



FOR EXCELLENCE IN MIAMI-DADE PUBLIC SCHOOLS

2023  
2024

Ideas with

# IMPACT

STEM

## Electric Cars and Environmental Preservation

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# Electric Cars and Environmental Preservation



**STEAM**  
**Science, Technology, Engineering,**  
**Art, and Math**  
**Special Education & General Education**



*“Logic will take you from A to B. Imagination will take you everywhere.” Albert Einstein*



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Project Conducted at Jose de Diego Middle School Code: 6361

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# **Background**

## **The Purpose of My Project**

I created this project to meet my special education students' unique needs for firsthand activities connecting real-life problems with real-life solutions. I also conducted this project with my general education students, and I presented this project to other teachers' classes as well. I conducted this project at Jose de Diego Middle School in Miami-Dade County Public Schools, Miami, Florida, United States of America, during the School Year of 2022-2023.

## **The Source of My Idea**

The source of my idea was to provide special education students and general education students a firsthand experience of using a 3D printer to make miniatures of electric cars and the layers of the Earth model to help them comprehend better how a real-life problem such as climate change, can be solved with the voluntary option of using electric cars. I emphasized that there are other options to solve this problem, and I also presented the pros and cons of using electric cars. My project was innovative because I gave special education students and general education students from an inner-city middle school the opportunity of learning how to use a 3D printer to create miniatures of electric cars and layers of the Earth model. At the same time, all students had an opportunity to gain firsthand experience, discuss solutions for real-life problems, and express how they felt about the content learned. I emphasized the importance of finding ways to have a positive attitude and a cheerful outlook toward solutions for real-life problems.

## **My Project Demographics**

I conducted my project at Jose de Diego Middle School in Miami-Dade County Public Schools, Miami, Florida, United States of America. Jose de Diego Middle School is located at 3100 Fifth Avenue, Miami, FL 33127, and it is an inner-city school that participates in the Educational Transformation Office Program (ETO Program). When I conducted my project in the School Year of 2022-2023, Jose de Diego Middle School (JDD MS), according to online data from <https://publicschoolreview.com>, students' demographics were 56% Hispanic, 43% Black, and 1% White. JDD MS is a Title 1 school. According to online information at <https://www.fldoe.org> Title 1 is a program funded by the United States of America Federal Government, which provides financial assistance to schools and school districts with high percentages or high numbers of children from low-income families.

Female and male students participated in my project. The total number of students included in my project was one hundred and twenty-two. Of the one hundred and twenty-two students included in my project, nineteen were special education students enrolled in the modified curriculum classes, and one hundred and three were general education students enrolled in the standard curriculum classes. Of the nineteen special education students, five students were enrolled in my Period 4 Access Science Grade 7 class, six students were enrolled in my Period 5 Access Science Grade 8 class, four students were enrolled in my Period 6 Social Skills Grade 6

class, and four students were enrolled in my Period 8 Access Visual Arts Grade 8 class. Of the one hundred and three general education students included in my project, eighty-seven students were enrolled in my English Language Arts through English as a Second Language Grade 7 classes (twenty-eight students in my Period 1 class, thirty students in my Period 2 class, and twenty-nine students in my Period 3 class). Sixteen students were enrolled in another teacher’s Science Research Laboratory Grade 8 class.

**Overview of Different Classes**

I conducted this project in nine classes I taught during the school year of 2022-2023 at Jose de Diego Middle School in Miami-Dade County Public Schools, Miami, Florida. I also did two presentations to another teacher’s classes: grade 8 Science Research Laboratory Classes, a total of 16 students.

The table below shows the nine classes' titles, periods, subject areas, grade levels, curriculum types, educational population types, and number of students in each class. The table also shows period seven as my planning time.

<b>Class Title</b>	<b>Class Period</b>	<b>Subject Area</b>	<b>Grade Level</b>	<b>Curriculum Type</b>	<b>Educational Population Type</b>	<b>Number of Students</b>
ELA through ESOL	1	English Language Arts through English as a Second Language	7	Standard	General Education Students	28
ELA through ESOL	2	English Language Arts through English as a Second Language	7	Standard	General Education Students	30
ELA through ESOL	3	English Language Arts through English as a Second Language	7	Standard	General Education Students	29
Access Science	4	Science	7	Modified	Special Education Students	5
Access Science	5	Science	8	Modified	Special Education Students	6
Social Skills	6	Social Skills	6	Modified	Special Education Students	4
Planning	7	Planning (P)	(P) for All	Modified Standard	Planning	(P) for All
Access Visual-Arts	8	Visual-Arts	8	Modified Standard	Special Education Students	4

**Different Ways to Conduct the Project**

I customized my project to fit the curriculum of each grade and subject area I teach. I also customized my project for a presentation to another teacher’s classes in Science Research Laboratory Grade 8 classes. I used different ways to conduct this project, such as in-depth lessons, firsthand experience, interactive activities, exposure to the content, and presentation.

The unique way I customized my project makes it easy for other educators to implement this project with their students regardless of curriculum, subject area, and grade level they are working with. Basically, depending on how this project is conducted, it can fit the level of exposure the students will have to the content.

