., hackathons and competitions) their peers in I&E and design thinking. Over the course of the program, Fellows become more influential on other students. Figure U-3 illustrates this change over time.

Figure U-3: Fellow change in **Influencing** the current I&E landscape on their campus (N=381)



#UIFresh

In March 2015, the #UIFresh initiative launched as part of a collection of initiatives announced during the fifth-annual White House Science Fair. Leaders and Fellows from 10 schools committed to exposing incoming students at their schools to entrepreneurship, design thinking, creativity, and innovation as

part of freshmen orientation. Fellows work to gain the commitment of their institution's president and/or provost to offer I&E to all freshmen, as part of orientation or a course. To date, 30 schools have made a commitment to this effort. The freshman classes at these schools total approximately 90,000 students.

Objective 2: Support student/UIF to create sustained change in their schools regarding I&E (Exposing faculty, staff, and institutional leaders)

Fellows can have a profound impact on the I&E landscape of their campus. Spring 2016 data shows that Fellows have affected campus environments through engaging students and sustainable change. Table U-11 summarizes the number of campuses in which students report having affected the environment:

| Table U-11: UIF Accomplishments | Total Number of campuses | |
|--|---------------------------------|--|
| | Complete | In Progress / Concrete plans for the future |
| Extracurricular Events | | |
| TEDx | 35 | 20 |
| Lecture | 41 | 19 |
| Hackathon | 37 | 27 |
| Challenge | 48 | 20 |
| Info session | 43 | 22 |
| Celebration/recognition ceremony | 30 | 17 |
| Showcase | 35 | 21 |
| Extracurricular Program | | |
| Club | 55 | 12 |
| Competition | 55 | 17 |
| Challenge | 45 | 24 |
| Living-learning communities | 26 | 24 |
| Coop/Internship | 31 | 18 |
| Mentoring program | 27 | 25 |
| Academic Offerings | | |
| Certificate/degree | 40 | 13 |
| Course | 33 | 23 |
| Curriculum redesign- Courses only | 19 | 37 |
| Curriculum redesign- Program | 17 | 35 |
| Non-credit offering | 43 | 29 |
| Faculty development | 17 | 34 |

| | | |
|--|----|----|
| Institutional Investment- Internal | | |
| Investment from within institution | 38 | 28 |
| Paid Position | | |
| Faculty | 34 | 11 |
| Student | 35 | 21 |
| Staff | 34 | 16 |
| Institutional Investment- Space | | |
| Ideation/brainstorming/lo-tech prototyping | 43 | 28 |
| Makerspace /Innovation space | 33 | 26 |
| Incubator /accelerator | 34 | 21 |
| New building/center | 27 | 26 |

Many of the Fellows work on campus to focus and amplify the student voice. Sponsors have noticed that:

- *Students have been much more able to break down doors and barriers on campus. Their ideas are innovative and novel and fresh and faculty tend to listen to them more readily than other faculty members*
- *UIFs provide valuable insight and traction for many of the I&E initiatives that are used to engage undergraduates. They play a role as a sounding board and collaborators for our I&E goals.*
- *Student-led activities get visibility and create energy in ways that curricular changes never will.*
- *The Fellows have been instrumental in building enthusiasm and momentum in efforts to change our I&E culture from the student base.*

Objective 3. Create a national movement that is student-driven and supporting of I&E in higher education (national)

The UIF program is working to build a movement. Bringing Fellows together to an annual (or regional) meet-up is a strategy used to generate a sense of community, participation and ownership. For many Fellows, this is where the elements of the online training come together. They develop a deeper knowledge of design thinking, lean startup, spaces that foster an innovation culture, and facilitation strategies they can deploy on their campus. The Fellows meet other students with a similar passion and commitment and many report this is when they feel part of a national community. They develop the relationships they subsequently draw upon as they make change on their own campuses. Nearly all Fellows have attended the in-person Silicon Valley Meetup, the highlight of the UIF program.

The meetups are seen as valuable for developing community among UIFs, sustaining engagement and for Fellows to learn new skills relevant to their UIF work. Networking is one of the most important aspects of the Meetup. Of the 135 Fellows that took the survey, 73% report that at the time of the survey, they were actively exchanging ideas with other Fellows.

CONCLUSION

The UIF program has had remarkable fidelity to the plan set forth in 2013 and the effort has proven to be a powerful mechanism for making change on a campus. The project has been effective at developing the individual participants, supporting Fellows in expanding I&E at their institutions and the national landscape.

