QSM SAMPLE PROPOSAL – Grade 7 Coding

The following sample proposal should be used to gain a better understanding of the grant application questions and components. Copying or including any part of this sample in your proposal will be considered plagiarism and your proposal will be disqualified.

I. Project Overview (9 points)

What is the approximate number of students that will be directly impacted by your project?

24

Which grade band levels will your project impact?

□ PK-3 ■ 4-8 □ 9-12

Which subject does your project fall under?

□ Mathematics □ Science ■ STEM

What class(es) will your project impact?

One 7th Grade STEM-Computer Science Class

Standards Sources

Identify source of the standards. Louisiana Student Standards should be given priority over national standards. National standards can be used if Louisiana State Standards are not available (e.g., upper level subjects). If other is selected, identify the source of the standards.

□Louisiana Student Standards for Mathematics
□Louisiana Student Standards for Science
□Louisiana's Birth to Five Early Learning Development Standards
■Computer Science Teaching Association Standards
□Standards for Technological and Engineering Literacy
□International Society for Technology in Education
□Advanced Placement
□Common Core Standards for Mathematics
□Other

Standards Outline

Provide the following information for each standard.

a. Provide a standard (by code and text) addressed by this project.
b. List students' actions associated with the standard.
c. List evaluation methods associated with the standard.

Standard 1

1a. 2-AP-12. Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals.

1b. *Students will create code to repeat actions within nested loops to get their mBot to draw single and repeated 2D shapes of geometric art.*

1c. *At the end of the unit students will submit their completed code and artwork for a unit grade and for display on a bulletin board. A rubric will be used for assessment.*

Standard 2

2a. *2-AP-14. Create procedures with parameters to organize code and make it easier to reuse.*

2b. *Student teams will create a shared folder for our class shared drive to organize screenshots of working code for the mBots to draw different sized circles, squares, and other 2D shapes. When a team may be experiencing a problem with code, they can visit this section to have a basic starting point to create a shape and then make changes as needed for their unique mBot creation. This teaches about giving credit to the original author of code within our computer science classroom as well as reusing their code in a shorter format or reuse. Students will also learn how to create and save procedures that may be repeated multiple times within their program. This will help, for example, when creating multiple circles or circles of different sizes.*

2c. *The teacher will view shared folders weekly to guide students in using this "open source" (i.e. code or software made available for free on the internet for anyone to use and edit as needed) resource and adding their edited code and shortcut procedures, as needed.*

Standard 3 (optional)

3a. *2-AP-15. Seek and incorporate feedback from team members and users to refine a solution that meets user needs.*

3b. *Student teams will create a digital feedback board (via conceptboard.com) for addressing problems they have encountered during a project and how they will split the responsibilities between team members. They will start each session by reviewing this board and organization of duties. Then, they will add new duties, problems or solutions at the end of each session.*

3c. *The teacher will view these boards weekly to guide students in effectively and consistently utilizing this tool to guide teamwork and help them stick to the timeline.*

QSM
QUALITY SCIENCE & MATH GRANT

Project Summary

Provide a brief summary of the project that addresses the items being requested and how this project will increase students' content knowledge, skills, and/or practices of the listed standards. (50-120 words)

First, students will create mindless mechanical robots (doodlebots) that draw random art by vibrating across paper and adjust a counterweight and/or the length/position of parts such as markers to try to control the robot's drawn creation. Students will then recognize the need for the mechanical doodlebot to have a computerized brain that can then be programmed to create intricate drawings repetitively on demand. Students will build and uniquely modify a programmable mBot with an attachment that holds a marker. Then, they will code the robot to create unique artwork containing a circle, square, triangle, hexagon, and octagon using nested loops throughout a 6-week unit. Students will have access to a shared "open source" drive to share final code and unique code for creating shapes.

II. Rationale (6 points)

State the primary motivating factor in proposing this project for the students (e.g., students' weakness, new curriculum, innovative project, challenges as a result of demographics, etc.). Include evidence supporting the motivating factor (e.g., student data, past experience, observation, education literature citations, etc.). (150-250 words)

This project is important to implement so that students can understand the importance of coding robots correctly and efficiently. The students have practice coding virtually in code.org but a virtual environment does not show problems that can arise in the real world when getting an imperfect robot to perform specified tasks. Students already practice coding simple premade robots. However, programming a robot that can be uniquely modified and performing a task effectively and efficiently takes time and determination. Groups must organize how they communicate and create a plan of how to divide responsibilities to get the project completed in a limited timeframe.

