Question 1: Provide a summary of your proposed project. Include a description of the project design. List the participating grades, subject areas, and number of participating teachers and students directly impacted. Do NOT list identifiable information such as school name or teacher's names.

Example Answer:

Alabama is quickly becoming a STEM-focused state with abundant automotive, aerospace, and other manufacturing corporations that need qualified workers to fill high-tech positions. The number of young people pursuing STEM careers remains low despite the growing demand for qualified applicants. Not only does Alabama have unfilled positions in STEM but we also have a gender divide that persists in STEM education, and female graduates' interest in STEM lags behind their male counterparts. Immersion in VEX Robotics will help prepare students to succeed in the current and future workforce. Our school aims to create teams of students to design, build, and program a robot to complete assigned challenges in the classroom as well as compete in the VEX IQ Challenge Squared Away challenge. Our teams will be composed of students from different races, genders and various disabilities. Using the engineering design process, the students will collaborate to design, build, and program a robot that demonstrates STEM concepts learned in the classroom. Students also hone their communication skills through documenting their design process in an Engineering Design Notebook that is evaluated by industry judges. The Engineering Design Notebook provides a format for students to document the entire iterative design process including both failures and successes. Participation in VEX Robotics allows students to develop vital teamwork, leadership and communication skills in a unique and engaging way. In addition, students will have the option to compete in year-round tournaments at the regional, state, and national levels, which creates an excitement that motivates them to complete the project.

One teacher from our school will attend an intensive two-day training hosted by the Southeastern Center of Robotics Education (SCORE) and the Robotics Education and Competition (REC) Foundation in spring 2020. This professional development is critical to the success of our teachers and students as they implement robotics. At the conclusion of the workshop, our school will receive two VEX IQ Super Kits, two VEX IQ competition add-on kits, and one SQUARED AWAY 4'X8'game field that will be used to evaluate the success of the students' engineering designs and programming abilities. Following the training, teachers will recruit 8 to 12 students in grades (ENTER GRADES HERE) to form collaborative teams that will learn to design, build, and program the two robots.

Question 2: Describe your project, including goals for student learning and how you will measure each outcome. Your goals should relate to the program purpose and include the purpose for the use of funds. Indicate how the project will align with the 2018 Alabama Course of Study for Digital Literacy and Computer Science.

Example Answer:

The primary goal of our project is for participating students to successfully design, build, and program a VEX IQ robot. This goal will be measured by assessing students' ability to complete in-class and on-line design and programming challenges. The funds from this grant will be used to provide the equipment students need to complete these challenges.

What do students learn by participating in VEX Robotics? Programming, engineering, design, manufacturing, problem-solving, mentorship, leadership, collaboration, and communication skills - all skills that are critical for developing the 21st century skills that are needed for future employment. In addition, students (1) achieve a working knowledge and skills in areas of engineering, design, programming and manufacturing/assembly, (2) understand basic programming skills through mastering the VEX IQ Blocks Code software, (3) increase problem-solving skills and gain an appreciation of creativity, invention, and innovation during the design process, and (4) develop an appreciation of teamwork, leadership, good sportsmanship, and mentorship as they help other students succeed. Learning such skills allows access to a future STEM career for students of all demographics and abilities. Based on data from the Robotics Education and Competition Foundation, 90% of students who participate in VEX robotics programs report an increased interest in studying STEM subjects and pursuing a future STEM career.

Our project is aligned with most areas that the 2018 Alabama Course of Study for Digital Literacy and Computer Science recommends. Once our students complete the VEX robotics program they could be considered a Global Citizen.

Computational Thinker: Implementing robotics allows for connected computing, creating computational artifacts, analyzing problems and artifacts, and communicating and collaborating when solving computational projects. Changing culture in robotics classroom activities places students in designed learning environments where they are required to solve problems using CTP like abstraction, decomposition, and algorithms. We contend that robotics problems that require students to apply the Big Ideas found in CSP and CTP will better integrate their understanding of core computer science concepts with an ability to use that knowledge to solve meaningful problems.

Citizen of the Digital Culture: Students will have the opportunity to collaborate with 26,000 teams all over the globe. They will have access to on-line challenges that they will complete and submit for judged awards. They will be able to practice Safety, Privacy, and Security, Legal and Ethical Behavior, Digital Identity, and Impact of Computing.

Global Collaborator: Students in the VEX Robotics program will have many opportunities to be a Global Collaborator. The VEX Robotics programs occur in over 60 countries. Students will have the opportunity to interact and compete with students from a multitude of nationalities over the Web with the VEX Global Skills Challenge, as well as in person at the World Championship event.

Computing Analyst: Our project will incorporate the VEX IQ curriculum, which is a free curriculum that offers 12 flexible units of instruction that can be used in sequence, in chunks, or as standalone lessons. Students begin their coding journey with block programming and progress to text based programming where they write their own code. They also have free access to an assortment of CAD drawings of robotic parts that allow for integrating 3-D printing options.

Innovative Designer: This is the most exciting part of VEX Robotics. Students have the opportunity to design, build and program their own robot. They will start building from a box of parts and it is up to the student to bring their vision to life. They will continue going through the iterative design process until they are able to complete assigned challenges.

Question 3: How will this project continue beyond the grant period? Provide a description of how the school system will support and assist in the implementation and sustainability of the program funded by the grant.

Example Answer:

VEX IQ robotics kits are durable, require minimal tools, and can be used for multiple years, making them a cost-effective option for creating a sustainable robotics program at our school. The administration at our school is in full support of our efforts to start and grow a robotics program to impact as many students as possible. In addition, the REC Foundation offers matching kit opportunities that will allow us to acquire additional robotics kits at a reduced cost for future growth.

Question 4: How, when, and where will the funds be used? Describe the activities in which you and your students will engage to reach your stated goals. In this description: (a) address how the activities will engage students in robotics education; and (b) detail the specific kits, tools, and technologies to be used, and (c) describe professional development activities to support the project.

Example Answer:

With this funding, we will purchase the *IQ New Teacher Package* from RobotEvents.com that includes two VEX IQ Super kits (P/N 228-2500), two VEX IQ Competition Add-on kits (P/N 228-3600), one game field (P/N 228-2550), and one set of SQUARED AWAY game pieces (P/N 228-6874). Included in this package is funding for a teacher from our school to participate in a two-day intensive professional development that focuses on designing, building, and coding a VEX IQ robot. Following training, our teachers will begin working with their students to model what they learned in training to design, build and code a VEX IQ robot using VEX Code Blocks software. In addition, the *IQ New Teacher Package* includes conference fees for on from our school to attend the two-day Southern Regional Robotics Education Conference hosted at Auburn University in 2020. This conference is the only one of its kind in the country and offers hands-on workshops and sessions on coding with VEX Code Blocks, the math of gear ratios, how to host summer robotics camps for students, how to host a robotics tournament, on-line STEM labs that integrate robotics, how to grow a sustainable system-wide robotics program, assessing robotics in the classroom, and more. Sessions are led by staff from the SCORE robotics center at Auburn University as well as AU faculty, REC Foundation staff, and experienced robotics teachers from across the southeast.

Question 5: Provide a summary of the evaluation plan/design for monitoring the implementation of the project and for determining whether the project met its stated goals and achieved the desired outcomes.

Example Answer:

An Engineering Design Notebook, which will be distributed during the two-day professional development, will be used by students to document the entire iterative process students use to design, build, and program their robot. The REC Foundation provides a rubric that teachers can use to assess mastery of students' documentation process. In addition, the REC Foundation offers on-line programming challenges and STEM labs that include pre/post-tests to gauge students learning.