The Effect of Internships and Professional Conferences on Student Retention and Graduation Rates

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Abstract

In this paper, the authors discuss the experiences of a National Science Foundation STEP (STEM Talent Expansion Program) award to the School of Engineering at the University of New Mexico (UNM). The setup of this STEP project is unique in the sense that it focuses its efforts and activity funding on internships and professional conference participation trips for early career engineering and computer science students. In addition to a background on the national STEP Program, the paper discusses the constructive elements of this project and the data that was collected to measure its impact.

Introduction and Background on STEP

The Science, Technology, Engineering, and Mathematics Talent Expansion Program (STEP) seeks to increase the number of students (U.S. Citizens or permanent residents) receiving associate or baccalaureate degrees in established or emerging fields within science, technology, engineering, and mathematics (STEM). The National STEP Program was funded by the National Science Foundation (NSF) for many years but has recently (2014) been archived and merged, along with two other programs, into the new Improving Undergraduate STEM Education (IUSE) Program. This increase is believed to be a direct result of improved retention and graduation rates as per the Program RFP/description. What distinguished the STEP Program from other programs funded by the NSF Directorate of Education and Human Resources (EHR) are a few collective things. First, it was a large award of up to 2 million dollars for five years. Second, the Program sought to induce permanent institutional change facilitated by this relatively large funding amount. Therefore, sustainability efforts were an important aspect of any STEP project. Third, the Program asked all projects to anticipate the actual improvements in retention and graduation rates as a result of implementation of their project. Fourth, the funding would be provided for the first three years whereas the last two year's funding would only be released after satisfactory progress towards the project in the previous years (and as certified by a NSF Panel following a third-year review process). Fifth, focus should be on early career students (freshmen and sophomores). Sixth, an internal review board/committee and an external one were important mandatory pieces of any project.

The UNM STEP Project was proposed in 2010 with the actual funding coming late in 2011. The actual start of the project in earnest was in Spring 2012. The 5-year, 2 million dollar Project involves the UNM School of Engineering (SOE) only which is composed of four engineering departments (Civil, Mechanical, Electrical and Chemical/Nuclear) and the Computer Science department. This Project revolves around the main goals of the National STEP Program and has the following main four components:

- Mentoring: About 25 mentors participate (5 faculty members nominally from each of the five departments) in 6 mentoring sessions a year—3 per semester, with some older peers involvement. Each group size varies by major/department. Last session is a talk by an expert (industrial or academic). Two of the sessions involve career development activities (resume writing, interview skills and financial aid workshops). These two sessions bring all groups from all departments together with their mentors and with food/drink.
- Internships: 75 funded internships/year during the summer (8 weeks). The internships can be off-campus at companies/agencies for practical internships or on-campus with faculty mentors for research.
- Targeted Retention Activities: 75 funded professional conference participations per year.
- Incentives: possibility to do a second internship for a sophomore after finishing a successful year with the Project as a freshman.

Every academic year, a new STEP cohort (which self-selects itself since this is not a mandatory program to participate in) starts in the Fall semester (with the exception of the first year when a cohort started in the Spring 2012 semester). By the end of the academic year, a STEP student who has completed all the mentoring sessions is eligible to participate in an internship that is paid for by the Project. Most students participating in the internships are sophomores who have started their STEP year during their first sophomore semester in their major. A large percentage of students participating in the conferences are freshmen or pre-major (i.e. not enrolled in an engineering/CS major yet).

The Principal Investigator (PI) of the UNM STEP Project is also the first author of this paper. There are a total of five PIs, one from each SOE department. There is also a full-time coordinator for the Project. The second author is the evaluator for the Project who is involved in assessment activities throughout the year. Moreover, UNM is in the unique position to be a Research I university (i.e. research-intensive) and at the same time a minority institution (MI) as well as a Hispanic-Serving Institution (HSI), one of only two such universities in the USA. Because of this fact, a goal of this program is to engage the minority and female students at UNM's SOE in the STEP project. Lastly, this particular STEP Project is different than other NSF STEP projects in its unique model which spends most of the funding on internships and conferences. In the next section, references related to UNM's STEP main components are presented.