### **Different Levels of Participation**

These are the different levels of exposure to this project that different classes had due to different schedules and subject area learning purposes. The different levels of exposure affected the levels of participation. Participation levels were as follows:

- Access Science Grades 7 & 8 (Special Education) - Full project in-depth participation.
- Access Visual Arts Grade 8 (Special Education)- Full project in-depth participation.
- Science Research Grade 8 (General Education) - Full project presentation participation.
- English Language Arts through English as a Second Language- ELA through ESOL Grade 7 (General Education) - Full project exposure and presentation participation.
- Social Skills Grade 6 (Special Education) -Full project exposure and presentation participation.

### **Academic Achievement Benefits of My Project for My Students**

My project increased my students' engagement due to their extreme curiosity about electric cars, climate change, and 3D printing real-life objects. All my students' interest in science and technology increased, making them more participative, even in other topics classes. My students also developed a more positive attitude and a cheerful outlook on how to solve their real-life problems to build a better future for themselves, their descendants, and humanity.

### **Pictures of Students' Engagement in the Project**



### **Media Release Forms**

Students who participated and had pictures taken while working on this project have Miami-Dade County Public Schools (MDCPS) Media Release Forms signed by their parents and guardians, allowing the use of the pictures for educational purposes. I also created a Project Specific Media Release form. The MDCPS Media Release Form and my Project-Specific Media Release Form were as follows:



- **Project-Specific Media Release Form in 3 languages: English, Spanish, and Haitian Creole**

**Innovator Grant Funded Project Title: Electric Cars and Environmental Preservation**  
**Project Creator, Executor, and Disseminator: Dr. Renata Novak Ed.D.**  
**Project Funded through The Education Fund**  
**Media Release Parental Consent Form**  
**Dear Parent,**

I am Dr. Renata Novak, a teacher at Jose de Diego Middle School (Miami-Dade County Public Schools). I was chosen to have my science project "Electric Cars and Environmental Preservation" to be funded through The Education Fund, a non-profit organization. The project uses a 3D Printer to make miniature electric cars and miniature Earth Layers. We will discuss the effect of electric cars on environmental preservation, and how we feel about climate change. Please be advised that while working on this project your child may be photographed, videotaped, or interviewed at various school-sponsored events, as well as The Education Fund-sponsored events. With your consent, the photograph, video, or interview may be reproduced and released for use in the media, i.e., newspapers, brochures, videos, television, the internet, Miami-Dade County Public Schools websites, The Education Fund websites/events materials, and social media platforms such as Facebook, Instagram, Twitter, etc.

Please indicate your preference below:

\_\_\_\_\_ (Student Name) \_\_\_\_\_ (Student's ID Number)

\_\_\_\_\_ **Yes. My child's photograph/video/interview may be reproduced and released for use in the media.**

\_\_\_\_\_ **No. My child's photograph/video/interview may not be reproduced and released for use in the Media.**

\_\_\_\_\_ (Parent or guardian full name) \_\_\_\_\_ (Parent or guardian signature) \_\_\_\_\_ (Date)

**Return this signed form to:**  
**Contact Person: Dr. Renata Novak Ed.D. Dr. Novak's Contact Number: (305)725-1260**  
**Dr. Novak's email address: [drpessoanovak@dadeschools.net](mailto:drpessoanovak@dadeschools.net)**  
**School Name: Jose de Diego Middle School School's Contact Number: (305)573-7229**

Título del proyecto financiado por Innovator Grant: Autos eléctricos y preservación del medio ambiente  
 Creadora, Ejecutora y Divulgadora del Proyecto: Dra. Renata Novak Ed.D.  
 Proyecto financiado a través del Fondo de Educación  
 Comunicado de prensa Formulario de consentimiento de los padres

Querido padre y madre,

Soy la Dra. Renata Novak, maestra de la Escuela Intermedia José de Diego (Escuelas Públicas del Condado de Miami-Dade). Me eligieron para que mi proyecto científico "Automóviles eléctricos y preservación del medio ambiente" sea financiado a través de The Education Fund, una organización sin fines de lucro. El proyecto utiliza una impresora 3D para fabricar coches eléctricos en miniatura y capas terrestres en miniatura. Discutiremos el efecto de los autos eléctricos en la preservación del medio ambiente y cómo nos sentimos acerca del cambio climático. Tenga en cuenta que mientras trabaja en este proyecto, su hijo puede ser fotografiado, grabado en video o entrevistado en varios eventos patrocinados por la escuela, así como en eventos patrocinados por The Education Fund. Con su consentimiento, la fotografía, el video o la entrevista pueden reproducirse y publicarse para su uso en los medios de comunicación, es decir, periódicos, folletos, videos, televisión, internet, sitios web de las Escuelas Públicas del Condado de Miami-Dade, sitios web/materiales de eventos del Fondo de Educación, y plataformas de redes sociales como Facebook, Instagram, Twitter, etc.

Indique su preferencia a continuación:

\_\_\_\_\_ (Nombre del estudiante) \_\_\_\_\_ (Número de identificación del estudiante)

\_\_\_\_\_ **Sí. La fotografía/video/entrevista de mi hijo puede reproducirse y divulgarse para su uso en los medios de comunicación.**

\_\_\_\_\_ **No. La fotografía/video/entrevista de mi hijo no se puede reproducir ni divulgar para su uso en los Medios de comunicación.**

\_\_\_\_\_ (Nombre completo del padre o tutor) \_\_\_\_\_ (Firma del padre o tutor) \_\_\_\_\_ (Fecha)

Devuelva este formulario firmado a:

