

Columbus Region Academy of Future Teachers of STEM (CRAFT-STEM)

**The Robert Noyce Teacher Scholarship Program at Columbus State
University**

Evaluation Report

Year 2 (2012-2013)

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Introduction

The Columbus Region Academy of Future Teachers of Science, Technology, Engineering, and Mathematics (CRAFT-STEM) is designed to attract more students into the STEM teaching profession. The program, which is supported by funds from the National Science Foundation's Robert Noyce Teacher Scholarship Program, provides **paid summer internships** for freshman and sophomores to recruit them into STEM education and **Noyce scholarships** for juniors and seniors in STEM-related secondary education fields or post-baccalaureate students seeking teaching certification in STEM. The program also supports a **teaching connections seminar** which encourages pre-service teachers to explore connections between coursework in their major and topics they expect to teach in the future and **summer STEM honors camp** for high school students, which provides opportunities for the interns to work with high school students.

The **summer internships** are designed to engage current CSU students into stimulating STEM-related activities and given them an opportunity to interact with talented high school students during the summer STEM honors camp. Interns receive a stipend for their participation in the ten weeks in the summer internship. As part of the internship, the interns participate in the STEM Honors Camp and in other activities, such as service-learning opportunities, working with scientists and mathematicians at CSU on research projects, tutoring students, and assisting with CSU Centers for Excellence events. The project team awarded 6 internships in year one and plans to offer at least six internships each year (one for each STEM-related education program - biology, chemistry, computer science, earth and space science, and mathematics) for the rest of the project. The project team plans to award a total of 47 internships over the five-year project.

The **Noyce scholarships** are designed to encourage highly talented students to enter the teaching profession. A select group of students who commit to taking part in CRAFT-STEM activities while enrolled at CSU and to teaching in a school located in a high needs district for at least two years after they graduate will receive a scholarship to help cover the current cost of tuition, on-campus housing, board, and textbooks. The scholarships are structured as forgivable loans; whereas students are entitled to have 100% of the loan cancelled if they fulfill their teaching obligations. The project team awarded 6 scholarships in year one and plans to gradually increase the number of scholarships awarded in the following years. The project team plans to award a total of 49 scholarships during the five-year project.

The **teaching connections seminar** is designed to provide additional support for preservice teachers as they learn how to teach. The intent of the seminar is to help pre-service teachers explore connections between coursework and the major topics they expect to teach in high schools. Preservice teachers will be required to create presentations that highlight these connections and the preservice teachers who make the best presentations receive invitations to present at the summer STEM honors camps.

The **summer STEM honors camp** serves as a recruiting tool. The intent of the camp is to encourage high school students to go into STEM fields and to spark undergraduate's interest in STEM teaching. The camp is two weeks in duration and provides several opportunities for high school juniors and seniors, university freshmen and sophomores, and university personnel to engage in inquiries that nurture and develop interest in STEM areas and potential STEM related

careers. The camp's culminating experience is a student colloquium. During the colloquium, the high school students teach each other about the inquiries they conducted earlier during the camp.

Given these key components of the project, the primary goals of CRAFT-STEM are to:

1. Recruit high school students, military dependents and retirees to the university through social media, mailings, recruiting visits, and summer camp experiences;
2. Encourage CSU students to consider STEM education programs through special events, service-learning opportunities, and peer-instruction experiences;
3. Provide at least 6 paid summer internships per year for freshman and sophomores at CSU in order to draw them into stimulating STEM activities and involve them in peer instruction experiences;
4. Provide at least 5 scholarships for pre-service STEM teachers per year to encourage more students to become a STEM teacher;
5. Provide a teaching connections seminar for future STEM teachers;
6. Provide a STEM honors camp that encourages high school students to enter STEM fields and provides opportunities for interns to interact with high school students;
7. Disseminate project results using professional email lists, a project website, conference presentations, and publications; and
8. Quadruple the number of students graduating in a STEM discipline with a secondary teaching certification each year at Columbus State University within the next five years.

As part of the requirements of the Noyce Grant, Columbus State University has contracted with Victor Sampson, Ph.D. to conduct an external evaluation of CRAFT-STEM. This report, which has been written by Victor Sampson, provides a brief summary of the year two activities associated with the project and answers to a set of evaluation questions. This evaluation is intended to be formative in nature. As such, it will include recommendations for improvement. A summative evaluation will be provided at the end of the project.

The Evaluation

The main objectives of the external evaluation of CRAFT-STEM are to:

1. Assess whether the project is making satisfactory progress towards its goals;
2. Assess the overall quality of the materials and activities associated with the project;
3. Recommend reasonable and evidence-based adjustments to project plans; and,
4. Attest to the integrity of any project outcomes.

This evaluation of CRAFT-STEM was based on a systematic review of materials supplied by the project leadership team. The materials reviewed included publicity materials, recruitment materials, web pages, artifacts created by participants during activities associated with CRAFT-STEM, a survey completed by camp participants, and other documents. The project materials were shared with the external evaluator on 7/2/2013. The evaluation is also based on the results of an electronic survey that sent to the Noyce scholars at the end of the academic year and a site visit that took place on 6/13/2013. The site visit included a meeting with the project leadership team, interviews with current Noyce Scholars and Interns, and observations of various activities associated with the STEM honors camp. The external evaluator used the site visit to not only monitor project process but to also reinforce the formative evaluation feedback loop between the external evaluator and the project team.