Literature Review

The National Science Foundation reports that 56% of students who began with a major in engineering in 2004 remained in engineering after five years. This is lower than persistence in social and behavioral sciences (61%) and non-science and engineering majors (79%), but higher than some other science fields, including physical/math/computer sciences (43%) and biological/agricultural sciences (54%) (http://www.nsf.gov/statistics/seind12/c2/c2s2.htm#s3, Table 2-9). While Meyer and Marx (2014) report that the average engineering completion rate is about 57%, recent data indicates that 61% of engineering students graduated within five years (http://www.nsf.gov/statistics/seind12/c2/c2s2.htm#s3, Table 2-8).

Despite these gains, data indicate that some students are less likely to graduate. For example, women are less likely to earn a degree in engineering than males. While the rate at which women earned bachelor's degrees awarded in 2011 exceeded males (57% to 43%, respectively) in general, women were much less likely to earn a degree in engineering. Among all students who earned a bachelor's degree in engineering in 2011, just 19% were awarded to women (http://www.nsf.gov/statistics/seind14/index.cfm/chapter-2/c2s2.htm#s2, appendix table 2-17). Other groups have been identified as at risk of dropping out. For example, lower income students are less likely to earn a degree within six years compared to high-income students (Tinto, 2006). Further, minorities are disproportionately less likely to earn a bachelor's degree (http://www.nsf.gov/statistics/seind14/index.cfm/chapter-2/c2s2.htm#s2, appendix table 2-23). Recognizing the lack of diversity in the workforce, there has been a push by both the National Science Foundation and academic institutions to increase retention (and recruitment) of students from a variety of backgrounds into engineering fields.

Studies indicate that undergraduate retention is related to a variety of factors, both individual and institutional. Individual factors such as demographics (e.g., sex, income status, race/ethnicity, first-generation college student), prior academic performance/background (e.g., high school GPA, ACT/SAT scores, math and physics background), learning styles and self-efficacy can all influence persistence in earning engineering degrees (Bernold, Spurlin and Anson, 2007; Meyer and Marx, 2014; Moller-Wong et al., 1999). Institutional factors include teaching quality, faculty-student relationships, academic support services, financial support, and opportunities for professional development among other characteristics (Lau, 2003; Moller-Wong et al., 1999). Tinto argued that students who are not engaged in the institution academically and socially are more likely to drop out, and that both the individual and the institution play a role (Meyer and Marx, 2014). Further, early and strong integration into the institution has been associated with increased retention (Walden and Foor, 2008). In the sections that follow, we discuss the roles of self-efficacy, institutional integration, and career development in student retention.

Self efficacy

Self-efficacy refers to perceived self-confidence or level or competence (Raelin et al., 2014). The literature has identified a variety of types of self-efficacy, which have been measured in a variety of ways, and have found self-efficacy is strongly associated with both retention in academic institutions and careers in engineering (Marra and Bogue, 2006). The literature focuses especially on academic self-efficacy (confidence and competence to successfully complete the academic work required), and professional or job-related self-efficacy (e.g., see Cech et al, 2011; Raelin et al.

2014). Self-efficacy can bolster commitment to academic and career-related goals. Notably, Moller-Wong et al (1999) argue that commitment to personal goals is the most important determinant of persistence (p. 256).

Self-efficacy is dynamic and can be influenced by a variety of factors. For example, academic self-efficacy has been shown to be related to prior academic achievement (e.g., high school GPA and SAT/ACT scores), sex (with females typically expressing lower academic self-efficacy), and, importantly, experiences (see Raelin et al 2014). Course difficulty or failure can lower academic self-efficacy, leading to dropping out of engineering (Meyer and Marx, 2012).

