Faculty Grants Program Retrospective Assessment

Report prepared for VentureWell June 25, 2020





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In October 2019, VentureWell contracted with Vantage Evaluation to conduct a retrospective evaluation of the Faculty Grants Program. This public-facing report is a shortened version of the final report delivered by Vantage in June 2020. The content that has been removed, including a set of internal-facing recommendations and appendices (evaluation methodology and interim products), does not change the interpretation of the results and findings presented.

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Introduction

The VentureWell Faculty Grants Program funds and supports faculty with innovative ideas to create new or transform existing courses and programs to help students develop novel, STEM-based inventions and gain the necessary entrepreneurial skills needed to bring these ideas to market. VentureWell engaged Vantage Evaluation to conduct a retrospective assessment of the Faculty Grants Program to better understand the impact of funding and identify opportunities to improve the program. This retrospective assessment included faculty grants awarded between Spring 2006 and Fall 2016.

This retrospective assessment sought to answer the following key evaluation questions:

Who received funding?	What kind of work did faculty grant recipients do as part of the grant?
What kinds of impact did the grants have on (1) faculty, (2) students, (3) higher education institutions, and (4) the broader I&E field?	What do higher education educators need to (1) advance change at their university and (2) support student entrepreneurs?

To answer these questions, Vantage Evaluation took a three-phase approach:

- Phase 1: Assessment of grant reports (n = 148 final reports)
- Phase 2: Interviews with faculty grant recipients (n = 16 purposely selected interviewees)
- Phase 3: Survey of faculty grant recipients (n = 64 completed surveys; response rate = 44%)

Vantage Evaluation synthesized learning from all three phases to identify salient findings in response to the key evaluation questions. Since grant reports and survey findings provided the widest breadth of information, we used those tools to identify trends and patterns. We present interview findings to provide detail, context, and clarity for these trends and patterns.

Key Findings

Kind of Work Completed

Faculty grant recipients primarily worked in engineering and entrepreneurship disciplines. As part of their grant, recipients collaborated with key partners to create new courses or programs or to strengthen existing ones.

Level of Impact on Key Stakeholders

The Faculty Grants Program provided grants (average grant size: \$27,565) to faculty members at an opportune time to foster interest in Innovation and Entrepreneurship (I&E). The grants served as a catalyst to strengthen impacts on faculty themselves as well as their institution's I&E ecosystem.

- Impacts on Faculty: The Faculty Grants Program improved recipients' knowledge and skills, motivation to support I&E, sense of collaboration, and ability to support students. The grants provided credibility to their work and supported their career development.
- Impacts on Students: Faculty grant recipients stated that the grants had a positive impact on the career path of students and their entrepreneurial mindset.
- Impacts on Higher Education Institutions: The Faculty Grants Program contributed to sustained courses and programs for I&E, improved collaboration, increased institutional support for I&E, and provided institutional credibility to secure additional funding.
- Impacts on the Broader I&E Field: The purpose and timing of the Faculty Grants Program contributed to the growing focus on I&E within higher education. Recipients earned media attention and produced conference presentations and peer-reviewed publications contributing to the knowledge base on I&E.

Support Needed to Advance Institutional Change

- Change within institutions is easier when there is institutional support, collaboration among faculty, alignment with institutional strategies and infrastructure, and financial support.
- Faculty want additional resources to adequately support students and venture development.

Who received funding?

In total, VentureWell awarded 303 grants through the Faculty Grants Program to 25 cohorts between Spring 2006 and Spring 2017. After applying exclusion criteria,¹ this evaluation included a sample of 148 grants from 21 cohorts between Spring 2006 and Fall 2016. All 21 cohorts in the sample had between five and nine grants, with the exception of Fall 2015 (n = 11) and Fall 2016 (n = 1).² The average grant size was \$27,565 (standard deviation of \$8,883), and the average grant length was three years (standard deviation of 1.3 years).

There were 106 unique schools in the evaluation sample; 29 schools had more than one grant, ranging from two grants (n = 21) to six grants (n = 1). The majority of schools included in the sample (55%) had more than 20,000 students and were located in the Mid East (20%), Far West (19%), Great Lakes (17%), and South East (16%). Most schools were located in cities (69%) and large suburban areas (18%). More than one-fifth (22%) of schools were minority-serving institutions, and an average of 27% of undergraduate students received Pell Grants.³ There were 142 unique principal investigators (PIs); six Pls were awarded two grants.⁴

¹ Grants were excluded from the sample if they (a) were awarded as a part of four "special" cohorts that deviated from the typical scope of faculty grants; (b) were planning grants; (c) were active grants (final report due date 10/31/19 or later and a final report had not yet been submitted); or (d) the PI had not submitted a final report. In total, 155 of the 303 grants awarded during the time period were excluded.

² The evaluation sample includes one of the 16 Fall 2016 recipients. Of the 16 Fall 2016 recipients, two were planning grants, 12 were still active at the time the sample was generated, and one had no final report. ³ All school characteristic data were taken from IPEDS data from 2016-2017, not the time the grant was received.

⁴ There is limited information on the demographic makeup of grant recipients. VentureWell started collecting demographic data for PIs in final reports in May 2018. VentureWell has demographic data from 2016 onward for PIs who engaged with VentureWell outside of their grant (most likely as a part of registration for OPEN). Additional demographic data were collected on the survey respondents in Phase 3. These raw demographic data are provided to VentureWell for additional analysis.

What kind of work did faculty grant recipients do as part of the grant?

Faculty grant recipients primarily worked in engineering and entrepreneurship disciplines. As part of their grant, recipients collaborated with key partners to create new courses or programs or to strengthen existing ones.

