Evaluation Report III:

The Robert Noyce Scholarship Program at CSUB*

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The National Science Foundation (NSF) Robert Noyce Teacher Scholarship Program is designed to increase the number of highly qualified science and math teachers at high-needs schools. Beginning in the 2009-10 academic year, California State University, Bakersfield (CSUB) has been receiving funding from NSF to recruit Noyce Scholars from upper-division science, technology, engineering, and mathematics (STEM) majors, graduate students, and professionals switched to STEM teaching from other fields (NSF DUE-0934944). The recruitment incentives include coverage of tuition and living costs. The Noyce Program also supports professional development activities, such as networking with other scholars through quarterly Noyce scholar meetings and the 2012 Noyce Scholar Conference at Washington, DC. For each year of the program funding, Noyce Scholars are expected to commit two years of teaching service at high-needs schools.

Methodology

This is the third annual report to summarize evaluation outcomes of the Noyce Scholarship Program at CSUB. According to the original Noyce grant proposal (NSF No. 0934944),

> This program will contribute to the knowledge of how to best recruit, prepare and retain teachers in the science, technology, engineering, and mathematics (STEM) fields. It will a) identify and investigate strategies that are effective in the recruitment of Noyce scholars; b) describe and assess the Scholars' progress and success as they fulfill their teaching service obligations; c) analyze the Noyce program's effectiveness in improving teacher quality and student achievement; and d) support data-driven decisions in order to strengthen the program and its outcomes over time. (p. 10)

To address these anticipated contributions, multilevel data are gathered from advisors, scholars, the program office, and university records to triangulate quality of student preparation and program outcomes across both quantitative and qualitative dimensions. After two rounds of follow-up request, all 30 Noyce Scholars responded to two versions of survey questionnaire, one for current students and the other for program graduates (Appendices 1 & 2). Concurrent validity of the quantitative results has been established by the content match with five scholar surveys from an NSF-sponsored website for Noyce program evaluation[1]. Meanwhile, repeated measures are embedded in these questionnaires to examine consistency of survey responses. The reliability index indicates 100% match of scholar responses to repeated questions of different formats[2].

In addition, qualitative analyses have been conducted on program documents, including Noyce Scholar transcripts, Noyce Advisor vitae, and minutes of local meetings hosted by the Noyce Program. The document analyses also include open-ended written responses transcribed from Noyce Scholar interviews. Whilst the local effort on data collection is guided by the intellectual merit delineated in the original NSF proposal, presentation of the evaluation findings conforms to professional practice illustrated by several external reports, such as the end-of-project report for Harvard Noyce Program (Goodman Research Group, 2012) and report templates from Abt Associates (2010, 2012), an NSF-contracted company for Noyce Program Evaluation.

Evaluation Findings

Noyce Scholar Recruitment

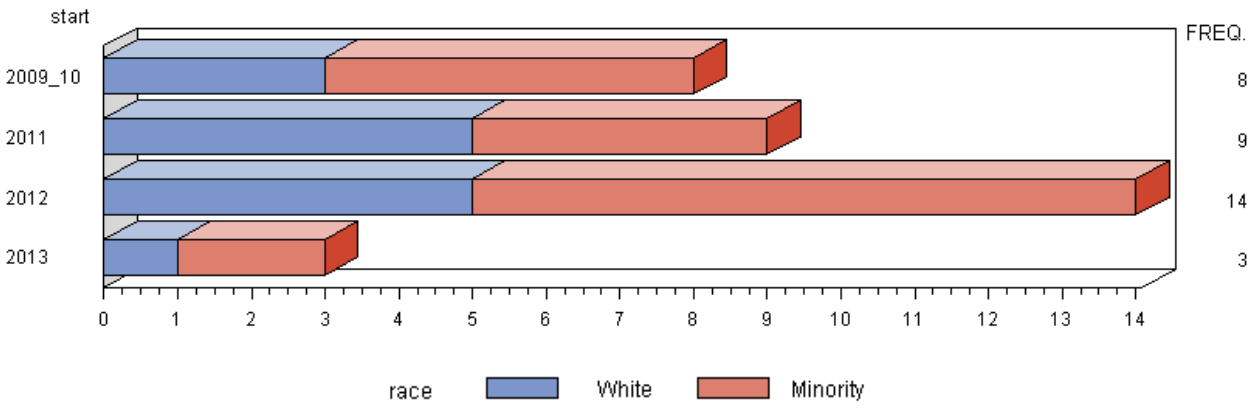
Two commitments were made in the original Noyce grant proposal: (1) Recruitment of

[1] http://www.cehd.umn.edu/EdPsych/NOYCE/Reports/Surveys/U%20of%20MN%20Scholar%20Surveys.html
[2] Questions 4 and 9i of Appendix 1 are employed for the reliability index computing.

quality Noyce Scholars in STEM fields, and (2) “Each year, two new awards will be reserved for minority or underrepresented gender applicants or persons with disabilities, unless there are no eligible applicants” (NSF Proposal No. 0934944, p. 15). More specifically, a plan has been incorporated in the proposal to recruit “14 students for year three, four, and five” (p. 13).

