DUKE ENERGY

Educational Foundation of Lake County

Educational FOUNDATION of Lake County

2018-19 Duke Energy Foundation STEM Grant

DEADLINE March 15, 2019 4:00 pm Foundation Office via Jackrabbit or Email (weidnerg@lake.k12.fl.us)

- This Classroom Grant is for 2018-2019 school year.
- Funds must be used to address a STEM related project.
- All funds must be used by May 1, 2019. A final program evaluation must be submitted by May 15, 2019.
- Requires signature of principal and requesting party

Contact Information	
Applicant Name: Christine Clark	Position: Science Teacher
School: Carver Middle School	
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Email Address: clarkc5@lake.k12.fl.us	

Detailed Project Information
Project Title: Building the Future Through Collaboration
What priority area(s) will your project address: science and math
What is your estimated start date: May 2nd, 2019
Estimated number of teachers who will participate in this project: 2
Estimated Number of Total Students Impacted by project: 200
Grade Levels to be Addressed: 8 (while reviewing standards from 6th and 7th)

Program Background:
This project would utilize laptops, 3D printers and Circuit scribe pens to build an ecofriendly model neighborhood/city. This is a culminating STEM project that encompasses many standards learned in all core areas, throughout the three years in middle school.

Project Summary:
Students will research the land forms, history, weather, energy sources and life in the area and use this information to create a living space that would be safe and inclusive for all living things in the area. Students will collaborate with multiple classes to complete the research and build their projects to include buildings, roads, electrical circuits to provide power, and showcase the living organisms in the area over a span of three weeks.

Need:
Currently the students have a notebook that is left in the classroom to communicate their ideas to the next group coming in, because this is not real time and cannot be taken home communication is an obstacle they must overcome. Building materials are limited to cardboard and pre-made items that may not convey their futuristic designs. Circuits are built using bulky wires and oversize bulbs that do not fit into the scale of their model.
The technology requested would allow real time collaboration through google docs and google classroom, the ability to build items to scale for their neighborhood, and create parallel circuits to power

their city as well as familiarize students with 21st century skills not normally available to them in the classroom.
We are requesting up to 10 Chromebooks, three 3-D printers, and filament for the printers, 5 circuit scribe kits and a package of circuit scribe pens.

Project Goals and Objectives:
Students will be taking the knowledge learned in middle school and applying it to a real world situation (designing ecofriendly neighborhoods for the future) while learning valuable 21st century and collaboration skills. The achievement goals in this project align to the following standards: MAFS.7.G.1.1 : Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites. SC.6.P.13.1 Investigate and describe types of forces, including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational. This project will help fill the curriculum gaps students have from previous school years. Often, students move onto the the next grade level without fully mastering that grade level content, this project allows students to review essential standards. This project also addresses the current gap students have in terms of hands on classroom experiences with technology. We are attempting to prepare students for technology based careers, and yet often times our students don't get their hands on technology before they enter college.

Evaluation Plan: *Describe how you will measure outcomes and evaluate your project.*
Students will be given a pre and post assessment as well as a project rubric to evaluate their progress. Students will be monitored throughout the project to ensure they are designing their neighborhood according to the specifications assigned.

Budget

Category of Expenditure	Dollar Amount	Related Activity
Computer Hardware	**$2,593.20**	**Chromebooks, along with google classroom, will be used for research, design and collaboration amongst the group members to complete the project.**
Computer Software		
Other Equipment (not computers)	**$959.97**	**3-D printers will be used to engineer houses/buildings that would be ecofriendly.**
Competition Registration Fees		
Program supplies	**$640** **$499.75**	**Filament for the 3-D printers** **5 Circuit Scribe kits to power the model neighborhood.**
	$179.95	**Circuit pens to draw the circuits that will power their model neighborhood.**
TOTALS	$4872.87	

Program Approved By: Kristina Kelley Tuuri
Principal

Funds Payable to: Carver Middle School

Address: 1200 N. Beecher St.
Leesburg FL 34748

Phone: 352-787-7868 **Email:** ClarkC5@lake.k12.fl.us

Requesting party has read and agrees with the funding policies of the Educational Foundation.

Signed Christina Clark **Date** 3/15/19

To be completed by foundation staff/board

Program meets Duke Energy Foundation's Mission/ Funding Policy _____Y _____N

Director Recommendation: _____

Executive Board Recommendation: _____

Designing an ecosystem				
	5 pts	10 pts	15 pts	20 pts
6th grade standards SC.6.E.6.2 Recognize that there are a variety of different landforms on Earth's surface, such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes, and relate these landforms as they apply to Florida. SC.6.E.6.2 Recognize that there are a variety of different landforms on Earth's surface, such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes, and relate these landforms as they apply to Florida. SC.7.E.6.5 Explore the scientific theory of plate tectonics by describing how the movement of Earth's crustal plates causes both slow and rapid changes in Earth's surface, including volcanic eruptions, earthquakes, and mountain building. SC.6.E.7.2 Investigate and apply how the cycling of water between the atmosphere and hydrosphere has an effect on weather patterns and climate. SC.6.E.7.3 Describe how global patterns such as the jet stream and ocean currents influence local weather in measurable terms such as temperature, air pressure, wind direction and speed, and humidity and precipitation. SC.6.E.7.6 Differentiate between weather and climate.				
Chose a location on the map you want to simulate.	List all possible ecosystems and the topography (landforms) and weather of each. To be included in your preplanning sheet.	All members of the team will research ecosystems they want to study further and present their choice to the team. Notes for each one should be included in your preplanning sheet and discussed with your group. (discussion can be video recorded or someone can keep minutes of your team's meeting)	The team should chose 1 ecosystem that they will build together. This should be noted in your preplanning sheet.	Written design your ecosystem is ready for approval to be drawn to scale. Included in your preplanning sheet.
Determine the topography of the location of your city. Use this information to determine building materials for your city.	What landforms are present in your ecosystem?	Determine if you are near any plate boundaries, volcanoes, etc that may impact your building choices.	Design your buildings to withstand natural geosphere events.	Write a report to the local government offering ways to increase the stability of existing buildings to withstand natural geosphere events.
Determine the climate and weather of your city and make building and energy source accommodations for the areas climate and topography.	What is the climate, to include average temperatures and yearly rainfall, of your location and how does this affect your city? To be included in your report.	What weather events can happen in your ecosystem that you will need to be prepared for?	Design your buildings to withstand natural weather events. Include your reasoning in your written report.	Write a report to the local government offering ways to increase the stability of existing buildings to withstand natural weather events.