Most faculty grant recipients worked in the engineering or entrepreneurship disciplines. Based on survey findings, 50% (n = 32) of survey respondents worked in the engineering discipline and 41% (n = 26) worked in the entrepreneurship discipline.⁵

Many faculty grant recipients used the VentureWell grant to start new courses or programs. Half (50%, n = 32) of survey respondents indicated that they used the faculty grant to develop and implement a new course in I&E, and 44% (n = 28) created a new program (Figure 1, page 6). A majority of interviewees started new courses with the grant, which introduced opportunities for interdisciplinary collaboration and design thinking campus-wide; incorporated I&E content within non-business disciplines (e.g. engineering, journalism, biomedicine); and facilitated the purchase of materials for hands-on learning. For example, one recipient created a course that brought together engineering and liberal arts students to commercialize a business idea, requiring collaboration between engineering and liberal arts faculty. Another interviewee described a course they created that focused on developing business models; it was designed as one of five courses in a series on humanitarian engineering.

Faculty grant recipients also used the VentureWell grant to enhance existing courses or programs in I&E. More than one third (39%, n = 25) of survey respondents indicated that they used the faculty grant to strengthen an existing course in I&E, and 41% (n = 26) strengthened an existing program (Figure 1, page 6). Interviewees who enhanced existing courses highlighted the fact that the grant facilitated the creation of complementary course or program offerings and introduced additional content not previously offered through traditional liberal arts and engineering programs. For example, one interviewee used their grant to incorporate more entrepreneurship content into the traditional biomedical engineering design curriculum.

Courses created or enhanced by the grant became anchor offerings in an entrepreneurship minor, master's program, or interdisciplinary entrepreneurship center. More than one quarter (27%, n = 17) of survey respondents noted that the grant catalyzed the creation of an entrepreneurship minor or major program. As one interviewee shared, "[The grant] contributed to our ability to get the minor up and off the ground." Another interviewee described the GlobalResolve program that the VentureWell grant funded. This program started as an elective course in the engineering college and has now been institutionalized

⁵ Grant reports showed a similar pattern: 46% (n = 68) of grant reports came from the science, agriculture, and engineering disciplines, and 29% (n = 43) of grant reports came from business and entrepreneurship disciplines. Disciplines in the grant report review were categorized differently than the survey findings, resulting in engineering and entrepreneurship being bucketed with other disciplines. Subjects identified in the review of grant reports were placed into four discipline areas: science, agriculture, and engineering; business and entrepreneurship; medical sciences; and humanities and social sciences. In 29 cases, it was not possible to determine the subject of the grant work. In 34 cases, grants conducted work in more than one discipline area. Where this is the case, grant reports were coded in all relevant disciplines, and in total 184 discipline codes were applied to the grant reports.

in the honors college, with administrative staff to support implementation. Over 13 years, there have been 150 projects involving approximately 700 students, including supporting 42 students in traveling abroad.

"A substantial result of [the grant] was that a multidisciplinary team from engineering, art, design, and busines put together a proposal which was funded for the construction of [the Design Center]. ...The formulation of the Design Center wouldn't have happened without that initiative [from the grant] plus a number of other things that put different people together that seeded other kinds of collaborations. There's a fairly direct line from this project to other curriculum developments in engineering and then through to the establishment of the Design Center." -Interviewee

In addition to using the faculty grant to develop a new course/program or strengthen an existing one, **faculty grant recipients used the VentureWell grant to support additional opportunities for students.** Survey respondents noted using the grant to develop or strengthen prototyping or fabrication opportunities for students (63%, n = 40), engage outside speakers or mentors to work with students (48%, n = 31), and develop or strengthen a space for students to collaborate on I&E (30%, n = 19) (Figure 1). Six interviewees described using the grant to provide prototyping opportunities. For example, two interviewees described using the grant to create a course that linked students with the clinical setting; this provided students with the opportunity to assess real-world challenges and develop prototypes to address those challenges. One interviewee described using the grant to merge disparate groups to build an innovation hub connected to an existing makerspace, where students could work on ideas across disciplines.

Develop or strengthen prototyping and/or fabrication opportunities for students 50% Develop/implement a new course in I&E Engage outside speakers and/or mentors to work with students 48% Develop/implement a new program in I&E 44% Strengthen an existing program in I&E Strengthen an existing course in I&E Develop or strengthen a space for students to collaborate on I&E 30% Develop or strengthn events at your institution such as conferences, hack-athons, make-a-thons, or pitch competitions Enable students to participate in events outside of your institution 27% Incorporate sustainability concepts and tools Develop a new course or program that incorporates sustainability concepts 20% and tools Incorporate I&F into a specific subject matter area Other 9% Develop/implement a new workshop in I&E 8% Strengthen an existing workshop in I&E 6%

Figure 1. Did you use your faculty grant to do any of the following? Please select all that apply. (n = 63) Question from Phase 3 faculty grant recipient survey.



What kinds of impacts did the grants have on (1) faculty, (2) students, (3) higher education institutions, and (4) the broader I&E field?

The Faculty Grants Program provided grants (average grant size: \$27,565) to faculty members at an opportune time to foster interest in I&E. The grants served as a catalyst to strengthen the impact on faculty themselves as well as their institution's I&E ecosystem.

The Faculty Grants Program is intended to support faculty in developing I&E courses, programs, and opportunities. Based on the Faculty Grants Program theory of change (see Appendix),⁶ VentureWell expects the program to impact faculty, students, higher education institutions, and the broader I&E field. Specifically, by providing grants to faculty, VentureWell expects that faculty will gain knowledge and skills and develop an identity, mindset, and approach to teaching that supports I&E. These will increase faculty's ability to support students and, ultimately, take on leadership roles in the field.