Studies have found that academic self-efficacy is strongly related to retention. For example, in their longitudinal study of engineering students from four universities, Raelin et al (2014) found that academic self-efficacy along with contextual support are important to retention. The literature indicates that there are a variety of ways to improve academic self-efficacy. These include advisement, mentoring, co-ops, internships, increasing social and intellectual ties to the institution, and improving support as well as faculty-student interactions (Raelin et al, 2014; Vogt, 2008). Further, professional role confidence and work self-efficacy are related to retention (Cech et al, 2011; Raelin et al, 2014). These can be bolstered through mentorship (including discussing role expectations), professional socialization experiences and real world learning experiences (such as internships) (Cech et al, 2011; Dehing, Jochems and Baartman, 2013; Raelin et al, 2014).

Institutional integration

Tinto explains that effective retention efforts are comprised of three principles. Besides institutional commitment to students and their success, as well as educating all of its students, Tinto argues that effective retention programs develop supportive social and educational communities (Tinto, 1993: p. 147). In other words, students who are better integrated into the institution, both academically and socially, are more likely to remain at the institution and ultimately graduate. This institutional engagement is one key to student retention, especially in the first year of college.

Mentoring

Mentoring can be a key component to fostering institutional engagement. Mentoring programs have been shown to increase self-efficacy, facilitate career advancement, provide opportunities for networking, and increase both satisfaction and retention rates among other benefits (Amelink, 2008; Raelin et al, 2014; Wilson et al, 2011). Mentoring can be especially beneficial for students most at risk for dropping out, including women and other underserved populations (Amelink, 2008; Raelin et al, 2014). For example, one program that combined mentoring with research experiences and targeted academic interventions was successful in increasing retention and graduation rates among those most at risk for dropping out (Wilson et al, 2011). Conversely, lack of effective mentoring (and advising) can be a factor in dropping out (Meyer and Marx, 2014).

Mentoring programs range from very structured to informal (Tinto, 1993). While mentoring is expected to be beneficial, the extent of the impact may differ depending on a variety of factors including the genders of the parties involved, the type of mentoring, how individuals communicate, how frequently they communicate, and the cultural background of the parties involved (Amelink, 2008; Santos and Reigadas, 2005). Regardless, successful mentoring programs share some important key objectives. These include increasing the student's feelings of support, providing positive role models, and providing the student with academic and career advice with the intent of increasing retention and graduation. Positive interactions with faculty through formal or informal mentoring are expected to facilitate retention.

Other methods of increasing institutional engagement

Students who have social ties to their institution are thought to be less likely to drop out (Tinto, 1993). Besides mentoring, there are other important ways that students and institutions can strengthen student social and academic engagement. Students may engage in student organizations, on-campus or campus-related recreational events and activities, utilize campus support resources such as tutoring services, and engage in other formal or informal activities. These can all serve to increase institutional engagement. Indeed, Meyer and Marx (2014) argue that studies show students who feel "comfortable and accepted" are less likely to drop out (p. 527).

Career development through internships

As noted previously, self-efficacy is an important component of engineering student retention and graduation. Career development may be fostered through activities such as internships, cooperative education, research experiences or exposure to the professional community and can influence both academic and professional self-efficacy. Here we focus particularly on internships.

Internships are believed to be positively related to both retention and graduation, and are an opportunity for students to learn about engineering as well as work expectations and procedures. Studies indicate that engineering faculty believe internships to be a valuable tool for undergraduate engineering students (Meyer and Marx, 2014) and research indicates that retention is improved when students engage in internships or cooperative education programs (co-ops) and is related to work self-efficacy (Raelin et al., 2014). Further, co-ops and internships are related to increasing not only practical skills but also improve work self-efficacy (Linn et al., 2004; Raelin et al., 2014). Internships can be a crucial component to developing an identity as an engineer (Dehing, Jochems and Baartman, 2013).

