QSM SAMPLE PROPOSAL – Grade 4 STEM

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?

40

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?

Two fourth grade STEM classes

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. *4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior and reproduction.*

1b. *Students will collect plant structure measurement data and construct an argument based on that data for an 8 week period.*

1c. *Students will be given a pre-test on plant structures, complete plant data collection logbook to showcase their understanding of how each structure assists the plant in surviving in an aeroponic environment. Teacher will use a checklist to monitor students' data collection.*

Standard 2

2a. *4.MD.A.1- Know relative sizes of measurement units within one system of units including: ft., in; cm,m. Within a single system of measurment, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table.*

2b. *Students will observe, measure and record the growth of plant structures in an aeroponic environment for 8 weeks. Students will compare this data to a traditional soil based class garden to determine the effects of growing plants in an air or mist environment rather than in soil.*

2c. *Students will be given a pre-test on measurement collection and conversion. Teacher will use a checklist to monitor students' data collection. Using a rubric, the teacher will determine how data is organized and represented accurately.*

Standard 3 (optional)

3a. *STEL 1F - Describe the unique relationship between science and technology, and how the natural world can contribute to the human-made world to foster innovation.*

3b. *Students will make qualitative observations comparing the aeroponically grown plants to the traditional soil based plants in order to describe how a human-made vertically designed structure supports plant growth processes more efficiently than traditional farming practices.*

3c. *Students will be given a pre-test on farming methods. An exit ticket featuring students' explanation of how technological developments in farming have been shaped by shifting economic and cultural influences will be completed. This will demonstrate students' ability to describe the unique relationship between human-made farming tools and how they affect our natural world.*

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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)

Students will use the requested aeroponic garden to gather measurement data for analysis which will support their understanding that plants' internal and external structures assist in survival. These materials will increase students' understanding of structure and function as well as measurement data collection by engaging them in activities featuring innovative tools that assist human interactions with the natural world.

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)

The primary motivating is for students to DO science as real scientists and engineers. Students assume the roles of agricultural engineers in order to collect data that supports the argument for vertical gardens in urban areas. Elementary students customarily are not required to create engineering design solutions. This project requires students to use their experiences with aeroponic gardening to design an inexpensive, self-contained vertical garden unit prototype using classroom items. To meet the needs of STEM education, students must not only be exposed to math and science content, but also engineering.

Students are frequently exposed to and use technology, but engineering practices are rarely required of students in these grades. Students generally perform the lowest on reasoning scientifically on standardized assessments. This past school year, only 24% of third grade students scored proficient in this category.

III. Project Description (23 points)

Timeline

Provide a timeline of project implementation.

Over the course of 8 weeks, students will monitor and measure the length of plant stuctures grown in an aeroponic garden and compare these to plant structures grown in a traditional garden. Students will record their measurements and take photos of both the aeroponic garden and the traditional garden three times a week for 5 weeks. During this time, students will discuss their observations with peers and participate in investigation analysis discussions to determine the accuracy in their measurements and the quality of evidence collected. In addition to this, students will begin researching alternative methods for traditional field farming to determine the advantages and disadvantages to utiling these human made systems. Students will spend the next 3 weeks focusing on applying the engineering design process to guide their steps in designing their aeroponic garden prototype.

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)

To introduce the unit, students watch a video featuring NASA growing plants in a microgravity chamber on the international space station. Then, students create their questions about the farms of the future for our class driving question board. After a review of plant parts and needs, a class discussion about farming methods takes place. Once students have been given more information about aeroponic gardening, the Tower Garden system and its parts will be introduced. Our class will be growing four different types of plants; therefore there will be four students in each plant group. In groups of four, students will select which seeds to plant in the rock wool so that the seeds can begin the germination process. These groups will also plant their selected seeds in the school provided traditional row gardens. In order for students to compare plant growth in a traditional garden to an aeroponic garden, each student will grow two plants (one aeroponic and one traditional).

Students will review prior knowledge of measurement before collecting baseline measurement data from the seeds. Students will continue to measure their plants three times a week for the next 5 weeks. Following each measurement, students will work in their assigned student groups to review qualitative and quantitative observations collected, focusing on measurement accuracy and identification of plant structures. During this time, as students continue to practice taking precise measurements, discussions on measurement conversions take place. Students are also individually conducting research on alternative farming systems, compiling evidence that would support their understanding of the relationship between the natural world and human made farming tools. While students are researching, I am looking and listening for evidence of students demonstrating their understanding of the importance of human innovations and how they affect our natural world.

To conclude the unit, students apply the conclusions from their data collections to an engineering design challenge. Students will be tasked with designing an inexpensive, self-contained vertical garden unit that can produce food for a family located in an urban area. Continuing to work in groups of 4, students will be given classroom materials to construct their prototype. After examining the materials, students will develop possible solutions based on the criteria and constraints before building their prototype. Students will test their solutions and present their findings to the class.

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IV. Evaluation

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

Baseline data will be collected through a pre-assessment of students' prior knowledge of plant structures, measurement collection/conversion and farming methods. Student growth will be determined by anecdotal notes (taken before, during and after project implementation) as well as review of student plant data collection logbooks using a checklist. In addition to this, students' quantitative data will be analyzed throughout the project to measure growth; specifically the precision of students' measurements and conversions. Exit tickets will also be collected throughout to showcase the progressive growth of student understanding surrounding the importance of the relationship between technology and sustainable organic farming practices.

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 for all students to score 80% or higher on the post-test focused on the standards 4-LS1-1, 4MD.A.1 and STEL.1F. These scores will be compared to the pre-assessment scores to determine mastery of the standards.

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 Link
Eligible	*Tower Garden Home Growing System with Lights*	*2*	*$1,020*	*Tower Garden*	link

QSM Eligible Items Total: *$2,040*
QSM Ineligible Items Total: *$0*
QSM BUDGET TOTAL: *$1,500*

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