If faculty experience these outcomes and build I&E-focused courses, programs, and opportunities, VentureWell anticipates that students will experience positive impacts, including development of an entrepreneurial mindset, and ultimately improved employability and increased engagement and leadership in I&E. VentureWell anticipates that higher education institutions will sustain courses, programs, and opportunities in I&E, increase collaboration, grow institutional support, and increase funding and resources for I&E. In the long term, VentureWell hopes that this work will lead to impacts on the broader I&E field, including an increased knowledge base and a culture that supports I&E.

The Vantage Evaluation team developed a graphic to describe the evaluation findings in the context of the broader Faculty Grants Program theory of change (Figure 2, next page).

⁶ VentureWell developed the Faculty Grants Program theory of change in September 2019 as a hypothesis to guide this evaluation.

Figure 2. Graphic based on the Faculty Grants Program theory of change to describe findings in context.



The major focus of this evaluation effort was to assess the extent to which the Faculty Grants Program achieved its intended impacts. The Phase 1 grant report assessment provided cursory data on the impacts in all four of these impact areas.⁷ We focused the Phase 2 interviews and Phase 3 surveys on gaining an in-depth understanding of the impacts of the grant on faculty themselves and higher education institutions, but we also captured some data on the impacts on students and the broader field.

Interviewees highlighted the timing of the faculty grant in relation to the growing interest in I&E and were pleased that the grant served as a catalyst for them to pursue development of I&E curricula. Interviewees found it difficult to differentiate between the impact of this grant, other funding opportunities, and the increasing interest in and support of I&E in the broader field (e.g., growing interest within academia, perceived growth of entrepreneurship in the business sector, and media attention on innovation in venture development). Additionally, nearly all interviewees noted that the amount of the faculty grant received was modest in the context of other funding for I&E or larger institutional gifts, making it challenging to assess the grant's direct impact. For example, one interviewee described the difficulty of distinguishing the impact of their VentureWell grant and other funding they had received. This interviewee noted that the VentureWell grant had a "smaller footprint," than other grants they received but went on to describe that the timing of the VentureWell grant was good because, when combined with other efforts, it supported a major push towards entrepreneurship.

⁷ The grant reports primarily included questions of the impact of the grant on students and the institution. Vantage Evaluation found it challenging to gain a full picture of the impact of the grants from our review of the reports, given that questions included in the grant reports changed over time and individuals completing the reports provided different levels of depth of information.



Impacts on Faculty

The Faculty Grants Program improved recipients' knowledge and skills, motivation to support I&E, sense of collaboration, and ability to support students. The grants provided credibility to their work and supported their career development.

In the Faculty Grants Program theory of change, we expect to realize impacts on faculty early on; this, in turn, facilitates impacts on higher education institutions and students. Indeed, faculty grant recipients reported experiencing many of the outcomes outlined in the theory of change.

Overall, we gained limited insight into faculty impacts from the grant reports: only 30 of 148 grant reports identified a "medium" or "high" impact on faculty (Figure 3).⁸ However, many survey respondents and interviewees reported that they gained knowledge about I&E, acquired skills to teach I&E, and/or experienced career-related benefits because of the grant.



Knowledge and Skills

Survey respondents reported a "moderate" or "large" positive impact on their technical capacity to support I&E (90%, n = 57) and their knowledge of the I&E subject matter (90%, n = 57). The faculty grant also had a positive impact on teaching methods (87%, n = 55) and research approach/focus (73%, n = 45) (Figure 4, next page). Additionally, for the grant reports that indicated a "medium" or "high" impact on faculty, the most common type of impact self-reported by recipients was a positive impact on teaching, research, and their careers (n = 17). One grantee indicated in their grant report that the grant influenced how they think about stakeholders to improve chances of commercialization, noting: "In regards to research, the grant has made a very positive influence in how we need to evaluate more stakeholders in the process of design – such as legal, IP, funding, and governmental processes in order to increase chances of commercialization."

⁸ Grant reports included few opportunities to describe impacts on faculty. Specifically, there were close-ended questions on the impact the grant had on teaching, research, and career. Responses were only counted as a "high" or "medium" impact if recipients explained these influences in an open-ended question that followed.







Another interviewee described the knowledge they gained through the grant work: "Parts of this grant were outside my direct area of expertise. ...Stretching to make that content meaningful for other people like me ... those skills and that knowledge doesn't go away. It helps every time I mentor teams or every time I embark on a new project. Rather than getting completely enthralled with the technology, thinking about how could this become an entrepreneurial exercise or how could it become a real product?"

Motivation and Sense of Connection

Survey respondents reported that the most positive impact of the faculty grant was on their motivation to promote I&E in their institution (90%, n = 57). Additionally, respondents indicated a positive impact on their inclination to incorporate I&E in other courses (81%, n = 51) (Figure 5, next page).