In my experience working with coding classes and robotic teams, I have found that students have a great amount of difficulty communicating effectively to complete a project. I want my teams to not only complete the tasks but also learn how to communicate, brainstorm, collaborate and stay on task. So, that is why I have put a large focus on the importance of creating and maintaining a digital feedback board and shared drive throughout this project.

III. Project Description (23 points)

Timeline

Provide a timeline of project implementation.

December 2022: Prepare for Spring Project:

- *Organize materials*
- *Create student accounts on conceptboard.com*
- *Set up Google Drive shared folder for the "open source" code share spot for shared code*
- *Organize Google Classroom assignments on Classwork Timeline*
- *Practice building, creating and coding mBot to have a knowledge base in order to help troubleshoot and guide students during the project.*
- *Prepare computers with mBot software (mBlock or scratch)*

  Note: Free mBlock Blockly, mBlock 5, or Scratch web-based software can be utilized to create code using block-based programming, Python, or Arduino C. The mBot is powered by a powerful Arduino "brain" that easily interacts with hardware and software, *so they communicate with the robots easily.*

January and February 2023: Project Begins (See details in the description section)

Week 1: Doodlebot Creation and Discovery
Week 2: Build basic mBots and prepare for project
Week 3: Build drawing component attachment, attach to mBot, code and test for dependability
Weeks 4-5: Create code to perform specific tasks of drawing simple 2D shapes as noted on the rubric, save dependable simple 2D shape code to class "open source" shared Google Drive for others to use and modify, create a unique geometric artwork using nested loops.
Week 6: Present mBots, code, and completed artwork. Attach completed code screenshot to Google Classroom final project assignment.
Week 7: Grade projects using rubrics, checklists, Google Drive files, and team planning and communication site (conceptboard.com)

March 2022: Complete and submit Itemized Expense Report and Final Report to QSM administrators

QSM
QUALITY SCIENCE & MATH GRANT

Description
Describe the project's instructional plan and classroom activities that will be used to improve content knowledge, skills and/or practices of your students. The items requested in your budget should be included here. (350-600 words)

*January and February 2022: Project Begins (**bold text items** are from QSM eligible purchases)*

***Week 1:** The students will be divided into 6 groups of 4. Students will create "brainless" vibrating doodlebots using 1 **DC hobby motor 3V**, 1 **2 slot AA battery holder (with cover, wire leads and switch), 1 adhesive motor clip**, counterweights (bottle cap, coin, etc.), paper, googly eyes, pipe cleaners, hot glue gun, AA batteries, wire strippers, scissors, glue sticks, sturdy paper cups, markers, and duct tape. The cup is turned upside down, the battery pack and motor are stacked and mounted on top, a counterweight is attached to the spinning shaft causing the robot to vibrate and move in unexpected ways. Three or 4 uncapped markers as "legs" mounted around the cup create random drawings on paper as the robot moves and jiggles. Eyes and pipe cleaners are attached to add personality to the robots.*

***Week 2:** In the same 6 groups, students will build **1 basic mBot (using the 6 mBot Arduino Lego with Robot Arm Kits) robot** using the directions in the kit. Time is also needed to get to know the robot and the software. They must practice creating and transferring the code from the software program to the mBot to learn how the system works. Then, they will plan how they want to modify the robot next week to make it a smart drawing robot. Finally, they get-to-know their team members and set up their accounts and plans on conceptboard.com. They must share access to this account with the teacher. On conceptboard.com, they will create a timeline and communication space to post problems they have encountered during the project and how they solved them. In addition, they will split responsibilities between team members each week and post this on the concept board as well.*

***Week 3:** Using the **3 classic Lego block kits (1 kit per 2 teams)** and zip ties as needed, students will modify their mBots to become smart drawing robots by attaching a modification part with a marker with plans created the previous week. Students will then test the robots by creating simple code, like drawing a straight line, to make sure their attached modifications are sturdy and dependable. They will identify changes needed, what needs to be accomplished, and post team jobs for the next week to conceptboard.com plans.*