Internships may also be helpful to students who need additional financial assistance. This can be especially significant for lower income students who are likely to work off campus. Studies indicate that students who work off campus are less likely to complete their degrees, with the risk of dropping out increasing with the number of hours worked (see Meyer and Marx, 2014 and Tyson, 2012). Due to the very structured nature of engineering programs, work can greatly interfere with successful and timely completion of the engineering degree, and increase the disconnect between students and the institution (Tyson, 2012). However, it should be noted that the pay provided through internships may not be enough to cover the need that lower-income students have (Tyson, 2012).

Results and Discussion

Throughout this project, a large number of data was collected to monitor the project's progress and as a feedback mechanism to help implement programmatic changes during its course. Specifically, both qualitative and quantitative types of data were collected. In the following, we present and discuss a select number of such data to illustrate the effect of project activities as seen formally during the evaluation process.

Before data on mentoring and internships/conferences, we present student data on gender, ethnicity, age, GPA, etc.

Major	2011-12	2012-13	2013-14	2014-15	2015-16
Chemical Engineering	14	10	27	35	24
Nuclear Engineering	10	8	5	5	9
Mechanical Engineering	14	22	24	25	44
Computer Engineering	6	2	7	8	16
Computer Science	9	12	8	36	29
Electrical Engineering	7	12	7	17	15
Civil Engineering	9	4	6	11	6
TOTAL	**69**	**70**	**84**	**137**	**143**

Table 1. UNM STEP students/participants number split by academic major.

The data in Table 1 reflects the number distribution for STEP students by major. The distribution parallels the number of student enrollees in each major (i.e. correlates with it). For example, students with large undergraduate enrollment like mechanical engineering have a relatively high STEP participation. This is not always the case as Electrical Engineering is large in undergraduate numbers but not participating highly in STEP activities. Another reason for high participation of students in a department is the strength of the push by which faculty and staff in that department is making for their students to be aware of the STEP program and take advantage of the opportunities it offers (examples are Chemical Engineering and Computer Science).

	White	Hispanic	Asian	American Indian	African American	Non-Specified
2011-12	42%	23%	9%	7%	1%	18%
2012-13	56%	24%	8%	3%	6%	3%
2013-14	50%	26%	6%	7%	4%	7%
2014-15	50%	28%	8%	7%	3%	4%
2015-16	47%	30%	13%	4%	3%	3%

Table 2. Ethnicity and race of STEP students over the years.

In Table 2, the race and ethnicity percentages reflect UNM's status as a MI and a HSI. These percentages closely parallel ones in the University at-large, i.e. about half the UG student population is white, followed second by the Hispanic student percentage.

	Age Range	Average Age	GPA Range	Average GPA	Gender
2011-12	17-44	24	2.2-4.3	3.4	M = 48 F = 21
2012-13	18-41	23	2.3-4.3	3.3	M = 53 F = 17
2013-14	18-50	23	2.1-4.2	3.5	M = 63 F = 21
2014-15	17-49	22	2.0-4.2	3.4	M = 96 F = 41
2015-16	18-45	23	2.2-4.3	3.3	M=106 F=29

Table 3. Age, GPA and Gender for STEP participants over the years.

Table 3 shows the wide range of ages and GPAs of student participants in the UNM STEP program. The reason for the wide age is UNM's share of non-traditional students. Also the young age end shows the focus of the STEP program on the early career students. With respect to the GPA range, it is noticed that it varies from the C students to the A students. This is not surprising since the National STEP Program is not an elitist program in the sense that it tries to cast as wide a net as possible and not just focus on academically talented ones like several NSF EHR programs. The ratio or percentage of female to male students is very interesting. It gets as high as 44%. The typical year-over-year percentage of female students in the UNM SOE is about 15%. This shows that this STEP and its programmatic activities are attractive to female students in larger percentage than male students.