Given the goals for the Noyce program outlined above and the nature of this evaluation, the following questions were used to guide the evaluation process:

1. Are the materials and the activities associated with the project of high quality and being completed on time?
2. Is the project team using appropriate criteria to award internships and scholarships to CSU students?
3. What perceptions do the campers, interns, and scholars have about CRAFT-STEM?
4. To what extent did the modifications made to the project in year two correct the challenges or problems that were identified in year one?
5. To what extent have the activities associated with CRAFT-STEM been effective in encouraging more individuals to enter the STEM teaching profession and preparing preservice teachers to teach in a high-needs school district?
6. What challenges did the project leadership team face in year two and how do they plan to address these challenges?
7. At this rate of progress, will the project team meet all their goals by the end of the project period?

Due to the nature of the grant and the amount of time since the project started, there is no data available that can be used to determine how well prepared the Noyce Scholars are to teach in a high needs setting at this time. Therefore, questions related to the impact of the program on teacher retention or the influence of the program on teacher effectiveness will not be the focus of this evaluation. These issues will be addressed in a future report.

Summary of Project Activities

This section provides a summary of the project activities carried out by the leadership team during year two. The activities are organized around the main goals of the project.

Recruitment of high school students, military dependents and retirees to CSU

The project team completed the following activities during year two:

- Updated the project website and made it easier to find (see http://uteach.columbusstate.edu/stem/noyce_scholarship.php);
- Increased their use of social media (see www.facebook.com/UTeachColumbus);
- Distributed fliers, brochures, and bookmarks about the UTeach Columbus program and CRAFT-STEM during high school visits and college fairs;
- Held two sessions of recruiter/orientation leader trainings;
- Met with the CSU liaison to Fort Benning
- Face-to-face meeting with leadership at Fort Benning to discuss recruitment;
- Distributed summer camp flyers and brochures at the NSTA regional conference and the Future Educators conference;
- Hosted a table at several high school visitations day at CSU and at the Georgia Perimeter College Transfer Fair;
- Attended the Taste of Tech at Luella High School and Henry County High School;
- Gave a presentation at Mastering CSU breakfast;
- Emailed over 100 High Schools in Georgia with high minority enrollments to encourage participation in the STEM honors camp;
- Presented a session about UTeach at the NeXTGen STEM conference;
- Hosted a table at CSU Discovery Day Fair; and,
- Held the STEM Honors Camp for high school students;

Although it is not possible to determine if any of one of these recruitment activities resulted in a student enrolling at CSU, at least five students chose to attend CSU after attending one or more of the recruitment activities. One of these students attended the 2012 STEM honors camp and two had conversations with a member of the project leadership team. In addition, freshman enrollment in the STEM education programs at CSU has increased since UTeach and CRAFT-STEM started in 2011 (see Table 1).

Table 1. Freshman enrollment in STEM education 2010-2012

Program	Freshman Enrollment		
	Fall 2010	Fall 2011	Fall 2012
Biology and Secondary Education	1	5	7
Chemistry and Secondary Education	0	1	2
Earth/Space Science Secondary Education Track	0	1	1
Math and Secondary Education	8	7	15
Total:	9	14	25

Recruitment of Potential STEM Educators at CSU

The project team completed the following activities during year two:

- An ongoing peer instruction leader program used to recruit CSU students into teaching;
- Hosted tables at various events such as the CSU freshman orientations, Georgia Perimeter College Transfer Fair, and the Jim Blanchard Leadership Forum;
- Hosted a recognition ceremony (Celebrate STEM) for Noyce interns, Noyce scholars, and UTeach interns;
- Sent recruitment e-mails to academic advisors in STEM fields to inform them about Noyce internship and scholarship opportunities;
- Sent recruitment emails to freshman and sophomore STEM majors to solicit applications for 2013 Noyce summer internships;
- Sent recruitment emails to current Noyce scholars and advisees to solicit applications for 2013-2014 scholarship applications;
- Sent recruitment emails to students in “professional” STEM tracks to encourage them to add a teaching credential and to promote the Noyce scholarships;
- UTeach interns and faculty made numerous class visits to recruit for the UTeach Step 1 course (Fall and Spring semesters);
- Posted flyers on campus, distributed internship flyers to STEM departments and placed an internship ad in the CSU student newspaper;
- Shared information about the Noyce internships and scholarships at WeTeach meetings (Fall and Spring semesters);
- Presented a session about the UTeach at the NeXTGen STEM conference; and,
- Encouraged Noyce interns to pursue a career in teaching during the STEM Honors Camp.

Although it is not possible to determine if any of one of these recruitment activities resulted in a student entering a STEM education program, at least 8 students joined UTeach-Columbus after attending one or more of the recruitment activities. One of these students was a Noyce Intern, two were involved in the STEM honors camp without being an intern, and the remaining were recruited by faculty through academic advising or through classroom interactions. In addition, two of these students have been awarded Noyce scholarships for the 2013-2014 academic year.