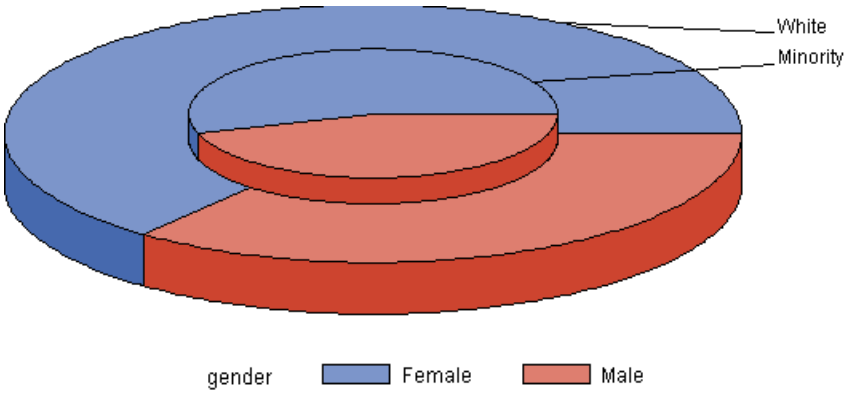
Figure 1 indicates attainment of the recruitment target (i.e., 14 students) in the third year. When data collection for this report occurred in the 2013 Winter quarter, the program already started recruiting additional scholars for the fourth year, and two of them belong to minority groups. This pattern has been consistently held over the past three years, and Figure 1 shows recruitment of at least two applicants with minority status each year.

Figure 1: Starting Time and Ethnic Distribution of Noyce Scholars



The equity consideration is also extended to the gender dimension. Frean (2007) suggested strong needs of recruiting female teachers in STEM education. Figure 2 shows outcomes of student recruitment across gender and ethnic categories. The aggregated results indicate that more females are recruited into the Noyce Program, regardless of their ethnic identity.

Figure 2: Gender identity of Noyce Scholars across Ethnic Groups



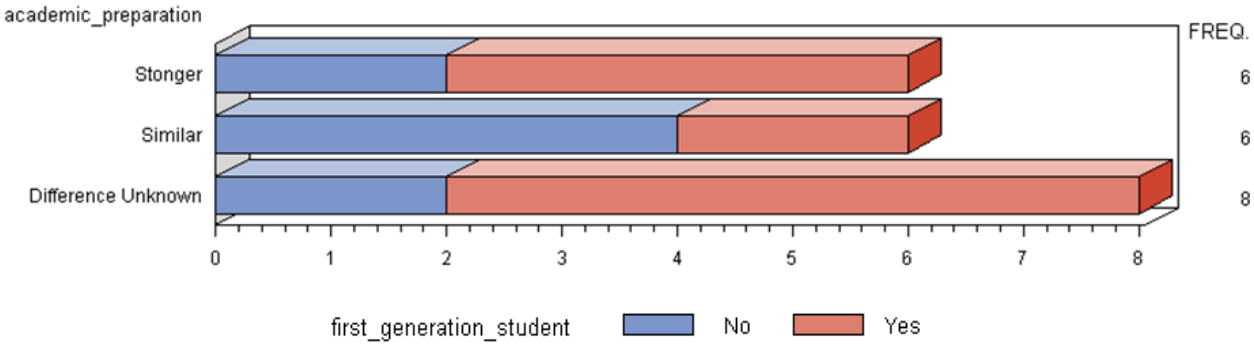
While recruitment targets have been reached according to indicators of **quantity** and **equity**, more empirical evidence has been analyzed from Noyce Scholars to reflect **quality** of learning experiences at CSUB. In this year, 20 scholars continue taking courses, and 12 of them are identified as first-generation college students. Across the nation, one in six students at 4-year universities is classified as first-generation college students (Saenz, Hurtado, Barrera, Wolf, & Yeung, 2007). Thus, the Noyce Program has proportionally recruited more students from the first-generation college student group.

The student composition is directly associated with quality of education. It was reported that "47% of first-generation students obtained a Bachelor's degree compared to 78% of students who had at least one parent with a Bachelor's degree" (Woosley, & Shepler, 2011, p. 700). Meanwhile, researchers found that individuals with strong training in STEM fields often chose to enter nonteaching careers (Guarino, Santibanez, & Daley, 2006). To address the quality concern, the following questions are incorporated in the questionnaire to assess performance of Noyce Scholars before program completion:

> *In comparison to your math or science classmates NOT on the teaching track, you believe that Noyce scholars have*
> *__ stronger academic preparation* *__ weaker academic preparation*
> *__ similar academic preparation* *__ Difference unknown*

Figure 3 shows that no Noyce Scholars ranked themselves weaker than their STEM-track classmates in academic preparation. In addition, more first-generation college students believed that their academic preparation was *stronger* than their peers in the non-teaching tracking (see the first red bar in Figure 3). Hence, despite the stereotypic view against first-generation college students and teaching-track students, Noyce Scholars at CSUB have demonstrated positive self-esteem regarding their STEM-subject competency.

Figure 3: Noyce Scholars' Feeling of Academic Preparation in Comparison to Their Peers on the STEM Track



The success of student recruitment is inseparable from effective strategies. One of the objectives of the Noyce Program is to "identify and investigate strategies that are effective in the recruitment of Noyce scholars" (NSF Proposal No. 0934944, p. 10). In the first evaluation report, six approaches were adduced as recommendations of student recruitment (Wang, 2011, p. 10). To address the results-based accountability, one question is included this year to evaluate impact of those approaches in facilitating Noyce scholarship application. Results in Table 1 confirm usefulness of all six approaches. In comparison, Noyce advisors and program office seem to have played a more important role in recruiting academically competent scholars at CSUB.

