

## Project Description

### Introduction

The Northern New Mexico College (Northern) Phase1 Noyce Scholarship Program is designed to recruit, prepare and successfully induct undergraduate engineering, biology, math and environmental science majors into the secondary science teaching profession. As part of the goal of serving the north-central region of New Mexico, Northern must produce knowledgeable, highly qualified teachers. This is especially important for teachers of science, who must possess both in-depth knowledge of their field and solid teaching skills in order to be highly effective teachers. The Noyce Scholarship Program will support 44 STEM students and 33 STEM professionals (career-changers) preparing to teach science and mathematics in 7<sup>th</sup>-12<sup>th</sup> grade classrooms in northern New Mexico's high-need local school districts. The five-year program will include four cohorts of 4 students who will receive three years of scholarship support beginning in their junior year and proceeding through the completion of the certification. Three STEM professionals will receive one year of scholarship support in each of the five years of the grant. For each year of support that a STEM student or STEM professional receives, he/she will commit to teach in a high need school for two years.

The College serves the needs of the vast, sparsely populated region of northern New Mexico. Its service area covers a 36,000 square mile swath of north central and north eastern New Mexico. It is close to a 200 mile drive from the northern environs of Albuquerque to the villages of Chama or Costilla, and more than 200 miles by road from the edge of the Jicarilla Apache reservation in the west to the Texas state line in the east. This tri-cultural region is home to 397,986 people (2004 Census estimates); roughly 235,000 (75%) are Hispanics and 55,000 (7-9%) are Native Americans. Aside from geographic isolation and rurality, poverty is also a significant challenge; 21% of our residents live in poverty (compared to 17.4% for the state and 12.6% for the nation (Regional Economic Development Initiative REDI, 2009).

Founded in 1909 as the "Spanish American Normal School at El Rito," Northern was designed to be and has always been a Hispanic Serving Institution. Its defined mission in the New Mexico Constitution was to produce bilingual teachers for northern New Mexico. Though hampered by chronic underfunding and inattention, Northern has nevertheless continued to evolve – from a secondary boarding school to a vocational training school to New Mexico's first community college in 1977, and finally to a baccalaureate degree granting institution in 2004. The primary challenge for the college is to address poverty, the most insidious barrier for the students in this region. Northern's mission is "to provide accessible, affordable, community-based quality learning opportunities that meet the educational, employment, and enrichment needs of our culturally diverse region." The purpose of this request for funding is to make this mission statement a reality by offering scholarships to dedicated, qualified students in the science programs. With both financial and institutional support, these students will be able to make their academic pursuits a priority and prepare themselves for a teaching career. This will improve their quality and life, the lives of their families and, ultimately, the communities in which they live.

Northern has a total enrollment of 2,481 students. Before taking the initial step to a degree in higher education, most of our students have faced and overcome significant barriers. A typical Northern student has an average income of \$18,017 and lives in an area of 10.2% unemployment (REDI, 2009). Most (83.4%) qualify for financial aid and (79.3%) are the first

generation college students. Since no role models exist for the pursuit of a college degree, often family members fail to grasp their son or daughter's need to dedicate time to prepare for classes. As a result, many must either steal time for studying or defy the embedded resistance to continue an education beyond high school. More than likely they are, out of necessity, employed in full-time or part-time jobs. A third of them are single-parents and susceptible to the parental pressure of providing child-care and fulfilling the enormous responsibilities that accompany single-parenting. Because of the isolation of this region, men and women who aspire to a college degree and a teaching career, and are striving to transcend the boundaries of minimum wage and dead-end jobs, Northern is the only way out. Funding of our Noyce Scholarship proposal is this institution's attempt to provide such as way.

Through the Northern-Noyce Scholarship Program, undergraduate science majors will be given the opportunity to explore teaching as a career through seminar classes and summer internships. These opportunities will provide science majors interested in becoming teachers a chance to work with the college faculty and local science teachers and to teach in a classroom. Drawing upon the foundations set by previously successful collaborative projects between the Colleges of Education and College of Engineering (e.g. University of Texas and University of Colorado), the goals of the program are to: 1) recruit future science teachers into the profession; 2) improve the preparation of these teachers; 3) provide a venue for collaboration and involvement of science and education faculty invested in the success of their students; 4) provide professional development and induction support for beginning science teachers; and 5) improve the pedagogical content knowledge of secondary science teachers that graduate from Northern

Building on the collaborative relationships at Northern between the College of Education, the College of Engineering and the College of Math and Science, the Noyce faculty team will be made up of faculty members representing each science department involved. The team will make awards on a competitive basis. Through the program, our Noyce scholars will receive: 1) a stipend to continue their science major program while preparing to become science teachers; 2) a mentor network system (Northern faculty members and local secondary science teachers); 3) a peer network system; 4) access to professional development workshops; and 5) ongoing induction support after the Scholar begins teaching. Each Northern Scholar will be tracked in order to monitor progress and success through the program, as well as the fulfillment of the commitment to teach after receiving certification.