Internships

The Noyce summer internships are awarded to freshmen and sophomores. Based on discussions with the PI and the provided documentation, 11 students applied for a 2013 Noyce internship. Three of the applicants did not meet eligibility requirements. Of the eight eligible applicants, seven were awarded an internship. All seven of these students participated in the summer 2013 STEM honors camp; these interns are still in the process of completing their assignments and a report of their activities was not available at the time this review was conducted. However, we now have a completed summary of 2012 intern activities. Besides supporting the STEM Honors Camp, the 2012 interns also participated in other activities. These activities included supervised

research, the development of science lessons for the home school lab program, tutoring, peer instruction in college algebra classes, and program development at the Coca Cola Space Science Center.

Scholarships

Noyce scholarships are awarded to full-time juniors and seniors majoring in STEM fields pursuing teaching certification or post-baccalaureate students pursuing teaching certification. Based on discussions with the PI and provided documentation, 10 individuals applied for a Noyce scholarship in year two. As of June 2013, 6 scholarships have been awarded. The application deadline has been extended to July 22nd in order to allow more time for individuals to complete their applications. The project leadership team hopes to award 1-3 more scholarships for the 2013-2014 academic year.

Teaching Connections Seminar for Future Stem Teachers

The teaching connections seminar was held on ten different occasions during the 2012-2013 academic year. Each seminar had a different topic focus. These topics included:

- Beginning of the Year Getting Acquainted-Social Gathering;
- Math and Science Standards;
- Content Knowledge for Teachers: Concept Maps;
- Sharing Concepts Maps, Math and Science Connections;
- Noyce Scholars sharing about NSTA experience;
- Presentations from Noyce scholars on selected math or science standard;
- Teaching in High-Needs schools;
- Teaching in High-Needs schools: Teacher Panel;
- Race-to-the-Top and Teacher/School Accountability; and
- End of the Year Celebration-Social Gathering.

The Summer STEM Honors Camp

The summer STEM honors camp took place June 2nd through June 14th, 2013. A total of 54 high school students applied to participate in the camp. Of the eligible applicants, 29 students were invited to participate in the camp. A total of 23 students elected to participate (six students did not attend after being invited). The participants at the camp were diverse (52% female, 78% seniors, 43% minority) and all had high GPAs and PSAT, SAT, or ACT scores. The participants were given an opportunity to work with university faculty on actual research projects, learn about career opportunities in STEM fields, and go on field trips related to STEM or STEM-related careers. The students also learned about the UTeach-Columbus program during a formal presentation and were given a campus tour by the university recruitment staff familiar with the UTeach program. At the end of the camp, the students taught each other about what they learned through their research project.

Dissemination

The project team has done a great deal in order to publicize CRAFT-STEM on and off campus. In year two, the project team gave 6 presentations at professional meetings (both at the regional and national level) to share details about the project and to disseminate what they have learned about the recruitment and preparation of future STEM educators. The project team expects to continue its presentations at the Georgia Scholarship of STEM Teaching and Learning meetings and Noyce PI conferences. In addition, the project team anticipates publishing their assessment results from the STEM Honors Camp in a refereed journal, as well as presenting those findings at regional and national meetings.

Students graduating in a STEM discipline with a secondary teaching certification

CSU graduated five individuals with a secondary teaching certificate in a STEM discipline (1 in Biology, 1 in Chemistry, 1 in Earth and Space Science, and 2 in Mathematics) in 2012-2013. This is an increase of two students from the 2011-2012 academic year.

Modifications Made to Project Activities

This section provides a summary of the modifications made by the project leadership during year two. The descriptions of the modifications are organized around the main project activities.

Recruitment

Modifications to the original recruiting plan in year two included:

1. Greater focus on emailing prospective transfer students and informing them of the Noyce scholarship program;
2. Less off campus visits due to time constraints; and,
3. Soliciting internship and scholarship applications at meetings of WeTeach, the CSU student organization for UTeach program students, which includes Step 1 and Step 2 students still being recruited to the program.

STEM Honors Camp

Modifications to STEM Honors camp in year two included:

1. Added presentations about UTeach-Columbus and CRAFT-STEM in order to encourage more students to pursue a STEM teaching career;
2. Added "College 101" sessions to the programming. Camp interns told campers what they think they should know about college and answered campers' questions; and,
3. Gave the Noyce interns more opportunities to engage in activities related to STEM teaching, such as serving as support staff for Oxbow summer camps, developing exhibits and lessons for the Coca Cola Space Science Center, tutoring

in the Math and Science Learning Center, and offering peer instruction in a college algebra course.

Noyce Intern Selection Process

The project leadership team did not make any revisions to the criteria used to select Noyce interns in year two. The application deadline for the 2013 summer internships, however, was moved to November 30th in order to provide the time needed to conduct interviews with the applicants. The interviews were added to application process in order to help the project team determine if an applicant is interested in teaching or just interested in the the internship as a way to make extra money or to build their resume.