Table 1: Effectiveness of Recruitment Approaches in Reaching Noyce Scholars

Information Dissemination Channel	Number of Scholars Being Reached
CSUB Noyce website	4
STEM classes	3
Flyers and brochures	2
Office mail and advising	9
Meetings of student societies and clubs	2
Career fairs, financial aid workshops, and science competitions	2

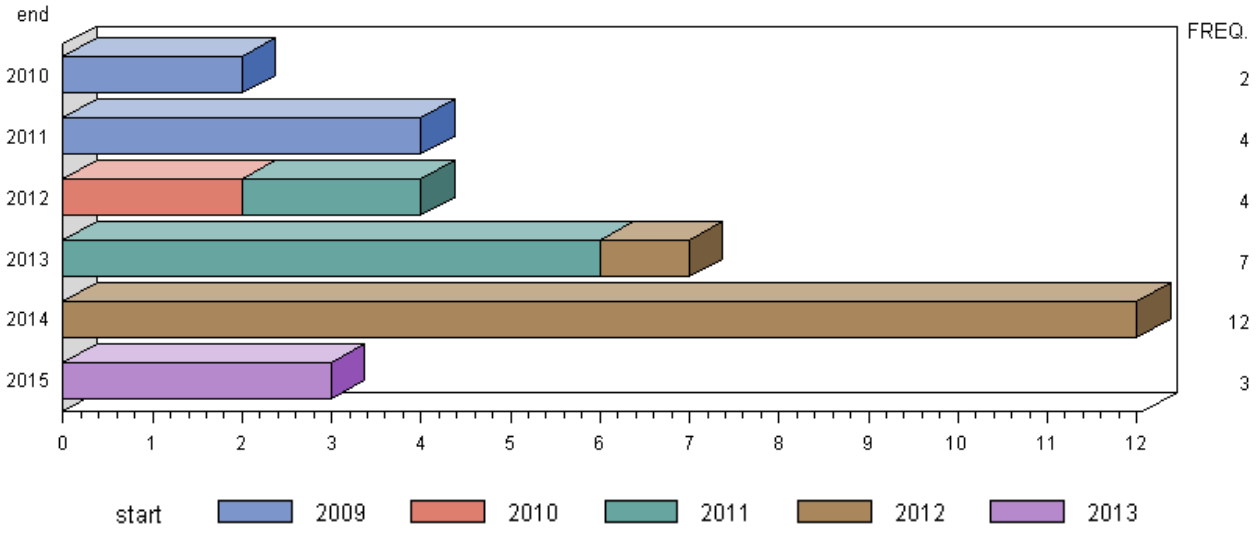
The impact of advising in Table 1 has been triangulated by qualitative findings from interviews. For instance, one scholar recollected,

> *I always wanted to be a teacher but a high school counselor discouraged it. I didn't know what else I wanted to do so I went to BC [Bakersfield College] and finished my general education and dropped out for 5 years. I went back to be a registered nurse but a life experience changed that. I met Andrea Medina when I was unsure what to do next and she showed me that becoming a teacher was still possible.*

Scholars' Progress and Accomplishment

Abide by NSF regulation, each Noyce Scholar is supported for *up to two academic years*. At end of 2012, 10 scholars reached their funding limit, and the remaining scholars are making progresses according to the two-year plan. In Figure 4, different colors are employed to represent starting years, and no single color has appeared more than twice in the bar chart. Thus, the Noyce Program is in full compliance with the two-year funding guideline from NSF.

Figure 4: Scholor's Progress under a Two-Year Constraint



Broad Impact

For those scholars currently fulfilling teaching obligations, interview results clearly revealed their backbone roles at high-needs schools. In coping with practical challenges, one scholar reported,

> *I'm having a lot of disciplinary issues. Students will get in trouble, then come back from an in-school suspension or detention and do the same thing, habitually. It's as though there's not as much reinforcement at home. I try to call home, and sometimes (more times than expected) the school doesn't have the correct phone number.*

Beyond the disciplinary issue is a more challenging task of engaging students in an active learning process. A scholar described the work setting below:

> *The most challenging aspect is clear and evident, motivating students. The second and most stressful aspect is a tough teaching load, four different preps.*

At high-needs schools, Noyce Scholars are often coping with an entangled issue of STEM teaching and student motivation. One scholar worked as a mathematics teacher, and found "Students being so shut down to math and not understanding, to the point of not caring".

Another scholar characterized her job as “Trying to teach students who cannot even multiply. Trying to teach students who rarely come to school, are tardy, don’t do their work, and just don’t care”. On average, Noyce Scholars managed to teach 3-5 different courses in mathematics and science to meet the acute need of quality teachers.