Recruitment efforts for the fifteen Noyce Scholarship Program-Career Changers will include the expansion of our service area to include the more densely populated region including the city of Albuquerque and its surrounding suburbs (pop.535,239). Located 55 miles south of the city of Española, Albuquerque has been severely impacted by the economic downturn. Manufacturing and industry combined are down by 27 percent (4,000 jobs) in 2009 from 2006. Construction is in its third year of decline of over-the-year losses, falling 12.5 % or 3,400 jobs, and professional and business services also declined by 3,400 jobs. Retail trade was down 3,000 jobs and ended its lowest yearly average since 2002. For those individuals who have a background in the sciences and who are seeking a new career, our scholarship program offers them an opportunity to be highly competitive candidates when applying much sought after positions as science teachers in the New Mexico public schools..

### **Results from Prior NSF Support**

#### **RECENT NSF AWARDS TO NMMC – Math and Sciences**

0855059 Parallel Computing to Promote Research and Education Opportunities at Northern New Mexico College CNS COMPUTING RES INFRASTRUCTURE 09/01/2009 Hira, Ajit NM Northern New Mexico Community College, Española; \$150,913.00 This program is not relevant to the current proposal, because it does not involve student scholarships.

0806469 Biological Sciences S-STEM Project at NNMCM DUE S-STEM: SCHLR SCI TECH ENG&MATH 08/01/2008 Chidambaram, K.C., Northern New Mexico Community College Española; \$598,000.00 This program is not relevant to the current proposal, because it does not involve scholarships to STEM students interested in teaching careers.

0757088 Advancing STEM Performance, Innovation and Retention (ASPIRe) DUE STEM TALENT EXPANSN PGM (STEP) 06/15/2008 Sena, Anthony NM Northern New Mexico Community College, Española; \$399,252.00 This program is relevant to the current proposal in the sense that students in the ASPIRe Program that are performing with excellence will be candidates for the scholarships under this proposal.

0353642 REU Site: Pipeline for Undergraduate Student Horizons (PUSH) DBI RSCH EXPER FOR UNDERGRAD SITES 08/01/2004 Sena, Anthony NM Northern New Mexico Community College, Española; \$384,912.00 This program is not relevant to the current proposal, because it does not involve students scholarships, and has expired.

**Collaboration between Northern and Local School Districts**

The four primary district partners providing the core placement sites for Northern College of Education teacher candidates are Espanola Public Schools, Los Alamos Public Schools, Pojoaque Valley Independent Schools, and Taos Independent Schools. The summary below reflects the diversity of the schools.

**Table 1: Comparisons of the Primary School Districts**

District	Income	Ethnicity			Population (2000 census)
		Hispanic	White	Native American	
<b>Espanola</b>	\$32,158	84.00%	11.80%	6.0%*	35,000
<b>Los Alamos</b>	Not Reported	12.21%	89.13%	0.7%*	11,909
<b>Pojoaque</b>	\$31,179	62.17%	52.10%	10.1%*	1261
<b>Taos</b>	\$33,564	54.34%	68.04%	5.6%*	4700

\*Information taken from *The State of Education in Northern New Mexico*, September 2008

The ethnicity category reflects the ethnic percentages of each population: for Espanola, the largest group is Hispanic; for Los Alamos, the largest group is White; for Pojoaque there is a ten percent increase of Hispanics over Whites; while in Taos, there is 14% increase of Whites over Hispanics. Note the percentage of Native Americans for each District.

Three of the four primary sites' income levels are essentially within the same range. Los Alamos did not report its median income. It is the only district that lists the educational level of its residents: “New Mexico's best educated community, proportionately, with 68.6% of adult

residents (25 and older) holding an associate degree or higher, and 62.1% of adults possessing a baccalaureate degree or higher (2000 Census).”

Northern’s College of Education (COE) has developed several highly effective partnerships, including one with the Northern New Mexico Network of Rural Education. The NNMNRE has been in operation for thirty plus years and has been the recipient of several NSF projects. Currently, the NNMNRE has a Teacher Quality Enhancement Program grant with Northern as the primary partner. One of the objectives of this grant is to create and sustain Professional Development Schools (PDS) across northern New Mexico. The partnership also provides Professional Development Schools training and support for Los Alamos, West Las Vegas, Espanola and Taos School Districts. In School Year 2007-08, 5 PDS sites were established and training for 20 Master Mentor Teachers was initiated. The master mentor teachers will provide a highly qualified cadre of mentors for teachers entering the profession from Northern’s College of Education.

