VIRGINIA DEPARTMENT OF EDUCATION

P. O. Box 2120
Richmond, Virginia 23218-2120

HIGH SCHOOL PROGRAM INNOVATION PLANNING GRANT

PROPOSAL COVER PAGE

Name: Lead School Division and Superintendent	**Fairfax County Public Schools Superintendent Dr. Karen Garza**
Name: Consortium School Division(s)* (if applicable)	
Name: Participating High School(s)	**Edison High School**
Name: Division Contact Person - Planning Grant Director	**Marcy Kneale**
Title:	**Director Counseling and Career and College Readiness**
Mailing Address:	**3877 Fairfax Ridge Rd.**
City/Zip	**Fairfax/ 22030**
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Project Title:	**Global STEM Challenges Program**
Innovations:	**Integrated Science, Mathematics, & Engineering Focused on Authentic Global Challenges**
Total of HSPI funds requested:	**$ 50,000.00**

CERTIFICATION BY AUTHORIZED OFFICIAL

The applicant certifies that to the best of his/her knowledge the information in this application is correct, that the filing of this application is duly authorized by the governing body of this School Division and that the applicant will comply with the attached Statement of Assurances.

Karen K. Garza, Ph.D. — Typed or Printed Name of Authorized Official

Division Superintendent — Title:

Karen K. Garza

Signature of Authorized Official

Date JUN - 1 2015

HIGH SCHOOL PROGRAM INNOVATION PLANNING GRANT

STATEMENT OF ASSURANCES

Should an award of funds from the High School Program Innovation planning grant be made to the applicant(s)* in support of the activities proposed in this application, the authorized signatures below certify to the Virginia Department of Education that the authorized school division officials will:

1. Upon request, provide the Virginia Department of Education with access to records and other sources of information that may be necessary to determine compliance with appropriate federal and state laws and regulations;
2. Conduct educational activities funded by this project in compliance with the following federal laws:
   a. Elementary and Secondary Education Act of 1965, as amended by the No Child Left Behind Act of 2001;
   b. Title VI of the Civil Rights Act of 1964;
   c. Title IX of the Education Amendments of 1972;
   d. Section 504 of the Rehabilitation Act of 1973;
   e. Age Discrimination Act of 1975; and
   f. Americans with Disabilities Act of 1990.
3. Use grant funds to **supplement** and **not supplant** funds from nonfederal sources;
4. Take into account during the development of programming, the need for greater access to and participation by students from historically underrepresented and underserved groups;
5. Submit, in accordance with stated guidelines and deadlines, all program and evaluation reports required by the Virginia Department of Education;
6. Ensure that at least 75 percent of the professional staff at each high school participating in this proposal is in agreement with implementing the innovations as a threshold requirement of pursuing this grant;
7. Ensure that the majority of the local school board is fully supportive of the multi-year effort for innovation: and
8. Upon review of and approval by the local school board and negotiation of acceptable and pertinent waiver requests, if any, made to the Virginia Board of Education, pursue implementation of the developed plan resulting from this High School Program Innovation planning grant for the 2016-2017 and 2017-2018 school years.

By signing and submitting this Statement of Assurances, the applicant school division assures that its participating high school(s) will adhere to state and federal laws and regulations governing public schools in the Commonwealth of Virginia, with the exception of any waivers that may be approved by the Virginia Board of Education at a future date. The applicant school division further certifies, to the best of its knowledge, that the submitted proposal has addressed all required elements of the High School Program Innovation planning grant RFP and the applicant understands and will comply with the assurances.

Karen K. Garza, Ph.D. Typed Name of Division Superintendent	Tamara Derenak Kaufax Typed Name of Division School Board President
Karen K. Garza Signature of Division Superintendent	Tamara Derenak Kaufax Signature of Division School Board President
Date JUN - 1 2015	Date May 26, 2015

*A Statement of Assurances page is required for each participating school division. The signed Statement of Assurances page for the lead school division will follow the Proposal Cover Page in the submitted proposal packet. Other participating school divisions' Statement of Assurances pages, if any, must be included as **Appendix D** of the proposal.

HIGH SCHOOL PROGRAM INNOVATION PLANNING GRANT

ABSTRACT PAGE

The High School Innovation Planning Grant will support the creation of a STEM-focused, interdisciplinary three-year program concentrating on authentic global problems based at Edison High School in Fairfax County Public Schools. This dynamic and integrated program will exemplify the model for preparing high school students to succeed in both college and careers with the primary goals of 1) providing student-centered learning based on demonstrated understanding; 2) aligning real-world connections to community workforce needs and college and career preparation; and 3) utilizing varying roles for educators to allow for best practice instruction.

The program will be based at Edison High School, but will be available to students throughout the county through a selection system. Edison has an existing Academy program which provides advantages to this proposal, including reconfigurable lab spaces and a transportation system to bring students from their base schools.

In the grant's first year, a team of teachers (Mathematics, Science, Engineering) will collaboratively plan and create a curriculum framework for a three-year program that integrates Mathematics, Science, Engineering, and Computer Science curriculum. In the 2015-2016 planning year, teachers will be wholly dedicated to writing and creating the interdisciplinary curriculum with structured guidance and evaluation processes in place from FCPS Instructional Services. An evaluation committee, made up of FCPS department and school staff, will periodically conduct a comprehensive review of the program to ensure that sufficient progress is being made towards goals/objectives. A specific framework for the collection of information and assessment will be developed by this committee.