The project leadership team plans to modify the selection criteria in year three in order to offer an internship to a 2014 high school graduate. The project team will require the recipient to commit to attend CSU in the Fall of 2014 as a condition of the internship. This modification is designed to provide an added recruitment incentive. The project leadership team is also considering a revision to the SAT/ACT score requirement for interns. Some students at CSU have low SAT/ACT scores but have a high gpa after their freshman year. These students are currently ineligible for an internship even though they perform well in college-level courses. The project team, therefore, wants to be able to offer these individuals internships as a way to recruit these individuals into STEM teaching.

Noyce Scholar Selection Process

After selecting 2012-2013 scholarship recipients, two revisions were made for scholarship requirements and selection criteria. The first was dropping the requirement of a minimum SAT/ACT score. The project leadership team believes that the SAT/ACT scores should only be used to determine eligibility for an internship when other, more relevant indicators of college success (such as college gpa, courses completed, and faculty recommendations) are not available because the SAT/ACT is designed to predict likelihood of success in college not actual success. Therefore, the use of SAT/ACT scores to determine eligibility for a Noyce Scholarship, from the project leadership team's perspective, was not informative. The use of the SAT/ACT scores as an eligibility requirement was also an unneeded restriction that limited the pool of applicants because it prevented talented students with high gpas but low SAT/ACT scores from applying for a scholarship. The project team also decided to lower the minimum gpa from 3.3 to 3.1 in order to increase the number of students at CSU that are eligible for the scholarship.

Teaching Connections Seminar

This was the first year the Teaching Connections seminar was offered so no modifications were made. The most significant challenge faced by the project leadership team, however, was scheduling a meeting time for the seminar. It was not possible to find a regular meeting time that worked for all six Noyce scholars during the 2012-2013 academic year.

Conclusions

This section provides an answer to each evaluation question. The answers are based on materials provided by the project team, observations made during site-visits, interviews with Noyce interns and scholars, and survey results.

Are the materials and the activities associated with the project being completed on time and are they of high quality?

The project leadership team has completed all major milestones for year two. The recruitment materials (e.g., flyers, websites, brochures) are informative and of high quality. The increased use of social media is exciting and it seems to be excellent way to increase the visibility of UTeach-Columbus and CRAFT-STEM. The STEM honors camp, which is designed to serve as a recruitment tool by encouraging high school students to major in STEM at CSU and by sparking undergraduates' interest in STEM teaching, was very well done. The internships were a great experience for the freshman and sophomores. The internships also appear to be sparking increased interest in the teaching profession. The Noyce scholars are talented and committed to teaching in high-needs schools. The scholars found the topics presented during the Teaching Connections Seminar to be relevant and informative. The scholars viewed the mentorship and the opportunities to interact with teachers who work at high-needs schools as the most beneficial components of the program. The project leadership team should be commended for the quality of their work. CRAFT-STEM is extremely well managed and an excellent program.

Is the project team using appropriate criteria to award internships and scholarships to CSU students?

The CRAFT-STEM program at CSU, as discussed earlier, provides scholarships to talented, full-time juniors and seniors majoring in STEM fields pursuing teaching certification and post-baccalaureate students pursuing teaching certification. The internships are awarded to freshmen and sophomores as a way to help recruit them into STEM teaching. The scholarships are awarded to full-time juniors and seniors majoring in STEM fields pursuing teaching certification or post-baccalaureate students pursuing teaching certification.

Based on discussions with the PI and provided documentation, eleven students applied for a 2013 Noyce internship in year two of the project. Three of the applicants did not meet eligibility requirements. Of the eight eligible applicants, seven were awarded an internship. Two of the interns had completed more than 60 semester hours of credit but would need at least 2 more years to complete secondary certification, if recruited. Their internships were awarded with the permission of the program officer. Ten individuals applied for a Noyce scholarship in year two. As of June 2013, 6 scholarships have been awarded. Except as has been noted, All of the internships and scholarships were awarded to individuals that met the minimum eligibility requirements. The characteristics of these individuals also fit with the established selection criteria. The project team is therefore using the eligibility requirements and following the selection criteria that they have established to award the internships and the scholarships.

The project team should also be commended for continuing to revise the minimum eligibility requirements and the selection criteria they are using to award the internships and scholarships in

an effort to increase the size of the application pool. If the internships and the scholarships are to function as a recruitment tool, it is important to find ways to increase student access to these financial incentives rather than restrict it. The modifications made to the eligibility requirements and selection criteria should increase the number of students who are eligible for an internship or a scholarship, and as a result, make them better recruitment tools.

What perceptions do the high school students, interns, and scholars have about CRAFT-STEM?

At the end of the 2013 STEM Honors camp, the 23 campers completed a *Student Assessment of Learning Gains* (SALG) survey. The survey was designed to measure the students’ perceptions of what they learned during the camp and their perceptions about which aspects of the camp contributed to their learning. The results of the survey are provided in Table 2 and 3.