Northern also has a grant from the Department of Education’s Office of English Language Acquisition. The Esperanza Project is a project designed to educate bilingual and Teaching English as a Second Language (TESOL) teachers for the public schools. As stated before, the English Language and Learning (ELL) population in the schools are often the subgroup that keeps schools from making Adequate Yearly Progress in math and reading. The Esperanza Project is infusing all areas of the College of Education with an increased awareness of the methods and materials that will help teachers effectively help students become proficient through effective linguistic strategies.

**Table 2:** Current reading and math scores in sample local school districts:

Reading and Math Scores for Collaborating Local School Districts	Espanola Middle School/ Espanola Valley HS	Pojoaque Middle School/ Pojoaque HS	Taos Middle School/ Taos HS	Los Alamos HS
Reading	25.2%/59.9%	47.8%/ 39.6%	35.9%/40.9%	73.4%/75.1%
Math	4.9%/21.7%	23.6%/23.5%	14.2%/35.3%	73.8%/71.0%

*CCSSO: School Matters: school data direct, 2009*

**Description of Teacher Preparation at Northern**

The College of Education at Northern offers an Elementary BA Program and a highly regarded Alternative Licensure Program for secondary teachers. The students who utilize the Noyce Scholarship Program will be taking robust education courses in the Alternative Licensure Program. These courses are designed to give students the opportunity to implement educational theory through practica, to understand the needs and developmental characteristics of adolescent learners and to learn to teach using strategies that are geared to advance the academic understanding of English Language Learners who comprise a majority of students in northern New Mexico.

Candidates are expected to demonstrate proficiency in knowledge, skills and dispositions, as listed in the Conceptual Framework. These knowledge principles are taken from the *New Mexico Entry Level Teacher Competencies*, and are aligned with the *Interstate New Teacher Assessment and Support Consortium Standards* (INTASC). (The Interstate New Teacher Assessment and Support Consortium is an organization that has developed nationally-recognized standards for teacher education.) The Conceptual Framework also lists two skills as integral to the development of effective teachers: (1) the implementation of technology as a tool for learning and teaching, and (2) assessment for and of learning, including skills in designing, implementing and adjusting lesson, unit, and integrated plans to develop effective learning experiences.

The dispositions that the COE expects candidates to develop and implement include ethical behavior and a belief that all students can learn. Teacher candidates are expected to adhere to the high ethical standards that are inherent in teaching and necessary for earning the respect of students, colleagues, parents and community members. (Ethical behavior is defined in the *New Mexico Code of Ethics*.) Teacher candidates learn about child and adolescent development and educational psychology to ensure their understanding that all students can learn. Teacher candidates learn sensitivity to community and cultural norms while learning to work collaboratively with students, colleagues, parents and the community, to ensure success for all students.

Teacher candidates are expected to demonstrate an understanding of diversity in learners from cultural, gender and interest diversity to diversity in learning ability and style. Teacher candidates learn to recognize student diversity and create an atmosphere conducive to the promotion of positive student involvement and self-concept.

The College of Education has developed a practical philosophy concerning math and science education. In addition to 12 lab science credit hours and College Algebra in the core classes of the BA program, the COE has developed 5 more courses in math and science that will help their future students in the schools become proficient in both areas. This is a departure from most teacher education programs that require only one course in mathematics for elementary teachers. One of the most effective elements of the Alternative Licensure Program is the highly qualified status of candidates because of their degree status in a content area. These candidates 'learn teaching' but do not have to be taught the content. There is no substitute for high quality content knowledge.

The need for a viable and sustained scholarship program for students in northern New Mexico, specifically at Northern is evident in the light of the critical need for quality 7-12 teachers in the areas of math and science, the results of a national assessment of students' mathematical skills and knowledge as well as national reports on the status of education commissioned by national education councils. Such need was also cited by a committee convened by the Office of The President as well as the mediocre performance of New Mexico students the previous 4 years on the mathematics subtest of the New Mexico Standard-Based Assessment (NMSBA).

### **Collaboration with Education Department and STEM**

The College of Education at Northern has a strong history of teacher preparation providing a comprehensive program that includes a general education, practicum and pedagogical framework. Collaborative initiatives set up with the local school districts provide

the candidates with access to a variety of diverse settings and levels in an environment with commitment to diversity and assisting all students to become successful. As described throughout this proposal, Northern faculty and administrators recognize that teacher education is not the exclusive responsibility of the College of Education, but the high-quality science educator preparation must include collaborative efforts from both college schools of education and content faculty. Additional evidence of the collaboration between the College of Education and the Colleges of Engineering and Math and Science is the hiring of a Scholarship Coordinator to work across academic units to ensure the successful implementation of the Northern-Noyce Scholarship Program.