The cohort will operate as a smaller learning community within the high school; up to ninety 9th grade students will enroll beginning in 2016. Students will fulfill 10 credits instead of the expected 9 during the three-year timeframe as Computer Science will be authentically woven into the content. The same team of teachers will work with students as instructors for the duration of the program, linking instruction across disciplines over time to foster in depth interest and enhance student achievement and performance. The curriculum framework will be designed to provide students the opportunity to work in a problem-based learning environment that directly correlates to current global challenges. These students will experience integrated coursework together in honors weighted courses, completing the 10 credits by the end of the 2019 school year. In their senior year, students will be able to pursue their individual interests by choosing advanced coursework in specific fields while they continue to benefit from the support of their cohort peers and teachers. In the meantime, new students will enroll each year at Edison for a cohort, building capacity over time to include 90 students at every grade level once the program has matriculated up over time.

As a result of this extended and in-depth learning experience, more students will pursue STEM-related career and college pathways upon completion of the program. Student interest in STEM-related disciplines will be measured and compared to control groups within the high school. Baseline data will also be developed to determine the student's development in the areas of critical and creative thinking, collaboration, and communication.

Business partners will emphasize real world connections via internships as well as site-based learning opportunities and mentorships and will support the implementation and sustainability of this innovative program.

WORK PLAN: DESIGN FOR INNOVATION

RATIONALE FOR CHANGE

Fairfax County Public Schools (FCPS) is the largest school system in Virginia and the 10th largest in the United States. In the current school year, nearly 187,000 students are served by over 23,500 staff members across 196 schools and centers. FCPS is becoming increasingly diverse, and today students come from all the countries in the world and speak more than 200 languages. In fact, student registration numbers show that nearly half of the students enrolled in elementary school spoke a language other than English at home. About 40 percent of FCPS' students identify themselves as White; 19 percent Asian American; 27 percent Hispanic; 10 percent African American; and 5 percent Multiracial.

The needs of students across our division vary widely. For FY 2015, there are 32,103 English for Speakers of Other Languages (ESOL) students (or 17 percent) and 25,697 students receiving special education services (14 percent). While the county is often viewed as having wealth and resources, 52,654 FCPS students—more than one student out of every four—are eligible for the federal Free and Reduced-Price Meals Program (FRM), a nationally recognized benchmark of poverty. Another indicator, student mobility, is a measure of change in student membership from the first count through the end of the school year. In 2013-2014, the mobility rate for FCPS was 12.2 percent, with part of the reason for a high mobility rate related to more than 10,000 military-connected students in FCPS.

With the diversity of our student population in mind, FCPS is seeking to expand opportunities for students to participate in science, technology, engineering and math, or STEM-related curriculum and activities. This grant would enable FCPS to create a unique program for students interested in STEM and partner with outside stakeholders as well. Through a thoughtful process, FCPS has chosen to have *Edison High School*, in Alexandria, host this program. This location is easily accessible by major highways, has an existing Academy (specialized programs in career and technical, world language and fine arts) to help alleviate transportation logistics, and has the physical space to host a new integrated program. The addition of this new programming at Edison Academy will enable an expansion of STEM classes to a portion of the county that currently does not access high level academy programs. FCPS will be creating a selection process for any rising 9th grader to be given a chance to participate in this program if they meet the criteria of successful completion of Algebra 1 in 8th grade.

<u>Supporting Data</u>:
FCPS students are interested in STEM-related curriculum and have a need for integrated concepts. Data pulled from student's career interest clusters and pathway surveys indicated that in excess of 800 students at the four schools surrounding Edison High School had expressed an interest in a STEM-related cluster or pathway. FCPS also receives approximately 3,000 student applications from both divisionwide and other jurisdictions to Thomas Jefferson High School for Science and Technology (TJHSST, Regional Governor's School) with only 480 spots available. This data alone demonstrates a great interest from our division's students in mathematics, science, and technology. In addition we have STEM Academy courses which maintain high enrollment but are not always accessible to students because of the partial day program. This

new program will be vastly different than our existing curricula and programs, but it will hold an appeal for students interested in STEM while also offering a different model for earning credits. About 66 percent of our students successfully complete Algebra 1 by the end of 8th grade and would be eligible for this program. Hosting this at an Academy location allows for equal student access to this program. Community partners are interested in collaboratively developing a workforce ready to join STEM-related companies and fill positions in the area.

Looking more broadly, according to the Department of Education, only 16 percent of high school seniors are interested in pursuing STEM careers. Virginia needs to graduate 28 percent more STEM graduates to meet the national average.

- There is a need for STEM educated graduates:
    - STEM job growth in Virginia is almost double non-STEM jobs.
    - Virginia was named by National Chamber of Commerce as best STEM state for jobs.
    - In a 10-year period, Virginia added 47,728 STEM jobs, a 17 percent increase. This is the 3rd highest rate of STEM job growth in the US.
    - Virginia will have 404,000 new STEM jobs by 2018.

- By preparing our students in a STEM-based education, we prepare them for successful postsecondary educational experiences and careers.
    - In Virginia, the average hourly earnings in STEM-related employment are almost twice that of all occupations.