Persona de contacto: Dra. Renata Novak Ed.D. Número de contacto del Dr. Novak: (305)725-1260  
 Dirección de correo electrónico del Dr. Novak: [drpessoanovak@dadeschools.net](mailto:drpessoanovak@dadeschools.net)  
 Nombre de la escuela: Jose de Diego Middle School Número de contacto de la escuela: (305)573-7229

Tit Pwojè Finanse Sibvansyon Inovativ: Machin Elektrik ak Konsèvasyon Anviwònman  
 Kreyatè Pwojè, Egzekite, ak Difizyon: Doktè Renata Novak Ed.D.  
 Pwojè ki finanse atravè Fon Edikasyon an  
 Fòm Konsantman Paran pou Divilge Medya

Chè paran,

Mwen se Doktè Renata Novak, yon pwofesè nan Jose de Diego Middle School (Lèkòl Leta Miami-Dade County). Yo te chwazi m pou gen pwojè syans mwen an "Machin Elektrik ak Konsèvasyon Anviwònman" pou finanse atravè The Education Fund, yon òganizasyon ki pa gen pwofi. Pwojè a sèvi ak yon enprimant 3D pou fè machin elektrik miniatur ak kouch Latè miniatur. Nou pral diskite sou efè machin elektrik sou prezèvasyon anviwònman an, ak fason nou santi nou sou chanjman nan klima. Tanpri sonje ke pandan y ap travay sou pwojè sa a, yo ka pran foto pitit ou a, kasèt videyo, oswa fè entèvyen nan divès evènman lekòl la patwone, ansanm ak evènman The Education Fund patwone. Avèk konsantman w, foto, videyo, oswa entèvyen a ka repwodui epi pibliye pou itilize nan medya yo, sa vle di, jounal, bwochi, videyo, televizyon, entènèt, sit entènèt Lekòl Leta Miami-Dade County, sitwèb/materiyel evènman Fon Edikasyon, ak platfòm medya sosyal tankou Facebook, Instagram, Twitter, elatriye.

Tanpri endike preferans ou anba a:

\_\_\_\_\_ (Non Elèv la) (Nimewo ID Elèv la)

\_\_\_\_\_ **Wi. Yo ka repwodui foto/videyo/entèvyen pitit mwen an epi yo ka lage pou itilize nan medya.**

\_\_\_\_\_ **Non. Yo pa ka repwodui foto/videyo/entèvyen pitit mwen an pou yo ka itilize li Medya.**

\_\_\_\_\_ (Non konplè paran oswa gadyen) (Siyati paran oswa gadyen) (Dat)

Retounen fòm sa a siyen bay:

Moun ki kontakte: Dr Renata Novak Ed.D. Nimewo Kontak Doktè Novak: (305)725-1260  
 Adrès imèl Doktè Novak: [drpessoanovak@dadeschools.net](mailto:drpessoanovak@dadeschools.net)  
 Non Lekòl la: Nimewo Kontak Lekòl Segondè Jose de Diego: (305)573-7229

## **Equipment and Materials**

The materials required for this project are:

- 3D printer
- PLA 3D printing filaments
- Video tutorials on how to assemble 3D printer.
- Video tutorials on how to install and use Creality Slicer software.
- Creality Auto Bed Leveling Sensor Kit
- Paint brushes and paint
- Paper Markers, pencils, erasers
- Notepads, folders
- Computer

### **Sainsmart 3D Printer**



**The flash drive and the software come with the 3D Printer**



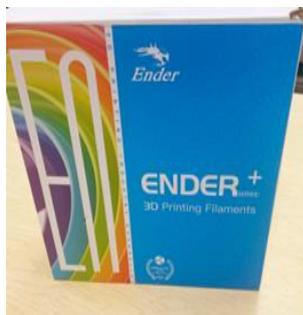


**Creality Auto Bed Leveling Sensor Kit**

**Parent-Donated Miniature of Earth's Layers Model**



**3D PLA Filaments 1.75mm**



# Goals and Objectives

## Overview of Goals and Objectives

The purpose of this project was to have students experience the connection of real-life problems with real-life solutions through innovative firsthand activities. I created this project to help my students increase their understanding of the class content through hands-on activities. I also created this project to increase the students' engagement and interest in the class. I created a goal related to my project on my Deliberate Practice Growth Form (DPGT) in the school year of 2022-2023. I feel blessed to have the excellent opportunity to share with fellow educators at the 2023 Education Fund Idea Expo the experience I had implementing my project with my students. I am sure my fellow educators will enjoy this curriculum packet and will be able to get many ideas to use in their classes. I customized my project to be used with special education students enrolled in a modified curriculum and general education students enrolled in the standard curriculum at the middle school level in the different subject areas of modified science, modified visual arts, social skills, and English Language Arts through English as a Second Language. However, this project can be customized for many more subject areas and grade levels, such as elementary school grade levels first through fifth grade and high school grade levels ninth through twelfth grade. Therefore, this STEAM project involving science, technology, engineering, art, and math can be adapted to fit many students' educational needs.