### **The Northern-Noyce Scholars and Internship Program**

The Northern-Noyce Scholars Program is designed to enhance the secondary science teacher preparation program at Northern, which currently does not have options for students considering a teaching career after declaring a major and beginning a program of study outside of the College of Education. This program provides a path to secondary science teacher licensure while allowing a student to finish their in science, without having to change majors. By introducing the Northern Noyce Scholars Program into the strong secondary teacher preparation program, we are providing a more flexible licensure pathway to an ever-changing diverse population of degree seekers of Northern New Mexico. Building upon strong collaboration between the College of Education, the College of Engineering and the College of Math and Science, students who participate in the program will have opportunities and support that will provide the high quality pedagogical knowledge, content knowledge and pedagogical content knowledge essential to becoming a successful secondary science teacher.

With this model we expect to have roughly four (4) students in the first cohort of Noyce Scholars and roughly eight (8) students in the other two cohorts during the 5-year duration of the program, which totals approximately 44 new science teachers certified through this new track of the Northern secondary teacher education program. While this does not completely address the shortage of science teachers, it does provide a new infrastructure in the Northern secondary teacher education program targeted to address the growing need in the state.

### **Foundations for the Success of Northern-Noyce Scholars Program**

In order to ensure that the Noyce Scholars are successful throughout the licensure program and into the classroom we have based the program on five main foundations:

- 1. A Strong Secondary Teacher Education Program:** In order for this program to succeed it needs to be situated within the successful infrastructure the Northern College of Education has established. Noyce Scholars will be immersed within and interact with students and faculty within this program.
- 2. Ongoing Science-specific Collaborative Network Support System:** This program is different than the traditional pathway to secondary science licensure. Therefore a strong support system needs to be in place for Noyce Scholars to succeed. This network system is collaborative between the Scholars, science and education faculty and mentor teachers.

Avenues for support through the program include a dedicated space for Noyce Scholars to meet as a group to develop a peer support system; an online support system for the Noyce Scholars to interact with each other, their mentor teachers and college faculty; and Seminar courses where Noyce Scholars can reflect on their content knowledge and developing

pedagogical knowledge with each other, faculty and mentor teachers, extending into their first years of teaching.

**3. Commitment to Inquiry-based and Diverse Teaching and Learning:** The faculty involved in the Northern-Noyce Scholar project support research based inquiry teaching and learning in science. This commitment permeates through all courses the Noyce Scholars take through the program.

**4. Strong Induction into Teaching: Inquiry and Experiential Learning:** We will offer science-specific Seminars which give the Noyce Scholars an opportunity to continue relationships with each other, the faculty team and mentor teachers as they begin teaching in their own classrooms. To facilitate and enhance experiential-based learning, we are requesting funds for teaching materials and supplies to be used by our Noyce scholars in local junior highs and high schools. Much of the inventory will include equipment and materials to set up laboratory experiments for hands-on learning. Due to the lack of resources in our local schools much of the equipment and supplies are broken or outdated. Our goal is to provide our scholars with a quality education and the instruments to implement their knowledge.

**5. Support of Faculty and Administration:** This program would not be successful without the support of the faculty and administration and the institutional leaders in the Colleges of Education, Engineering, and the College of Math and Science. Monitoring of the Northern-Noyce Scholarship Program will be the charge of the Program's Steering Committee, chaired by Dr. Anthony Sena, Provost. Dr. Sena is also a senior faculty member in the College of Math and Science. The Steering Committee also includes Dr. David Torres PI; Dr. Catherine Berryhill, Co-PI; Dr. Ivan Lopez, Co-PI, Dr. Fangyang Shen, Co-PI. This group is charged with broad responsibilities, including oversight or program design and modifications of that design as needed, review of funding opportunities and monitoring of program evaluation.

### **The Noyce Scholar Track to Secondary Science Licensure**

Students will be introduced to the Northern-Noyce Scholars Program in their first two years at the college. Students who may be interested in teaching will be able to explore the profession through low-risk paid summer internships and a seminar course offered during each semester. Through these opportunities, 1<sup>st</sup> year (Freshman) and 2<sup>nd</sup> year (Sophomore) science majors will be provided with early teaching experiences with middle school children before making the commitment to the program. Students will be recruited into the Noyce Scholar program from the early field experience summer internship, seminar course and those enrolled in the introductory science major courses.