Results also suggest that the grant improved faculty members' sense of connection and support. For example, survey respondents indicated that the faculty grants positively impacted their participation in peer networking opportunities (81%, n = 50) (Figure 5, next page). One way recipients have felt this connection is through participation in networking events and conferences sponsored by VentureWell. Most interviewees reported benefiting from the networking opportunities among faculty grant recipients at the VentureWell OPEN conference and other workshops. One interviewee described attendance at the annual conference as

"[The grant] had an impact on me. ...I became a different person. I started thinking about things in a much broader context, whatever it might be. I became very entrepreneurial as a faculty member. I was moving in that direction anyways, but [the grant] certainly reinforced and contributed to it. By the end of my career, I proposed a minor in entrepreneurship." -Interviewee

providing "contact with my tribe. ...When I went to the conferences it was fantastic because we all had the same sort of push and we could learn from each other." A recipient shared in their grant report how the grant gave faculty the opportunity to attend networking events that allowed them to exchange ideas and improved the quality of instruction: "This course has given the faculty involved the networking opportunities needed to connect with other faculty members around the nation involved in innovation and design through the ASME I-Show, BMEidea, BMEteaching lab and the NCIIA annual conference. This has allowed the flow of new ideas to percolate and improve the quality of instruction in the course."



Ability to Support Students

Survey respondents reported a "moderate" or "large" positive impact of the faculty grant on their ability to support emerging innovations (90%, n = 57) (Figure 6).

Figure 6. To what extent did the faculty grant positively impact each of the following? Question from Phase 3 faculty grant recipient survey - response option related to faculty impacts of ability to support students.



Interviewees who felt they improved their support of students through the faculty grant viewed the support through courses and programming, not directly through their personal ability. For example, interviewees explicitly referenced improved resources for them as their means of improved support for students, including sustained courses, improved makerspaces, and other opportunities to pursue I&E, such as minors. Interview and survey data suggest that faculty are seeking additional skills to further support students through to the venture development stage after the entrepreneurship class.⁹

Leadership Roles

The faculty grant had a large impact on respondents' career satisfaction (86%, n = 54). In addition, over half of survey respondents (61%, n = 38) indicated a positive impact of the faculty grant on their career advancement (Figure 7, next page).

⁹ Refer to the Supporting Student Entrepreneurs section on page 24 for more information.



Figure 7. To what extent did the faculty grant positively impact each of the following?

The faculty grant fostered personal and professional credibility for interviewees within their institution, helping them to advance their interests in I&E, apply for additional funding, and be included in campuswide program development. Some interviewees referenced the "love of the work" as their motivation for pursuing I&E course content in their curriculum and were pleased that the grant afforded them the opportunity to pursue that path. One faculty grant recipient received the President's Professor award because of their grant work. The interviewee noted that the president described the faculty's work as having "impacted the pedagogy of the entire university and none of that would have happened if [not for] that seed money. What [VentureWell] did was planted that seed."

"Without that funding, I would argue that I probably would not have been able to do any of the things I've done since then. Just to be able to get funding for a class at the time was pretty novel. ...It opened me up to the community of VentureWell. ...I would largely attribute any of my academic success to VentureWell." -Interviewee

"[The grant] demonstrated to my institution that an instructor is capable of writing grants. [My institution] seems to only think that tenure track faculty can write grants, and not only write them, but get them because that translated into...several NSF grants now. ...In fact, I needed special dispensation to apply for the VentureWell grant because at the time lecturers weren't even allowed to apply for grants."

-Interviewee

Impacts on Students

Faculty grant recipients stated the grants had a positive impact on the career path of students and their entrepreneurial mindset.¹⁰

The theory of change hypothesizes that as faculty build I&E-focused courses, programs, and opportunities and increase their ability to support students as emerging innovators and entrepreneurs (as described in the previous sections), there will be positive impacts on students.

Many grant reports (107 of 148) reported "medium" or "high" impacts on students (Figure 8).

¹⁰ Student impacts are described from the perspective of faculty grant recipients. We did not collect any data from students as part of this evaluation effort.

Figure 8. Most faculty grant reports indicated a "medium" or "high" impact on students (n = 148). Findings from Phase 1 grant report assessment.

Low Impact	Medium Impact	High Impact
41	55	52

Specifically, recipients reported four types of impact on students in their grant reports:

They most commonly reported an increase in student **entrepreneurial mindset**¹¹ as students were exposed to activities like prototyping, developing business plans, and pitching (n = 72). For example, one recipient noted in their grant report: "The grant increased innovation and entrepreneurship through rapid prototyping, human-centered design, and resulting civic technologies built for positive social outcomes and environmental impact."

Second, recipients reported an increase in **employability and career satisfaction** as students used the experiences they had as part of the grant work to secure jobs and internships (n = 62). For example, one grant report author stated: "Several students involved in the project have used the experience to secure internships and full-time positions within the health industry."

Third, recipients reported increased **student engagement and leadership** in I&E, with students participating in activities such as conferences and competitions (n = 53). One recipient shared in their grant report: "Five E-Teams competed in a series of business plan competitions. Two of these teams advanced to a Midwest regional final competition, and one advanced to the national round. By the end of 2015, the teams had raised \$175K in follow-on funding as a result of these competitions and other exposure to industry."

Finally, a small number of recipients reported the grant increased the number of **students** exposed to entrepreneurship (n = 12).¹²

Survey respondents indicated that the courses that have been sustained beyond the initial faculty grant period reach a total of 11,893 undergraduate students (average: 264 students per course; standard deviation: 1,053; median: 40 students) and 468 graduate students (average: 20 students per course; standard deviation: 19; median: 11 students) each time they are taught.¹³

Six interviewees indicated that the grant had the greatest impact on students. The interviewees highlighted increased employment opportunities, experiential learning, and practical skill building as the key impacts on students. One interviewee reported that, "a lot of [students] have told us very explicitly they changed entirely their life plans as a result of going through the programming."

¹¹ Entrepreneurial mindset was a term frequently used in grant reports. We note that this term is defined in a variety of ways in the I&E literature.