Despite the barriers of internal motivation and extra teaching load, Noyce Scholars did not change their existing service commitment. Seven scholars expressed interest in taking leadership roles after their survival mode. One scholar indicated:

> *I feel as though I am making a difference not only in these students' educational experiences, but I am also impacting their lives. That means a great deal to me.*

The benefit is also reciprocal. While Noyce Scholars gain the sense of satisfaction, their accomplishments are reflected on outcomes of student learning in STEM subjects. Below is a list of positive changes reported by Noyce Scholars:

> *The most rewarding aspects are seeing students succeed in my class and in life in general.*
>
> *Seeing the students take a personal interest in their own success, especially after they do well on a test and surprise themselves.*
>
> *Helping students who actually do what to learn and seeing them pass the CAHSEE.*
>
> *Looking past those obstacles and students succeeding, doing well, and understanding. Seeing improvement and excitement in students as they succeed.*
>
> *The most rewarding aspect is when students learn from you; both content information and general guidance about life. When they tell you that you are the only teacher that they understand, when they return and ask your opinion about their future, etc. To know that you impact their life in such a dramatic way is so rewarding. Teachers really do have great influence on students, which can either be positive or negative. Encouraging them in positive directions and watching them learn in grow is indescribable in how rewarding it really is.*

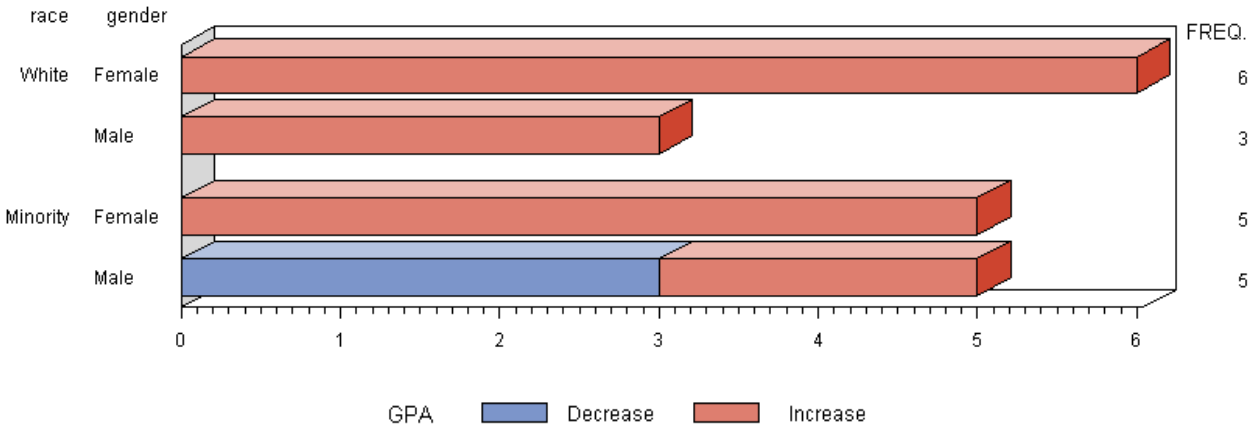
Those findings jointly reflect broad impact of the Noyce Program on STEM teaching and learning at high-needs schools.

Intellectual Merit

Transcript analysis has been conducted to examine academic performance of Noyce Scholars prior to program completion. The university records show an increase of the median GPA from 3.26 in last year to 3.66 this year. The data tracking reconfirms significant improvement of GPA between the adjacent annual evaluations [$t(18)=3.25$, $p<.005$].

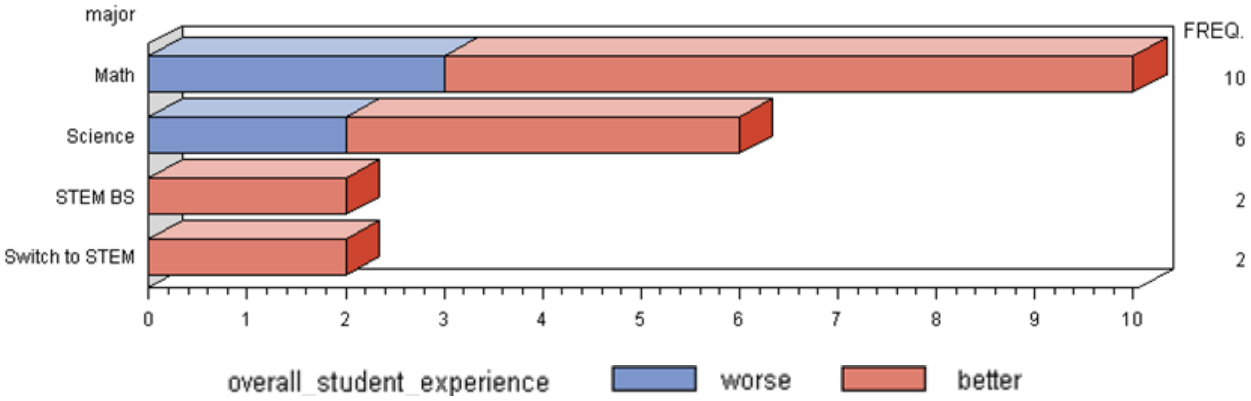
Figure 5 displays GPA changes among Noyce Scholars across the gender and ethnic dimensions. In three out of the four categories below, all Noyce Scholars reported GPA increase.

Figure 5: GPA Change by Gender and Ethnicity



At the program level, Noyce Scholars' entry occurred at various stages of professional preparation, including undergraduate math/science majors, graduates of STEM departments, and professionals switched to STEM teaching from different fields (Figure 6). Despite the background differences, most respondents indicate that the Noyce Program has improved their overal student experiences at CSUB (see red bars in Figure 6).

Figure 6: Change of Overall Student Experience Due to Noyce Scholarship Program



In summary, Noyce Scholars are at different stages of STEM teacher preparation. For those graduated from the program, their impact is reflected by improving STEM education and student motivation at high-needs schools. Noyce Scholars remaining at the course-taking stage have reported better student experiences at CSUB due to the Noyce Program.

