



Santa Cruz County
Birthplace of Arizona's History

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Santa Cruz County School Superintendent's Office

Alfredo I. Velasquez, County School Superintendent

Career Readiness and Educational Opportunities (CREO) project

Funded by the US Department of Labor CareerConnect Program

as part of the

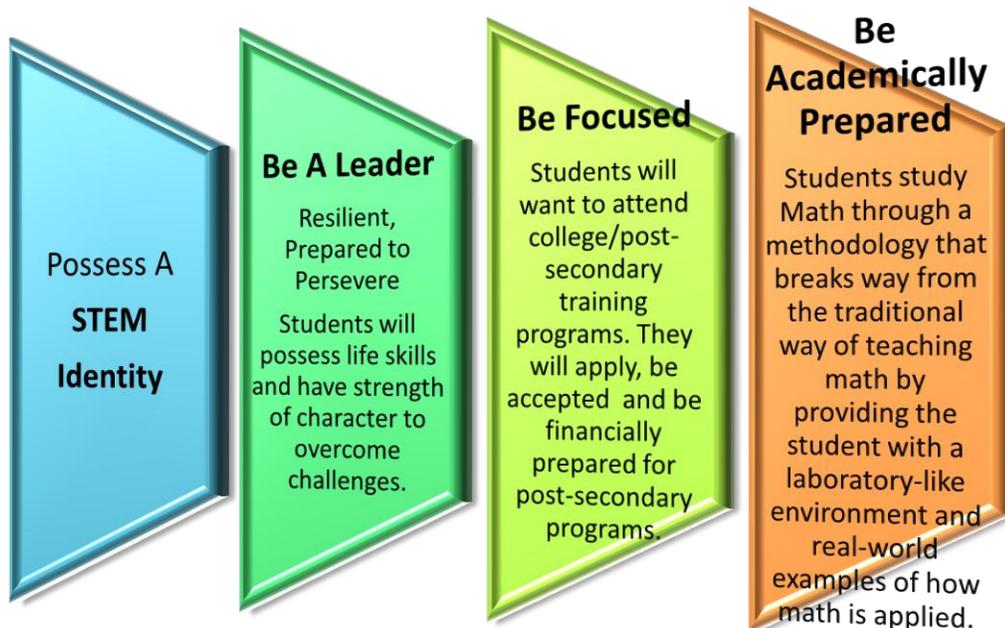
Pima County ***Innovation Frontier Arizona Grant***

A regional STEM career-pathways initiative focused on

Southern Arizona's border economy.

PROJECT OVERVIEW

Through ***CREO***, our Students will



For Post-Secondary Success and their Careers in the STEM fields

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PROJECT OVERVIEW - DESIGN

Funded through a grant from the US Department of Labor as part of the Innovation Frontier Arizona project, Pima County fiscal agent, the Santa Cruz County *Career Readiness and Educational Opportunities* (CREO) project consists of four integrated strategies that will result in achievement of diploma, post-secondary degree advancement, credit-bearing certificate, and/or an industry-recognized credential for participants throughout a four-year program. Beginning in ninth grade, participants will: 1) engage in activities that create identity in the STEM careers; 2) build resiliency to overcome the challenges they will face as they progress toward their career; 3) plan for and enroll in college and career programs; and 4) academically prepare for post-secondary and credential STEM programs. The underlying concept is that the curricula and pathways will provide meaningful settings for students to tackle real world applications as they engage in contextual learning and prepare for life's challenges. To accomplish this, CREO proposes to develop:

1. **Career Identity.** Provide students opportunities so they visualize themselves as STEM professionals.
2. **Resiliency and Perseverance.** Working with our partners, participants will be involved in internships, mentoring programs, community service, and employability skill trainings. These will and develop in students the strength of character with a commitment to succeed and overcome obstacles.
3. **Career College Focus and Planning,** CREO will include participants in college and career awareness and readiness activities that will lead to enrollment in career and post-secondary programs.
4. **Academic Preparation.** Beginning in ninth grade, students of all proficiency levels will participate in an Applied STEM Learning Center that utilizes the MetroMatematicas Learning Lab Program (reference attached description). Students will receive credit for the program.

MetroMatematicas integrates highly accurate instruments and machines common in today's STEM industry workplaces in the teaching of mathematics. Students are taught math using the scientific inquiry method that incorporates an applied practice and problem-based learning approach. As is common in the STEM fields, students will work primarily in teams to complete projects. The curriculum is structured so MetroMatematicas also facilitates the development of technology skills, scientific instrumentation, reasoning, communication, and interpersonal (leadership, cooperation, motivation) skills.

Students will remain engaged in CREO for the four years of high school. During which:

Ninth (9th) grade participants will complete the MetroMatematicas Basic Lab program which teaches applied math concepts using a methodology that is aligned/integrated with other subjects. They will be supported by college and career exploration and readiness activities.

Tenth (10th) grade participants can progress to an Advanced Lab, which utilizes an applied practice curriculum that allows students to apply their new skill set to real world scenarios. They will also participate in college exploration and career readiness activities.

Years 3 and 4: The focus will be on college and career planning and readiness activities which include applying to post-secondary programs and obtaining financial support that will fund the continuing education. Students can continue in the Basic or Advanced Lab as needed.

For additional information or to participate in CREO, contact:

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Attachment: Santa Cruz County STEM Applied Learning Center and the CREO Project.