## Pictures of Students' Participation in the Project



## **DPGT & IPEGS Goal Inclusion and Impact**

Using my project, I created a goal for my 2022-2023 Deliberate Practice Growth Target Form (DPGT). I included the impact section of my DPGT on my Instructional Performance Evaluation and Growth System (IPEGS) in the section for Professional Development/ Professional Growth Experiences. The goal, plan of action, and impact were as follows:

- **Growth Target:** My goal is to help my special education students to **increase their percentage of subject content understanding** from a range of 70%-85% to a range of 90%-100% according to their disability and performance level, **by using hands-on activities** in every class. By May 2023, 100% of my special education students will **increase their subject content understanding** by 20% to 30% **by using hands-on activities** in every class, depending on their disability and level of performance.
- **Plan of Action:** I will create more hands-on activities for every class. I will participate in professional development workshops. **I will conduct the special needs science project which I received an Innovator Grant for it, from The Education Fund.**
- **Impact:** I met my goal, 100% of my special education students increased their understanding of the subject content by 30% using hands-on activities. **I won an Innovator Grant through The Education Fund to conduct a hands-on project (Electric Cars and Environmental Preservation). This was a multidisciplinary project with an emphasis on STEAM (Science, Technology, Engineering, Art, and Math), and a lot of hands-on activities such as the use of a 3D printer to create miniatures of electric cars, painting, and drawing. The students learned how to connect real-life problems such as climate change to real-life solutions such as the use of electric cars.** I attended the 2022 IDEA EXPO workshops on technology, English Language Arts, and Code. I attended Behavior Summit and 2 Frontline FTCE Tutorial workshops: ELA 5-9 and ELA 6-12. I attended a CSTA (Computer Science Teachers' Association) Event. I took workshops on Code-Art and implemented what I learned in the Access Visual-Art class I teach, as well as exposed the Code-Art knowledge to all my students in the other classes I teach. I submitted a Report on the 2022-2023 Innovator Grant I won. I was awarded The Education Fund Ideas with Impact Innovator Grant 2022-2023. I wrote and submitted another Innovator Grant project to the Education Fund. I submitted a Disseminator Application for the IDEA EXPO 2023. I worked with arts4all & will perform on May 5 at the Adrienne Arsht Center. 1 of my students won an arts4all Trophy.

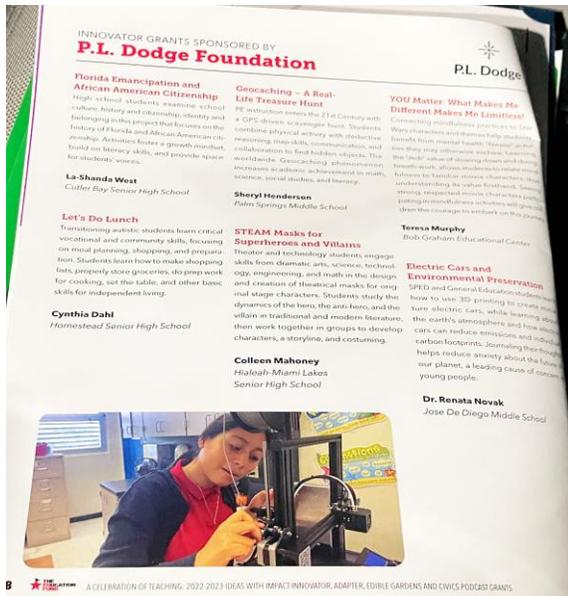
## **Goals & Objectives in Depth**

1. **Main Goal** - By May 2023, 100% of my special education students will **increase their subject content understanding** by 20% to 30% **by using hands-on activities** in every class, depending on their disability and level of performance.  
**End of 2<sup>nd</sup> quarter Objective** – By January 2023, 100% of my special education students will **increase their subject content understanding** by 10% to 20% **by using**

**hands-on activities** in every class, depending on their disability and level of performance.

2. **Additional Goal** -By May 2023, all my students will increase their engagement and interest in class to a range of 90% to 100% of the class time with 80% accuracy in 4 out of 5 trials, measured by a teacher observation checklist of students' participation in class.  
**End of 2<sup>nd</sup> quarter Objective** – By January 2023, all my students will increase their engagement and interest in class to a range of 80% to 90% of the class time with 80% accuracy in 4 out of 5 trials, measured by a teacher observation checklist of students' participation in class.

## Recognition of Our Work



## Educators Can Expect from This Workshop

Educators can expect to learn how to:

1. Create an innovative hands-on/firsthand project combining various skills such as using a 3D printer to create objects, paint objects, draw models, science and math and problem-solving skills.
2. Adapt this project to their specific teaching subject, grade level, and curriculum demand.
3. Network with coworkers, parents, and businesses.
4. Increase student interest and level of engagement.
5. Stimulate students' critical thinking to use in the future.

## Cost & How to Adapt this Project for Your Students

In this project, I used the funds from the Innovator Grant I won through The Education Fund for one thousand dollars. This amount allowed me to buy several 3D PLA Filaments in different

colors and many materials in a larger quantity. However, educators can adapt this project with four hundred dollars, buying fewer materials. The most essential piece of equipment to acquire is a 3D Printer. I acquired a Sainsmart 3D Printer for two hundred and thirty-six dollars. To be able to 3D print objects, you must acquire at least one pack of Creality 3D Official PLA Filament 1.75mm; the cost per pack is around twenty-one dollars and ninety-nine cents. To adapt the project to use with your students with four hundred dollars, educators can stick to the basics of the project: a 3D printer, one pack of 3D PLA Filament 1.75mm, paint, paintbrush, paper, eraser, and pencils.