The campers, overall, thought that they learned a great deal at the camp. There was a 66% moderate or large gain response rate on the understanding of scientific inquiry items (see Table 2). This result indicates that the campers felt that their understanding of scientific inquiry (such as the role of questions, the role of mathematics, and importance of evidence) improved during the camp. There was also a 71% moderate or large gain response rate on the understanding of scientific inquiry items (see Table 2). This result suggests that the campers felt that their scientific inquiry skills (such as designing and conducting investigations, using evidence, and using mathematics) improved during the camp. Finally, and perhaps most importantly, there was an 84% moderate or large gain response rate on the attitude towards science items (see Table 2). This finding suggests that the various features of the camp had a positive impact on the campers’ attitudes towards STEM (such as a desire to take more STEM classes or pursue a degree in STEM). This finding is rather important given the overall goal for the camp.

Table 2. Perceived learning gain response rate

Perceived gains	Percentage of Responses			
	No Gain	Small Gain	Moderate Gain	Large Gain
Understanding of scientific inquiry	6%	27%	39%	27%
Scientific inquiry skills	1%	28%	45%	26%
Attitudes towards science	5%	11%	27%	57%

The campers, overall, thought that all the various features of the camp contributed to their learning. There was an 87% moderate or large gain response rate on the aspect of the camp items (see Table 2). This result indicates that the various aspects of the camp, such as the field trips and research projects, were meaningful to the campers. There was also a 66% moderate or large gain response rate to items that targeted the various camp activities items (see Table 2). This result indicates that campers felt that they learned a great deal from the speakers and other events that took place during the camp. Finally, there was an 82% moderate or large gain response rate on the interaction items (see Table 2). This finding suggests that the interactions with the faculty, interns and other campers had a positive impact on the campers perceived learning gains.

Table 3. Features of the camp that students reported as contributing to their learning

Perceived contribution to learning	Percentage of Responses			
	No Gain	Small Gain	Moderate Gain	Large Gain
Aspects of STEM Honors Camp (i.e., fieldtrips, workshops, research projects)	2%	12%	45%	42%
Activities during STEM Honors Camp (i.e., speakers, specific events)	7%	27%	28%	38%
Interactions with others (i.e., faculty, interns, peers)	3%	15%	27%	55%

It also important to note that at the end of the STEM Honors Camp, 3009 different people viewed the UTeach-Columbus Facebook page (June 14, 2013 data from Facebook). Many of these people viewed the UTeach-Columbus Facebook page because the campers ‘liked’ photos taken during the camp, made status updates about the camp, or uploaded their own photos. Parents have also sent messages to the project leadership team after speaking with their child or viewing posts on Facebook. To illustrate this type of feedback, consider the following example:

[Camper name] is such an introvert that I was afraid that I would be taking that 4 hour trip back to Columbus before this Friday. He has called or texted each day and I can hear the joy in his voice and words. He told me last night that saying goodbye on Friday would be hard. I never dreamed that it would be as good socially for him as it has been educationally. In a few of the photos that have been posted on UTeach Columbus and other kids sites on facebook, I even see him smiling or laughing. That is rare. I’m so appreciative that he has been afforded this opportunity.

The external evaluator interviewed each of the Noyce interns as part of the site visit on June 13, 2013. All of the Noyce interns indicated that STEM honors camp was a positive and meaningful experience. All of the interns also claimed that they learned a great deal during the camp and valued the interactions they had with CSU faculty and the campers. To illustrate the views of the interns, consider the following comments. These comments were made in response to the question, “Tell me about you experience as an CRAFT-STEM intern?”

I thought the internship experience so far has been very involved, but enjoyable. At present, I have only helped at the STEM Honors Camp. I’ve been able to not only actively assist in and help supervise activities, but also participate in the activities and tours themselves. I’ve been able to visit locations I haven’t had the chance to and learn new material from both the different activities and time I spent preparing the geology professors. Although I’m not majoring in a STEM area, I’ve really enjoyed the exposure and immersion in different fields (Intern 1, 6/13/2013).

The internship has been an amazing experience thus far. I absolutely love having the ability to work closely with the campers and being able to become close with professors not in my field. I’m so thankful for this opportunity (Intern 2, 6/13/2013).

The STEM Honors Camp at Columbus State University has been an extremely fun and rewarding experience. I personally felt that I had more fun than some of the campers at

times. Even though some days were very hot and humid, we all had a memorable time. Again, I have enjoyed myself these two weeks and I have learned so much from this internship (Intern 3, 6/13/13).

STEM Honors Camp has been a fantastic experience and opportunity! I have thoroughly enjoyed working with the campers, faculty and other interns. I would definitely recommend the internship to anyone who enjoys learning and working with young people! (Intern 4, 6/13/2013)

STEM Honors Camp was a very memorable experience for me. I had the opportunity to be exposed to various areas of science, math, technology and engineering and worked with wonderful professors who are truly passionate about what they teach. I met a lot of wonderful campers and was glad to make a difference in their lives (Intern 5, 6/13/2013).

The STEM Honors Camp has been one of the greatest experiences of my college career. It was a great opportunity to meet many new people who also are very interested in STEM fields. The immersion into various subjects really stimulated the campers. When I partnered with my assigned professor for our research project with the campers into environmental science. This camp was an amazing experience and I am so glad I got this opportunity (Intern 6, 6/13/2013).