<u>School and Community Support:</u>
Edison High School and Academy Administration is in support of the development of this program. The added staffing and resources will enhance the STEM learning opportunities for Edison and the surrounding schools. The Career and Technical Advisory Committee supports the innovation grant as well. The committee strongly believes in problem-based integrated learning for all students. FCPS Instructional Services mathematics, science, and career and technical education coordinators, the STEM integration program manager, as well as Instructional Services directors have met and discussed the potential of this out-of-the-box program over the past two months. Members of this group are in agreement that this is an excellent opportunity for the cohort teachers, students, and Edison High School. As outlined in the Planning Grant Timeline, ISD coordinators/program managers will be an integral and continuous part of the HSPI grant support team within FCPS.

<u>Relationship between Identified Needs & Proposal</u>:
There is a need for more STEM programing in FCPS. This integrated approach allows for students to explore and apply the content in an innovative way while learning at a deeper level. We believe this programing will have a large impact on student achievement and result in sustained interested in pursuing STEM careers and courses.

<u>Completed High School Information Form</u>:
The completed high school information form has been completed and is included as Appendix A.

IMPEDIMENTS TO INNOVATION

For decades, high schools have tended towards a more departmentalized approach for both teaching and learning. Students enroll in discrete courses in mathematics, engineering, or specific science content courses. However, the reality is that projects in our world do not fit in such nice silos. A project may include biology and chemistry content, as well as algebra and geometry. In this proposed school structure, instead of students signing up for a specific course and any projects confined to those course requirements, students will be engaged in authentic problems, and will learn the mathematics, science content, and engineering necessary to solve the problem or complete the task. As a result, the standards of a particular course may not be mastered in one year. The state provides codes for this type of course development through the integrated course codes. The current integrated science codes assume that students will be taking the earth science, biology, and chemistry SOL tests when that content is completed. For this innovation high school, we would like students to receive a biology, chemistry and physics credit, with students taking the corresponding SOL tests when that content is completed.

Another impediment for science is the endorsement for the teacher. Unlike in mathematics, where a teacher endorsed in mathematics can teach any mathematics course, science teachers can only teach the specific content course for which they hold the endorsement. The waiver that we would like to request is that a teacher can hold any science endorsement and teach the integrated science course that will be a part of this program. This waiver might be needed over the entire three-year time period, although it is our expectation that science teachers would be able to add to their endorsement by taking the Praxis tests.

Students who are interested in pursuing science, mathematics, and/or engineering should also have computer science to be prepared for the work force. Finding time to take all these courses in the traditional schedule is difficult. As part of this program, Computer Science would be embedded throughout the three years as the students work on their projects. So, another waiver that we are requesting is that students be able to receive a credit for computer science. This would give the students 10 credits at the end of this three-year program:

- Biology
- Chemistry
- Physics
- Geometry
- Algebra II
- Pre-calculus
- STEM Engineering
- Advanced STEM Engineering
- STEM Advanced Electronics & Robotics
- AP Computer Science Principals

GOALS AND OBJECTIVES

The HSPI Planning Grant will provide funding for the development of a three-year interdisciplinary curriculum framework for high schools students, grades 9-11, in the subject areas of science, mathematics, engineering, and computer science. This unique STEM-focused high school program will provide three teachers the opportunity to plan an ‘out-of-the-box’ program that directly addresses an area of need in the national and local job market, as the demand for a STEM educated workforce continues to grow. The program model will employ

best practice educational strategies, inform future education policy, serve as a demonstration site for innovative practices, and has the potential to be replicated with minimal funding impact once the curriculum framework is completed.

Because of the integrated, interdisciplinary foundation of this program, science staff will be instructing outside their endorsed content area and will require waivers at the state level. Planned innovations extend outside of the classroom as active participation by business partners will allow students to have authentic work experiences.

Program Objectives/Goals	**Outcomes Aligned with Grant Intents**
Instructional Objectives/Goals • Planning and Instructional Team will consist of a Mathematics Instructor, Science Instructor, & a Technology and Engineering Education Instructor. • Planning Team will create a three year nontraditional interdisciplinary curriculum framework for the content areas of science, mathematics, technology and engineering education, and computer science for grades 9-11. • The cohort model and scheduled class time provided by the integrated curriculum will support in-depth, hands-on and project-based learning. • Development of alternate, validated methods for meeting standards and division curriculum objectives and for objectively measuring, aggregating, and reporting mastery of learning and achievement. • Restructure conventional classifications for licensed and endorsed staff beyond the traditional roles. • Make clear connections to workforce development issues that align with Virginia Employment Commission projections for job areas including applied mathematics, health services fields, communication and computer technologies, natural sciences, and engineering.	**Instructional Outcomes** • Varying instructional models for educators. ***Intent D & I*** • Each instructor brings a unique voice and lens to the planning process and to critiquing curriculum. ***Intent B, D, H***. • Direct engagement of instructors in the creation of the curriculum framework increases their investment in the curriculum and grows their knowledge across content areas. ***Intent B, D, H*** • Interdisciplinary STEM centered curriculum supports transition to postsecondary education and/or career training. ***Intent C, G*** • The structured framework/model can be replicated across the county and state with minimal funding impact. ***Intent F*** • Development of interdisciplinary performance-based assessments that demonstrate student learning and understanding of content and skills. ***Intent B, C*** • Instructors with an endorsement in one science content area will be eligible to teach a cohort of students in an integrated curriculum classroom. ***Intent E, I*** • Successful implementation of the program will inform future education policy as to the benefits of

	interdisciplinary STEM-based learning and performance-based assessments. ***Intent B & F***

