

# Noyce Scholars and Their Educational and Career Aspirations at TAMIU

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**Abstract** This presentation attempts to examine the distinction between the educational and career aspirations among Noyce scholars at Texas A&M International University (TAMIU), Laredo, Texas. In addition, data collected throughout the last three years of the program will be reviewed together with the progress the scholars have made so far. Positive expectations on these matters together with scholarship experience will definitely lead to positive outcomes and the attitudes for them to succeed in becoming successful high school mathematics teachers. The investigation of these positive outcomes and attitudes from the scholars' participation, through extensive research, is essential for the continued success and growth of the Noyce Program in progress.

**Keywords:** Noyce Scholarship Program, career aspirations, educational

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## 1. Introduction

First, we define a few words that are frequently used throughout the paper. Aspiration: "A students' ability to identify and set goals for the future, while being inspired in the present to work toward those goals" [1], Educational aspiration: "Educational aspiration is defined as when the aspirational goals relate to educational achievement" [1], and Career aspiration: "Career aspiration is defined as when the aspirational goals relate to career achievement" [1].

As the themes of this discussion, educational and career aspirations often revolve around the ambition and inspiration of the student. Quaglia and Cobb [1] define ambition as "the perception that an activity is important as a means to future goals." Students are more ambitious in obtaining their personal goals when they have a desire to achieve the desired outcomes. Quaglia and Cobb further asserted that "inspiration reflects that an activity is exciting and enjoyable to the individual and the awareness of being fully and richly involved in life here and now" (p. 130). Hence, ambition and inspiration are critical components of aspiration because ambition and inspiration provides the desire to work and direction for the work, respectively. Aspirations can be influenced by the interaction between personal factors, such as ability and self-efficacy, and environmental factors, such as peer influence and school setting [1]. Generally self-concept, also known as self-esteem, is an example of a personal factor that is related to aspiration. Rinn [2] states that self-esteem comprises all of the information we know about ourselves and is an interpretation of that information.

In theory, the higher the level of aspiration that the student has, the higher the self-esteem of that student. As it relates to college students, research has consistently indicated that self-concept increases in college students of all ability levels throughout their college years. College students' increase of self-concept may be attributed to age or an increase in knowledge, maturity and/or achievements. Therefore, the increase in college students' self-concept throughout their college years may promote an increase in both educational and career aspirations during that same timespan and beyond.

We can all agree that having positive educational aspirations can have a positive impact on student lives. A greater desire for career aspirations predicts career attainment later in their lives [3], even after their career curiosity dies down [4]. As Greene [5] highlighted, career attainment has a major reflection on people's lives if they spend 30-35 years on average in the same careers. The study of career aspirations together with the study of educational aspirations is a critically important avenue to pursue, as Rinn [2] noted.

Kerr and Sodano [6], citing their previous research studies, have also noted that:

Despite the choice of nearly 200 college majors, more than half of the high-scoring students in 1988 crowded into just five majors: business, engineering, communications, pre-med, and pre-law. Among students who scored perfectly on sub-tests of the ACT—indicating an extraordinary grasp of English, mathematics, social studies, or natural sciences—relatively few expected to major in their area of great expertise. Instead, these students chose pragmatic, applied majors associated with high-salary, plentiful jobs. (p.173)

This disparity between students' aptitudes and their chosen career paths indicates that additional guidance from faculty and peers is in fact needed. The extra guidance could help them choose a career path that is more in line with their interests and abilities equally.

Positive expectations on matters unique to the program of study will definitely lead to positive outcomes and the attitudes for students to succeed in becoming successful high school mathematics teachers as projected from the Noyce Scholarship Program. Addressing these components in a timely manner will lead to a national approach that reaps maximum benefits expected from the programs. In general, the program will enable recipients to attain both educational and career successes in higher education. Herzberg's work considered motivation into two factors that include motivators and hygiene [7]. Motivator factors, such as achievement, attainment, success, and appreciation, will result in job satisfaction. Bridging the initial career aspirations to the eventual lasting success of becoming mathematics teachers hinges on the students' motivations and positive expectations. In a typical college course, student motivation, engagement, and achievement are expected to be high in the course and will help them to earn a better grade. In a scholarship program, similar achievements are expected. Focus on these factors is vital and, at the same time, is of prime importance for the educational development of each student.