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Santa Cruz County
STEM Applied Learning Center and the CREO Project

Context:

“STEM occupations are projected to grow by 17.0 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations.”¹

“Students who practice what they’re learning in a hands-on environment can often retain three and half times as much as opposed to just sitting in a lecture room and listening...”²

The future of Santa Cruz County necessitates that our youth and young adults be skilled in the fields of science, technology, engineering, and mathematics (STEM). The employment opportunities both in the county and for our youth who will work in the maquiladoras located in Mexico along our border will require increased learning of the STEM subjects, creativity, and excellent problem-solving skills. Having a skilled labor force which is prepared for careers in the Fresh Produce Industry, Transportation and Logistics Commerce, Health-Care, and the Maquiladora-Related Trade Sector (the latter reflecting robotics, aerospace, electronics, automobile, nano-technology, and associated manufacturing industries) will determine our economic potential and define our standard of living and quality of life.

Opportunity:

A countywide coalition of schools, post-secondary institutions, public agencies, and the private sector have partnered to address this concern. We have identified and continue to study innovative curriculum and instructional programs which will provide our youth and young adults with the knowledge and skills they need to succeed in STEM related training and post-secondary programs and ultimately in STEM careers.

Our research has lead the coalition to propose the establishment of the **Santa Cruz County Applied STEM Learning Center and its Career Readiness and Educational Opportunities (CREO)** project. Through **CREO**, our students will be academically prepared, focused on their future, and prepared for life's challenges.

The innovative **MetroMathematics Learning Lab Program** has been adopted as the Center’s core academic curriculum.

MetroMathematics represents a new model of teaching mathematics. In addition, it is designed to facilitate the development of technology skills, scientific instrumentation, and reasoning skills for students beginning as early as sixth grade. *MetroMathematics* was launched in July 2009 by Ing. Nahum Correa as an initiative to address the low math achievement by students in the state of Sonora Mexico. The program utilizes an applied practice curriculum that employs current technology used in the STEM fields. This allows students to apply their new skill set to real world scenarios. *MetroMathematics* also trains and certifies math and science teachers to teach the *MetroMathematics* curriculum in both the Basic and Advanced Labs through a 240 hour training program (120 hours for each lab).



¹ US Dept of Commerce, Economics & Statistics Administration: <http://www.esa.doc.gov/Reports/stem-good-jobs-now-and-future>

² Everest Colleges, Institutes and Universities (an industry leader in Adult Education).

What makes a program such as *MetroMathematics* unique and innovative is its integration of highly accurate instruments and machines common in today's STEM industry's workplaces. For example, *MetroMathematics* curriculum incorporates math used in advanced manufacturing through CNC machining and trigonometry, geometry and algebra in 3D Printing and 2D Laser Cutting. Additionally, students learn to apply probability and statistics to real work problem solving. Finally, since students work in teams, they learn to collaborate.

Accordingly, the Santa Cruz Center will combine problem-based learning with object-oriented learning and case-based learning pedagogies. Instruction will utilize a constructivist learning theory approach which proposes that knowledge best occurs when the student is at the center of the discovery process and he/she generates results from collaborative work. This is the opposite of traditional models for teaching math where students generally assume roles of greater receptivity and less participation in classroom activities.

Example of the Advanced *MetroMathematics* Lab

STUDENTS WILL ENGAGE IN APPLIED SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS LEARNING



STUDENTS WILL DEVELOP CREATIVITY, AND PROBLEM-SOLVING SKILLS



STUDENTS WILL USE WORKPLACE TECHNOLOGY

The typical *MetroMathematics* lab is organized into workstations of two to four students per station.

The Center will utilize an applied lab based methodology. However, instruction in the lab will be coordinated with the classroom teacher. Consequently, the program of study will combine the teaching of the applied learning with mathematical theory. Therefore, students will be taught the theoretical constructs and employ the concepts using state of the art technology.

In summary, the Santa Cruz STEM Applied Learning Centers will adhere to a program of study that is aligned with the common core math curriculum. What makes it inventive is the fact that students will learn the concepts as they concurrently participate in a series of practical applications and project-based learning activities.

Supporting our students will also be proven programs that will assist our youth in learning about and being accepted into STEM post-secondary programs of study and supports that will prepare them to overcome life's challenges.

METROMATEMATICAS COMBINES THEORETICAL AND PRACTICAL INSTRUCTIONAL DESIGN



STUDENTS CAN
EARN INDUSTRY
CERTIFICATION



MetroMatematicas Works:

Preliminary results from studies of the *MetroMathematics* program conducted in 2012 are promising.

1. Based on treatment/control group study involving 279 students (132 students from experimental schools and 147 from control schools) and eighteen (18) teachers: Students and teachers in the *MetroMathematics* classrooms reported the new structure and operation of the program strengthened learning and improved the use of information technology and communication. The *MetroMathematics* laboratory was viewed as being more interactive.
2. In a study of 9th grade students (544 in the treatment group and 529 in the control group), after only 60 hours of math instruction utilizing the *MetroMathematics* Lab, the math performance of the treatment group increased significantly as compared to the control group. In fact, based on the pre-posttest comparison, the students in the control group who only had the classic math instruction recorded an 8.6 point loss; whereas math performance by participants in the 9th grade *MetroMathematics* Laboratory increased 13.6249 Q.E.D.
3. In a study of participating students between 2011 and 2013, prior to attending the *MetroMathematics* Lab program, 67.3% scored at the Insufficient Level based on the Mexican National Math Exam. By 2013, this was reduced to 25.2%. During this same period, the percent of students who achieved at the Excellent level increased from .7% to 30.1%.