Noyce Scholars will typically begin the full program in the first semester of their 3<sup>rd</sup> year (Junior). Since the Noyce Scholars will be enrolled in or have completed courses related to their science major when they begin the program, the required area of focus courses for the secondary science education program will be completed, or scheduled to be completed by the end of their 4<sup>th</sup> year. Following the general education course requirement, Noyce Scholars will also have completed the majority of the general education course requirements. Therefore, the only courses the Scholars will need to add into their schedules will be the required education courses. By beginning the Northern-Noyce Scholars program in the first semester of the 3<sup>rd</sup> year of their science major program of study, science undergraduate students will have the ability to complete all secondary science licensure requirements for the College of Education and the State of New Mexico by the completion of a 5<sup>th</sup> year of coursework. Students who begin the program in this

way will be eligible to receive up to three years of scholarship support. A student may enter the program later in their degree program; however, it will be understood that the program will take longer than one year past their 3<sup>rd</sup> and 5<sup>th</sup> year of attendance at Northern.

There are four seminar courses designed specifically for and offered to Noyce Scholars provided by this program. The design and implementation of these seminars are fully supported by the program’s Faculty Team (Program PI and four Co-PI’s) as well as faculty members of all colleges involved. Mentorship in all Seminars is ongoing. The Seminar 1 and Seminar 2 courses are modeled after the UCTeach program at the University of Colorado (modeled after the University of Texas UT Teach program). Seminar One: Introduces science majors to teaching as a career by providing early science teaching experiences in local middle school and high school classrooms and introducing the theory and practice necessary to becoming highly-qualified science teachers. Seminar Two: Provides early teaching experiences in a local middle and high schools while allowing Noyce Scholars the opportunity to develop lesson design and inquiry-based teaching practices. A mentor teacher involved in this seminar provides support to the students as they design and deliver small lessons. This seminar emphasizes assessment of student learning. Seminar Three: Provides Noyce Scholars with faculty and mentor teacher support as the student’s have their first full semester of education courses. This seminar course is designed in such a way to ensure students are able to successfully complete these courses, while giving students a chance to connect the pedagogy to their science content courses. The Seminar Four: Offered as an on-going mentoring and support structure this Seminar is open to any Noyce Scholar enrolled in the program. This course will complement the induction programs in the local school districts.

**Table 3: Noyce Seminar Schedule**

Fall: Year 1	Seminar 1		Seminar 3	
Spring: Year 1		Seminar 2		Seminar 4
Fall: Year 2	Seminar 1		Seminar 3	
Spring: Year 2		Seminar 2		Seminar 4
Fall: Year 3	Seminar 1		Seminar 3	
Spring: Year 3		Seminar 2		Seminar 4
Fall: Year 4	Seminar 1		Seminar 3	
Spring: Year 4		Seminar 2		Seminar 4
Fall: Year 5			Seminar 3	
Spring: Year 5				Seminar 4

**Table 4: Course Map for Noyce Scholars to achieve secondary science teaching license**

Year/Semester	Course(s)	Northern-Noyce Role
Yr1 and Yr2 Fall/Spring	Lower division courses as required by program of study	Recruit into Noyce Scholarship Program Offer opportunity to participate in <b>Seminars</b>
Yr1 and Yr. 2 Summer	Summer Internship	Promote early field experience with local school districts
Yr 3 Fall	ED 401 Foundations of Education	Early field experience and introduction to science teaching theory and practice <b>Seminar Class 1</b>
Yr 3 Spring	ED 452 Pedagogy and Human Learning	<b>Seminar 2</b>
Yr 3 /Summer Yr 3/Summer	ED 492 Assessment and Evaluation of Student Learning	Any courses offered that might be missing from the transcript
Yr 4 /Fall	ED 462 Reading and Writing Across the Curriculum Secondary	<b>Seminar 3</b> Continue early field experience with high school students focusing on inquiry lessons
Yr 4/Spring	ED 474 Methods and Materials in Secondary Education	Extended field experience Take NMTA Basic Skill Test <b>Seminar 4</b>
Yr 4/Summer	Missing courses Submission and review of TEP portfolio Following graduation with a BA degree, students can officially apply to the Alternative Licensure Program and submit to a background search	Any required courses offered over the summer which may be missing on the transcript TE P portfolio submitted to faculty for review  Take NMTA Content Exam
Yr 5 Fall (ALP)	ED 498 Supervised Field Experience (Portfolio) And ED 498L Supervised Field Experience Lab	Student teaching Portfolio submission Noyce pays a stipend to the cooperating mentor teacher Take NMTA Professional Exam <b>Attend Seminar of choice</b>
Yr 5 Spring	ED 499 Special Topics in new teacher Mentoring	Noyce pays a stipend to mentor teachers to continue working with first and second year teachers. <b>Attend Seminar of choice</b>

### Recruitment Plan

Following the lead of other institutions that have implemented programs similar to this, we will recruit undergraduate science students already enrolled in the Northern science major program of study. Since our program hinges on students beginning the licensure process in their