¹² Grant reports were only counted as increasing the number of students exposed to entrepreneurship if they explicitly stated that the number of students exposed had increased. Few grant reports stated this, and more grant recipients may have increased the number of students exposed to entrepreneurship than those who reported this. ¹³ The Phase 3 grant recipient survey asked respondents to estimate the number of undergraduate and graduate students who participate in the course or program each year. The total and median numbers of students were calculated based on these estimates.

"Most of the impact I see almost universally [is that] 100% of the students are changed by this experience. ...We've had students who have gone on to do other projects. ...It's still going strong. I had several more students who joined the Peace Corps after doing this course." -Interviewee

"By the time [students] graduate they [have] worked on eight projects. ...I had one student who interviewed with GM ... and the recruiter said, 'tell me about your project,' singular. And the student said, 'which one?' His resume went from the bottom of the stack to the top of the stack. And he got the job. When you talk about this [grant] work, ...[students are] doing project work which helps them in their career." -Interviewee

Venture Development

Faculty grants provided opportunities for students to develop ventures. A majority (84%) of survey respondents (n = 43) whose course was still in operation indicated that, as part of the course or program, students create interdisciplinary teams that work to create a potential venture. Additionally, 74% (n = 109) of recipients indicated in their grant report that students participated in student or E-Teams as part of the grant.¹⁴ In total, the grant reports indicated that 2,536 student/E-Teams participated with a median of 12 teams per grant (average: 23 teams; standard deviation: 31) and that 133 of these student teams applied or intended to apply to VentureWell's E-Team program.¹⁵ Additionally, 53% (n = 78) of grant reports indicated that at least one student/E-Team established a venture or company as a result of the grant work.¹⁶

Interviewees described a few student ventures that were established through the courses or programs supported by the grant. For example, one interviewee who developed a program aimed at creating social ventures noted that many of the ventures that had been started through the program were still in existence. However, most interviewees highlighted competing paths for student's post-graduation and indicated that students were more focused on finding employment or continuing their education as opposed to assuming the risk of starting a venture right after graduation.

¹⁴ Recipients were either asked how many E-Teams or student teams participated in grant work and how many E-Teams or student teams had applied or would be applying to the VentureWell E-Team program.

¹⁵ Of 148 grant recipients, 81 were asked how many student teams applied or could be applying for the E-Teams program: 52 recipients indicated that student teams applied or could be applying. In total, these 52 recipients reported 133 teams that had applied or would be applying to the E-team program.

¹⁶ Recipients were either asked whether E-Teams or student teams had started a new venture or whether E-Teams had started a new company.

Impact on Higher Education Institutions

The Faculty Grants Program contributed to sustained courses and programs for I&E, improved collaboration, increased institutional support for I&E, and provided institutional credibility to secure additional funding.

As described in the theory of change, fostering changes among higher education institutions is an explicit focus of the Faculty Grants Program. Overall, faculty grant recipients highlighted the grant's large impact on their institution. Most grant reports (109 of 148) reported a "medium" or "high" impact on institutions (Figure 9). Over half (n = 9) of interviewees described the impact on their institution as the biggest impact of the grant.

Figure 9. Most faculty grant reports indicated a "medium" or "high" impact on institutions (n = 148). Findings from Phase 1 grant report assessment.

Low Impact	Medium Impact	High Impact
39	73	36

Strengthened or Implemented Courses, Programs, and Opportunities

The large majority of courses started with the Faculty Grants Program are still in operation. A total of 80% of survey respondents (n = 51) and most interviewees reported that this was the case. The majority of these courses or programs (84%, n = 43) were taught at the undergraduate level. The most common type of impact on higher education institutions noted in the grant reports was strengthening or implementing new courses, programs, or opportunities for students (n = 92). About half of interviewees stated that the course developed with the grant helped to inform additional, expanded versions of the course content in "next generation" courses. One interviewee shared that the most sustained contribution from the grant was that the initial course served as the template for a newer course. This interviewee described how they created an internal fund for entrepreneurship-related senior design projects. Each year, they have four to six projects and fund approximately \$20,000. This interviewee described this as an institutionalized "descendant course" from the initial grant work.

"After I had this grant, [the university] made an investment in creating a Center for Entrepreneurship that was focused on undergraduates. ...It was a sign of the times of entrepreneurship at the university level, which VentureWell clearly has had a leadership role in establishing as a really fantastic way to instill entrepreneurial instincts in a wide variety of young people. My institution was reacting to that by creating this program focused on the undergraduate." -Interviewee

Interviewees discussed two key factors that supported their institution's ability to sustain a course:

1. The first (most commonly referenced) factor was the **institutional leadership backing to designate the course as required**. When the courses were formally required as part of a degree, they were sustained and the course content was used to inform additional courses and programs focused on I&E. 2. Where the course remained an elective, the role of the **course champion**, typically a faculty member, became crucial to keeping the course going year after year, sometimes in the face of opposition from other faculty. Interviewees discussed breaks in offering the course for multiple semesters until a new faculty member could commit to teaching it. They also shared that when the faculty champion left the institution, or was promoted out of a teaching role, the elective course usually ceased to be offered.

Some interviewees discussed funding and student interest as influential pieces for sustaining courses, though less important than making the course required and having course champions. About half of the interviewees discussed challenges finding additional funding to sustain the course, and one interviewee stated that the program was no longer offered because of a lack of ongoing funding. Additionally, a few interviewees mentioned student interest as one of the reasons their courses continued in the face of resistance from other faculty and/or the institution. These interviewees noted that a way to make courses or programs "stick" is to ensure that the students want it.