<u>Student Objectives/Goals</u>
• Coursework to be completed by students over three years in an integrated setting. All courses will be taught at the Honors level.
  o *Biology, Chemistry, Physics*
  o *Geometry, Algebra II, Pre-calculus*
  o *STEM Engineering, Advanced STEM Engineering, STEM Advanced Electronics and Robotics*
  o *AP Computer Science Principles*
• Cohort Experience throughout the program; students will matriculate through grade levels with the same peer group and teachers.
• Opportunities for dual enrollment or college level courses.
	<u>Student Outcomes</u>
	• Learning will be student-centered, collaborative, and based on student demonstrated proficiency. ***Intent C, H***
	• Real-world connections will be made as subjects are explored and connected to real life problems. ***Intent C***
	• The interdisciplinary model will provide all students with workplace readiness skills. ***Intent B, C, D, G***
	• Students will earn ten credits over the three year sequence of courses. AP Computer Science Principles will be integrated into the curriculum over the three years. ***Intent B, D, I***

<u>Partnership Objective/Goals</u> • Provide mentors/internships • Provide funding for technology to be integrated into classroom. • Provide funding for interdisciplinary curriculum development. • Support the development of clear connections to workforce development issues that align with Virginia Employment Commission projections for job areas. • Collaborate with Fairfax County Public Schools on the development of dual enrollment partnerships and course offerings with local community colleges and universities.	**<u>Partnership Outcomes</u>** • Real life connections and experiences prepare students for postsecondary education/training and/or careers. ***Intent G, D, I*** • Enhances workforce development capacity. ***Intent B*** • Creates credible and collaborative learning beyond traditional building sites. ***Intent C*** • Enhances authentic participation by business/community members. ***Intent D***

TARGETED PROGRAM INNOVATIONS

The HSPI Planning Grant will allow FCPS to create a dynamic, STEM-focused high school program based on best practices. Current practices will be innovated to better support student centered learning with progress based on student demonstrated proficiency, to promote 'real-world' connections that align with community workforce needs, to emphasize college and career readiness, and to provide varying models for educator supports and staffing.

The integrated framework will provide opportunity for student-led learning and the demonstration of proficiency via authentic problem solving. Differentiated instruction will further meet personalized student learning needs throughout each of the courses. By allowing students to work collaboratively within the integrated sequence with multiple teachers, each student will be provided the opportunity to explore their own personal learning styles and therefore cater their learning experience with the outcome of facilitating a deeper understanding of the content. The integrated courses will utilize technology and a small group design to allow students the opportunity to develop collaboration, critical thinking, and communication skills. By providing real world, authentic learning experiences, students will be inspired by the curriculum and further engaged in their academic learning. Through the curriculum provided, students will develop a greater understanding of the connectedness of each of the disciplines. This interconnectedness will be reinforced by the long-term nature of the program as students will participate in a three-year cohort model. As a result of this extended and in-depth learning experience, more students will pursue STEM-related career and college pathways upon completion of the program. Student interest in STEM-related disciplines will be measured and compared to control groups within the high school. Baseline data will also be developed to determine the student's development in the areas of critical and creative thinking, collaboration, and communication.

The curriculum for this program will be developed in a problem-based and student centered learning environment. Teachers will have the ability to work closely with small groups and individuals to develop and ensure individual learning needs are met for each student. The flexibility of the program will allow students to work closely with content specialists and peers when additional support, scaffolding, or structure is needed. The interdisciplinary curriculum and instruction will provide a unique opportunity to integrate the mathematical and scientific content knowledge with the competency-based learning outcomes provided by the engineering curriculum. Integrating these content areas focused on real world authentic problems such as the National Academy of Engineering's (NAE) Grand Challenges for Engineering will motivate students to apply content knowledge, learn from lasting understanding, and develop the critical career and college skills needed. The curriculum will be developed and offered as honors weight mathematics, science, and engineering credits, providing students the rigor and relevance needed to prepare them for postsecondary education.

By providing students with real world connections that promote alignment with community workforce needs, this program emphasizes college and career readiness. Students will be offered the opportunity to work closely with business partners and higher education to provide additional learning opportunities for student enrichment, personal growth, and engagement outside of the conventional school day or setting. Internship, mentoring, and off-site field trips will be a critical component of the cohort. With continued support from business, the community, and

higher education, students will be provided opportunities to collaborate on real world problems with guidance and support from nonschool-based organizations.

This innovative interdisciplinary program will restructure the way mathematics, science, and engineering are taught with student achievement and engagement as the key drivers. Through collaboration with business partners and higher education, the curriculum will provide students with real world and authentic learning experiences that will create an engaging learning environment. The curriculum for the program will be centered on the (NAE) Grand Challenges for Engineering. These fourteen challenges have been identified as the most vital challenges that our next generation of students will need to solve. By providing high school-level students access to working towards and greater understanding of these challenges and allowing them the opportunity to work towards finding solutions, we are providing students an engaging curriculum that will prepare them with the career and college readiness skills necessary. By working collaboratively, students will gain a deeper understanding of the content and how knowledge from different content areas must be used to solve real world problems.

The school governance surrounding this innovative program will look very different from a traditional school environment. Three content experts will serve as the facilitators of learning for the ninety student cohort. The students will move freely between the classrooms during the block time allocated for the courses (estimated 4.5 hours per day). Students will no longer be restricted to a classroom or specific compartmentalized content area based upon a preexisting bell schedule but will rather move freely between work spaces to take advantage of the technology, tools, resources and content knowledge that may be located in each space. Business and community members will play a key role within the program. Stakeholders from each of these areas will be supporting the development and structure of the problem-based learning environment and interdisciplinary curriculum. Business and community partners will also be instrumental in providing genuine real world work experiences both during and outside of the traditional school day. These experiences may include but are not limited to authentic problems for students to work on, internships, mentoring, and site visits.