### 1.1. More from Literatures

Quaglia & Cobb [1] define aspiration as a students' ability to identify and set educational and career goals for the future, while being inspired in the present to work toward those goals. These educational and career aspirations can be influenced by three rudimentary factors, which include: academic aptitude or ability, available resources, and interpersonal relationships. Such factors are incorporated, in one aspect or another, with the Noyce Program at Texas A&M International University (TAMU). TAMU Noyce Program is a multi-faceted program designed to provide the participants with the resources and support required for becoming a highly-qualified and certified mathematics teachers that will serve high-need areas, while encouraging and inspiring their students to pursue their own studies in the mathematics field.

Comprehending the distinction between the educational and career aspirations among TAMU Noyce scholars would be an instrumental asset for enhancing and expanding the programs' overall effectiveness and quality, however, this task has shown to be very arduous. Most of the research on students' career and educational aspirations has been directed towards middle and high school, while some research has been conducted at the college level [8]. In addition, little to no research has been conducted on Noyce scholars' educational and career aspirations. Due to the lack of research, elucidating the correlation between the influencing factors of educational and career aspirations of the Noyce scholars' with the assistance given to them by the Noyce Program would be the most plausible method for understanding the distinction between these aspirations.

The rigorous selection process of ensuring the most qualified applicants are selected for the program at

TAMU is based primarily on their aptitude. Aptitude, an indicator of the students' academic ability, is most often measured by standardized test scores (ACT, SAT, THEA, etc.) and overall GPA [9]. Upon admission to the program, necessary resources will be provided to them to ensure success in obtaining their aspirations. Resources, the capital involved in forming and realizing aspirations, are provided for the scholars, such as social and financial resources [10]. The program is designed so that social resources provided will bolster interpersonal relationships between peer scholars and faculty via providing scholars with numerous activities and intensive mentoring. Socialization is the process of acquiring knowledge, skills, and disposition by individuals to become effective members of society [11]. Weidman [9] argues the outcomes of undergraduate socialization during any particular time period are a function of the characteristics, values, and aspirations of the student and as they pass through the college years, the faculty become more salient agents of socialization, thus, they provide significant roles in assisting the students towards achieving their aspirations [12].

Financial resources that the program awards to the selected scholars include yearly grants throughout the program, with the strict requirements of the scholar to participate in mandatory boot camps and workshops. The scholar must also serve two years as mathematics teacher in a high-need school district for each year of the scholarship. The scholarship is an act of recognition, which is not itself a verbal recognition, rather, it is perceived by the recipient as a source of feeling recognized [7]. Thus, money "earned" (the scholarship) as a direct reward for outstanding individual performance, progress, and responsibility is a reinforcement of recognition and achievement [7]. Thus, recognition via financial resources is a major criterion for motivating the scholars to be highly engaged within the program while increasing their interest in the mathematics field, to maximize their performance and progress, and ultimately provide a direct path towards obtaining their aspirations.

### 1.2. TAMU Noyce Scholarship Program

The TAMU Robert Noyce Mathematics Scholarship Program (TAMU-NMTSP) in its fourth year has granted 31 awards. The primary goal of the program is to encourage talented students with strong mathematics skills to become math majors if they are not already. Moreover, students are encouraged to join this program designed to provide the students with intensive mentoring along with components which are highly enriched in mathematics content and pedagogy. Graduates of the TAMU-NMTSP will be highly-qualified, field-tested and certified mathematics teachers who will embark on the mission to serve the high-need student population in the South Texas region. To this end, the TAMU-NMTSP provides grants up to \$10,000 per year for students to graduate and teach mathematics grades 7-12 in a public or private school that serves students from high need areas. About 36 Noyce scholarships will be awarded throughout the program, as each scholarship supports selected junior and senior students up to two years. As of Spring 2018, the program has awarded 41-total awards as opposed to a projected

36-total awards expected. [Table 1](#) breaks down the scholarship distribution for past four years.