Features of the Noyce Program

To sustain the positive impact at CSUB and high-needs schools, program features are examined at the *university*, *department*, and *student* levels to disentangle contextual factors that contribute to the program success. At the university level, Associate Dean of Natural Science and Mathematics pointed out that "The main function of the CSU system is to prepare teachers"[1]. At CSUB, all Noyce Advisors earned Ph.D. in science education or STEM fields, and have been on faculty for at least 10 years. In particular, the P.I. (Andreas Gebauer) was the 2010 recipient of the University Faculty Leadership and Service Award. Co-P.I. (Kamel Haddad) was an awardee of the Millie Ablin Excellence in Teaching at CSUB. Another Noyce Advisor (Dirk Baron) won the 2011 Faculty Research Award. As a result, Noyce Scholars

[1] See http://www.csub.edu/csubnews/cstoday/winter08/insideCSUB_w08.pdf

acknowledged faculty support as the most positive aspect of this program:

> *The most positive aspects of the program are the connections I have made with the faculty, whether that be in education or mathematics. This program has allowed me to interact with them in a way that I would have not been able to otherwise.*
>
> *I believe, the most positive and helpful aspects of my program is the support given by the advisors. They are always helpful and have really given me to tools to continue my educational success.*
>
> *The teachers have an abundance of experience, are easy to relate to, and are inspiring.*

Impact of faculty mentorship is demonstrated on multiple fronts. Noyce Scholars responded to additional questions that address their experiences of research, learning, and student teaching at CSUB. The quantitative data are subjected to contingency table analyses, and Kappa Coefficient Test indicates a significant association between *stronger connection to STEM faculty* and *more research or internship experiences* ($Z=1.92$, $p<.05$). Meanwhile, *strong STEM faculty connection* leads to more contact of Noyce Scholars with Education faculty ($Z=2.12$, $p<.05$). The broad-based campus support has directly contributed to *more coordinated student teaching* ($Z=1.79$, $p<.05$) and *better overall student experiences* ($Z=1.70$, $p<.05$).

At the program level, faculty expertise has enhanced curriculum integration in STEM education. In mathematics, the Noyce Program features a blended program that allows Noyce Scholars to graduate with teaching credentials in four years. In contrast, "Most campuses in the CSU system don't have this blended program and students must spend five years to accomplish their undergraduate studies to become a math teacher" (Popa, 2008, p. 9). As indicated in an NSF-sponsored evaluation report, the speed of training is more important than money in Noyce Scholar recruitment (Liu, Johnson, & Peske, 2004).

The program support has been valued highly by Noyce Scholars at different stages of teacher preparation. At the pre-service stage, one scholar of the blended program wrote:

> *I feel I am receiving a well rounded education. The ability to complete the blended program allows me to relate the pedagogy skills I'm learning in the credential courses to the subject matter I am simultaneously mastering through my mathematics courses. I feel the classroom management skills I have learned have been one of the most beneficial. It is so important to have a well managed classroom to promote student learning*.

Similar recognitions of program quality are illustrated in the area of science education. At the in-service stage of professional development, one scholar worked as a science teacher at a high-needs school. He reported:

> *Next year I will likely be taking on the role of the science representative on the District Site Leadership Team. I have been recommended by my department, and thus will likely accept the position. The knowledge that I have attained about effective strategies I first learned about in the credential program will likely provide me with background information that will help me in this role. Actual experiences with those strategies will also contribute. Critical analysis of information from my science courses throughout college will likely be what has the greatest impact on my preparation for this leadership role, since analysis and then making decisions based upon that analysis is mainly what is done in these meetings*.

In summary, the Noyce Program is built on strong university commitment, innovative program features, and extensive faculty support to sustain effective STEM teacher preparation over past three years. In addition to student advising, professors of the Noyce Program demonstrated role models of educational leadership across the campus. An analysis of faculty vitae revealed various leadership positions assumed by the grant team, including Chair of Chemistry Department (Andreas Gebauer), Associate Dean of Natural Science and Mathematics (Kamel Haddad), Founding Director of CSUB Graduate Student Center (Dirk Baron), and Affiliated Doctoral Faculty in Education (Carl T. Kloock). The professional leadership has supported development of a healthy and multidisciplinary learning community for Noyce Scholars at CSUB.

Recommendations for Noyce Program Improvement

Success of the Noyce Program hinges on collaborative efforts among various

stakeholders, including STEM faculty, Education faculty, and local school supporters. Given the fact that no program can be equally effective under all circumstances, Sloane (2008) suggested that "We change the basic research question from what works to what works for whom and in what contexts" (p. 43). Build on the paradigm of CIPP (Context, Input, Process, and Product) model, four recommendations have been identified below to enhance the ongoing program improvement:

Creating Network Contexts to Support Information Exchange

Interviews with Noyce Scholars recaptured contextual issues of high-needs school across multiple levels. At the school level, one scholar observed:

> *Dealing with the changes has been the toughest issue and sometimes **not knowing what I am teaching until the first day of class** is not enjoyable.*

In addition, the school issue is not isolated, and one scholar noted that "Teachers in high schools … don't really motivate students in the sciences". Consequently,

> *Many students have accepted that their future will mimic that of their parents, and so many will drop out of high school and/or care little about pursuing a career that requires a high school or higher education.*

The contextual problems will inevitably undermine the opportunity of retaining Noyce Scholars in those schools after completing their scholarship requirement. One scholar conceded, "I wouldn't mind going to another school to see if there are students who care more about their education and are willing to do homework and study".