Fairfax County Public Schools will also work internally or through business partners to provide cohort teachers an additional planning time to collaborate and revise the curriculum throughout the first years of implementation. This will allow increased collaboration between the content specialist and time to ensure the curriculum is refined for the next cohort to begin the following school year. In order to develop a sustainable interdisciplinary curriculum that will continue to host new students each year with the expectation to scale to other schools, time must be allocated for teachers to collaborate throughout the process. Traditional school models provide time for teachers to meet within their content area Collaborative Learning Team (CLT) but rarely provide teachers time to meet across disciplines. This valuable time will be crucial to the successful implementation, sustainability, and scalability of the program.

COORDINATION OF INNOVATIONS

The STEM-based interdisciplinary program will provide rigorous learning opportunities for all participating students. This will lead to higher achievement and a reduction in learning gaps associated with socioeconomic factors. As a result of this rigorous STEM focused program,

students will be equipped with 21st century skills and prepared to move forward with postsecondary education or training for a STEM-based career field.

Rigorous learning opportunities for all students:

- STEM-centered curriculum with student inquiry driven, interdisciplinary instructional focus.
- Competency-based learning with solution creation or product development used as measures of mastery of learning and achievement.
- Simultaneously fulfill Computer Science Course requirement; this awards students an additional point towards graduation.

Integrated instructional model allows for concentrated time for in-depth and flexible instruction to meet individual student needs.

Higher achievement for all students:

- This program will lead to increased interest/enrollment in higher level mathematics/science courses in senior year.
- The model of curriculum that will be developed mirrors best practices in education to support student achievement. Wade Boykin of Howard University developed a model for improving academic achievement for African American students, "and it is common sense that all students, regardless of their ethnicity or class, would benefit as well." The components of this model include:
  - High standards for all students
  - Multiple ways to determine student success
  - Approaches that build on student assets
  - A developmentally appropriate curriculum
  - An active constructivist model to learning
  - A thematic, interdisciplinary curriculum
  - Preparations for the demands of the 21st century (1)

Significant reduction in the learning gaps associated with socioeconomic factors:

- FCPS is the largest school system in Virginia and the 10th largest in the United States.
- FCPS is becoming increasingly diverse; students come from all over the world and speak more than 200 languages.
  - 40% identify as White
  - 19% Asian American
  - 27% Hispanic
  - 10% African American
  - 5% Multiracial
  - More than 25% Federal Free and Reduced Priced Meals
- It is expected that the diversity of students enrolled in this program will reflect the diversity of the school system as a whole.
- Failure risk is tied to two main factors: socioeconomic status and "school practices such as inflexible schedules, narrow curricula, rigid instruction, tracking, and low expectations." (1)
  - By its structure and instructional focus, this program is the opposite of the school practices correlated with failure risk.

Stronger preparation for postsecondary education and training:

This interdisciplinary program offers students an authentic educational experience relevant to 21st century career paths: inquiry and problem-based learning, differentiated instruction, work-based learning skills, and internships and site-based learning through business partnerships. Once enrolled, students participate in honors level courses throughout the three years. The structured, integrated curriculum provides a built-in continuum for rigorous coursework, where no single class inhibits a student from moving forward with a well-rounded STEM focused education. Additionally, this program will allow students access to industry certifications, such as Workplace Readiness Skills, Autodesk AutoCAD, and Autodesk Inventor.

As participants in this program, students will be ready for college and/or career ready as creative and critical thinkers, collaborators, and effective communicators with in-demand industry skills and potentially even industry certifications.

1. "Who is At Risk of Failing?" *The Power of the Media Specialist to Improve Academic Achievement and Strengthen At-Risk Students*. Jami Biles Jones and Alana M. Zambone. Columbus, OH: Linworth Books, 2008. 9-21. *Gale Virtual Reference Library*. Web. 1 May 2015.

PLANNING GRANT TIMELINE

Month	Planning/ Professional Development Staff Responsibilities/ Events	Responsible Party	Objective
July 2015	Seeking funding from corporate partners to hire at least three resource teachers to develop curriculum for the three year integrated program. The resource teachers will be funded for the first year of the program	PreK-12 Mathematics and Science Coordinators, STEAM Integration Program Manager	Select qualified teachers (1 science, 1 mathematics, 1 technology) to work as a small team that will create the integrated curriculum for this high school program
August 2015	Develop a framework for curriculum planning and teacher evaluation	PreK-12 Mathematics and Science Coordinators, High School Mathematics and Science Specialists, STEAM	Build the integrated curriculum in the areas of mathematics, science, and technology for the first three years of the HS curriculum