**Table 1. Scholarship award profiles: Fall 2014 to Fall 2018**

2017 – 2018: 10 Applications

Full year	Spring	Withdrew	Teaching	Graduated
4	6	0	0	0

2016 – 2017: 11 Awards

Full year	Spring	Withdrew	Teaching	Graduated
11	0	0	3	3

2015 – 2016: 10 Awards

Full year	Spring	Withdrew	Teaching	Graduated
5	5	1	5	5

2014 – 2015: 10 Awards

Full year	Spring	Withdrew	Teaching	Graduated
10	0	4	6	6

The TAMIU-NMTSP is a multi-faceted program focused on preparing undergraduate mathematics educators for their profession. As first year mathematics teachers are dealing with the inherent difficulties of making the transition from college student to becoming an educator [13,14] increasing the mentoring resources to help them adjust and deal with mathematics and teaching issues is very beneficial [15,16]. Therefore, there are several levels of mentoring integrated into this system to make this possible including a bootcamp, a well-planned orientation, and travel opportunities to attend teacher conferences. [Figure 1](#) below depicts that TAMIU Noyce scholars who attended an orientation held for the 2015-2016 cohort of scholarship recipient.

### 1.3. Recruitment Efforts and Summer Bootcamps

The data can be skewed as the selection of candidates must choose the high school mathematics teaching profession. In addition, the bootcamp is designed as a recruitment effort for the scholarship program. The

TAMIU Noyce Mathematics Summer Boot Camp (TAMIU-SMBC) is a weeklong program designed to provide enrichment opportunities to better prepare students for the experience of being a highly qualified mathematics teacher. This program has sessions devoted to both mathematics content knowledge and pedagogical approaches in mathematics instruction. Guest speakers include TAMIU and LCC faculty and highly qualified educators from local school districts. Participants will develop and present an inquiry based learning project during the camp. By participating in the TAMIU-SMBC, the scholarship recipients will get a head start on developing their teaching skills with their exposure to well-known classroom teaching practices, introduction to new classroom technology and how to incorporate it into a classroom as well as learning how to manage time wisely to maximize their potential for success. Additional sessions on admission processes and financial aid options will be provided by the Admissions and Financial Aid Offices. This camp is designed for rising sophomore, rising junior, and graduating senior college students from LCC and TAMIU who are interested in pursuing certification in 7-12 Mathematics.

### 1.4. Student Teaching Experience: Blocks I, II, & III

One reason for the scholars to be motivated for this noble profession is the experience they gain through the coursework on student teaching: blocks I, II, & III (EDCI 3301, EDCI 3304, EDSE 4350, & EDCI 4693). Interactions with the students in the courses leads them to complete the program on time and to become high school mathematics teachers. Learning supports students to be prepared in applying their knowledge and conceptual understanding to either problems or situations where the instructor directs and facilitates learning. Attending conferences provides an acceptance to this task. The classroom or fieldwork assists them through embedded activities such as case and problem-based studies, guided inquiry, simulations, or projects which are essential for this task [17].



**Figure 1.** TAMIU Noyce scholars attended an orientation held for the 2015-2016 cohort of scholarship recipients



**Figure 2.** Participants of the 3rd Noyce Summer Bootcamp completed the fractals (Sierpinski tetrahedron & Menger sponge), project.

## 2. Methodology

A survey monkey link was created and sent out to all past and current Noyce scholars and alumni of the program. The survey consisted of 10 questions to address the theme of the paper as appeared in the appendix. The data collected has been summarized, aggregated, discussed, and conclusions were drawn. In addition, the information of the current and past Noyce scholars and alumni has been tabulated to showcase the program not only to deliver financial assistance to students, but also provides the mentoring and preparation that is generally expected from the scholars to be a capable high school mathematics teacher in the high school mathematics classrooms from day one to their graduation.