Therefore, collective wisdom is needed to extend additional assistance for Noyce Scholars after program completion. In support of the capacity building, **the first recommendation is on creating a network of support for idea exchanges and information sharing**. Since the contextual issues are broadly dispersed across high-needs schools, the support for networking not only helps Noyce Scholars identify long-lasting solutions to

strenuous problems, but also avoids repeated discoveries of the same solution through an ineffective trial-and-error approach.

In the past, networking has illustrated its feasibility with the Noyce Program. Noyce Scholars have been encouraged to attend local orientations and quarterly/annual conferences. Below are some of the benefits reported by scholars:

> *The monthly Noyce meetings held by Ron Hughes were very helpful due to the various people he brought forth to discuss teaching. Hearing different perspectives from people who had been teaching for years was very helpful in gaining an understanding of what to expect.*
>
> *[We appreciate] The trip to Washington DC to learn about STEM and more about common core.*
>
> *The most important part is Learning by my experience and from the experience of others. It would also be helpful is the Noyce Scholars interacted with one another at the meetings instead of just listen to the professor talk.*
>
> *[An area for improvement] Maybe some social activities with Noyce scholars on my campus so we can get to know each other better.*
>
> *I feel as if I have made a strong network of friends and colleagues. Hopefully, in the future we will stay in contact and provide support and encouragement in our first years. Moreover, those teachers that I have established a relationship with can continue to provide support as a type of mentor.*
>
> *Having an overwhelming school load this year has been quite stressful. I have found that knowing others who have taught these same subjects has helped me figure out how to balance my time and teaching structure.*
>
> *It would be a lot more helpful if all the Noyce scholars attended the meetings.*
> *I feel the program needs more meetings and social experiences to help keep the members more connected and updated. Rotating the meeting days would benefit everyone because all of my meetings were scheduled for the same day of the week and time frame, so I was always working an unable to attend. Also, we were often only notified a week in advance.*

Due to the strong network needs and benefits, the Noyce Program may consider establishing on online platforms, such as forums of discussion within the Blackboard E-learning System. For those scholars unable to attend meetings, videotaped sessions can be posted online

to support thread discussions. The time flexibility is particularly helpful to program graduates. One of them noted,

> *So far, I haven't stayed in touch much since graduating. Aside from the basic questions I asked to some of my professors when I started, I have had no further communication with the people at CSUB.*

In addition, Noyce Scholars before graduation also identified creative ways to support the effort of networking. One scholar suggested that "a 'book exchange network' would have been great. Student put books in a box after quarter is over and next quarter use books from box – community book sharing".

Enriching Program with Thematic Workshops or Elective Courses

The Noyce Program articulates preparation of STEM content knowledge with pedagogical strategies to support student learning at high-needs schools. Noyce Scholars appreciated the dual emphases,

> *The most positive and helpful aspects of my program at CSUB include: emphasis of content knowledge and information regarding research based/best-practice strategies.*

> *I feel I am receiving a well rounded education. The ability to complete the blended program allows me to relate the pedagogy skills I'm learning in the credential courses to the subject matter I am simultaneously mastering through my mathematics courses. I feel the classroom management skills I have learned have been one of the most beneficial. It is so important to have a well managed classroom to promote student learning.*

To utilize the existing curriculum capacity at CSUB, Noyce Scholars typically share STEM courses with classmates not on the teaching track, and take credential courses with teacher candidates unrelated to STEM education. As school-accountability initiatives being implemented across the state, the Noyce Program can be enriched by workshops or elective courses on specific STEM teaching strategies at high-needs schools. To accommodate those

ingredients of program input, **the second recommendation is on enrichment of the Noyce Program with Thematic Workshops or Elective Courses**.

This recommendation has been backed by evaluation findings this year. During interview sessions, Noyce Scholars requested inclusion of thematic learning experiences to fill potential void in the existing curriculum:

> *I am thoroughly enjoying the teacher certification program here at CSUB. However, if I could change one thing, I would **add classes that pertain specifically to how to teach mathematics to students**.*
>
> *Personally I would enjoy learning and attending **Common Core workshops and lectures** because I feel I'm not that knowledgeable in this area. I would like to see lesson plans in effect that satisfy common core so when I have my own classroom I will have had some experience.*
>
> *I would like to hear of more ideas on **how math teachers can promote critical thinking** in their classrooms.*
>
> *It would be nice if we had **workshops** that were designed to prepare us to be a teacher in a high-need school.*
>
> *I would like more opportunities to gain experience as an undergraduate in my area of teaching. Perhaps some sort of tutoring or teaching assistantship at a local high school. The summer tutoring job I had as a recipient of the Math and Science Teacher Initiative grant was invaluable experience that I would not have otherwise received, and I think that a program like that would benefit Noyce Scholars.*

Supporting Noyce Scholar Progress Through Program Coordination

The Noyce Program was established at CSUB in 2009. In 2010, Teacher Education Department was re-grouped under a new school structure. This change inevitably impacted coordination of the program requirements between STEM and credential sectors. One Noyce Scholar pointed out,

