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Investigating the Influence of the CSU Robert Noyce Teacher Scholarship Program on College Students' Teaching Plans

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The Robert Noyce Teacher Scholarship Program (CRAFT-STEM) at Columbus State University offers academic and financial support for students pursuing secondary teaching certificates in STEM fields. In return, students commit to teaching in high-need K-12 school districts in Georgia. Here we provide preliminary results regarding influences of programmatic elements on students' reasoning to pursue careers in STEM teaching and to commit to teach in high-needs schools.

Noyce Scholarship Program

The National Science Foundation's Robert Noyce Teacher Scholarship Program provides funding to institutions of higher education to help address "the critical need for K-12 teachers of science, technology, engineering, and mathematics (STEM) by encouraging talented STEM students and professionals to pursue teaching careers in elementary and secondary schools" (National Science Foundation, 2010).

Selection Criteria. Juniors, Seniors, and Post-Bac students with a minimum GPA of 3.1 may apply. They must demonstrate dedication to teaching and an ability to complete the academically rigorous program. Applications include an essay stating why they want to teach STEM.

Scholarship Awards. To date, 18 students have been awarded a total of 23.5 academic years of scholarship to pursue a degree in math or science along with a teaching certificate. Of these 18, 6 have graduated and 4 are completing their requirement of teaching in a high-need school.

Commitment. Scholars participate in Teaching Connections Seminars, Summer Honors Camp, tutoring, peer instruction, and other service learning experiences. For each year of award, they commit to serve two years in a high-need school district.

Teaching Connections Seminars. Pre-service Noyce Scholars meet monthly to discuss issues related to teaching STEM in high-needs schools and to explore connections to high school topics they will teach. Emphasis is placed on preparing Scholars to teach in high-needs schools.

Literature Review

Influence of the Scholarship. Liou, Kirchhoff and Lawrenz (2010) surveyed 555 Noyce scholars and found that participants perceived the Noyce program more as a means to completing a teacher certification program than as a factor influencing their decision to become a teacher. Additionally, the scholarship was influential in participants' initial decision to teach in a high-need school but less of a factor in their decision to remain in that type of setting. These findings suggest that the Noyce scholarship supports those who are already committed to teaching, but not necessarily in a high-need school.

Teaching Commitment & Retention. Darling-Hammond and Sykes (2003) noted that consideration of candidates' commitment and perseverance may be an important component of an effective scholarship program. Other researchers have reported a significant relationship between commitment and teacher retention and job satisfaction (Coladarci, 1992; Day, 2005). Eick (2002) compared pre-service teachers that began as education majors vs science majors, and found that those motivated to impact students were more likely to persist in teaching careers. Identifying the types of motives that underlie teacher candidates' career decision may be an important factor in retaining teachers, since adaptive motives may lead to a long-term commitment to the profession while maladaptive motives may lead to a short-term commitment.

Case Selection & Methods:

All Noyce applicants who had completed at least one year in teacher education during 2010-2014 were invited to complete a questionnaire regarding the impact of the Noyce Scholarship Program. A thematic analysis of returned questionnaires and original scholarship applications were used to identify two cases to better understand the trajectory of the impact of the scholarship: a graduate who was teaching in a high-needs school and a current student. Data was collected by an additional questionnaire, a 45 minute interview, and follow-up clarifying questions via telephone interviews, and thematically analyzed and compared to all data collected for all Noyce applicants.

Case I: Adams -- A Current Scholar

Adams loves science. Adams entered college with no desire to pursue science teaching, but found himself on a path leading to a teaching certificate and a job in a high-needs school.

Pre-Teaching Teaching Experience. For Adams, who entered college determined to earn a science degree, there was one specific catalyst that moved him to make this change: tutoring peers on campus. For Adams, tutoring began as just a job, a means for earning a little money to make things easier. Tutoring was a good fit because he loved the content and knew it well, but he had no idea that becoming a science tutor would "change [his] life." Adams enjoyed sharing his content knowledge with other students and was most pleased by the positive evaluations he received as a tutor, which he states were "the first and main reason why I want to be a science teacher." This pre-teaching experience along with strong STEM mentors from high school put him on the path to Secondary Science Education.

While Adams is excited about pursuing a teaching certificate and is firmly committed to teaching at a high-needs school to fulfill his obligation to the Noyce Scholarship, he does not believe his future lies in education.

"I do not wish to pursue education at all....teaching for me has really only been, I don't want to say the 'back up plan' because I like teaching, but at the same time I'm getting a teaching degree for job security."

Adams plans to teach for only the required amount of time and then moving on to a Masters in science.