Individually, student participants show an increase in their knowledge, skills, commitment and degree of influence on a campus. Students devote a substantial amount of time to their training and subsequent work on campus. As members of the social learning community the Fellows develop their abilities to work with campus administrators and faculty and to galvanize student participation on campus.

The efforts of the Fellows have led to significant changes on campuses. Most campuses have benefited from events and programs that engage students, faculty and administrators in I&E activity. Campuses have developed innovation spaces, from low-tech prototyping carts to new centers and buildings. Fellows are being recognized as campus change agents by faculty and administrators. Fellows are also recognized through media and press coverage.

The national community of Fellows has been an important resource for the Fellows in their work to serve as change agents. They often turn to the network through social media to get advice and ideas when undertaking projects. The national network also gives a substantive student voice in the I&E change community. Fellows participate in national events, such as the White House Science Fair and the ASEE and Open national conferences.

Moving Forward

The UIF program underwent a substantial iteration for the fourth and fifth cohorts, when the training became an on-line/in person hybrid model. This new model was tested and seemed to be met with success as Fellows reported satisfaction with the training and were effective at making change on their campuses. In year 4, the program turned to thinking through how to scale, and was able to recruit and train 151 Fellows. Year five doubled that number again to over 300. The program made a concerted effort to plan for the future, and have been successful to that effect with a new home in the d.school at Stanford.

Moving forward, the UIF program may want to consider the following:

Recruitment: While the program has attracted 45% students of color and 30% women, it could do better to create even greater economic diversity by providing work-study subsidy to low-income students (currently 26% percent of Fellows self-identified as coming from a low-income household). The evaluation team has found in other programs that students are often limited by work obligations from participating fully in extracurricular and co-curricular activities such as research experiences.

Training: As more campuses sustain engagement through sponsorship of consecutive Fellows, the program may want to consider a multi-track model. There are likely topical areas in which all Fellows need to be trained, however some activities such as the landscape canvas may benefit from a track for

novice Fellows and a more advanced or tailored track for those that are coming from campuses with a history of UIF activity, and/or those Fellows who report having been active partners of the Fellows that preceded them. The program may want to consider what topics could be tracked into different tiers and what the defining characteristics might be.

Cohort size: The training has been effective over the course of the Epicenter program, yet there remains a question as to how large a cohort can be without diluting the UIF brand. In the earlier years of the program, the Fellows received highly individualized support. As the program expanded, the leadership team remained highly accessible, however the number of Fellows precluded the universal level of support and accountability that was previously enjoyed. There are likely Fellows from the larger cohorts who did not fully engage once the training was over, but it is unknown who or how many of these Fellows there are. There is probably an ideal cohort size in which Fellows are tracked and supported with minimal numbers of students who drop out, leaving the UIF brand strong. Should too many Fellows take on minimal responsibility, it could be a problem. One protective factor is the rigorous application process, in which Fellows demonstrate their commitment to the effort.

Engaging Faculty: The training has been overall well received and effective, as demonstrated by the changes being made on campus, however, meaningful engagement of faculty has been a struggle thus far, though the number of faculty members involved in the UIF program has grown. The leadership team piloted several approaches, including inviting faculty sponsors to orientation and the annual Meetup. In the coming year, the team will offer several iterations of a four-day intensive workshop for faculty members, the Teaching and Learning Studio (TLS), at the d.school. Developing a minimal viable communication product would help the program ensure sustained faculty support. Faculty sponsors are often the “repeat customers” of the program as they send consecutive Fellows through training. Importantly, they are also resources for the Fellows undertaking small to ambitious projects on campus.

National Presence: The UIF program benefited from being part of Epicenter in that it had visibility among faculty and other leaders who are at the forefront of the I&E educational movement. A partnership with the White House Office of Science and Technology Policy gave the UIF program notoriety, both through the launch the wiki – <http://universityinnovation.org> – and also by highlighting the work of students change-makers. In addition, conferences such as Open, SXSWedu, and the annual meeting of the American Association of Colleges and Universities helped to garner substantial faculty support for the program, as have collaborative relationships with KEEN, the National Academy of Engineering, Ashoka, and the University Economic Developers Association. Fellows are part of a change process that is bigger than UIF, though it may not be felt explicitly. Students are a part of a larger ecosystem of change and finding ways to stay connected and integrated to the national efforts to expand I&E education will have a positive effect on recruitment, training and Fellows’ unique efforts. It will also ensure that the student voice remains a strong, vibrant part of the change efforts.