Survey respondents whose courses were no longer offered (16%, n = 10) cited the following reasons the course or program was not sustained:

- Departure of lead champion on the grant (n = 5)
- Inability to secure additional funding (n = 4)
- Lack of institutional or administrative support (n = 3)
- Lack of student interest/enrollment (n = 3)
- Lack of access to adequate I&E program workspaces (n = 1)
- Faculty opposition (n = 1, listed as "Other")

Survey respondents also highlighted other opportunities that the VentureWell grant catalyzed within their institution, such as prototyping and/or fabrication facilities (47%, n = 30) and competitions (41%, n = 26) (Figure 10).

Figure 10. Apart from the work that was funded by the grant, did receiving the grant help to catalyze any of the following at your institution? Please select all that apply (n = 63). *Questionfrom Phase 3 faculty grant recipient survey.*



External Funding

Faculty grants served as a catalyst for institutions to earn additional credibility and funding for I&E. In fact, 47% of survey respondents (n = 30) indicated that they were able to leverage the VentureWell grant to secure additional funding. Collectively, these survey respondents indicated that they received over \$14,284,229 of additional funding to support their I&E work (median: \$92,500) from organizations such as the National Science Foundation, the National Institute for Health, USAID, the Bill & Melinda Gates Foundation, and numerous other private and public donors.¹⁷ Additionally, 14 of 148 grant reports mentioned additional and/or sustained science and technology (S&T) and I&E resources in their institutions as a result of the grant.

The majority (n = 11) of interviewees highlighted the role of the grant as a catalyst to secure external funding and the credibility their institutions gained through receiving the faculty grant. One mentioned that they are at a young institution, only 50 years old, and that their institution gained recognition in the I&E field because of the work the grant spurred. Several interviewees talked about much larger funding that came from the work of the Faculty Grants Program grant from funders such as the Bill & Melinda Gates Foundation, Kauffman Foundation, Women in Philanthropy, and individual donors committed to opening new

"These grants from [VentureWell] enabled us to go after other money. We also were able to get [funding] from the Gates Foundation. That wouldn't have happened unless we would have had funding from other organizations like [VentureWell]." -Interviewee

centers on campus for students to work across disciplines and on venture development. One interviewee stated that specifically because VentureWell is a national organization, the grant provided credibility when applying to other funders.

Collaboration

Faculty grants sparked changes in collaboration. Survey respondents highlighted collaboration within their institution as one of the largest positive impacts of the faculty grant on their institution (82% "moderate" or "large" positive impact, n = 52). Survey respondents (50%, n = 37) also indicated that there was a "moderate" or "large" impact on collaboration with other institutions (Figure 11). In addition, 30 of 148 grant reports stated that the grant increased collaboration within and across institutions.

Figure 11. To what extent did the faculty grant positively impact each of the following? *Question from Phase 3 faculty grant recipient survey - response options related to institutional impacts on collaboration.*



Some interviewees reported an increase in collaboration with other departments through the grant work, but others discussed the challenges of persisting silos and competition among departments for course

¹⁷ The Phase 3 faculty grant recipient survey asked respondents to provide detail on additional funding they secured as a result of their faculty grant, including total amount, date awarded, and funding source. The total and median amounts of additional funding secured were calculated based on these estimates.

loads and funding that hindered collaboration. In two cases, the grant was part of the institution's larger focus on I&E, which resulted in an interdisciplinary center for entrepreneurship where students of all disciplines can work together on design problems. Many interviewees described collaborating as part of the grant and discussed specific people with whom they worked with to develop the course or program; however, they did not report an increase in collaboration as a result of the grant. Interviewees did collaborate across disciplines to apply for the grant and co-teach courses, but the grant did not create collaboration that was not already happening. Interviewees in liberal arts colleges expressed the greatest challenges with fostering ongoing collaboration, particularly if the faculty champion for the course ceased to be involved.¹⁸

Collaboration with other institutions was challenging for interviewees due to differences among school philosophies, curriculum requirements, and competition for resources. One interviewee cited the intentional lack of collaboration between partnering universities as a factor of success in sustaining the course supported by the grant. In this instance, the interviewee intentionally excluded their partner institution in the creation of the course content and format to avoid complicating the development of the course and process for registration for students from multiple institutions.

Institutional Support, Policies, and Resources

Survey respondents reported that the faculty grant increased their institution's awareness of or commitment to support I&E philosophically (77%, n = 48) and their institution's capacity to support I&E programs through physical spaces, connection to alumni, processes to support innovators, and so forth (76%, n = 48) (Figure 12). Additionally, 33 of 148 grant reports indicated an increase in institutional support for I&E. A little over half of survey respondents (59%, n = 37) thought that the faculty grant positively impacted their institution's financial capacity to support I&E programs or courses.

"Ultimately that's where grants like these help because [they're] objective. That's external validation. ...The validation we got, the awards we won, all helped us tremendously." -Interviewee

Figure 12. To what extent did the faculty grant positively impact each of the following? Question from Phase 3 faculty grant recipient survey - response options related to institutional impacts on institutional support, policies, and resources.



The grant reports did not contain any examples of changes to institutional policy as a result of the grant, and the interviews and survey did not specifically inquire about this. However, one interviewee described

¹⁸ Refer to page 24 for more detail on the challenges faculty in liberal arts institutions experience implementing their grant or with finding institutional support and change.

the impact of the grant on institutional policies as follows: "The class motivated [leadership] to think about student IP at the university."

Impacts on the Broader I&E Field

The purpose and timing of the Faculty Grants Program contributed to the growing focus on I&E within higher education. Recipients earned media attention and produced conference presentations and peer-reviewed publications contributing to the knowledge base on I&E.

