INSTRUCTIONAL TECHNOLOGY GRANT PROPOSAL

Name of Applicant Daniel R. Hoeh

District/School Cobb County Schools/ Hillgrove High School

Date 7/13/16 **Total Cost of Project:** $1099.99

Title of Project: Sphero in the classroom

To what organization will you submit this grant application in the future?

I. Why is this project important (In 2-3 paragraphs, describe the need for the project.)?
Wired Magazine has called reading and writing code as the new, "literacy" (Grandin, T., & Panek, R. 2013). By teaching coding in the classroom students are better equipped to talk the new language of coding. However, not all students understand the language of the future. According to an article published in USA Today, only about 2% of students are currently studying computer programming. If that number were tripled we would get close to closing the gap between students and jobs" (Partovi, H., 2013). Sphero in the classroom addresses the need for students to understand the new literacy of coding.
Sphero is a small sphere that teaches students coding by utilizing true authentic student based learning. Using only an Ipad students can program Sphero to execute simple to complex operations. Sphero allows students of all ages and content areas to utilize coding to solve real world authentic problems.

Georgia Performance Standards

S8CS1.
Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.
a.Understand the importance of—and keep—honest, clear, and accurate records in science.
b.Understand that hypotheses can be valuable even if they turn out not to be completely accurate.
S8CS3.
Students will have the computation and estimation skills necessary for analyzing data and following scientific explanations.
c.Apply the metric system to scientific investigations that include metric to metric conversions (i.e., centimeters to meters).
S8CS4.
Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities utilizing safe laboratory procedures.
b.Use appropriate tools and units for measuring objects and/or substances.
S8CS9.
Students will understand the features of the process of scientific inquiry.
a.Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing different theories. Scientific

investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.
b.Scientific investigations usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations to make sense of collected evidence.
c.Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.
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c.Scientific experiments investigate the effect of one variable on another. All other variables are kept constant.
d.Scientists often collaborate to design research. To prevent this bias, scientists conduct independent studies of the same questions.
e.Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator's credibility with other scientists and society.
f. Scientists use technology and mathematics to enhance the process of scientific inquiry.

ISTE NET-T (http://www.iste.org/standards/standards)

1. Facilitate and Inspire Student Learning and Creativity
Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments. Teacher
c.promote student ref lection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes
d. model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments
2. Design and Develop Digital-Age Learning Experiences and Assessments
Teachers design, develop, and evaluate authentic learning experiences and assessments incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS•S. Teachers:
c.customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources
d.provide students with multiple and varied formative and summative assessments aligned with content and technology standards and use resulting data to inform learning and teaching
4. Promote and Model Digital Citizenship and Responsibility
Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices. Teachers:
a. advocate, model, and teach safe, legal, and ethical use of digital information and technology, including respect for copyright, intellectual property, and the appropriate documentation of sources

ISTE NET-S (http://www.iste.org/standards/standards/for-students-2016)

Empowered Learner
Students leverage technology to take an active role in choosing, achieving and demonstrating competency in their learning goals, informed by the learning sciences.
1d Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.
Knowledge Constructor
Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts and make meaningful learning experiences for themselves and others.
3a Students plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
3d Students build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

Innovative Designer
Students use a variety of technologies within a design process to identify and solve problems by creating new, useful or imaginative solutions.
4a Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts or solving authentic problems.
4d Students exhibit a tolerance for ambiguity, perseverance and the capacity to work withopen-ended problems.
Computational Thinker
5a Students formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
5c Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

8th grade physical science standards

II. What would you like to accomplish (In 2-3 paragraphs, describe the unit or lesson and list instructional objectives.)?

Sphero is capable of using different apps to complete STEM based PBL instructional goals. Using both a Sphero class set and the SPRK Lightning Lab app the class will use basic coding to determine time, speed and distance. The students will analyze and interpret data using the Sphero to identify patterns in the relationships between speed, distance, velocity and acceleration (S8P3.a). The students will then utilize different surfaces to determine their impact on the motion (S8P3.b) and evaluate the effects of inertia (S8P3.c).

Along with using the basic SPRK Lightning Lab app for coding the more advanced students can utilize the orbBasic app. OrbBasic allows the Sphero to program using a form of BASIC programming language. Although both operations can be can be done with either app, the use of BASIC programming skills allows for a degree of differentiation that will challenge the more advanced programming/coding students.

- Learners will use Sphero and the SPRK Lightning Lab app to increase their STEM coding skills.
- Learners will use Sphero and the SPRK Lightning Lab app to work collaborative to solve authentic STEM based PBL activities.
- Learners will use Sphero and the OrbBasic coding app to create Sphero operations that require complex coding skills.
- Learners will use Sphero and the SprkLab app to solve math equations.