> *The Credential and the NSME [Natural Science & Mathematics Education] offices need to communicate better. The Credential office believes that the sequence of math classes are not appropriate for the best teacher prep experience. When you have a credential advisor telling you that the math department is setting you up to fail in student teaching,*

> *it is very discouraging. The Credential Office needs to better understand that Noyce scholars are some of the top students at CSUB and have a deadline to meet. I feel like if both offices understood the respective plans better, the entire process would be a lot smoother for the student. Right now, the student is the go-between and it is frustrating with a busy, often overloaded schedule.*

Thus, **the third recommendation is to support Noyce Scholar progress through better program coordination**. One possibility is to include an agenda item for staff members of the Credential Office, and invite them to discuss program coordination at quarterly Noyce Scholar meetings. The mutual dialogue may improve understanding of what has been encountered by Noyce Scholars toward program completion. In the current setting, one scholar delineated more specific course coordination issues below:

> *The credential program is connected though, and yet there were times **when midterm projects would be due for a couple classes on the same week that the TPAs were supposed to be turned in**. Stuff like that might be restructured at a foundational level with planning. It'd be pretty helpful, considering that we also have a field work component, in addition to outside work and families. That is, because credential candidates are not undergraduates any more (unless we're in some variety of 4 plus 1 program), it is a bit more difficult to commit to the rigors of the undergraduate study schedule as efficiently as before.*

In addition to streamlining the existing courses, improvement of program coordination could help create additional learning opportunities during summer sessions and/or with collaboration of other STEM programs. In this regard, Noyce Scholars provided the following suggestions:

> *I think the program should include more research/internship/job experience opportunities. It's difficult for students with a rigorous schedule to be on the lookout for such opportunities. For example the **Summer** Research program for Future Teachers was a great opportunity to develop experienced science teachers. The program could work with local high school to help place a student with free time to do some work as an aid and experience the teaching experience before the credential program begins. I know some students that took the CBEST and went through the medical check to be Substitutes, what a better opportunity to experience science teaching than in a classroom.*

> *One thing that would be beneficial is more opportunities to interact with students. An example I am thinking of is the **Rev Ups** program. If possible, I would propose that Noyce scholars have first access to such programs. I inquired about this program well in advance and was told that the slots had already been filled by other students.*

Sustaining Assistance on Teacher Placement at High-Needs Schools

Similar to the benefit of shadowing experiences in medical fields, Noyce Scholars stressed importance of student teaching practice at high-needs schools. The following comments are fairly representative of scholars' opinions:

> *The student teaching portions are the most helpful. The other stuff is important too, like being able to study about the profession itself, but student teaching was great practice for getting over "stage fright".*
>
> *The observations, tutoring, and student teaching I did, as part of the teacher certification program, are what prepared me.*
>
> *It has provided me with background research about effective techniques to use in the classroom.*

Unfortunately, the ongoing economic recession has caused teacher layoffs across the state, adding more difficulty to teacher placement at local schools. Therefore, the Noyce Program may need to collaborate with Credential Office in *student teaching and job* placements. According to the following responses, the placement challenge has caused anxiety for several scholars:

> *Next quarter I will be doing my student teaching. Hopefully I will receive help when the time does come for me to apply for jobs.*
>
> *I am just starting the search and currently have not received any help in searching for a teaching position.*
>
> *[at this point] There was absolutely no assistance offered at all whatsoever.*
>
> *The Noyce program can improve by give us opportunities to work or help local high-need schools.*

To address this new issue, **the fourth recommendation is on sustaining assistance in teacher placement at high-needs schools**. As indicated by the responses below, increasing visibility of the Noyce Program in the past has naturally helped teacher placement:

> *I was able to attend a STEM workshop and meet the read of the distant where leaded me to my current job.*
>
> *My teacher certification program was fairly involved. My position sort of fell into my lap without their involvement, but I was able to speak with professors at CSUB who helped me to say the right things to solidify my stay at the school.*
>
> *The Noyce Program allowed me to identify High Need High Schools in the area and thus I searched for opening in these schools*.

To support more coordinated effort, a thread of discussion could be created on the Noyce Scholar Network for timely information exchanges on job availability at high-needs schools. Although this recommendation is in reaction to the latest job market decline, it is also pertinent to the original design of the Noyce Program – "This program will provide a regular, and much needed, stream of qualified science and mathematics high school teachers primarily into Kern County schools" (NSF proposal No. 0934944, p. 10).

Conclusion

The Noyce Scholarship Program at CSUB has been funded by a five-year grant from NSF. With a goal of providing *clear, convincing,* and *sufficient* evidence through program evaluation, this report is based on multilevel quantitative and qualitative data from *university records, program minutes,* as well as *individual-level information gatherings* from Noyce Scholars and Advisors. In addition, the report design is grounded on a thorough review of updated literature to ensure its conformation to best professional practices (e.g., Abt Associates, 2010, 2012; Goodman Research Group, 2012; Liou, Desjardines, & Lawrenz, 2010 ; Liou, & Lawrenz, 2011).

The third-year report indicates continuous improvement of student recruitment, program effectiveness, and outcome sustainability for the Noyce Program. More specifically, Noyce Scholar recruitment has reached its enrollment target this year, and the program quality is

ensured by support from a group of award-winning faculty in STEM education. As a result, significant GPA improvement has been observed among Noyce Scholars since last year. The program is also enriched by more research or internship experiences led by faculty of STEM education. Besides improvement of *overall student experiences* at CSUB, Noyce Scholars graduated from the program have demonstrated their success in supporting student learning at high-needs schools.