Mentoring and Student Interaction

We begin by describing changes in perceived support from faculty and student-to-student interaction. First off, we present student survey results from the 2013-2014 academic year (an exemplary year). Specifically, in Table 4 we compare the preliminary survey (i.e. "Pre-survey") taken by STEP students at the start of the Fall semester and before starting any STEP activities. Students take the "End of semester survey" after finishing three mentoring sessions in the Fall semester. The "End of year survey" is completed after the end of six mentoring sessions and before the start of the summer internship. Eighty-four (84) students were invited to participate in the "End of year survey." Sixty-nine (69) students accessed the survey and 68 (81%) completed it. Table 4 shows the support from faculty and staff as perceived by the STEP students. During the first five STEP sessions, faculty members are supposed to engage the STEP students in a mentoring capacity helping them academically and beyond to make their transition into engineering/CS better and help connect them more with their department and major.

		STRONGLY AGREE	AGREE	DISAGREE	STRONGLY DISAGREE
I know one or more faculty members I can talk with if I have questions about my field of study[a,b,c]	Pre-survey	13%	55%	27%	5%
	End of semester survey	40%	47%	12%	2%
	End of year survey	58%	42%	0%	0%
I know at least one faculty member I can talk with if I am having problems with school[a,b,c]	Pre-survey	10%	42%	38%	10%
	End of semester survey	32%	40%	27%	2%
	End of year survey	47%	43%	8%	2%
I feel like the faculty members in my major generally want to see me succeed[b,c]	Pre-survey	32%	65%	3%	0%
	End of semester survey	38%	48%	12%	2%
	End of year survey	52%	45%	3%	0%
The administrative staff in my major department are helpful	Pre-survey	30%	58%	10%	2%
	End of semester survey	42%	48%	8%	2%
	End of year survey	40%	48%	8%	3%

Table 4. Support from faculty and staff members as perceived by the STEP students.

[a] indicates statistically significant ($p < .05$) results comparing pre-survey to end of semester survey

[b] indicates statistically significant ($p < .05$) results comparing end of semester survey to end of year survey
[c] indicates statistically significant ($p < .05$) results comparing pre-survey to end of year survey

As exemplary Table 4 shows, student perceptions of faculty and staff support generally increase over time, particularly between the pre-program survey and the end of the semester survey. Specifically, the proportion of students who indicate that they DISAGREE with each statement decreases, while the proportion that STRONGLY AGREE increases. This table indicates the general satisfaction of students with the support they feel they are receiving from faculty and staff during the STEP year. The superscripts in the first column indicate statistically significant differences ($p<0.05$) in the response percentages. From this table, the results of which generally repeat year to year, it is believed that the STEP project is performing satisfactorily in this aspect of enhancing professor-student or staff-student relationship/interaction. In accordance with the previous references (e.g. Tinto, 1993), this mentoring provided by the UNM STEP faculty members bodes well for increasing the students' satisfaction and their retention and graduation.

		NONE	ONE	TWO TO THREE	FOUR TO TEN	MORE THAN TEN
How many students do you know in your major?*	Pre-survey	12%	3%	23%	49%	13%
	End of year survey	2%	2%	8%	38%	51%
How many students from your major would you feel comfortable asking for help with coursework?*	Pre-survey	20%	12%	41%	25%	3%
	End of year survey	7%	3%	36%	39%	13%
How many students from your major do you consider your friends?*	Pre-survey	34%	10%	39%	16%	0%
	End of year survey	10%	7%	51%	23%	10%
How many students from your major would you be comfortable talking to about any problems you were having at school?*	Pre-survey	41%	10%	36%	12%	2%
	End of year survey	15%	12%	53%	13%	7%

Table 5. Interaction between STEP students.