7th grade standards				
SC.7.L.17.3 Describe and investigate various limiting factors in the local ecosystem and their impact on native populations, including food, shelter, water, space, disease, parasitism, predation, and nesting sites.				
Determine the plant population in your chosen area and represent that in your model	Determine and include in both your model and brochure the plants found in your ecosystem.	Determine the limiting factors of the plants found in your ecosystem to be included in your essay.	Explain the impact of these limiting factors on the native populations to be included in your essay.	How can you counteract limiting factors so that the plants in your ecosystem can thrive? to be included in your portfolio.
Determine the animal population in your chosen area and represent that in your model.	Determine and include in both your model and essay the animals found in your ecosystem.	Determine the limiting factors of the animals found in your ecosystem to be included in your essay.	Explain the impact of these limiting factors on the native populations to be included in your essay.	How can you counteract limiting factors so that the plants in your ecosystem can thrive? To be included in your essay.
Research the human population of your chosen area and represent that in the type and number of buildings you include in your model.	How do humans use the plants and animals within your ecosystem? Demonstrate knowledge through your essay.	How do human activities affect your chosen ecosystem? Demonstrate knowledge through your essay.	What steps can you take to limit the effects of human activity within your ecosystem? Your buildings should be designed to minimize disturbance to the ecosystem.	How can you counteract the damage humans have already caused to your ecosystem? Demonstrate knowledge through your essay.
8th grade standards				
SC.6.P.13.1 Investigate and describe types of forces, including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational				
Chose an energy source to power your city based on its location and available resources	Determine the energy resources available in your chosen ecosystem	Choose a resource readily available to power your city for generations to come. Gather needed materials to harness your energy. Determine placement of your energy source. (create a materials list)	Build your energy source and connect it to the cities power grid. This should be able to power all of your houses, make revisions as needed until it does.	Develop Cost benefit analysis and an environmental impact statement comparing resources available and supporting your choice.
Wire your city so that every building has a light using your chosen energy source.	Design a circuit that will light all buildings while remaining on the main grid. This can be battery powered for testing.	Every building have the ability to turn its power on or off without affecting the other buildings while remaining on the cities circuit. The can be battery powered for testing.	Design a circuit that will light all buildings while remaining on the main grid using your energy source of choice.	Written response: how will your city run when your source is unavailable?

Math standards MAFS.7.g.1.1 solve problems involving scale drawing of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.				
Draw a scaled model of your city BEFORE you start building. Using graph paper draw a model of your ecosystem. Be sure to include your topography, streets and buildings in your drawing. When your drawing is completed and checked by your teacher you may begin your model.	50% of the items in the drawing/model are accurate to the scale. Complete drawing and measurements worksheet.	75% of the items in the drawing/model are accurate to the scale. Begin building model using predetermined scale.	100% of the items in the drawing/model are accurate to the scale. Model is completed using predetermined scale.	I can use proportional reasoning to explain why my scale drawing is the equivalent to its real world ecosystem.
Technology 24.0 demonstrate an application of basic electronic publishing techniques.				
Brochures to "sell" your housing! (There will be buyers!)	Brochure explains the characteristics of your ecosystem.	Brochure explains the characteristics of your ecosystem, identifies the native populations and natural landforms of your community.	Brochure explains the characteristics of your ecosystem, identify the native populations and at least 3 limiting factors and how your community addressed the limiting factors of the area and how the community was designed to be ecofriendly.	Typed brochure containing all requirements and is inviting to prospective buyers and residents. Brochure should allow buyers to know the socioeconomic level of the area (high class, middle class, up-and-coming). Educational options and recreational activities nearby.
Language arts standards LAFS.8.Rl.1.1-I can cite evidence from text to support my analysis of what the text says explicitly as well as inferences I make from the text.				
Provide citations from the sources of information concerning ecosystem, topography, weather, and building choices.	Citations are done in a logical format that still provides the ability to review the original sources of information.	Provide 9 citations in APA format. 3 for each stage of the project. In ABC order.	Provide 12 citations in APA format. 4 for each stage of the project. In ABC order.	Provide at least 12 citations in APA format and a synopsis of the contents of your source. (annotated bibliography)
Social Studies Standards S.S.8.A.1.1-Provide supporting details for an answer from text, interview for oral history, check validity of information from research/text, and identify strong vs. weak arguments				
Provide clear supporting details for city. Example: History, location, population etc.	Typed information containing: history of city as well as validity	Able to list not only the history of the town, but historical buildings, features and landscapes	Provide evidence from research and identify strength and weaknesses of city	Provide evidence from oral history, research and able to identify strength and weakness of city

	check of researched information			
Educational choices for your community.	Evidence of educational choices for the community are available.	School is designed to be ecofriendly and kid friendly.	School curriculum is written out and correlates to the needs of the community.	There are multiple school options for your community.