3<sup>rd</sup> year, a major focus will be the recruitment of 2<sup>nd</sup> year students (Sophomores). We will strive to recruit from the top 20% in the introductory science courses: biology, etc. Much of the recruitment effort will be placed on the Science Faculty involved in this program in each of the targeted science disciplines. Northern has adopted a comprehensive framework that builds on existing marketing and outreach efforts with the region's high schools to provide a pipeline of interested science students. Specific activities include sponsorship and direct support of the Sally Ride Science Festival and Science Pioneers, involvement in local science fairs, and participation in area K-12 science clubs by NNMC faculty members. In part, these recruitment and outreach efforts have benefited from prior NSF support and represent a long standing commitment of the part of the college to provide access of area youth to knowledge about science careers. However, the Northern team recognizes that marketing and recruiting to raise awareness of opportunity is not enough. Therefore the project team has designed opportunities for early exposure to teaching as a profession that will permit our science majors to see first-hand the challenge and opportunities that exist in science education. Interested Freshmen and Sophomore will be invited to attend any of the four Noyce Seminars. Early engagement in active learning will allow students the experience of engaging with students in learning and demonstrate the value of sound pedagogical principles and practices.

Northern-Noyce will provide the science professionals contemplating a career change the opportunity to experience a rural high school classroom prior to entering the program. The Noyce career changers will participate in the Seminar programs as well, which will provide them field experience at local school districts. The scheduling of Seminars is flexible, built around the science professional's work schedule in coordination with faculty. Recruitment strategies focus on the Human Resources Departments within industries and companies who are experiencing down-sizing and/or reduction in profits. Entries in Craig's list and popular job-search sites will be effective in reaching beyond the local perimeters and advertisements in the *Albuquerque Journal* and community publications serve to inform members of the community. With the recent completion of the Rail Runner rapid transit, the obstacle of long and expensive commuter is now eliminated. The city of Santa Fe offers regular bus service to Espanola and provides frequent connecting links between the two cities.

### **Fellowship Selection Process:**

The charge of the Selection Committee will be to clarify, revise and monitor scholarship award standards and select scholarship recipients. The committee will be co-chaired by Dr. David Torres, PI; Dr. Cathy Berryhill, Dean of the College of Education, Co-PI.

**Option One scholarships will be for Northern science students with at least a junior level status.** Successful scholarship applications will include: 1) minimum grade of C in all science courses with an overall science GPA+3.00 and an overall GPA=3.00 in other coursework; 2) plan of study approved by their academic advisor documenting 60 hours or less of coursework remaining to obtain a bachelor's degree in a STEM field; 3) satisfactory scores on the College Basic Academic Subjects Examination; 4) three letters of recommendation (at least one must come from NNMC science department faculty); 5) background check ; 6) completion of Free Application for Student Aid (FAFSA); 7) narrative statement about a career as a high school science teacher in a high-need district.

**Option Two scholarships are for second career professionals interested in becoming high school science teachers.** Successful scholarship applications will include: 1) Evidence of science

content bachelor's degree from an accredited university (transcript); 2) Minimum grade of C in all science courses with an overall science GPA=3.00, and an overall GPA= 3.00 in other coursework; 3) Satisfactory scores on the College Basic Academic Subjects Examination; 4) Transcripts which document completion of all New Mexico science content certification requirements; 5).three letters of recommendation; 6) Background check; 7) Completion of Free Application for Student Aid (FAFSA); 8) Narrative statement about becoming a high school science teacher in a high-need district.

Applicants seeking each scholarship option will be evaluated on the overall application they submit. In the event of applications demonstrating equal qualifications, preference will be given to the applicants who have completed a minimum of one internship. Similarly, the Scholarship Committee will recognize and give weight to financial need, as documented by the FAFSA, and historically underrepresented groups in science education.

### **Management Structure**

The management of the Northern-Noyce project will be handled through the College of Education, the discipline-area department infrastructures and the PI and co-PIs. Administrative tasks specific to the Northern-Noyce Scholar program will be managed by the PI, Dr. David Torres. Funding for a part-time coordinator is included. This individual will be hired for 5 years of the project to assist the Noyce Scholar team in the management of collected data, the summer internships, recruitment and other administrative tasks.

The tasks specific to the Northern-Noyce staff and faculty will include:

1. Recruiting students into the NNMC-Noyce program through recruitment materials, informational meetings and application and review
2. Collaboratively developing and teaching the four new Noyce Scholar seminar courses that integrate content and pedagogy specific to this population of pre-service teachers.
3. Working with the College of Education to ensure Noyce Scholars meet the requirements for secondary science licensure in the state of New Mexico.
4. Providing a strong mentoring and support network made up of NNMC-Noyce staff and faculty, local mentor teachers and Noyce scholars.
5. Ensuring the Northern-Noyce program addresses the needs of a secondary science education in the state of New Mexico.
6. Research, evaluation and adjustment to the Northern-Noyce program in response to participant needs, the needs of the institution and state and the suggestions provided by the external evaluator