		Integration Program Manager	for the cohort of students
September 2015	Resource teachers work with consultant to develop PBL curriculum development strategy Build curriculum for the three years of courses in the integrated program	Resource teachers supervised by PreK-12 Mathematics and Science Coordinators, STEAM Integration Program Manager	Build the integrated curriculum in the areas of mathematics, science, and technology for the first three years of the HS curriculum for the cohort of students
October 2015	Resource teacher team visits model PBL school Build curriculum for the three years of courses in the integrated program	Resources teachers Resource teachers supervised by PreK-12 Mathematics and Science Coordinators, STEAM Integration Program Manager	Gain insight and ideas for program development Build the integrated curriculum in the areas of mathematics, science, and technology for the first three years of the HS curriculum for the cohort of students
November 2015	Create clear and fair process for student selection into the program Build curriculum for the three years of courses in the integrated program.	STEAM Integration Program Manager and STEAM Specialist Resource teachers supervised by PreK-12 Mathematics and Science Coordinators, STEAM Integration Program Manager	Create selection process for students interested in participating in this cohort Build the integrated curriculum in the areas of mathematics, science, and technology for the first three years of the HS curriculum for the cohort of students
December 2015	Continue advertising selection process for program Build curriculum for the three years of courses in the integrated program	STEAM Integration Program Manager Resource teachers supervised by PreK-12 Mathematics and	Create selection process for students interested in participating in this cohort Build the integrated

		Science Coordinators, STEAM Integration Program Manager	curriculum in the areas of mathematics, science, and technology for the first three years of the HS curriculum for the cohort of students
January 2016	Begin implementing selection process for the program Start planning physical space and ordering appropriate resources that support the changes at the high school location to meet the needs of the integrated program Continue to build the curriculum for the three years of courses in the integrated program	STEAM Integration Program Manager Resource teachers supervised by PreK-12 Mathematics and Science Coordinators, STEAM Integration Program Manager	Implement selection process for students interested in participating cohort Create plan, materials list, and collaborate with facilities to make the correct changes to the physical space Build the integrated curriculum in the areas of mathematics, science, and technology for the program
February 2016	Continue implementing selection process for the program Continue working on the physical space at the program location Continue to build the curriculum for the three years of courses in the integrated program	STEAM Integration Program Manager Resource teachers supervised by PreK-12 Mathematics and Science Coordinators, STEAM Integration Program Manager	Implement selection process for students interested in participating cohort Create plan, materials list, and collaborate with facilities to make the correct changes to the physical space Build the integrated curriculum in the areas of mathematics, science, and technology for the program
March 2016	Finalize the selection process for the program Continue working on the	STEAM Integration Program Manager Resource teachers	Select students for the program Create plan, materials

	physical space at the program location Continue to build the curriculum for the three years of courses in the integrated program	supervised by PreK-12 Mathematics and Science Coordinators, STEAM Integration Program Manager	list, and collaborate with facilities to make the correct changes to the physical space Build the integrated curriculum in the areas of mathematics, science, and technology for the program
April 2016	Continue working on the physical space at the program location Continue to build the curriculum for the three years of courses in the integrated program	STEAM Integration Program Manager Resource teachers supervised by PreK-12 Mathematics and Science Coordinators, STEAM Integration Program Manager	Create plan, materials list, and collaborate with facilities to make the correct changes to the physical space Build the integrated curriculum in the areas of mathematics, science, and technology for the program

RESOURCES FOR IMPLEMENTATION

Fairfax County Public Schools and its STEM partners are committed to the implementation and growth of the integrated program. Edison High School has already been identified and staffing, resources and implementation plans will be identified now through the grant planning period. Much thought was given to the location of the program to expand STEM opportunities to an area of the county that is currently not supported by Academy STEM programs. Additionally, we know that Fairfax County Schools and Government are both fully committed to the economic development of a STEM workforce to ensure that future workforce needs are met. The development of this program is supported by a selective teacher screening process and extensive professional development by both internal and external stakeholders. Equipment and resources will be provided by the division and its partners to ensure that a state of the art program is implemented. Transportation will be provided to all students selected for this program from their base school.

PARTNERSHIPS

In addition to the identified partnership matrix on the next page, two letters of support have been included as Appendix B.

Partner	**Role of Partner**
National Academy of Engineering	• Provide support with the development of curriculum aligned to the *Grand Challenges of Engineering*. • Provide an avenue of communication and collaboration with over one hundred colleges and universities that are currently working to educate a new generation of engineers expressly equipped to tackle some of the most pressing issues facing society in the 21st century. • Provide connections to industry leaders in STEM disciplines to support student learning and provide authentic educational experiences for students.
George Mason University	• Support FCPS School teachers by providing professional development opportunities. • Development of opportunities for dual enrollment for students enrolled in the program. • Offer courses for high school seniors to take for college credit.
Outside Stakeholders (To be finalized)	• We anticipate that outside stakeholders will provide financial support for staffing to development the integrated curriculum. Outside stakeholders will also support the project by providing real world, authentic problem-based learning opportunities for students to collaboratively work on through the integrated coursework. • Development of internship and externship opportunities with outside stakeholders and other regional businesses and community agencies.

BUDGET AND BUDGET NARRATIVE

The grant budget totals $50,000. In addition to this funding, a contribution from outside stakeholders for $200,000 is being pursued to implement this program during the critical first years. One business partner has expressed support for funding three teacher positions contingent on approval of this grant application; however, this contribution has not been recorded in the budget worksheet since an official commitment has not been secured. A basic budgetary goal will be to obtain this funding as soon as possible after the award.

In year 1, funding will be spent on salaries for (1) providing an extra planning period for the three business-funded teacher positions mentioned above and (2) providing hourly wages for teachers selected by the project staff who will need to work outside of their regularly contracted hours. Funding of $20,901 will be used to enable these teachers to develop the three-year curriculum framework and integrate units in the areas of science, math, engineering, and computer science. In addition, having teacher involvement during the early stages of project planning and implementation is necessary to make certain that integrated units are modified and projects are developed-based on critical teacher input. Projected benefits are estimated at $1,599 using the standard FICA rate of 7.65 percent.