One of the interns is enrolled in the UTeach-Columbus program; five of the interns are STEM majors, and one is a history major. Three of the five STEM interns indicated that the STEM Honors Camp increased or reinforced their interest in STEM teaching. Two of the interns who are interested in teaching want to teach at the post-secondary level. The other intern who is interested in teaching has low self-efficacy and is therefore hesitant to pursue a career in teaching. Unfortunately, these three individuals did not recognize the value of enrolling in a STEM education program for their future career goals (at least at the time of the interview).

The external evaluator also interviewed two of the Noyce scholars as part of the site visit. These two individuals indicated that CRAFT-STEM is a valuable program. The two scholars also mentioned that the discussions about the realities of high needs schools during the Teaching Connections Seminar were informative and the additional mentoring provided by the CRAFT-STEM program is a real benefit. To illustrate the views of the scholars, consider the following comments. These comments were made in response to the question, "Tell me about your experience as a Noyce scholar?"

The Noyce Program has helped me understand the realities and benefits of teaching high needs students. Most education employment opportunities in our area are in high needs schools, so being part of a program that offers encouragement and advice on teaching in these schools has been very beneficial (Scholar 1, 6/13/2013).

The Noyce Program has been a useful resource for my academic and professional career. I would specifically like to mention the mentor teacher aspect—Dr. Hughes has been a tremendous resource and has gone above and beyond to find helpful information to assist me (Scholar 2, 6/13/2013).

The Noyce scholars were also asked to complete an electronic survey at the end of the academic year. Unfortunately, only three of the scholars chose to respond to the survey. A statistical

analysis of the responses to the multiple-choice items included in the survey is therefore uninformative due to the low sample size. The responses to the two open-ended items, however, can help shed some light on the impact the CRAFT-STEM program had on the scholars' decision to teach in an high needs school. Overall, the three scholars indicated that the Noyce Program did not influence their decision to become a teacher. To illustrate, consider the responses provided by the Noyce scholars in response to the question, "How much did the Noyce Program at Columbus State University influence your decision to become a teacher?"

The experiences I had this year were meaningful and encouraging. Connecting with other teachers and administrators at conferences who are positive about the changes occurring in science classrooms was helpful. Of course it was especially nice to meet these people when they mentioned they will be hiring more science teachers in the upcoming years. Conferences also provided an array of informative and interesting workshops to attend as well as free materials that i will be able to adapt and use in my future classroom. The connection seminars and mentor partnership was also beneficial as we discussed relevant topics that are being addressed in educational standards and in classroom achievement.

I already plan [sic] on being a tracer [sic].

I was already committed to teaching.

It is important to note, however, that these types of responses are expected given the limited amount of time that CRAFT-STEM has been in place at CSU. The project leadership needed to offer scholarships to individuals who were already in a STEM teaching program. The scholarships will, in all likelihood, become more of a recruitment tool in years to come as more freshman and sophomores learn about them before entering a STEM teaching program. The comment made by the first individual is also informative because it indicates that the scholars view CRAFT-STEM as a supportive program that provides many benefits to future teachers.

Although the CRAFT-STEM program did not attract any of these scholars to the teaching profession, it did seem to influence their decision to teach in a high needs school. To illustrate this finding, consider the following comments. These comments were made in response to the question, "How much did the Noyce Program at Columbus State University influence your decision to teach in a high needs school?"

Meeting teachers who have had enjoyable experiences at these schools and have been able to impact these students was helpful. We too often (especially in the Ed dpt) hear only horror stories about what it will be like to work in high needs schools.

I already have to teach in a high needs school.

There is a stigma attached to "high needs" and the opportunity to speak with teachers in high needs schools and other parts of the Noyce Program have helped me understand what teaching in a high needs school is really like, and has helped erase any hesitancy I might have had about working in such a school.

These comments indicate that the Teaching Connection Seminar seems do be doing a great deal to alleviate many of the negative views that pre-service teachers have about high-needs schools.

To what extent did the modifications made to the project in year two correct the challenges or problems that were identified in year one?

Overall, there were two major challenges faced by the project leadership team in year one of the project. The first challenge was encouraging enough students to submit applications for the internships and the scholarships. The second was finding a way to improve the effectiveness of the summer internships as a recruitment tool. To address the first challenge, the project leadership team increased their recruitment efforts, made adjustments to their recruitment strategies, and revised the eligibility and selection criteria for the scholarships. These modifications resulted in similar numbers of applicants in year two of the project. The project leadership team, however, was pleased with this outcome (especially in light of the well documented difficulties associated with recruitment). In order to address the second challenge, the project leadership team added a face-to-face interview to the internship selection process in order to decrease the number of internship going to individuals who are only interested in summer employment or adding an internship to their resume. This modification was successful in producing the desired outcome. A greater proportion of the interns reported that they were interested in teaching at the end of the STEM Honors camp than the year before.

To what extent has the activities associated with CRAFT-STEM been effective in encouraging more individuals to enter the STEM teaching profession and preparing them to teach in a high-needs school district?