### **Monitoring and Enforcing Teaching Commitment**

A requirement of receipt of the scholarship given by the Northern-Noyce Scholar program is that the student will remain in good academic standing and complete the two-year service requirement in a high needs school for each year the scholarship is received, Noyce Scholars will be monitored throughout the program as they complete each course in the secondary teacher education Noyce Scholar track. The educational advising office, as well as the faculty team, will be available to advise students regarding coursework and be sure students are completing requirements on time. If a scholar is found to be in violation of the scholarship requirements he or she will be contacted, and every effort will be made to be sure the student is able to get back on track in the program. If a student cannot rejoin the program or complete their

service agreement, their scholarship will be revoked and the student will be required to repay the monies with interest (as per P.L. 110-69, SEC. 7030). After completing the program, Noyce scholars will be required to provide the program an annual certification of employment as well as up-to-date contact information. Failure to produce the required information will place a hold on the student's Northern record, preventing the request of transcripts in the future.

**Evaluation and Assessment Plan**

In order to provide a complete evaluation of the Northern-Noyce project, both process and product evaluation will be carried out. During the course of the project, all activities will be documented to ensure that they are implemented according to project specification. In addition, the quality of project activities will be examined, particularly through observations, surveys and interviews. This information will be reported to the Principal Investigator so that areas that need modification/improvement can be identified. It can also serve as a guide for future planning and implementation. Each year a final report will be prepared, summarizing data collected during the course of the year.

**Table 6:**

**Goal One: To increase the pool of potential Noyce Teacher Scholars**

Objectives	Performance Measures	Performance Targets
1.1 To target freshman and sophomores who are interested in a degree in the sciences and math (STEM)	Percentage of STEM units with literature referencing NTSP; % of students expressing interest in a teaching career; % of students aware of the NTSP	100% of STEM units will have literature referencing NTSC; 20% of STEM students will express an interest in teaching career; 80% will indicate they are aware of NTSP
1.2 To coordinate and monitor participation in the Seminar experiential learning experience	% of students participating in STEM seminars and activities; number of hours of participation	10% of students participating in STEM programs and activities for at least a week for at least 2 hours a week
1.3 To strengthen academic resource network	% of students needing support services who receive support services	100% of students who will need assistance will receive academic support services.

**Goal Two: To select and support Noyce Teacher Scholars as undergraduates:**

Objectives	Performance Measures	Performance Targets
2.1 To select four STEM students as Noyce Teacher scholars per year	% of eligible students with a GPA of 3.0 or higher in their major; % of student Who meet all requirements; # of Applicants who submit a written Application: # of applicants interviewed:  # of applicants selected each year	25% of target students will be eligible to apply; top 50% of applicants interviewed; 4 STEM students will be selected as NTS each year
2.2 To select three STEM Career	% of eligible students with a GPA	25% of target students will be

changers as NTS per year	of 3.0 or higher in their major: % of STEM students who meet all requirements; # of applicants who submit a written Application; number of applicants interviewed; # of professionals selected each year	eligible to apply; top 50% of applicants interviewed <sup>3</sup> STEM career changers will be selected at NTS each year
2.3 To coordinate and monitor Directed experiential learning experiences	% of all NTS participating in STEM Seminars and activities; number of hours of participation	100% of NTS should have participated in a minimum of two Noyce Seminars each year
2.4 To ensure that students will meet all undergraduate requirements for the credential program	% of all NTS meeting all undergraduate requirements for the credential program; Letters of Recommendation; second language acquisition requirement; completion of required educational experience	100% of NTC will satisfy credential program requirements
2.5 To nurture a network of all NTS	Participation in networking activities	95% Noyce Scholars will participate in networking activities

**Goal Three: To support Noyce Teacher Scholars:**

Objectives	Performance Measures	Performance Targets
3.1 To support continued growth in the STEM content area	NMTA professional exam	100% of NTS will meet satisfy credential program requirements
3.2 To improve their teaching skills	Teaching performance expectations	Final program completion is based on documentation based on Teaching Performance Assessments
<b>3.3</b> 2.5 To nurture a network of all NTS	Participation in networking activities	95% Noyce Scholars will participate in networking activities

**Goal 4: To support Noyce Scholars in the Workplace:**

Objectives	Performance Measures	Performance Targets
4.1 To support continuous development of teaching skills	Teaching performance expectations	100% of NTS will meet teaching and performance expectations
4.2 To support career choice and ensure all NTS remain in the profession	% of students completing first year of teaching: % of students completing second year of teaching	80% of students completing first and second year of teaching
4.3 To support students teaching in high-need high schools	% of students completing first year of teaching in a high-needs school; % or students completing second year of teaching in a high-	first and second year of teaching 80% of students competing

	needs school	
4.4 To nurture a network of all NTS	Participation in networking activities	95% Noyce Scholars will participate in networking activities