Another goal of the UNM STEP Project is to increase the interaction of students with their peers (see the discussion on social integration in the **Literature Review** section). This is performed primarily through the group settings provided in this Project. Table 5 indicates improved connections between students from the Pre-Survey to the End of the year survey as measured by the number of students the participants know and level of engagement with fellow students. All changes were statistically significant ($p \leq .05$). According to Meyer and Marx (2014), the data in Table 5 should have the STEP students less likely to drop out as it indicates they are feeling (at least from a peer's perspective) more comfortable and accepted due to their participation in the STEP Project.

Retention and Graduation Rates

We assessed retention and graduation rates of STEP students relative to the following comparison groups: SOE students from the same cohort years as the STEP students but did who not participate in the STEP Project for one reason or another. The STEP cohorts are labeled in the following tables as 2011 (standing for the 2011-2012 year); the same labeling applies to the comparison group. Data for the 2012-2013 year and beyond is not included as it is still developing.

In Table 6, it is seen that a higher percentage of students, albeit not statistically significant, have switched majors in the comparison group compared to the participant group. Students in the comparison group are leaving Engineering at rates that exceed those who participate in the STEP program. Compare this excellent retention rate with that 56% reported by NSF earlier in the **Literature Review**!

Cohort	Changed within 5 semesters	Changed within 8 semesters
2011 participants (69)	1% (1)	6% (4)
2011 comparison (92)	6% (6)	12% (11)

Table 6. Percentages and number of students who have changed majors from their current SOE major to something else within 5 and 8 semesters.

In addition to students who are in STEP proper, the STEP Project has also offered professional conference opportunities to pre-majors/pre-engineering students. With respect to the effect of professional conference participation trips on retention, a total of 46 pre-engineering/pre-major students attended conferences in 2012-13 and 2013-14. The first group attended a conference was in Fall 2012. Of those 46 students, 38 (83%) have stayed in the School of Engineering in the Fall semester after. Also, 14 such students participated in conferences in 2014-2015, and 13 students stayed on (i.e. 93%). This is contrasted to a 52% rate official figure by the SOE in the year 2010.

With respect to graduation data, please refer to Table 7. STEP students are graduating at a faster rate than non-STEP students. This could be related to GPA differences, as can be seen later, as well as Table 8 data. As a reminder, improving graduation rates is one of two important goals for the national STEP program, along with improving retention. This data favorably supports this graduation rate goal. By next year, data for the 2012-2013 year should be available.

The follow up period for measuring graduation is quite short, thus, we also examined two intermediate measures for assessing likelihood of graduation: the ratio of earned credit hours to attempted credit hours (see Table 8) and pre/post-program GPA (Table 9). Table 8 shows that although the STEP students have started with a lower ratio than the non-STEP students, they have picked up course completion and improved over the semesters. The same cannot be said about the non-STEP students who seem to regress with semesters passing. Note that ideally this ratio is a perfect 1.00 indicating complete success in taking credit hours.

Cohort	Graduated within 2 semesters	Graduated within 5 semesters	Graduated within 8 semesters	Graduated within 10 semesters
2011 participants (69)	0	7% (5)	72% (50)	88% (61)
2011 comparison (92)	0	9% (8)	53% (49)	75% (69)

Table 7. Graduation data for STEP students and the comparison group.

Cohort	Pre-program credit ratio	Post-program credit ratio (up to 2 semesters)	Post-program credit ratio (up to 5 semesters)	Post-program credit ratio (up to 8 semesters)	Post-program credit ratio (up to 10 semesters)
2011 participants	.884	.920	.924	.925	.922
2011 comparison	.893	.870	.880	.877	.874

Table 8. The ratio of mean earned credit hours to the attempted credit hours of the comparison and participant groups pre-program (i.e. before the start semester of the year in consideration) compared to up to ten semesters post program (or post hypothetical program for the comparison groups).

Lastly, an indirect metric for retention and graduation rate/achievement is pre/post-program GPA.