***Week 4-5:** Each group creates an intricate geometric artwork on poster board paper. They must create and upload the code and/or modify and use the "open source" code from our shared Google Drive and then upload any dependable simple code for a circle, line, square, triangle, hexagon, and octagon. Then, they must modify simple code for each 2D shape and use each code successfully in a nested loop so that it stays within the parameters of a poster board, about 22 x 28 inches. The code must also work with their uniquely modified mBot. They will identify changes needed, what needs to be accomplished, and post team jobs for the next week to conceptboard.com plans.*

***Week 6**: Present coded mBots "in action" to the class, discuss what worked in each group and how they solved problems, display artwork and photographs of presentations on a class bulletin board. Turn in all work in Google Classroom.*

The following ineligible items needed for this project are already a part of my classroom, recycled, or will be purchased using my teacher consumable supply account at school: printer paper, zip ties, markers, duct tape, googly eyes, glue, pipe cleaners, paper cups, poster board paper, hot glue gun and glue sticks, bulletin board paper, AA batteries, wire strippers, and counterweights.

Our school currently has Dell Chromebooks and Apple MacBook Airs that both can be used to program the mBots. Free mBlock Blockly, mBlock 5, or Scratch web-based software can be utilized to create code using block-based programming, Python, or Arduino C. The mBot is powered by a powerful Arduino "brain" that easily interacts with hardware and software.

IV. Evaluation (9 points)

List and describe the evaluation method(s) that will be used to determine student growth during the implementation of your project. (150-300 words)

A teacher-created checklist and project rubric will be used to assess the final project. Students will need to plan and engage meaningfully and consistently throughout the project with their team in person and virtually on conceptboard.com. Students will need to participate in the doodlebot creation to understand the need for smart robots. Students will need to build and modify a smart drawing robot, and then create a program to perform simple and complex 2D drawings on a poster board to display.

Identify the target outcome(s) for student success. Indicate and describe the criteria for determining success at achieving the target outcome(s). (50-150 words)

The target outcome is successful completion of the project in a team while achieving a 75% or higher on the rubric and checklist. As I will be helping students along the way and keeping a close watch on how they are communicating and working, I believe that students will be 100% successful because there are so many ways to code and in-class opportunities are given to borrow and modify code as needed.

QSM
QUALITY SCIENCE & MATH GRANT

V. Budget (8 points)

Budget items includes equipment and materials that will be used for quality instruction to increase knowledge, skills, or practices in Math, Science, and STEM classes. The maximum award is $1,000 for PK-3 proposals and $1,500 for 4-12 proposals.

The budget should include all QSM eligible items and QSM ineligible items that need to be purchased to successfully implement your project. If your budget includes QSM ineligible items and/or the total of QSM eligible items exceeds the award limitations, an explanation of how these items will be funded is required.

Click "+ New Item" to add a new budget item. For each item, specify if it is QSM eligible or QSM ineligible and fill in the Item Name/Description, Quantity, and Cost/Item. For QSM eligible items, the Vendor Name and Vendor Link is required.

QSM Eligible/Ineligible	Item Name/Description	Quantity	Cost/Item	Vendor Name	Vendor Item Link
Eligible	*DC hobby motor-pack of 10*	*1*	*$16*	*Science Kit Store*	Link
Eligible	*2 AA battery holder with cover, switch and wire leads*	*10*	*$1.60*	*Sparkfun*	Link
Eligible	*adhesive motor mount clips-pack of 10*	*1*	*$12*	*Science Lab Supplies*	Link
Eligible	*mBot 2 Arduino Lego with Robot Arm*	*6*	*$199.99*	*Robot Academy*	Link
Eligible	*Lego Classic Large Creative Box*	*3*	*$43*	*Amazon*	Link
Eligible	*Estimated Shipping Costs for all Products (10% of total)*	*1*	*$137.30*	*All Above Vendors*	

QSM Eligible Items Total: *$1,510.24*
QSM Ineligible Items Total: *$0*
QSM BUDGET TOTAL: *$1,510.24*

Please indicate who will fund any overage for QSM Eligible items if needed. Select all that apply.

□ School Funded
□ District Funded
□ PTA
□ Private Company
□ Non-profit organization

■ Not Needed- QSM Eligible Items within Total Limitations
□ Other

Please indicate who will fund any overage for QSM Ineligible items if needed. Select all that apply.

■ School Funded
□ District Funded
□ PTA
□ Private Company
□ Non-profit organization
□ Not Needed - Budget does not have QSM Ineligible Items
□ Other