

Career Enhancement Grant: Principles of Engineering

1. Describe the program improvement plan's alignment to the appropriate institution or building plan(s). For all program improvement plans which are multi-year in length, explain the connection the funding request has to enhanced or augmented instruction during the grant period, and to longer term improvement for the program and either institution or building plan(s).

With this grant money, we are seeking to systematically expand/enhance our current course offerings to students with the express purpose of preparing them for post-secondary options that match their career interests. Each of our expansions/enhancements will provide a pathway for a student to eventually earn possible college credit and/or an industry credential. Specifically, we are planning to offer the next course in the Project Lead the Way engineering program to our high school students, Principles of Engineering (POE).

In the 2015-2016 school year, prior to offering IED, less than 2% of our students had access to the PLTW engineering program. By offering the first level of coursework, (IED), we expanded the learning opportunities our students had in the area of engineering. In our first year, approximately 48 students enrolled in the IED course, greatly increasing the number of students who were able to experience a pre-engineering curriculum at a local level. It is now our intention to further expand the programming by offering Principles of Engineering in the 2017-2018 school year and additional courses in school years beyond that time frame. In particular, we are considering Computer Integrated Manufacturing and/or Civil Engineering and Architecture. In addition, the middle school in the district began offering the Gateway program (in the areas of Design & Modeling and Automation & Robotics) in the 2016-2017 school year. We believe this will help students be even more prepared to enroll in PLTW courses once they begin to enter high school in the 2017-2018 school year and beyond.

This plan continues to fall in line with the visions of our high school's College and Career Readiness Work Group and our district Innovation Committee; both groups are committed to expanding course offerings at the high school in areas of occupational need and increased rigor. The College and Career Readiness Work Group includes district office administrators, building administrators, counselors and post-secondary institution representation. The district Innovation Committee includes district administration, building administration (K-12), teachers (K-12), board members and community members.

The plan for these grant dollars aligns to the Raymore-Peculiar School District's multi-year strategic plan which was developed under the leadership of our superintendent and involving over fifty stakeholders, including administrators, certified and classified staff, Board of Education members and community members. The team developed eight focus areas and all work in the district is aligned to at least one of these areas.

The goals of our strategic plan directly aligned to this improvement plan are as follows:

- I. "We believe we must ensure the relevancy of educational programming for preparation of students for post-secondary opportunities." PLTW engineering programming is absolutely relevant based on the job market needs of our society and the need for students to engage in critical thinking and problem-solving learning experiences. By opening this opportunity up to all of our students, they will be better prepared for post-secondary opportunities in college and the workforce. Each year, more and more students will be able to access this learning to a deeper level as we continue to offer additional courses.
- II. "We believe we must ensure an environment that is conducive to learning." PLTW is a national curriculum that is both engaging and challenging to students. In addition, it prepares students for their future by providing real-world, hands-on learning in a scaffold manner. Students will be able to take concepts they have learned and apply them in an authentic manner.
- III. "We believe we must maximize academic proficiency for all students." The PLTW curriculum and assessment allows students to participate in an intense, demanding, high level of educational excellence in the area of engineering and biomedical science. The skills and knowledge students bring into the course will further be sharpened and enhanced through participation in the curriculum. Through this opportunity, students will be able to maximize their academic potential and challenge themselves and their peers.
- IV. "We believe we must maximize technology applications and resources to facilitate effective instructional delivery and student learning." PLTW uses up-to-date technology and software that is currently being used in the engineering industry. The training provided to teachers ensures they know how to best deliver instruction for optimum student learning. The curriculum seamlessly blends technology and instruction and is well known across the country to be a leader in student preparatory programs.

2. Describe how each program to be funded will use measurable objectives to determine effective use of requested funding and to demonstrate successful rollout of the improvement plan for the grant period, and positive impact toward success of the institutional or building plan(s). Explain the extent in which the program improvement plan has determined the composition of allowable items to be funded by the grant.

In the 2016-2017 school year, Raymore-Peculiar High School offered its first PLTW engineering course (IED). Approximately 48 students enrolled; based on the popularity of the course, as well as the addition of two Gateway engineering courses at the middle school, this number is only expected to increase in upcoming years. As a way to further support student interest and build the PLTW program, the high school seeks to offer Principles of Engineering in the 2017-2018 school year. This addition will allow us to continue to expand the PLTW engineering program at a local level. Growing enrollment numbers and student achievement on the end-of-course exams will be used to determine the success of the engineering program over the course of multiple years. We have our baseline enrollment in IED (48 students) and will seek to expand that in the 2017-2018 school year, anticipating at least double numbers based

on interest expressed by middle school students who will coming to the high school. We will also monitor how many students from IED enroll in POE to determine maintained interest in the engineering field. Our baseline assessment data will be provided this spring. From there, we can set specific achievement growth goals with the ultimate goal being 100% proficiency among our students.

Data and progress will be measured on a regular basis by the advisory committee as well as our innovation committee. In addition, our district practices the data team process. Once specific learning targets are designed, the teacher will be expected to track student achievement at the classroom level by analyzing pre/mid/post assessment data aligned to the targets. The items requested on the grant are aligned with the PLTW supply list so there is no question as to whether we have the appropriate items for optimal student learning. Items not covered in the grant will be purchased by the district.

3. Include a description of the improvement plan's measurable objectives for the grant period, and if applicable, longer term rollout of the plan. If the program improvement plan identifies objectives beyond the grant period, explain the correlation between those anticipated to be achieved during the funding timeline and those further into the future. Explain the extent in which the objectives will determine project success.