GPA data is presented in Table 9 below. The table shows a typical trend for SOE students: they start their SOE program/major at a higher GPA that initially decreases over time as course difficulty increases but then later on increases as students are more used to their majors. Students who participate in the STEP program have a higher average GPA than their cohort peers who do not participate. This is true both prior to program participation (3.37 as compared to 3.25) and after participation begins. This suggests that students who participate in STEP may be "stronger" students academically, and conversely that those who are eligible but choose not to participate in STEP do not perform as well in their courses relatively speaking.

Cohort	Pre-program GPA	Post-program GPA (up to 2 semesters)	Post-program GPA (up to 5 semesters)	Post-program GPA (up to 8 semesters)	Post-program GPA (up to 10 semesters)
2011 participants	3.37	3.34	3.35	3.38	3.37
2011 comparison	3.25	3.16	3.22	3.24	3.25

Table 9. GPA data for participants and the two other groups.

While the descriptive statistics presented above regarding GPA and the ratio of earned to attempted credits suggest that there are some differences between STEP participants and those in the cohort comparison group, it is unclear whether those differences are due to program participation or differences in the students themselves. That is, as noted previously, students who participate in STEP may be "stronger" students to begin with, and participation in STEP may not increase graduation and retention. Thus, the evaluator completed a series of multivariate regressions to assess whether participation in STEP had an effect independent of other variables that are likely to impact graduation and retention or their intermediate measures. In this section, we present the results of two of those analyses.

To determine whether the program has an independent effect on GPA after the program begins, the evaluator completed a multivariate regression, controlling for variables that are thought to be predictive of post-program GPA. As would be expected, pre-program GPA was the strongest predictor of post-program GPA. Other statistically significant variables include age (older students had a lower GPA) and whether the student was a first-generation college student (student who were first generation college students had a lower post-program GPA). The results also indicate that program participation is marginally related ($p=.06$) to post-program GPA (up to four semesters) once other variables are accounted for. This indicates that the program may have some effect on post-program GPA. These results are displayed in Table 10 below. The first column shows the unstandardized regression coefficients, the second is the standard error and the third is the standardized beta coefficient.

Post-program GPA Regression results	B	Std. error	B
Participant*	.109	.060	.091
Age***	-.014	.005	-.137
Female	.016	.072	.011
Minority	-.055	.059	-.046
First generation college student**	-.164	.076	-.110
Amount of initial financial aid	-.00001	.000	.063
Pre-program GPA****	.800	.075	.528
Constant	.969	.305	---
R^2=.363			

Table 10. Multivariate analysis of factors affecting the GPA of student participants.
*p<u><</u>.10 ** p<u><</u>.05 *** p<u><</u>.01 ****p<u><</u>.001

Next, the evaluator assessed the impact of the program on post-program credit attainment (up to four semesters). Summarized in Table 11 below are the results of a multivariate regression measuring the post-program earned to attempted credits among students in the 2011 and 2012 cohorts. Variables that were significantly related to post-program credit attainment were age and pre-program GPA. Older students were significantly more likely to have lower credit attainment while students with higher GPAs had higher credit attainment. The addition of the participant variable which differentiates between STEP and non-STEP students was statistically significant. The significant (p<.01) positive coefficient indicates that STEP students have a higher percentage of earned to attempted credits, even once other variables such as pre-program GPA and age are accounted for. Further, the relationship between the participant variable and post-program credit completion was the strongest among the variables in the model, suggesting that participation in STEP is associated with improved course completion. It is important to note, though, that approximately 12% of the variance in the dependent variable is accounted for in this model indicating that there are important predictor variables that are not included here. However, due to the strong relationship between program participation and earned to attempted credits, we would expect that this finding would hold.