Ms. Marcy Kneale, who is the FCPS contact and project director, will appoint an FCPS manager to monitor and oversee the activities outlined in the grant application, and a set percentage of his

or her time will be dedicated to the project. The person who will be appointed will be named upon award of the grant depending on qualifications as well as work load, and this information will be provided to VDOE.

HSPI grant funding will also be used to hire a consultant to work with teachers on curriculum development. The consultant will spend a week in August 2015 not only supporting the teachers by developing coursework but also will provide PBL training. The consultant will mentor the resource teacher team monthly and offer advice on the progress of their work. The consultant will be selected following standard procurement procedures regarding vendor selection, and the cost of the consultant was estimated at the highest rate allowed by the grant of 25 percent, or $12,500.

Travel was also estimated at $7,500 using the highest permissible rate of 15 percent. Travel will be required for the project team to present to the Virginia Board of Education in April 2016. A team would also need to travel to a PBL-based STEM high school and observe programming for a week. The site to be visited would be determined in consultation with VDOE.

As permitted by the grant, 15 percent of grant funding, or $7,500, has been budgeted for consumables that will be used that include the supplies, materials, and services that teachers will need to design the curriculum, and only materials directly required to create the integrated units will be purchased. All materials will be directly consumed in the course of the planning process.

FCPS will provide the instructional materials that will be required by this project; however, besides the initial costs associated with planning, there will be no further costs to FCPS once the program is implemented. An explicit goal of developing this program has been to ensure that it will not cost the school system any additional funding above and beyond current expenditures. Furthermore, although the grant monies awarded are valued, it is the waiver of specific regulations outlined in the narrative that will provide the greatest change, and it is this waiver that is the primary impetus for the application.

The budget document is included as Appendix C.

EVALUATION PLAN

The Evaluation Committee will be made up of members of FCPS administration, Edison High School staff, and members of the businesses and organizations in partnership with FCPS. The Committee will convene every three months of the first grant year and will conduct a comprehensive review of the program to make certain that sufficient progress is being made towards the agreed upon goals/objectives. A specific framework for the collection of information and assessment will be developed by this Committee. Any findings that would require the project to be in any way revised will be brought to the attention of the project leaders, who will use this feedback to adjust the program. The Committee will note milestones and the timeline to confirm that the project is on time and that resources are being used effectively. The Committee will evaluate the curriculum and provide oversight on the rigor and relevance of the project and will be driven by the anticipated academic and achievement needs of the students, the ongoing requirements for professional development for faculty, and workforce requirements. At least annually, a comprehensive review will be conducted and data and results will be forwarded to both FCPS and the Virginia Department of Education.

Appendix A-High School Information Form

High School Program Innovation Planning Grant

Fairfax County Public Schools-Global STEM Challenges Program

Attachment A to Supts. Memo No. 066-15
March 27, 2015

VIRGINIA DEPARTMENT OF EDUCATION
P. O. Box 2120
Richmond, Virginia 23218-2120

HIGH SCHOOL PROGRAM INNOVATION PLANNING GRANT

HIGH SCHOOL INFORMATION

High school name:	**Edison High School**		
Mailing address:	**5801 Franconia Road, Alexandria VA 22310**		
School division:	**Fairfax County Public Schools**		
Principal's name:	**Pamela Brumfield**		
E-mail:	pebrumfield@fcps.edu		
School telephone:	**703-924-8000**		
Student enrollment:	**Grade 9 474 Grade 10 460 Grade 11 450 Grade 12 393**		
Student race/ethnicity distribution:	**White: 29.8% African American: 21.0% Hispanic: 31.4%** **Pacific Islander/Asian: 13.8% Native American: N/A Other: 4.0%**		
Students eligible for free or reduced lunch:	**38.8%**	**Number of students with IEP or 504 plans: 306**	**128 Spec. Ed Students (4/15)**
State accreditation status:	**Fully Accredited**		
On-time graduation rate:	**93.3** (VA 2014 Cohort)	**Grade 9 retention rate: 3.59% (2013-2014)**	
Subgroups or proficiency gap groups not meeting ESEA Annual Measurable Objective in reading and mathematics:	**Students with Disabilities - Mathematics**		
Number of teachers:	**140**	**Number of teachers teaching one or more classes outside their endorsement areas:**	**6**

The High School Information form(s) for each participating high school should be attached as **Appendix A** to the school division's submitted proposal.

Appendix B-Letters of Support

High School Program Innovation Planning Grant

Fairfax County Public Schools-Global STEM Challenges Program

NATIONAL ACADEMY OF ENGINEERING
OF THE NATIONAL ACADEMIES

Program Office

May 22, 2015

John W. "Billy" Haun, Ed.D.
Chief Academic Officer
Division of Instruction
Virginia Department of Education
Richmond, VA 23218

Dear Dr. Haun:

I would like to express my strong support, and pledge of assistance, for a proposed new integrated curriculum in Fairfax County Public Schools focused on the National Academy of Engineering's (NAE) Grand Challenges for Engineering (GCs).

The NAE GCs are 14 ambitious goals, identified by some of this generation's leading technological thinkers and doers, believed to be both achievable and necessary to help people and the planet survive. They are already having inspirational impacts in education through programs like the undergraduate level NAE Grand Challenge Scholars Program which, as President Obama recently announced, will soon be offered in more than 120 colleges and universities across the nation.