III. How will you complete the work? (In 1-2 paragraphs for each section, describe how the project will be completed.)

A. Describe how the instructional objectives will be met.

- Students will complete a pre-assessment of basic coding skills to determine which app to use.
- Students will complete a pre-assessment of basic physical science skills including speed, distance and time.
- Schedule time for students in collaborative groups of 2-4 to go to SPRK Lightning Lab and complete the Time, Distance and Speed Lesson.
- Students will receive an Ipad cart with the SPRK Lightning Lab to code the assignment, execute with Sphero and log findings.
- Students will log process, chart and graph findings, create inferences and test them using the Ipad, Sphero and SPRK Lightning Lab.
- The students will complete the speed, time and distance SPRK Lightning Lab lesson and submit online or in paper.(https://sprk.sphero.com/)
- Students will turn or submit their time, speed and distance lesson
- Complete their post-assessment of basic physical science skills lesson of speed, distance and time.

B. Describe the time involved (project length including amount of time each day/week)

- The students will take a week and a half to complete the project. Each class will consist of a minimum of 30 minutes per day to devote to the project.
    - 1 day on digital citizenship and proper conduct and group lesson and introduction to Sphero.
    - 2 days introducing class to SPRK Lightning Lab and the SPRK Lab app.
    - 2 days executing the time, distance and speed lesson from SPRK Lightning Lab using the IPad, Sphero and SPRK Lab or OrbBasic app.
    - 2 days testing inferences of different speeds, distances, time and surfaces.

C. Describe the people involved (grade level/subject & # of students, teachers and/or staff).

- Subject Area – Physical Science
- Number of students involved – 4 full classes, 26-30 students
- Number of teachers or staff members – 2 teachers

D. Describe the materials needed for the project.

- Sphero Education Pack (12 x Sphero SPRK) at $1099.99.
- Sphero SPRK Lightning Lab (teacher and class account) at $0.
- SPRK Lab or OrbBasic app at $0.
- Ipad cart (already available at school for sign-out) $0.

IV. What is the timeline for assessing accomplishments and objectives (In 1-2 paragraphs, describe program evaluation procedure.)?

- Pre-Assessment of Physical Science skills of speed, time and distance at the beginning of the project.
- Post-Assessment of coding skills to determine level of coding ability.
- Pre-Assessment of Physical Science skills of speed, time and distance at the end of the project.

- Post-Assessment of coding skills to determine level of coding ability.

V. How will the students be assessed (In 2-3 paragraphs, include details regarding how student progress will be assessed and reported to students, parents, teachers, and others.)?

Student progress will be assessed using teacher created pre and post-assessments, SPRK Lightning Lab and teacher feedback. The progress from the assessments will be reported to students and parents through the Synergy online grading system. The pre-assessment will be qualitative in nature and thus the grades and feedback will not way on final grade. The post-assessment results will also be quantitative in nature and results will be communicated to the students and parents using the Synergy online grading system.

Information on student progress will also be communicated using teacher feedback. The teacher will meet with students and conduct an informal discussion about the project. The students will receive timely feedback about their progress along the way and also obtain suggestions from the teacher.

VI. What is the proposed budget? Include information on the following:

A. Materials and Supplies
   - Classroom subscription to https://sprk.sphero.com/ $0
   - Classroom subsciption to SPRK Lab app https://itunes.apple.com/us/app/sprk-lightning-lab-programming/id1017847674?mt=8 at $0
   - Classroom subscription to OrbBasic app https://itunes.apple.com/us/app/orbbasic-for-sphero/id647306205?mt=8 at $0

B. Classroom Set of Sphero SPRK http://store.sphero.com/products/education-pack-10-x-sphero-2-0 at $1099.99.

C. Ipad classroom cart, currently available for sign out at school, $0.

Total Cost $1099.99

V. List your supporting references.

Works Cited:

Grandin, T., & Panek, R. (2013, May 23). How an Entirely New, Autistic Way of Thinking Powers Silicon Valley. Retrieved July 17, 2016, from http://www.wired.com/2013/05/silicon-valley-coders-and-autism-and-asperbergers-maybe-its-a-new-kind-of-design-thinking

Partovi, H. (2013, February 26). Computer programming education needed: Column. Retrieved July 17, 2016, from http://www.usatoday.com/story/opinion/2013/02/26/computer-programming-coding-education/1947551/

Patterson, S. (2015, October 19). Robots That Teach: Using Sphero in Class. Retrieved July 17, 2016, from http://www.edtechmagazine.com/k12/article/2015/10/robots-teach-using-sphero-class

INSTRUCTIONAL TECHNOLOGY GRANT PROPOSAL
EVALUATION FORM/SCORING RUBRIC

Total Points (out of 200): _____

1. Impacts a variety of skill levels and/or learning styles or impacts an important target population.

   Possible number of points: 40 _____

2. Clearly identifies standards and learning objectives being addressed.

   Possible number of points: 40 _____

3. Pedagogically sound, based on research and/or best practices.

   Possible number of points: 40 _____

4. Clear plan for assessment of project and goals with examples of implementation methods.

   Possible number of points: 40 _____

5. Impacts large number of students and/or can be recycled/reused.

   Possible number of points: 40 _____

General Comments:

Adapted from: The Education Foundation of Oconee County, Inc.