Post-program earned to attempted credits Regression results	B	Std. error	β
Participant***	5.322	1.965	.160
Age**	-.410	.170	-.153
Female	-1.285	2.354	-.032
Minority	.449	1.915	.014
First generation college student	2.627	2.453	.064
Amount of initial financial aid	.000	.000	-.079
Pre-program GPA**	5.762	2.456	.132
Percent pre-program earned/attempted credits*	.364	.189	.123
Constant	43.919	21.891	
R^2=.117			

Table 11. Multiple regression results for post-program completion of earned to attempted credits among STEP cohort

*p≤.10 ** p≤.05 *** p≤.01 ****p≤.001

Each year the STEP students who participate in a STEP-funded internship are asked to complete a survey about their experiences. In the table below, we present the results from some of the questions the students are asked; the data includes all three cohorts that have completed the internships to date. The first several questions indicate the level of satisfaction with the internship. Students are generally very satisfied with their internships in many ways including the overall experience, how much they learned, whether it was meaningful and the level of responsibility they were given, among other factors.

Importantly, the results suggest that students are more confident about their academic and career goals. This suggests that the opportunity to participate in the internship may have increased their self-efficacy in these areas. This is important as others have found that self-efficacy is an important component of retention and graduation.

Agreed or strongly agreed that:	**All 2012 students (N=37 unless otherwise specified)**	**All 2013 students (N=31 unless otherwise specified)**	**All 2014 students (N=37)**	**All 2015 students (N=45 unless otherwise specified)**
I had a positive experience	94%	100%	100%	98%
I learned a lot from my internship	91%	97%	97%	96%
The level of responsibility was compatible with my abilities	88%	97%	95%	98%
I was assigned meaningful tasks in my internship	84%	97%	92%	96%
I received adequate training to complete the tasks assigned during my internship	91%	90%	95%	89%
The internship was relevant to my skills	81%	93%	97%	91% (N=44)
The internship was relevant to my interests	91%	90% (N=30)	86%	89%
I attained skills that I can use in my future career	88%	100%	100%	93%
I attained knowledge that I can use in my future career	87% (N=31)	100%	100%	96%
I am now more confident in my choice of a major	88%	100%	92%	93%
As a result of this internship, I am more likely to pursue an advanced degree	63%	87%	89%	80%
I am more certain I wish to pursue a career in this field after the internship	78%	87%	84%	87%

I learned what is expected from professionals in my field	80%	97%	95%	96%

Table 12. Internship experiences

Conclusions and Future Work

Overall, these results suggest that students who participate in the STEP program are on track to performing better than their peers who do not participate in STEP. One reason could be that the students who participate in STEP may be stronger students from the outset. For example, STEP students have significantly higher GPAs than their cohort peers. They are not different in terms of age, ethnicity or whether they are a first-generation college student. However, they are more likely to be female (which is considered a more at-risk group among Engineering majors). Further, once key predictor variables are controlled for in the multivariate equations, participation in STEP is still a significant predictor of positive outcomes (higher post-program GPA and higher percentage of earned to attempted credits). Moreover, when we limit the sample to students whose GPA is below average, we find that STEP students perform better than non-STEP students, both in bivariate and multivariate models (data not shown here for brevity). Lastly, STEP students appear less likely to leave Engineering compared to their cohort peers as well as more likely to graduate faster.

Future considerations and work are the following. First, it is better for the examination of credit hours to focus on the hours that count in the major as opposed to non-major hours. Second, as we go forward in time, we will be working on more data collection for more cohorts and for a longer follow-up period of all cohorts. Third and last, as total sample size grows in the future it will enable us to study sub-samples (e.g. minority status vs. none, gender differences, GPA differences, first generation vs. none) and how that impacts retention amongst participation.

With respect to the status of this program after the NSF funding runs out end of June 2017, the UNM STEP Program has spurred several other internship programs in the UNM SOE. The coordinator for the STEP Program now coordinates all such programs and the PI for the STEP Program oversees such programs. The University has further committed some long-term resources for it. Furthermore, a couple of endowments have been established at the University to help continue student support activities involved in this Program. It is hoped that the sum of all of these developments will help support the Program activities for the long haul.

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