

Collaborative Partner: Sanger Unified School District

Project #2: Engineering Pathways to the Future - Building Interest, Engagement and Achievement

Pathway(s): Engineering

Project Summary

Sanger Unified School District (SUSD) with the Collaborative partners will be executing their proposal (attached) to support the “Engineering Pathways to the Future” project. This project will increase the number of students entering an engineering-related pathway to obtain skills certification, associate and bachelor’s degrees. First, by integrating and enhancing community efforts for STEM outreach and recruitment in elementary and middle school students. These outreach efforts will increase access by under-served students and provide equitable recruitment and support for disproportionately impacted students. The agriculture and engineering pathways supported by this proposal are:

- Mechanical
- Electrical
- Civil
- Geomatics
- Biomedical
- Environmental
- Agriculture
- Engineering Tech

Curriculum alignment will take place created in consultation with Reedley College, Fresno State and the other universities. Pre-engineering curriculum will be expanded at Sanger USD to include middle school STEM courses, dual enrollment and concurrent enrollment opportunities, resulting in accelerating student movement through these pathways. Expansion of the current Fairmont School AG-STEM program and the partnership with Fairmont and the Fresno State SmartFarm University will be provided to all elementary students in the district.

Support for student retention and success within this pathway will come from the formation of success teams that will share resources with Reedley College, including cross-trained

counselors, faculty and special services such as parent/student advocates and math tutoring at high school and middle school. Student mentors and advisors will also be trained and deployed.

Professional development will be used to cross-train participants in this pilot program, offering an opportunity to build a common understanding and mission among counselors, teachers and staff, while also providing an engineering pathway context and reinforce skills, such as, collaboration, creativity, critical thinking and communication within this pathway. Training of the elementary teachers to support the project-based learning units from Fairmont AG-STEM and SmartFarm University will take place. Also, increasing opportunities for high school teachers in the engineering pathway to earn a Master's in order to teach the dual enrollment courses is a goal.

In order to increase opportunities for K-8 students to learn about and be interested in engineering activities, robotics teams will be formed at all sites with an opportunity to compete with each other. The comprehensive middle school currently provides classes in Engineering, Ag Mechanics & Woodshop or STEM to over 345 students. Deepening and expanding the project-based learning instructional program will support the ability to recruit and retain more students for the future Engineering pathway. SUSD will increase the student participation in STEM activities at the K-8 level by extending the pilot integrated AG-STEM program at Fairmont School (500 students) to students throughout the district (5,000 students). Also, a female club, Femineers, is established at 3 sites and a goal is to expand that club to promote more women in engineering.

Technology, including mobile computer laptop stations with engineering software, 3-D printers, robotics hardware, FarmBot, drone and Agriculture technology will be provided to ensure that all students will have access to engineering and STEM educational programming including our underrepresented students.

Project Progress Report

Sanger Unified has participated in the larger K-16 Collaborative Engineering Pathway regional group and has started the process for the implementation of the Sanger Unified K-16 Engineering Pathways to the Future grant. The regional group implementation has allowed the entire team to establish a clearer vision of the regional perspective and engage in conversation with our regional partners to enhance the success of our students in the valley for Engineering/STEM careers. District personnel has participated in initial larger regional group meetings as well four smaller groups; Leadership, Outreach and Awareness group, Guided Pathways group and the Curriculum group. We have gained a greater understanding of the types of outreach from the community colleges and universities through specific events and activities, speaker series, summer bridge programs, robotic competitions, and the Ambassador program. We have developed a greater understanding of how our K-12 system can prepare

students for the community college pathway to Fresno State and the aspects of the Guided Pathway system such as the tutoring, success teams, “just in time” supports, cross platform

data analysis and work-based learning opportunities. The regional participation has allowed a glimpse of the articulation between our regional community college system and Fresno State regarding the dual admission status, proficiency standards for Engineering, existing curriculum maps at the community college and Fresno State, the need to expand the curriculum maps to the K-12 system, and the urgency of middle school math preparation for future engineering student success. Our district team members received valuable information to pass on to our K-12 system to inspire, prepare, recruit, and retain students for future Engineering/STEM fields.