While outcomes of continuous improvement are derived from the paradigm of norm-referenced assessment against the past baselines, criterion-reference assessments have been concurrently incorporated in this report to examine compliance of program performance according to its anticipated benchmarks. The results show full compliance of the Noyce Program on multiple fronts, including quantity (14 scholars this year), equity (at least two minorities each year), and quality (GPA requirement for the program).

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Appendix 1: Questionnaire for Noyce Recipients Before Program Completion

1. When did you decide to become a teacher?
   __ age 18 or before __ ages 19-22 __ ages 23 or after

2. By the time you received the Noyce scholarship, you already (check the one that fits)
   __ declared major in mathematics
   __ declared major in science
   __ switched career/major to mathematics or science
   __ entered a credential program with a bachelor degree in mathematics or science

3. What drove your decision to become a teacher in a high-need school? (e.g., finances, rewards associated with teaching, mentors, past experiences, personal interest, etc.)

4. Would you have chosen to teach if you had **not** received Noyce scholarship? Why or why not?

5. How did you hear about the Noyce program and its scholarship?

6. Indicate the areas in which the Noyce scholar improved your learning experiences at CSUB (check the ones that apply):
   __ Stronger connection to Science or Mathematics faculty
   __ Less anxiety in career placement
   __ Better course plan and time management
   __ More research/internships experience
   __ More preparation for working with high-need populations and/or different cultures
   __ Better coordinated student teaching experiences
   __ Easier access to mentors
   __ More contact with Education faculty
   __ Better quality of your overall student experience

7. In comparison to your math or science classmates NOT on the teaching track, you believe that Noyce scholars have
   __ stronger academic preparation __ weaker academic preparation
   __ similar academic preparation __ Difference unknown

8. The Noyce program helped you (check those that fit)

__ learn strategies for teaching students from diverse ethnic backgrounds
__ expose to special issues of high-need school
__ understand the need of students with learning disabilities/limited English proficiency
__ engage meaningful student learning in math/science subjects
__ expand your access to education faculty
__ strengthen your mentorship relation with math/science faculty
__ network with other Noyce scholars to address challenges in high-need schools
__ enhance your passion and understanding of students from underserved communities

9. Please check the following statements that fit your background/past experiences:

__ I am the first generation of college student in my family
__ I know someone working at high-need schools
__ I know math/science teacher(s) without a bachelor degree in the subject
__ The community I live has at least one high-need school nearby
__ I have classmates in the Noyce program
__ I have current information from Noyce local/national conferences
__ I would choose to be a math/science teacher regardless of the scholarship
__ None of the schools I attended were high-need schools
__ If I had to do it all over again, I would take the same program/route into teaching

10. How far would you go with your future education to better address the teaching needs?

__ No further education is needed for the teaching job
__ An MS degree in math/science would help
__ An MA degree in education is desirable
__ A terminal degree (Ph.D. or Ed.D.) in either field

11. From the perspectives of content-knowledge, teaching pedagogy, and/or classroom management, what are the most positive and helpful aspects of *your program in general*?

12. Please use the space below to provide suggestions for improving your experiences in the Noyce program and/or better preparing you as a teacher in high-need schools (if you need more space, please send an elaborated e-mail to Dr. Wang at jwang@csub.edu).

Appendix 2: Questionnaire for Noyce Recipients After Program Completion

1. When did you decide to become a teacher?
   __ age 18 or before __ ages 19-22 __ ages 23 or after

2. What drove your decision to become a teacher? (e.g., finances, rewards associated with teaching, mentors, etc.)

3. Have your reasons for pursuing a teaching career changed since the time when you first decided to become a teacher? If so, please indicate this change and when it occurred.

4. What drove your decision to pursue a career teaching in a high-need school?

5. Your Employment Status is (please choose one)
   __ Trying to find a job at a high-need school
   __ Currently teaching at a high-need school
   __ Finished the Noyce teaching requirement and still teaching
   __ Finished the Noyce teaching requirement and no longer teaching

6. Are you taking or plan to take a leadership role at your school? Why or why not? [e.g., please relate your teacher certification program/Noyce prepare you for the leadership role(s)]

7. Would you have chosen to teach if you had **not** received a Noyce scholarship? Why or why not?

8. How involved was your *teacher certification program and the Noyce program* in helping your search for the first teaching position after completing teacher certification? – Please provide specific examples.

9. What impact has your *teacher certification program* had in your teaching career (e.g., mentoring, general communication level, and overall connectedness?)

10. Please put a ranking number (1=most serious barrier, … 7=least serious barrier) in 2nd and 3rd columns of the following table to indicate barriers of **attracting** and **retaining** mathematics and science teachers at high-need schools

Barrier	Attract Teachers	Retain Teachers
Poor administrative support		
Heavy teaching load		
Lack of student motivation		
Low salaries		
Bad public perception		
Lack of parent respect		
Few teachers living in the community		

11. In reflecting on your teaching experiences in a high-need school,

(a) What are the most challenging aspects?

(b) What are the most rewarding aspects?

(c) What are the most helpful aspects of *your teacher certification program and/or the Noyce program* in preparing you for the challenges of teaching in a high-need school?

12. What aspects of your teacher certification program could have been improved? [e.g., content-knowledge; teaching pedagogy; classroom management]