**Experience of Project Leaders:**

The Northern-Noyce project team is made up of individuals from the College of Education, the College of Math and Science and the College of Engineering who feel very strongly that this project is needed and essential for the advancement of science education in the state. The PI, Dr. David Torres holds the position of Math Director in the College of Math and Science. Dr. Torres has been responsible for introducing innovative teaching practices in this department. Dr. Ivan Lopez, Co-PI, is the current Chairperson and faculty in the Department of Engineering and the current coordinator for the Northern STEM program. Dr Fangyang Shen is currently tenure-track Assistant Professor, Department of Computer and Engineering Technology; Program and director for Bachelor Software Engineering program. Dr. Catherine Berryhill, Co-PI, Dean of the College of Education since 2007; Dr. Berryhill has been instrumental in establishing NNMC’s Alternative Licensure Program.

**Internal Evaluator:**

Dr. Dan McLaughlin, Director of Assessment at Northern New Mexico College is an invaluable member of the leadership team at the College. He has earned a Ph. D. in Educational Foundations from the University of New Mexico, 1987 and a Masters of Art in Teaching ESL from the School of International Training in 1978. His success in evaluating Hispanic Serving Institutions and Tribal Colleges makes him an asset of the institution. He has directed more than 15 federally-funded education projects and has more than 20 years of experience in program assessment and evaluation at the post-secondary level. Before assuming the position of Director of Assessment at Northern, Dr. McLaughlin was: Dean of the Education Department, Northern New Mexico College, 2005-2007; Director of Office of Planning and Research, Diné College, 2003-2005; and Program Specialist for the Center for Diné Teacher Education, Diné College, 1994-2003.

**External Evaluator:**

Dr. Tin Yau Tam, Professor in Mathematics and Statistics and Assessment Director for College of Science at Auburn University, will be invited to help the PIs assess the course and student outcomes. Dr. Tam has 3-year service in the COSAM Diversity Advisory Council and 10-year service as the director of Planning and Assessment of COSAM. He has evaluated several NSF educational programs. Dr. Tam will visit the Northern campus once a year and he will conduct an independent assessment. He will provide an assessment report annually and a final assessment report. The data from both internal and external assessments will be used by the PIs to guide instruction at appropriate levels of challenge, guide students' learning, and communicate progress to the students to support their lifelong learning.

**Dissemination Plan**

In order to make our processes and the results of the Northern-Noyce Scholar Program transparent to the broader science and teacher education communities, the results of the project will be shared at local, state and national venues. We will present at local and national organizations that have an interest in the preparation of science teachers (New Mexico Science Teacher Association the Association for Science Teacher Education, National Science Teacher Association, etc.) We will present at meetings of local and national organizations who have interest in the preparation of teachers within each of the science disciplines. Each of the venues will provide opportunities for the Northern-Noyce team and for our Noyce Scholars to give presentations in their respective teaching communities. The project will support travel to profession conferences for two scholars and one faculty member each year. We expect that the work and results of the project will be published in appropriate professional journals and the Northern New Mexico College STEM website.

### **Intellectual Merit:**

Research in the field of teacher education has found that the knowledge base for teaching comes from different disciplines and is first developed in the pre-service years. The development of the necessary knowledge for successful science teaching extends into the induction years (first 3-5 years of teaching), and further into the professional development years (Feinman-Nemser, 2001). Specifically, a teacher's pedagogical content knowledge (PCK), the intersection of content knowledge with pedagogical knowledge for teaching (Shulman, 1986), has been shown to be important to the success of beginning teachers in the classroom (Abell, 2007). This project will add to the knowledge and understanding of the development of science teachers' pedagogical content knowledge in a population of pre-service teachers who have received the majority of their content knowledge before their pedagogical preparation. A more full understanding of the development of pedagogical content knowledge will be gained by following these teachers into the early years of their teaching careers.

### **Broader Impacts;**

The Northern College of Education currently produces about 8 science teachers a year through the regular teacher education program and about 4 science teachers a year through the alternative licensure program. This project will have a broad impact on the number of science teachers produced by Northern who are then able to teach in the northern New Mexico region as well at the state of New Mexico and elsewhere. It will also infuse the cadre of teachers in this area with highly trained individuals grounded in both content and pedagogical knowledge and provide local junior high and high school students the opportunity to participate in inquiry-based, experiential learning. This Hispanic Serving Institution, with an enrollment of approximately 75% Hispanic and 9% Native American students is bound by poverty, geographic isolation, subsistence wages and low test scores. Through this program, and based on these strong foundations, the graduates of the Noyce Scholarship Program will be provided many opportunities through our program and after certification to teach a diverse range of students in high-need areas.