The questionnaires in the survey focuses on several aspects. First, the survey questions their short term career aspiration, followed by long term career aspiration. Next, the survey focuses on the extent of their preparation for a high school mathematics teaching position throughout the experience in the program. Next, the type of training and development that includes specific technical training, leadership development, communication skills, etc. which are instrumental in reaching the goals beyond their bachelor's degree program, will be ascertained. Finally, the questionnaire focuses on how the Noyce scholar program served as a pillar or a springboard to their career aspirations and how relevant the program is to these aspirations. 22 responses were received for the survey and have been aggregated and summarized.



**Figure 3.** TAMIU Noyce scholars (P.A. Arias, R. Castillo, S.A. Duarte, N.A. Huerta, and F. Salazar) participated in the 2017 Western Regional Noyce Conference in Fresno, California on February 17-19, 2017

### 3. Data Analysis & Results

The information gathered from the survey has been aggregated and tabulated. Responses to the questions, 1-10 are provided below.

- Q(1). How long have you been in the program receiving funds? The data shows among 22 Noyce scholars participated in the survey the scholars have completed a total of 64 semesters of funding.
- Q(2). Identify your rank as freshman, sophomore, junior, senior or alumni? Fifty-five percent of those surveyed identified as seniors and 28% are considered to be those of alumni.
- Q(3). Previous positions/past experience if held:



■ Relevant to teaching ■ Other ■ None

Figure 4. Previous positions/past experience of the scholars

- Q(4). What is your short term career aspiration? Responses from scholars are below.

HS Math Teacher	Finish School	Grad School	Gain Experience	Passing TEXES	HS Administrator
100%	30%	25%	20%	20%	15%

- Q(5). What is your long term career aspiration? Responses from scholars are below.

Continue to be a teacher	Graduate school	HS Administrator
68%	21%	11%

- Q(6). Do you think you have prepared for a high school mathematics teaching position? If no, please explain. In fact, all who have responded indicated that all of them are prepared for this career position.
- Q(7). When do you plan to graduate? According to the survey data, about 23% planned to graduate in Spring '17, 35% in Fall '17, 18% in Spring '18, and 24% in Fall '18. No responses for Spring '19 and beyond were reported.
- Q(8). Are you willing to relocate out of Webb County for work? In response to this question in the survey, about 86% responded their willingness to relocates as opposed to 14% who do not.
- Q(9). What type of training/development (i.e. specific technical training, leadership development, communication skills, etc.) do you need to reach your goals beyond your bachelor's degree program?
- Q(10) What would you tell someone if they asked you how the Noyce scholar program served as a pillar or a springboard to your career aspirations and how relevant is it to these aspirations?

Regarding the previous positions or past experience of scholars if held, the scholars indicated that 64% of them have done something relevant to teaching, 14% of them held other positions, and 22% responded saying done nothing. As for their short term career aspiration, 100% preferred high school teaching, 30% wanted to finish the school, and 20% wanted to engage in gaining experience. In response to their long term career aspiration, 68% responded to say they would like to continue high school teaching, 21% want to seek graduate school, and 11% plan to be school administrator. Almost every scholar indicated that they are prepared for mathematics teaching. As to their graduation from the program, 36% of them plan to do so at the end of Fall 2017 and 24% plan to graduate in Spring 2018.