### **Project Phases**

This project had three phases. In the first phase, I introduced the real-life problem of climate change and explained the Greenhouse Effect. I also introduced electric cars as one of the real-life solutions to the problem we were discussing. I made sure the students learned that there are other solutions as well. The students were very engaged because they were curious about learning how electric cars work. In the second phase, I introduced the 3D printer and explained how it works and how to use it. I also explained how to download the configuration for the object they would save to the flash drive to print in 3D. The students had hands-on experiences using the 3D printer to make miniatures of electric cars. Also in this phase, we had a parent, who owns FABLAB, a 3D Laboratory Workshop where he teaches 3D printing, come by the classroom, and share with us tips on how to level the 3D printer Bed and show us how to install an automatic 3D printer Bed Leveling device. In the third phase, the students answered a survey on how they felt about climate change and if what they learned during this project changed how they felt about it. The survey aimed to verify the impact of learning a real-life solution to a real-life problem on the students' feelings toward the subject. It was essential to verify if the students felt good and felt they had more control of their future.

### **Students' Activities**

Students' activities were as follows:

1. Learn how to use a 3D printer to 3D print miniature electric cars.
2. Paint the 3D Layers of Earth model using acrylic paint.
3. Complete graphic organizers related to each phase of the project.

Examples of specific educational materials and resources used:

- the students watched videos about Climate Change, the Greenhouse Effect, Sainsmart 3D Printer, How to Assemble and Use a 3D Printer, Creality Software for 3D Printer.
  - the students completed graphic organizers like See/Think/ Wonder and Compare & Contrast.
  - the students drew a model of the Earth's layers and electric car parts.
  - the students analyzed a poem about an electric car.
4. Complete Exit Tickets. Example: after the final presentation, the students had to complete an Exit Ticket with six questions about the presentation.
  5. Complete a survey of the project. Example: At the end of the project, the students completed a survey with five quantitative and five qualitative questions.

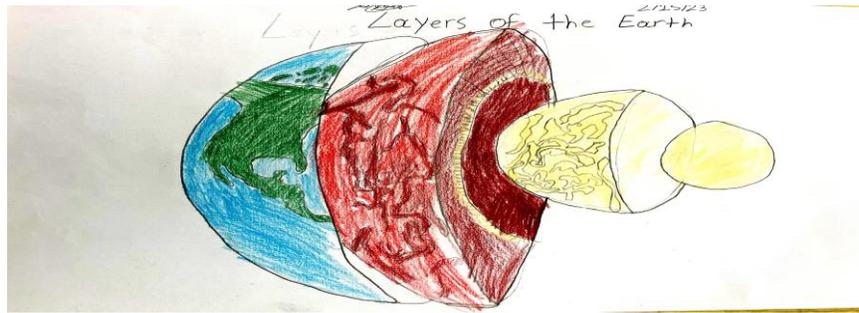
## **Data Collection**

I collected data at the beginning, during, and at the end of the project.

At the beginning of the project, I collected data using students' work samples, such as graphic organizers. During the project, I collected data by analyzing students' work samples. At the end of the project, I did a final interactive presentation. The students completed a KWL Chart and answered a Final Exit Ticket and a Project Survey.

## **Student Product & Work Samples**

### **Student's Free Hand Drawing Access Visual-Arts Class**



### **Students Made 3D Electric Car Miniatures Samples**



### **3D Printer Picture of the Process of Making an Electric Car Miniature**



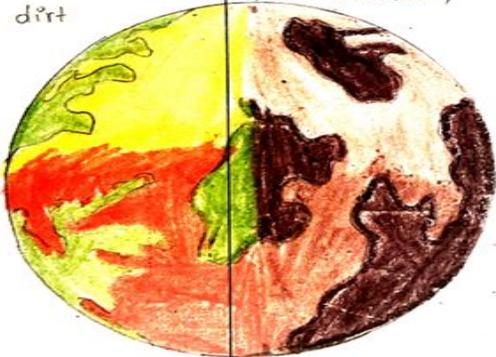
### **Miniature of Earth's Layers Model Painted by Students**



# Students Work Samples

**CLIMATE CHANGE**

Name: YESDANIK Date: 12/05/22 Period:     

<b>See</b>	<b>Think</b>	<b>Wonder</b>
<ul style="list-style-type: none"> <li>• Greenhouse.</li> <li>• people</li> <li>• Animals</li> </ul> <p>i see how the gas affects the earth, I see that there are stills people who take care of nature and also clean the dirt</p>	<ul style="list-style-type: none"> <li>• Greenhouse gases harm Earth's atmosphere</li> </ul> <p>i think that when the climate changes it affects some animals, but it also helps others, the same happens with humanity</p>	<p>How to prevent Earth from getting too warm?</p> <p>i wonder that after climate change, it affects the earth a bit, if there is no water the animals die of thirst, when the temperature is very high it affects humans</p>
		

**Compare and Contrast:**

climate change

- Greenhouse gases effect

Electric cars

- Electric cars are silent

Nikata testa

- Induction motors

Electric cars for kids

How does an electric car works

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## Bellringer Electric Car - Poem by Robert Pettit

In a morning rush that can be hectic,  
I go to work in my car that is electric.  
I got a tax credit from Uncle Sam for the buy.  
Clean and economical is something I cannot deny.  
Each week, gas prices go higher than before.  
Pulling up to the pumps can be a chore.  
Well, that is something I don't have to do anymore.  
Because my car is running clean,  
I am helping to keep our planet green.  
However, this morning I will not go very far.  
Last night, I forgot to plug in the car.