The ultimate measurable objective of the improvement plan is to increase the number of students who graduate college and career ready. As a part of this grant, we will offer Principles of Engineering to our students in the 2017-2018 school year. In 2018-2019, we will offer at least one additional PLTW engineering course. Currently we are considering Computer Integrated Manufacturing and/or Civil Engineering and Architecture. Decisions will be based on the advice of the advisory board and student interest. Although not funded from this grant, we currently offer the two foundational Gateway courses (Design and Modeling and Automation and Robotics) at our middle school (this began in the 2016-2017 school year as well). We believe this will better prepare our students as they enter high school and generate increased interest in the engineering program.

For the engineering PLTW programs, and as a result of the strong curriculum, teacher training and real-world/hands-on learning opportunities PLTW courses provide, we will be able to provide a relevant, academically challenging path for students that will prepare them for a variety of post-secondary options. We will use our initial year of POE enrollment as baseline data and seek to continue to increase this number in subsequent years with the specific intent to double enrollment numbers after the first year. The advisory board will set reasonable yet challenging benchmarks to reach in regards to enrollment for future years and courses. In addition, we will administer the end of course exams to our students as an external measure of progress made and learning achieved. The first year will serve as baseline data and, again, the advisory board will be charged with setting and monitoring measurable goals starting with the baseline. Many universities and colleges use end of course exam scores for student recognition opportunities. In addition, PLTW utilizes a balanced assessment approach and therefore formative and summative assessments are used at the classroom level. The teacher will

monitor student achievement through the data team process as an internal measure of achievement.

4. Describe the eligible courses for which funding is sought by course name and CIP Code, what teacher will be providing instruction for each course, and designate in what building and room(s) instruction will occur for each funded course. Include a description of what is to be purchased for each course along with how these expenditures will address needed improvements and/or augmentation in the delivery of the eligible course(s) and student performance and/or learning.

Principles of Engineering

CIP Code 21.0104

Ivan Robinson will be teaching this course; he currently teaches IED. Although he has not yet attended POE training, he is excited about the opportunity and has agreed to attend training in the summer of 2017. The district and the school are registered with PLTW.

The course will be taught at Raymore-Peculiar High School in our industrial technology wing. The high school is currently under construction, expanding the space to house all 9th-12th graders. This construction includes additions and renovations. Former family and consumer science classrooms will be renovated and become a part of the industrial technology wing where PLTW engineering courses will be housed.

Through participation in POE, students work through engaging and challenging problems that require critical thinking skills. They will explore a broad range of engineering topics, including mechanisms, the strength of structures and materials and automation. They work both individually and in teams to design solutions to a variety of problems and regularly document and present their work. The PLTW supply list was used as guidance in regards to what needed to be purchased. This will ensure the fidelity of the program. The following items are recommended by PLTW in the engineering class inventory and are a part of the grant proposal: VEX robotic kits. Monies are also being requested to pay the Pathway to Engineering participation fee and the registration for the teacher training this summer. The PLTW supply list was used as guidance in regards to what needed to be purchased. This will ensure the fidelity of the program in regards to equipment being of industry-standard. Training will ensure the fidelity of the program in regards to the curriculum being used and the instruction being delivered. This combination will lead to high student achievement in our PLTW course.

5. Describe any student performance and/or learning measures which be used to determine project success.

The courses will be evaluated using a variety of methods during the initial implementation year and subsequent years after. Results will be shared with building and district administration as well as the advisory board. In addition, regular updates will be provided to the Career and College Readiness Work Group and the Innovation Committee.

- I. Students in POE will be assessed through the PLTW end-of-course exams via online assessments and hands-on labs.
- II. Throughout the school year, students will be assessed through the use of unit assessments; results will be used to plan for additional instructional opportunities as needed via our data team process.
- III. The teachers will be evaluated using the district's performance-based teacher evaluation tool as required by the state of Missouri and our local school board policies.
- IV. Data gained through assessments, hands-on labs and evaluations will be analyzed by advisory boards, teachers and administration.
- V. Students who complete the program will be surveyed for post-graduation work and/or education through the 180 day follow-up as required by the state.

6. Describe any relationship the program improvement plan and/or funding request has to specific industry credentials, including the development of such when none is presently available, and the potential for future career mobility for students.

While there are no specific industry credentials for the engineering course sequence, students will be able to take an end-of-course exam that will show higher institutions their expertise in the field. Colleges and universities will also be able to see, on the student's transcript, that he/she has engaged in a challenging, real-world curriculum at the high school level. Some colleges and universities offer reward opportunities for students based on end of course exam results.

Engineering is one of the fastest growing industries in the Kansas City area. Currently there are over 21,000 engineering jobs in Kansas City and that number continues to grow each year. The projected growth in this field by 2023 is a 25% increase in jobs. The job potential for our current students is extraordinary. Allowing students the opportunity to enroll in PLTW courses in the engineering field will better prepare them for the rigor of post-secondary education and provide them with a solid foundation in this area.

7. Describe the composition of the applying program's occupational advisory committee. Explain the extent the committee, building/district/institution administration, faculty and other key stakeholders were involved with the development of the program improvement plan and prioritization of the funding request.

The advisory board consists of building administrators, counselors, teachers, and district level administration. In addition, we have business/labor leaders, parents, community leaders and senior citizen representation. Members are involved in creating plans and prioritizing fund requests. Student interest is also considered in the development of plans. For the past three years, engineering has been one of the top career choices for our students according to their ACT interest surveys. The supply list for the POE course is based on the PLTW recommended inventory list so that students have what they need to achieve. The instructor reviewed the supply list as well. Advisory board members will be a part of reviewing the progress of the implementation of PLTW in the high school and monitoring the success of the program through

an analysis of enrollment numbers and assessment data. Eventually, members will also be able to review students' postsecondary decisions to determine if students who are a part of the PLTW program go to further their education and/or start high need, high paying careers.