The project team, in their proposal to the NSF's Noyce scholarship program, described how they wanted to attract more individuals into STEM education. To accomplish this goal, the project team planned to create a STEM teacher pipeline by (1) recruiting high school students to CSU through STEM summer camps and a variety of other recruiting measures, (2) drawing CSU undergraduates into STEM education programs with paid summer internships, (3) supporting junior and seniors who are pursuing initial STEM teacher certification with scholarships, and (4) providing academic year service learning opportunities through teaching connections seminars. These various components of the project, therefore, need to be examined one by one in order to determine what they are each contributing to the overall goal of project.

The summer STEM camp appears to be an excellent recruitment tool. The camp exposes students to career opportunities in STEM fields, teaches them about the various STEM fields, and gives students an opportunity to engage in STEM-related activities, such as actual research. As noted earlier, the high school students reported that their understanding of science inquiry and inquiry skills improved during the camp. The camp also seems to help students develop positive attitudes towards STEM and sparks their interest in pursuing a STEM major.

The summer internships have also become a powerful opportunity for recruitment in year two of the project. All seven of the interns, as noted earlier, were very enthusiastic about their opportunities to engage in STEM-related activities, work with CSU faculty, and interact with high school students. The internship is also sparking interest or reinforcing an existing interest in teaching for many of these interns. The project leadership team, however, will need to find ways to transform interest in STEM teaching into actual enrollment in a STEM education program.

The project leadership team has engaged in numerous recruitment activities to draw more CSU students into a STEM education program. These activities include, but are not limited to, posting flyers around campus, sponsoring tables at recruitment events, making presentations, sending out emails, and contacting and speaking with students on a case-by-case basis. Enrollment in STEM programs at CSU is clearly on the rise but the number of individuals who apply for a Noyce internship or a Noyce scholarship is not. Most of the Noyce interns and scholars claimed that they decided to apply for an internship or a scholarship because a faculty member or a member of the project leadership team contacted them and encouraged them to do so. These face-to-face conversations appear to be the most effective recruitment tool.

The intent of the Noyce scholarships is to heighten enthusiasm for the teaching profession and to serve as an incentive that will encourage more individuals to enter the teaching profession. At this point in time, there is no way to determine if the scholarships are serving as an incentive for individuals to enter the teaching profession. In the next few years, it will be important for the project team to track the number of individuals who decided to switch into a teaching certification program because of the available scholarships in order to determine if the Noyce scholarships are attracting more individuals, such as mathematics majors, into the teaching profession. It will also be important to examine if the scholarships are decreasing attrition rates.

It is important to note, however, that all six of Noyce scholars will be teaching in a high needs school district after they graduate from CSU. Two of these individuals stated that they decided to teach in a high-needs setting because of the scholarships. Therefore, it appears that the Noyce scholarships are increasing the number of STEM teachers in a high needs setting.

The Teaching Connections Seminars appears to be a meaningful component of CRAFT-STEM. Many of the Noyce scholars stated that the topics of the seminar, especially the discussions that focused on the realities of teaching in a high-needs school, were informative and a real benefit to them. Many of the Noyce scholars also commented about the value of the mentorship component of CRAFT-STEM. The seminars and the mentorship offered by the project leadership therefore appears to be providing the support the Noyce Scholars need as they pursue an initial teaching certification.

What challenges did the project leadership team face in year two of the project and what are their plans to address them?

The project leadership team reported a number of challenges in year two. The first major challenge was soliciting a sufficient number of applicants, especially from underrepresented groups of students, for the internships and scholarships. The second major challenge was securing the funding needed to offer the STEM honors camp, keep the camp residential, and keep the cost to participants low. The third major challenge was scheduling the Teaching Connections Seminar and identifying topics that would be of interest to all the scholars.

To address the first challenge, the project team plans to extend application deadlines, make additional adaptations to the eligibility requirements and selection criteria used to award scholarships and internships, and engage in additional recruitment activities. To address the

challenge of funding the STEM honors camp, the project team submitted several grant proposals. The project team was awarded a \$50,000 grant from AT&T to support the 2014 and 2015 STEM honors camp. This award will not only fully fund the camp over the next two years but will enable the project team to expand it. This additional source of funding will also eliminate the need for the project leadership team to spend time each year raising the money needed to provide the camp. Finally, the project leadership team plans to use the feedback from the current Noyce scholars to address the challenges associated with the Teaching Connection Seminar. The topics covered next year, for example, will be aligned with the interests and concerns voiced by the scholars this year. The scheduling issues that are associated with the seminar, however, may continue to be a challenge because many of the scholars will be apprentice teaching next year.

At this rate of progress, will the project team meet all their goals by the end of the project period?

The project team has accomplished all their objectives for year two. The project team has also made great strides toward their most important goal, which is to graduate 12 STEM teachers a year by 2017. This number of STEM teachers is quadruple the average number of STEM teachers that currently graduate from CSU each year. The CRAFT-STEM project, along with the new UTeach-Columbus program that started at the same time has resulted in an increase in the number of students pursuing an initial STEM teaching certificate at CSU. This puts the project team on track to surpass their goal. The project team, therefore, is making excellent progress.