March 1, 2014

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## Electric Car Poem by Robert Pettit Bellringer



Electric Car Poem by Robert Pettit - Bellringer

1. What is the meaning of the word "clean" on line 4 "Clean and economical is something I cannot deny."?
  - a. Not pollutant.
  - b. Well washed.
  - c. Neatly swept.
  - d. Waxed.
2. What is the meaning of the expression "running clean" on line 8 "Because my car is running clean,"?
  - a. The car just got washed.
  - b. The car does not pollute the air.
  - c. The car got waxed.
  - d. The car tires are clean.
3. Do you think the poem "Electric Car" can be the lyrics to a song? Explain.

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# Final Presentation Worksheet Sample

ELECTRIC CARS & ENVIRONMENTAL PRESERVATION PROJECT PRESENTATION BY DR. RENATA NOVAK EDD

STUDENT NAME: \_\_\_\_\_ GRADE: \_\_ PERIOD: \_\_ TEACHER: \_\_\_\_\_ DATE: \_\_\_\_\_

## KWL CHART

KNOW	WANT TO KNOW	LEARNED

ELECTRIC CARS & ENVIRONMENTAL PRESERVATION PROJECT PRESENTATION BY DR. RENATA NOVAK EDD  
 STUDENT NAME: Zuleyka GRADE: 8<sup>th</sup> PERIOD: 2 TEACHER: Dr. novak DATE: 04-25-23

### KWL CHART

KNOW	WANT TO KNOW	LEARNED
They don't need to use gasoline. They are better for the ecosystem.	How do they work? why are they better for the environments.	Multidisciplinary Project. Bed Leveling Sensor Kit. Level the bed on 9 points manually Creality slice software Better battery solution sodium ion. Methane Carbon dioxide

# Final Exit Ticket Blank Sample

## Electric Cars & Environmental Preservation Project Presentation by Dr. Renata Novak Edd Exit Ticket

Name: \_\_\_\_\_ Grade: \_\_\_\_ Period: \_\_\_\_ Teacher: \_\_\_\_\_ Date: \_\_\_\_\_

- What kind of project was this?
  - Multidisciplinary project
  - Science project
  - Technology project
  - Math project



- What is this?
  - A charger
  - A Bed Leveling Sensor Kit
  - Eraser
  - Flash drive kit

- Select 1 PRO from the Pros section of electric cars:
  - Recycling risks
  - Disposal risks
  - Short-range charging time
  - Reduces air pollution.

- What is a better battery solution for electric cars?
  - Lithium Ion
  - Sulfate Ion
  - Sodium Ion
  - Carbon Ion

- What is one causing factor of climate change?
  - Greenhouse gases
  - The ocean tides.
  - Ancient culture.
  - Asteroids

- What was your favorite part of this presentation? Explain.

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# Final Exit Ticket Students Sample

## Electric Cars & Environmental Preservation Project Presentation by Dr. Renata Novak Edd Exit Ticket

Name: AJURIT Grade: \_\_\_\_ Period: \_\_\_\_ Teacher: \_\_\_\_\_ Date: 11-26-2023

- What kind of project was this?
  - Multidisciplinary project
  - Science project
  - Technology project
  - Math project



- What is this?
  - A charger
  - A Bed Leveling Sensor Kit
  - Eraser
  - Flash drive kit

- Select 1 PRO from the Pros section of electric cars:
  - Recycling risks
  - Disposal risks
  - Short-range charging time
  - Reduces air pollution.

- What is a better battery solution for electric cars?
  - Lithium Ion
  - Sulfate Ion
  - Sodium Ion
  - Carbon Ion

- What is one causing factor of climate change?
  - Greenhouse gases
  - The ocean tides.
  - Ancient culture.
  - Asteroids

- What was your favorite part of this presentation? Explain.

The car he made  
is electric, so I don't have to  
put gas.

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## Project Survey Blank Sample

### ELECTRIC CARS & ENVIRONMENTAL PRESERVATION PROJECT BY DR. RENATA NOVAK EDD SURVEY

STUDENT NAME: \_\_\_\_\_ GRADE: \_\_\_ PERIOD: \_\_\_ TEACHER: \_\_\_\_\_ DATE: \_\_\_\_\_

Circle YES or NO/ If YES Explain

1. Have you heard about electric cars before this project? YES NO

If YES Explain \_\_\_\_\_

2. Have you heard about how to preserve the environment by having electric cars before this project? YES NO

If YES Explain \_\_\_\_\_

3. Have you heard about climate change before this project? YES NO

If YES Explain \_\_\_\_\_

4. Do climate change scares you or/and make you feel anxious? YES NO

Explain \_\_\_\_\_

5. Did this project change your view or/and feelings towards climate change? YES NO

Explain \_\_\_\_\_

## Student Answered Project Survey Sample

### ELECTRIC CARS & ENVIRONMENTAL PRESERVATION PROJECT BY DR. RENATA NOVAK EDD SURVEY

STUDENT NAME: Jose \_\_\_\_\_ GRADE: 2 PERIOD: \_\_\_\_\_ DATE: 4/25/23

Circle YES or NO/ If YES Explain

1. Have you heard about electric cars before this project? YES NO

If YES Explain I heard of this before because when i was younger, i studied abt this before and i had classes.

2. Have you heard about how to preserve the environment by having electric cars before this project? YES NO

If YES Explain I don't know how to explain abt it, but i heard about the elements that they use for the electric cars.

3. Have you heard about climate change before this project? YES NO

If YES Explain It is a good understanding abt this, because we can know how to solve it, and ETC.