VentureWell hopes that, according to the theory of change, the faculty grants will ultimately support changes within the broader I&E field, including an increased knowledge base for effective I&E practices and a culture that supports I&E. Interviewees highlighted the growing interest in I&E within the broader field at the time of receiving the VentureWell faculty grant. They discussed institution-wide prioritization on entrepreneurship from the leadership, a perceived increase in entrepreneurial paths to career development in the business sector, and widespread media attention on innovation in small-scale startups. They noted that this generative climate around entrepreneurship was important for supporting the work of their faculty grant.

"We went from a small one-room makerspace to \$3 million 5,000 square foot makerspace. Some of the materials that came out of this [grant] and other work were used to develop the proposal to get the funding for [the makerspace]. ...The entrepreneurial leadership program has grown. They now have an entrepreneurship minor, which is the most popular minor on campus. ...[But] it's difficult at this point distinguishing what happened as a result of this grant program and other grants. This grant was not relatively large." -Interviewee

The evaluation yielded limited findings about the impact of the grant on the broader I&E field.¹⁹ The grant reports and survey primarily uncovered evidence about the outputs faculty produced to contribute to the knowledge base of I&E; however, we do not know if or how those materials have impacted the broader field.

"Medium" or "high" impact on the ecosystem was noted in 92 of 148 grant reports (Figure 13). Figure 13. Most faculty grant reports indicated a "low" or "medium" impact on the broader field (n = 148). Findings from Phase 1 grant report assessment.

Low Impact	Medium Impact	High Impact
56	76	16

This evaluation effort focused primarily on the earlier parts of the Faculty Grants Program theory of change (Figure 2): impacts on faculty, students, and higher education institutions. As a result, we know about the outputs faculty produced to contribute to the knowledge base of I&E but not how those materials might have impacted the broader field. Six of 148 grant reports specifically described

¹⁹ Impacts on the broader field were not a focus for the Phase 2 interviews or the Phase 3 survey.

increasing the knowledge base of promising practices. However, a larger number of grant reports, survey respondents, and interviewees noted specific actions that have the potential to contribute to the knowledge base, including:

- Media attention: The most common type of impact on the field self-reported by recipients in grant reports was media attention for the work undertaken as part of the grant (n = 64). One recipient shared: "Numerous articles and media have mentioned our various E-Team accomplishments in the Governors' Cup competition, entries into the Accelerators in Oklahoma City, and grants awarded."
- **Conference presentations:** Interviewees and a majority of survey respondents (63%, n = 40) developed a conference presentation based on the work they undertook during the grant. Interviewees predominantly developed conference presentations for the VentureWell OPEN conference.
- **Peer-reviewed publications:** One third (33%) of survey respondents (n = 21) developed peerreviewed publications. Ten of 148 grant reports mentioned academic publications as a result of their work. One interviewee mentioned having three papers published in peer-reviewed journals on the work done with the grant.

A few recipients reported the following impacts on the broader I&E field in their grant reports: relationships with the S&T and I&E communities outside of the university were established or maintained (n = 17); there was an increase in organizational and geographic culture that supports S&T and I&E (n = 10); and future research emerged from the work (n = 3).

What do higher education educators need to (1) advance change at their university and (2) support student entrepreneurs?

Advancing Change within Universities

Change within institutions is easier when there is institutional support, collaboration among faculty, alignment with institutional strategies and infrastructure, and financial support.

As described in the previous section, the Faculty Grants Program led to changes within higher education institutions, namely sustained I&E course and program offerings. This section examines the experiences of grant recipients as a way to learn about what it takes to advance change within academic institutions.

Facilitators of Change

In the faculty grant recipient survey and interviews, faculty highlighted factors that supported the implementation of their grant and contributed to sustaining I&E offerings. The most important facilitating factors included: institutional support and alignment with institutional goals; collaboration among faculty; and financial support. For example, when asked what would help them overcome any barriers to implementing their grant, survey respondents (n = 14 responses to an open-ended question) described the need for changes in institutional culture around I&E (e.g., improved interdisciplinary relationship between different departments, an institution-wide policy promoting I&E, and a tenure system for involvement in I&E activities) and support from institutional leadership.

Institutional Support and Alignment with Institutional Goals

Institutional support was important for faculty to successfully implement their grant. Survey respondents highlighted existing institutional I&E resources and infrastructure (e.g., makerspaces, tech transfers offices, business competitions, etc.) (73%, n = 45), professional support from leadership (72%, n = 45), and institutional objectives and strategies around I&E (e.g., alignment with institutional strategies and policies) (71%, n = 44) as supportive of their grant implementation (Figure 14).

Figure 14. To what extent did the following institutional factors inhibit or support the implementation of your grant?

Question from Phase 3 faculty grant recipient survey - response options related to institutional support and alignment

Not Sure Strongly Inhibited Somewhat Inhibited Did Not Impact Somewhat Supported Strongly Supported

Level of professional support from leadership at your institution (n = 63)

Existing institutional I&E resources and infrastructure (n = 63)

Institutional objectives and strategies around I&E (n = 59)

10%	16%	35%	37%
8%	17%	41%	32%
7%	14%	46%	25%

"Several faculty members have explicitly said they came to work at [the institution] because we ran programs like [the one funded by VentureWell], because we cared about doing good in the world, because we felt like we had some sense of ethics or responsibility for social goods, and civic engagements, et cetera. Those people in turn changed the institution. They in turn contributed to setting the direction for the institution." -Interviewee The majority of interviewees cited support from institutional leadership and alignment of the grant with institutional strategies as facilitators of systemic change within their schools. Some interviewees shared that they implemented the grant without substantial interest in I&E from their leadership, but once the grant was successful, key champions sought ways to support it. Where leadership increased focus on I&E, interviewees cited support from their dean and department head as the most helpful. Interviewees also discussed the challenges of maintaining support when turnover occurred among champions for I&E.