Recommendations

This evaluation, as noted earlier, is formative rather than summative in nature. As such, it is important for the external evaluator to provide reasonable and evidence-based recommendations to the project team about ways to improve various aspects of the project (although the project team is making excellent progress towards its overall goal at this time). This section, therefore, provides several recommendations for the project team in terms of recruitment, preservice teacher preparation, and research opportunities.

Recruitment. The project leadership team has done a great deal to recruit individuals into STEM teaching. In addition to the strategies that are already in place, the following activities might make the recruitment effort even more effective:

1. Focus more on individual and face-to-face recruitment. Many of the current Noyce interns and scholars applied to the program because a member of the project leadership team contacted them or they were encouraged to do so by a faculty member. Perhaps a useful strategy would be to ask faculty for lists of talented students and the set up face-to-face meeting with these students to encourage them to apply. This strategy may be more time consuming but in the end, it may result in more applications and greater enrollment numbers.
2. Contact the freshmen that enroll in a STEM education program and determine how they heard about the program, if they attended any of the recruitment activities, and why these decided to join. This information will enable the leadership team to make evidence-based decisions about where to devote limited

time and resources for recruitment. Be sure to continue to track freshman enrollment numbers over time (this will be important because the UTeach program does not require the declaration of a secondary major).

3. Provide lists of what counts as a “high needs district” on the project website (and provide links to the district websites) and provide this information to potential Noyce scholars during presentation so individuals that are either apprehensive about teaching at a high needs school or worried that they will not be able to find a job in a high needs district after graduation (which would require them to pay back the scholarship) can see examples of what qualifies as a high needs district;
4. Continue to provide opportunities for high school students to see what it might be like to be a STEM teacher during the summer STEM honors camp. Perhaps some of the high school students could work together with a Noyce intern or scholar s to develop a math or science or math lesson for homeschool science lab or an activity for the Coca Cola Space Science Center. This might be a way to encourage high school students to CSU to be a part of UTeach-Columbus;
5. Update the survey given to campers at the end of the camp so it is easier to examine gains in interest in STEM fields and STEM careers;
6. Hire a current NOYCE Scholar as an ambassador for the UTeach-Columbus program and the CRAFT-STEM project (perhaps as a paid internship funded by UTeach-Columbus since the Noyce funds must go to freshman and sophomores) and then have this individual “talk up” teaching and the benefits of the UTeach program, the Noyce internships, and the Noyce scholarships during classroom visits and the summer STEM honors camp;
7. Be sure to explain the value of enrolling in a STEM teaching program to the interns at the end of their internship. Two of the 2013 interns claim that they are interested in teaching at the undergraduate level and one is interested in teaching but is hesitant to pursue a career in it because she feels that she would not be good at it. These individual might decide to enroll in a STEM teaching program if they understood the value of such a program;
8. Have the interns complete a post internship questionnaire in order to document students views about pursuing a career in STEM teaching (which will allow the project team to assess the impact of the internships as a recruitment tool); and,
9. Track the number of students who decide to enter a STEM teaching certification program because of the Noyce Scholarships (which will allow the project team to assess the impact of the scholarships as a recruitment tool).

Preparation. The Teaching Connections Seminar and mentorship offered by the project leadership team is clearly beneficial to the Noyce scholars. The following activities might make these aspects of CRAFT-STEM even more effective:

1. Be sure to focus several seminar sessions on the realities of teaching in a high needs school and how to be an equitable STEM teacher. Many of the Noyce Scholars reported that they were apprehensive about teaching in such a setting and the two sessions that focused on teaching in a high-needs setting were transformative for them. It will also be important for these teachers to learn what to be an equitable STEM teacher; and,
2. Consider inviting Noyce graduates to the Teaching Connection Seminar. It would be beneficial for Noyce graduates and current Noyce to be involved in the teaching connections seminar – that way current and past Noyce scholars can develop shared a common vision for effective STEM teaching in high needs schools and have opportunities to learn form each other.

Research Opportunities. The project team has done a great deal to publicize CRAFT-STEM. It will be important for them to focus the dissemination efforts on what they have learned about recruiting students into the STEM teaching profession and how to prepare the Noyce Scholars for the realities of teaching in a high needs school over the next few years. In order to accomplish this goal, the following will be important activities:

1. Track graduate rates for Noyce scholars and non-scholars in the STEM teaching certification programs (which will allow the project team to assess the impact of the scholarships as a way to prevent attrition);
2. Consider conducting a longitudinal comparative case study of several Noyce and non-Noyce students. The project leadership team could track their beliefs about teaching and learning at the beginning of the program, end of the program, and then during their first few years of teaching. The project leadership team could also examine where these individuals teach and how they teach in these contexts;
3. Take some time to define what counts as “effective” teaching in a high needs schools and then determine a way to measure it (e.g., teaching observations, student test scores; surveys about students attitudes towards mathematics and the learning of mathematics); and,
4. Use the measure of effectiveness to collect data in the Noyce Scholars classrooms once they begin teaching and in the classrooms of a comparison group of teachers (perhaps graduates of Columbus State that did not participate in the CRAFT-STEM program but are teaching in a high needs district or experienced teachers who work in a high needs district) so the project team will be able to examine the impact of the program at the end of the project.