4. Do climate change scares you or/and make you feel anxious? YES NO

Explain It doesn't. In fact, it is not good what is happening. Because we need to reduce the pollution in the air

5. Did this project change your view or/and feelings towards climate change? YES NO

Explain Yes, Because we can discuss abt this topic, and we can learn every information abt this.

# **Florida Standards**

This is a multidisciplinary project; therefore, different subject area standards were used. I listed the standards by subject area and grade level. I also listed the access points for the standards once the special education (SPED) students use them in the modified curriculum.

## **Florida Standards & Access Points by Subject Area & Grade Level**

### ***Essential Questions, Objectives & Big Ideas Included***

#### **Science and Access Science**

**Essential Question:** How are layers of the Earth different from one another?

**Objective:** Students will review how to identify the three layers of the Earth (crust, mantle, and core).

**Standard S6E5a.** Compare and contrast the Earth's crust, mantle, and core, including temperature, density, and composition.

#### **Access Points:**

**SC.6.E.6.In.1:** Describe how weathering and erosion reshape the Earth's surface.

Independent Level Access Point for higher functioning SPED students.

**SC.6.E.6.Su.1:** Recognize that wind and water cause physical weathering and erosion.

Supported Level Access Point for SPED students who need support to complete the task.

**SC.6.E.6.Pa.1:** Recognize that water can move soil. Participatory Level Access Point is an alternate version of this benchmark for students with significant cognitive disabilities.

#### **Science Grade 8 Big Idea 4**

Science and Society As tomorrow's citizens, students should be able to identify issues about which society could provide input, formulate scientifically investigable questions about those issues, construct investigations of their questions, collect and evaluate data from their investigations, and develop scientific recommendations based upon their findings.

**Big Idea Subject: Science Grade: 8 Body of Knowledge: Nature of Science**

**SC.8.N.4.1.** Explain that science is one of the processes that can be used to inform decision-making at the community, state, national, and international levels.

#### **Access Points:**

**SC.8.N.4.In.1:** Identify ways that science processes can be used to make informed decisions in the community, state, and nation. Independent Level Access Point for higher functioning SPED students.

**SC.8.N.4.Su.1:** Recognize that science processes can be used to help people in the community and state make wise choices. Supported Level Access Point for SPED students who need support to complete the task.

**SC.8.N.4.Pa.1:** Recognize a way science is used in the community. Participatory Level Access Point is an alternate version of this benchmark for students with significant cognitive disabilities.

#### **Gifted Technology**

**Standard: G.K12.5.3.3a Technology** - Identify appropriate technology to achieve a project goal.

**General Information Subject Area: Gifted Grade: K12**

**Goal: Student Outcomes Program Goal 5:** By graduation, the student identified as gifted will be able to assume leadership and participatory roles in both gifted and heterogeneous group learning situations.

**Objective:** The student will manifest significant leadership skills and organize group(s) to achieve project goals.

### **Visual Arts and Access Visual Arts**

**Standard: VA.1.H.3.1:** Identify connections between visual art and other content areas.

**Access Points:**

**VA.1.H.3.Pa.a** Attend to the use of patterns, line, or form in visual art. Participatory Level Access Point is an alternate version of this benchmark for students with significant cognitive disabilities.

### **Math**

**Standard: MA.7.AR.4.3** Given a mathematical or real-world context, graph proportional relationships from a table, equation, or a written description.

**Access Points:**

**MA.7.AR.4.AP.3** Given a table or equation, graph a proportional relationship. Participatory Level Access Point is an alternate version of this benchmark for students with significant cognitive disabilities.

### **Computer Science**

**Standard: 3 Computer Science 1B-CS-02 3-5** Model how computer hardware and software work together as a system to accomplish tasks. *Computing Systems Hardware & Software Abstraction The Corporate Member Council – K-12 STEM*

### **Engineering**

**Guidelines for All Americans Dimension 1: Engineering Design**

**Problem-Solving National Science Standards** (ITA) 9C/P. 102 and G/P. 103; *Atlas of Science Literacy* (Project 2061) Chapter 3; *National Math Standards* P. 52 Declarative (Understands) **All Americans will develop an understanding of engineering design. All Americans will understand that:** Engineers design and conduct experiments, as well as analyze and interpret data as it relates to product design.

### **English Language Arts through English as a Second Language (ELA through ESOL)**

**Standard: ELA.7.R.1.1:** Analyze the impact of setting on character development and plot in a literary text.

**Standard: ELA.7.R.3.1:** Analyze how figurative language contributes to tone and meaning and explain examples of allusions in the text(s).

**Access Points: ELA.7.R.3.AP.1:** Explain how figurative language contributes to the tone and meaning of the text(s).

## Course Outline/Overview/ Lesson Plans

This project must flow in the following order: the real-life problem is presented, then real-life solutions are discussed; in this case, we learned and discussed climate change. The next step is to focus on one solution, which in this project it was electric car utilization. Introduce the technology which will be used, in this case, the 3D printer and the software to configure the object to be printed in 3D. Follow the course outline below:

**Project Phase 1.** Check on Prior Knowledge about Earth's layers & introduce the real-life problem: climate change.

- a. Mini-Lesson
- b. Students work in groups and individually.
- c. Discussion

**Project Phase 2.** Introduce the real-life solution: Electric Car Utilization

- a. Mini-Lesson
- b. Students work in groups and individually.
- c. Discussion

**Project Phase 3.** Introduce the technology which will be used: 3D Printer and software.

- a. Mini-Lesson
- b. Hands-on/firsthand activities
- c. Students work in groups and individually.
- d. Discussion

The Lesson Plans section below will explain how to conduct this project in more detail.