Collaboration among Faculty

For survey respondents, the factor that most strongly supported the implementation of their grant was collaboration with other faculty (79%, n = 49) (Figure 15).



Interviewees shared that collaboration across departments helped emphasize the interdisciplinary focus in I&E, but most lasting institutional commitment to I&E occurred with support from higher levels of leadership.

Financial Support

Sustained I&E courses and programs required ongoing financial support. Nearly half (n = 7) of interviewees mentioned that to sustain the course or program developed for the grant, they had to secure additional funding. One interviewee cited a lack of ongoing funding after the faculty grant expired as the reason that their program was not sustained. While interviewees reported the need for additional funding to support the sustainability of courses or programs, survey respondents noted that additional financial



support from within or outside of the institution did not strongly support the implementation of the grant itself (Figure 16).

Figure 16. To what extent did the following institutional factors inhibit or support the implementation of your grant? Question from Phase 3 faculty grant recipient survey - response options related to financial support.



Factors That Inhibit Change

We identified three primary factors that inhibited implementation of the grant or the ability to sustain I&E course and program offerings. Interestingly, many of these represent the "opposite" of what the facilitators noted above, for example, reflecting a lack of institutional support for I&E or a lack of collaboration among faculty.

Tenure and Promotion

For about a fifth of survey respondents (17%, n = 11), promotion and tenure committee advancement activities inhibited the implementation of their grant (Figure 17). Over half of respondents (62%, n = 39) indicated that their position within their institution supported the grant implementation, suggesting that recipients may have already had a position within their institution that allowed them to implement the grant more easily.



Most interviewees reported either having already become full tenured faculty or being on an instructor track (i.e., not a tenure track) when they received the faculty grant. Overall, interviewees and survey respondents reported that the implementation of the grant, and associated promotion of I&E across the institution, was not impacted by tenure and promotion processes. While most interviewees said the grant added credibility to their interests in I&E and led to additional work and responsibilities that might have ultimately advanced I&E in their universities, all reported that the grant work did not help faculty achieve tenure.

Lack of Faculty Buy-In

Two interviewees shared that other faculty members' resistance to entrepreneurship posed significant challenges in advancing I&E initiatives within their schools. In both cases, faculty buy-in was required to



formalize new programs. Faculty members' opposition to entrepreneurship as a discipline led to the rejection of the introduction of a new minor and of a humanitarian engineering program. Both respondents attributed these challenges to a lack of alignment with the institutional strategies that would support entrepreneurship as a discipline of study within their contexts.

Challenges Specific to Liberal Arts Institutions

Faculty from four liberal arts colleges discussed the challenges of introducing and sustaining a focus on entrepreneurship at a liberal arts institution, citing a misalignment with the philosophy of such schools. In one case, the courses and program were no longer taught due to internal conflict about the mission of the university between liberal arts and entrepreneurship. The four faculty from liberal arts programs said that it was easy to develop and teach a new course but noted that larger system change throughout the university was met with great resistance. These faculty said that although it is challenging to establish common interests across disciplines in this context, they recommended that VentureWell continue to give grants to these institutions because it was so impactful for the students.

Supporting Student Entrepreneurs

Faculty want additional resources to adequately support students and venture development.

Faculty were better able to support students with the funding provided through the Faculty Grants Program, as highlighted in the previous section on impacts of the Faculty Grants Program.²⁰ All interviewees shared their desire for VentureWell to continue the Faculty Grants Program to provide needed funding to further advance the focus on I&E education for students at their university.

"What VentureWell does well, and maybe could do more of, is making sure that faculty who have these grants know as much as they can know and learn as much as they can learn about the other people who had these grants and what they're doing. And are there lessons learned that could be leveraged across [grants]?" -Interviewee

"There are very few organizations in a space like VentureWell that do what they do, and that support educational institutions in doing not just entrepreneurship but doing socially and environmentally-oriented work. Focus on human and environmental wellbeing in a very intentional and explicit way. [VentureWell is] one of the few organizations in the space doing this in a substantial way with a lot of institutions and have a really big footprint in the higher education world of making change in the space. I want VentureWell to [organize] itself for longterm sustainability, to continue to accomplish what it is already accomplishing."

On the survey, the most frequently identified area for VentureWell to provide additional support to faculty was "support for students (e.g., mentoring, training, funding)," noted by 63% (n=40) of survey

²⁰ Refer to page 12 for more information.

respondents. Interviewees discussed needing additional assistance to build their capacity to support students in entrepreneurship and venture development. Some interviewees acknowledged that while the students are interested in I&E course content, most are not aspiring entrepreneurs. To better support the students who would like to pursue entrepreneurship and take their product to market, faculty expressed needing more knowledge about commercialization, support with promoting I&E in interdisciplinary contexts (e.g., across silos with business, liberal arts, medical settings, and engineering departments), networking (either directly with experienced faculty or in small workshop settings), and access to online resources (case studies from other faculty and curricula development support).

Appendix: Faculty Grants Program Theory of Change

DRAFT Theory of Change: Faculty Grants (2006-2016)



Given the limited "touch" of the grant (beyond funding) the outcomes in bold are most likely

Ecosystem Outcomes (broader US ecosystem)