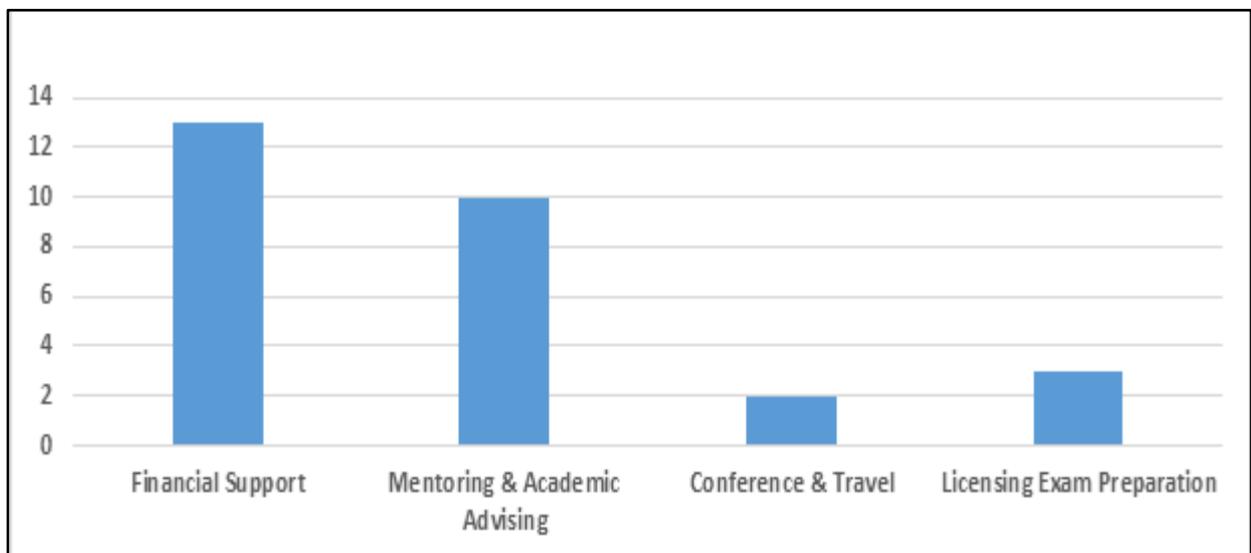


Figure 5. The extent of the relevancy of the Noyce program to the aspirations

## 4. Conclusions

TAMIU Noyce Scholarship program is already well into the fourth year of program implementation. With about two years to go, the program intends to achieve all objectives as concluded from this presentation. This is a short survey intended to provide a glimpse of the situation. The short term goals appear to meet the scholarship expectations to become high school teachers and 60% of which would like to continue the same in the long run. It is apparent that the full implementation of all components of the program has in fact served the population at large. However, more data is needed to conclude the findings to support the claims significantly.

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The preliminary work of this project has been presented at the 2017 Noyce Summit: “Stimulating Research and Innovation for Preservice Education of STEM Teachers in High-Need Schools” co-hosted by American Association for the Advancement of Science (AAAS), Education and Human Resources Program (EHR), and National Science Foundation (NSF) Division of Undergraduate Education (DUE) held on July 19-21, 2017, in Washington DC.

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## Appendix

### Noyce Educational and Career Aspiration Survey Department of Mathematics and Physics Texas A&M International University May 2017

We, the Noyce scholar program at TAMIU, are developing a survey to examine the distinction between the educational and career aspirations among Noyce scholars currently at Texas A&M International University, Laredo, Texas. Your participation in this survey is greatly appreciated. Please check as appropriate.

1. How long have you been in the program receiving funds?
  - 1 semester
  - 2 semesters
  - 3 semester
  - 4 semesters
  - 5 semesters

2. Identify your rank as freshman, sophomore, junior, or senior.
  - Freshmen
  - Sophomore
  - Junior
  - Senior
  - Alumni
3. Previous positions/past experience if held:  
\_\_\_\_\_
4. What is your short term career aspiration?  
\_\_\_\_\_  
\_\_\_\_\_
5. What is your long term career aspiration?  
\_\_\_\_\_  
\_\_\_\_\_
6. Do you think you have prepared for a high school mathematics teaching position? If no, please explain.
  - Yes
  - No \_\_\_\_\_
7. When do you plan to graduate?
  - Spring '17
  - Fall '17
  - Spring '18
  - Fall '18
  - Spring '19
  - Fall '19
  - Other
8. Are you willing to relocate out of Webb County for work?
  - Yes
  - No
9. What type of training/development (i.e. specific technical training, leadership development, communication skills, etc.) do you need to reach your goals beyond your bachelor's degree program?
10. What would you tell someone if they asked you how the Noyce scholar program served as a pillar or a springboard to your career aspirations and how relevant is it to these aspirations?  
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