Influence of the Scholarship. For Adams, the Noyce Scholarship did not influence this student to consider teaching as a career since his decision was made prior to his application. He believes the scholarship had a positive effect on his capability to pursue teaching by academically preparing him to teach in a high-needs school. Adams thought the Noyce Connection Seminars helped him more than the UTeach curriculum alone to see "the different aspects of what it is like to have your own classroom and teaching." Of the seminars he states:

"Oh I definitely would not think as much about implementing high-needs children into my lessons."

The financial benefit also allowed him the freedom to commit more time to his education. "It made it easier to just focus on all my education courses and it really has been a blessing." While the scholarship has been successful in securing the commitment of this student to fulfill his obligation in a high-needs school, it looks as if continuing in a teaching career beyond the commitment is unlikely.

Case II: Ford -- A Noyce Graduate

Ford successfully completed his degree and was in his first year teaching at a high-needs K-12 school in Georgia. Ford loves science, but teaching was always a consideration, not an afterthought. While he did consider teaching, it was not his first endeavor when it came to higher education. He chose a degree path in research chemistry because there were many options:

"I could go to med school, I could go to vet school, I could go into teaching, or work in industry with an undergraduate degree."

Pre-Teaching Teaching Experience. While completing a science course requirement, Ford was approached by his professor, who was involved with UTeach, and encouraged to explore a teaching career in the UTeach Step 1 introductory course. Since tuition was reimbursed with a passing grade, Ford thought "why not?" and took a step toward a career in teaching. While Ford had no doubt in his mind that he would one day turn his love of science into a career, he needed the push to explore the world of science education. He became committed when conducting a homeschool science lab as part of his UTeach requirements:

"It was then that I realized, I really wanted to go into teaching because I thought it was really cool to see students learning content."

Influence of the Scholarship. Ford applied for and was awarded the Noyce Scholarship his last two years at CSU. With a firm commitment to teaching at that time, he does not believe the scholarship influenced him to become a teacher. Instead, he credits the seminars for preparing him to teach in high-needs school and the scholarship for supporting him financially so he could "really focus" on his student teaching.

"The money was essentially there to help me...pay for any other expenses and it is really what got me through student teaching. That was one of my worries that I had. How am I going to pay for student teaching because that is five or six months that you can't work?"

While Ford does love his content area, it is most important to note that teaching was always a consideration when he thought about possible future careers. For him, science and teaching go hand-in-hand and are not separate career steps. He believes his "passion for science fueled [his] desire to become an educator" but it is with equal passion that he approaches education. After completing his obligations to the Noyce Scholarship, Ford intends to pursue an M.Ed. and continue to educate himself in ways he can best serve his students.

Findings & Implications

The primary goals of the Noyce Scholarship are to recruit students into STEM education fields and to ensure that these students make and hold commitments to teach in high-needs K-12 school districts. However, our case studies revealed:

- **Timing of scholarship awards did not recruit teachers.** Requirements for scholarship application include the stipulation that students must be within two years of completing a degree in math or science and a secondary teaching certificate, and both cases had already committed to teaching when they applied.
- **Pre-Teaching Teaching Experiences did recruit teachers.** Tools such as the tuition-reimbursed UTeach courses that imbed pre-teaching experiences or teaching internships at summer camps may be more effective strategies that support recruitment.
- **Teaching Seminars influence commitment to high needs schools.** The Noyce Scholarship does prove effective results regarding the production of high-needs teachers as each case study examined here was, at the very least, committed to fulfilling this obligation. Long term retention of teachers may be problematic.
- **Scholarships provide critical financial support.** Funding mitigated financial burdens of students, and both cases explicitly noted that the scholarships allowed them to focus more on developing as teachers during this critical period.

These cases are consistent with the findings of Liou, et al. (2010) that the scholarships were more likely to impact decisions to teach in high-needs schools.

Future Study

A longitudinal study of these cases is needed to verify the success of the Noyce Scholarship in placing and retaining STEM teachers in high-needs schools and to better understand the relationship between the Noyce program elements, teacher retention, and job satisfaction (Coladarci, 1992; Day, 2005; Eick, 2002). To date, while we have successfully placed students in high-needs schools, none have had enough time to complete their commitment in full. In addition, a questionnaire should be developed using these findings to collect large scale data to determine the influence of Noyce scholarship funding and provide generalizable findings.

Valuable information would be gained by exploring the most effective use of Noyce Scholarship funds. Since in these cases, the scholarship is ineffective in recruiting students that have not previously made the commitment to teach, implementing a revised timeline may be beneficial. To be considered a teacher recruitment tool, the scholarship program may be more effective if it reached students prior to their junior year and/or support pre-teaching teaching experiences. While students did not find that the scholarship influenced their decision to teach, it did make them more capable of reaching their goal and teaching in high-needs schools. Additional research is needed to identify the level of academic and financial support required as well as a timeline for optimization.