FCPS has an opportunity to create a national model for extending this revolution in education into the K-12 curriculum. The NAE GCs can break down the silos of individual class subjects by framing all of them on clearly relevant and important issues of our time. Courses as supposedly disparate as art, science, and social studies could be connected through common, relevant, and important themes.

Such an integrated curriculum would better prepare students for college and beyond while simultaneously increasing interest in STEM-based disciplines—particularly the under-emphasized engineering component—and highlighting their creative aspects.

A major benefit of using the NAE GCs as a frame is their ability to attract, inspire, and retain a more diverse set of students within challenging curricula. These real world issues have the power to engage unmotivated or under-performing students and build their confidence and capacity to excel.

Your proposal provides a wonderful opportunity for FCPS to further collaborate with higher education, community partnerships, and businesses. Authentic problem-based learning experiences, that include development of collaboration and communication skills, would flow naturally from an integrated curriculum and certainly help groom your students for the workforce.

Today's young people are clearly motivated by wanting to make a difference…to change the world. I am very excited that FCPS is boldly planning to encourage this passion and lead development of a new paradigm in education.

Please don't hesitate to contact me (202-334-1508; atkins@nae.edu) with any follow-ups.

Sincerely,

Randy Atkins
Director, NAE Grand Challenges for Engineering

May 26, 2015

Career and Technical Advisory Committee
Fairfax County Public Schools

Dear Dr. Haun,

I am writing to express the strong support of the Career and Technical Advisory Committee for Fairfax County Public School's grant proposal to plan for an innovative, integrated, and interdisciplinary STEM based program at Edison High School. FCPS has been highly engaged with the Career and Technical Advisory Committee to increase post-secondary preparation for FCPS students.

FCPS works closely with the Career and Technical Advisory Committee to develop strategies to facilitate the acquisition of 21st century college and career readiness skills in students. More than 60,000 students are currently enrolled in FCPS's Career and Technical Education Program, with a model that has been proven to increase post-secondary success as evidenced by the annual follow-up survey of our graduates. The strong commitment of FCPS and post-secondary influential partners and our collaborative efforts to provide students with seamless support are some of the program's strong and enduring components.

FCPS has truly taken a leadership role in the Northern Virginia region to improve college and career readiness, access, and success for students as demonstrated by the strong, positive outcomes of our joint efforts. We wholeheartedly recommend FCPS as a school division with the expertise and committed partners to launch and scale such an ambitious and innovative program for our region's high school students, and look forward to continuing to collaborate with FCPS in the near future.

Sincerely,

Patricia DeiTos

Patricia DeiTos
Chair, FCPS
Career and Technical Education Advisory Board

Appendix C-Project Budget

High School Program Innovation Planning Grant

Fairfax County Public Schools-Global STEM Challenges Program

HIGH SCHOOL PROGRAM INNOVATION PLANNING GRANT PROJECT BUDGET

Grant funds requested may not exceed $50,000.

Period of Award: July 1, 2015 - June 30, 2016							
Applying School Division:							
Personal Services 1000					**Source of Funds**		
	Description				**HSPI**	**In-Kind**	**Total Cost**
Job titles of individuals whose salary will be charged to this project	Project Role	% FTE Administrative	Salary	Total charged to grant for this individual			
Teachers	Curriculum Develop		$20,901	$20,901	$20,901		$20,901
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
				$0			$0
Total Personal Services 1000				$20,901			$20,901

Employee Benefits 2000				Source of Funds		
Job titles of individuals whose benefits will be charged to this project	% benefits	Salary	Total	HSPI	In-Kind	Total Cost
Teachers-Curr Dev	7.65	$20,100	$1,599	1,599		$1,599
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
0		$0	$0			$0
Total Employee Benefits 2000				$1,599	$0	$1,599

Purchased/Contractual Services 3000	Source of Funds		
Description (Please provide detailed cost calculations.)	**HSPI**	**In-Kind**	**Total Cost**
Contractor(s) to be hired for curriculum development, PBL training, monthly mentoring meetings.	$12,500		$12,500
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
Total Purchased Contractual Services 3000	$12,500	$0	$12,500

Internal Services 4000	Source of Funds		
Description (Please provide detailed cost calculations.)	**HSPI**	**In-Kind**	**Total Cost**
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
Total Internal Services 4000	$0	$0	$0

Other Charges 5000	Source of Funds		
Description (Please provide detailed cost calculations.)	**HSPI**	**In-Kind**	**Total Cost**
Travel to Richmond for presentation to Va. Board of Education and travel to PBL Stem High School	$7,500		$7,500
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
Total Other Charges 5000	$0	$0	$0

Materials and Supplies 6000	Source of Funds		
Description (Please provide detailed cost calculations.)	**HSPI**	**In-Kind**	**Total Cost**
Materials, supplies, and services to be used by teachers to design the curriculum	$7,500		$7,500
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
			$0
Total Materials and Supplies 6000	$7,500	$0	$7,500

Total Project Budget for HSPI Planning Grant

	Source of Funds		
	HSPI	**In-Kind**	**Total Budget**
Personal Services (1000)	$20,901	$0	$20,901
Employee Benefits (2000)	$1,599	$0	$1,599
Purchased/Contractual Services (3000)	$12,500	$0	$12,500
Internal Services (4000)	$0	$0	$0
Other Charges (5000)	$7,500	$0	$7,500
Material and Supplies (6000)	$7,500	$0	$7,500
Total Project Budget	**$50,000**	**$0**	**$50,000**