Sanger Unified has moved forward with the implementation of the K-16 Engineering Pathways to the Future grant at the three levels of our K-12 system. The initial stages of the implementation at the elementary level have progressed over the last few months. The elementary focus consisted of the expansion of the Fairmont School AG-STEM and SmartFarm University to other elementary schools in the district. The Fairmont AG-STEM program has been operating over the last several years and has a dedicated agriculture teacher at the K-8 school and a part-time STEM teacher that have been developing units with expansion as a goal. We have an existing 2-acre farm adjacent to the school a dedicated Ag Science lab and plans in place to develop an agriculture facility with a focus of hydrology on the farm. Currently we have mapped out the identification of the Project Lead the Way (PLTW) units in the 3rd, 4th, and 5th grade to be used by pilot teachers. We have identified the pilot schools and met with the leaders of the school to understand the training that would be provided to the teachers, the expectations of the unit implementation, the site support that will occur during the implementation, and the Fairmont AG-STEM field week that will occur as a summary event. The field week will consist of student access to agriculture drones, automatic agriculture robots, and industry representatives to interest and inspire the students. The next steps include the finalization of the pilot schools, the training the teachers, and ordering the PLTW units and other equipment needed for the site teachers and for the Fairmont AG-STEM field week. (I have attached a flyer o explain the program). We are planning for the pilot schools to be completed in the fall of 2021 and another group of pilot schools in the spring of 2022. We are committed as a district to continue this opportunity for all our students in the district beyond this first group of pilot schools.

The Engineering Pathways to the Future grant will all Sanger Unified to expand the implementation Engineering/STEM learning at the comprehensive middle school, Washington Academic Middle School (WAMS). The comprehensive middle school currently provides classes in Engineering, Ag Mechanics & Woodshop or STEM to over 345 students with two teachers. This occurs as a result of offering elective classes periodically to students through an elective wheel for some students or a dedicated elective course for additional students. WAMS will be restructuring their schedule next year to increase the number of elective courses and adding an additional Engineering/STEM teacher for a total of 3 teachers that will provide Engineering,

Ag Mechanics & Woodshop or STEM elective courses. The schedule will also increase the frequency of the elective courses next year to allow for a greater coverage of the curriculum over the year and an ability to embed career content in the curriculum. In addition, we expect the elective courses to support the hands-on implementation of the math class to support the students in a cross-curricular manner. The high school has hired a Career Technology Education Curriculum Support Provider that will support the articulation of the middle and high school curriculum maps, events, and outreach activities for ambassadors and industry partners. She is a former high school Engineering Pathway teacher and a former engineer in the industry prior to her teaching career. She will be an outstanding role model, support and inspire students at the middle school and high school levels to aspire for an Engineering/STEM future. The district will refurbish existing lab facilities to accommodate the additional courses and an enhanced location to support the Robotics team at the middle school level. Although we have not completed the middle school registration process, we anticipate an increase in the number of students participating in the Engineering/AG/STEM courses and learning opportunities with the additional teacher. The specific number of students will be provided at the next report. The next steps for middle school program include the need to recruit students for the program, order materials for the new courses, training of the teachers, and begin the transition process of the facilities to provide the necessary environment for the hands-on Engineering/STEM courses.

Sanger Unified has a unique opportunity to transform the currently existing Engineering Pathway at the Sanger High School campus and move the existing pathway to a new complex, the Sanger High School West Campus. Currently the SHS West campus is open to ninth grade students and will be opening to each grade level in the next few years to eventually become the second comprehensive high school in the district. The change in the location has allowed the staff to re-examine the Engineering Pathway program and enhance the level of support for the recruitment and retainment of the students in the program. In addition, we have recognized a need to enhance the pipeline of students and the district has committed to establishing an Ag/Engineering Pathway at the current Sanger High School campus. We are providing the team a year of pathway development to determine the focus of the pathway as well as the training, curriculum, equipment, and supplies for the new pathway. In addition, as mentioned previously, Sanger High School hired a new CTE Curriculum Support Provider that has been an active engineering teacher in the Engineering Pathway. Although she will oversee all the pathway implementation, she will provide additional articulation, support, and industry outreach for the Engineering Pathways. The environment due to COVID has presented challenges for students. We have enhanced our outreach for students in both academically and socio-emotionally. Students have been participating primarily in virtual environments but have recently the school has provided targeted in-person support for students.

In addition, students participated in a winter intercession to catch up on any credit deficiencies that occurred during the first semester classes. Each student in the district has a district issued iPad for virtual learning, however, the district also purchased additional PC laptops for every

student in the Engineering Pathway with the capacity to use the appropriate software for the courses offered in the pathway. In terms of recruitment for next year, we are currently finalizing the registration process and have identified 80 students that have showed interest in the program. We have established an additional Femineers course offering for next year as an elective at both campuses. The schools are identifying key equipment to move to the West Campus and for some equipment to stay the Sanger High campus. We are in the process of ordering the necessary equipment for each course for next school year. The CTE CSP has been starting the process for outreach with industry and academic partnership as well as the articulation of the Engineering/Ag/STEM focus within our K-12 district system.