### Lesson Plans

At the school where I conducted this project, I used the school's specific lesson plan templates. However, to make this curriculum packet easier to be adapted to other educators' academic instructional needs, I summarized the most important aspects of the lesson plans I used. For a detailed explanation of each standard and access points used, refer to page 20 of this curriculum packet. The Science, Math, Technology, ELA through ESOL and Visual-Arts standards and the access points related to the standards can be found online at CPalms at <https://www.cpalms.org>. The Engineering and Computer Science standards are from a different source. Detailed information on the materials and resources will be listed on this curriculum packet's Reference and Resources page.

**Project Phase 1.** Check on Prior Knowledge about Earth's layers & introduce the real-life problem: climate change.

- a. **Mini-Lesson:** Review Earth layers' prior knowledge and explain climate change causes. Connect Earth layers' knowledge to climate change content.

### **Science and Access Science**

**Essential Questions:** How are layers of the Earth different from one another?

What is climate change? What is the connection between climate change and the Earth's layers?

**Objectives:** Students will review how to identify the three layers of the Earth (crust, mantle, and core). Students will identify what climate change is. Students will identify the connection between climate change and the Earth's layers.

**Standard S6E5a/ Access Points: SC.6.E.6.In.1, SC.6.E.6.Su.1, SC.6.E.6.Pa.1**

**Science Grade 8 Big Idea 4 Nature of Science**

**Standard SC.8.N.4.1/ Access Points: SC.8.N.4.In.1, SC.8.N.4.Su.1, SC.8.N.4.Pa.1.**

**Materials and Resources:**

- Teacher Made PowerPoint on Climate Change
- Layers of the Earth PowerPoint available on the Modified Teacher website.
- Videos on Climate Change and the Greenhouse Effect.

**b. Students work individually and in groups.**

**Activities:**

- Complete the See section of the See/ Think / Wonder Graphic Organizer before watching the video.
- Complete the Think and the Wonder sections of the See/ Think/ Wonder Graphic Organizer after watching the video.
- Pair and share your responses with a group of classmates.

**c. Discussion**

- Groups share with the class their responses and have a class discussion.

**Project Phase 2.** Introduce the real-life solution: Electric Car Utilization

**a. Mini-Lesson:** Learn how electric cars are made and work.

**ELA through ESOL/ Engineering & Visual-Arts**

**Essential Questions:** How are electric cars made? How do electric cars work? What does the figurative language mean in the Electric Car Poem by Robert Pettit? How do I draw electric car parts?

**Objectives:** Identify how electric cars are made and how they work. Identify the meaning of the figurative language in the Electric Car Poem by Robert Pettit. Identify how to draw electric car parts.

**ELA through ESOL**

**Standard: ELA.7.R.3.1/ Access Points: ELA.7.R.3.AP.1**

**Visual Arts and Access Visual Arts**

**Standard: VA.1.H.3.1/ Access Points: VA.1.H.3.Pa.a**

**Engineering: *All Americans will understand that:*** Engineers design and conduct experiments, as well as analyze and interpret data related to product design.

**Materials and Resources:**

- Videos about how electric cars are made and how they work.
- Teacher-made PowerPoint on Electric Cars parts and on the pros and cons of electric cars.

**b. Activities:**

- After watching the videos, complete the Compare & Contrast Graphic Organizers.
- Draw the electric car parts.
- Write what you learned today in your project journal. Share your notes with a classmate.

**c. Discussion:**

- Pair and share your thoughts on how electric cars can help solve the problem of climate change.
- Discuss the pros and cons of electric cars with your group.

**Project Phase 3.** Introduce the technology which will be used: 3D Printer and software.

**a. Mini-Lesson:** Learn how to assemble a Sainsmart 3D printer and use it to print a 3D miniature of an electric car and an Earth's layers model.

**Technology, Math & Computer Science**

**Essential Questions:** How do I assemble a Sainsmart 3D Printer? How does the Sainsmart 3D Printer work? How do I install the Creality Slicer Software? How do I download the configuration of the object I want to print in 3D? How do I change the measurements of the downloaded object configuration to fit on the 3D Printer Bed?

**Objectives:** Identify how to assemble the Sainsmart 3D Printer. Identify how the Sainsmart 3D Printer work? Identify how to install the Creality Slicer Software. Identify how to download the Configuration of the object I want to print in 3D. Identify how I change the measurements of the downloaded object configuration to fit on the 3D Printer Bed.

**Technology Standards: G.K12.5.3.3a Technology**

**Math Standards: Standard: MA.7.AR.4.3/ Access Points: MA.7.AR.4.AP.3**

**Computer Science Standard: 3 Computer Science 1B-CS-02 3-5**

**Material and Resources:**

- Teacher-made PowerPoint on how to assemble a Sainsmart 3D Printer, how to install the Creality Slicer Software, how to download the configuration of the object to print in 3D, how to change the measurements of the downloaded configuration to fit the Sainsmart 3D Printer Bed.
- Videos on how to assemble a Sainsmart 3D Printer, how to install the Creality Slicer Software, how to download the configuration of the object to print in 3D, how to change the measurements of the downloaded configuration to fit the Sainsmart 3D Printer Bed.
- Paint and paintbrushes.

**b. Hands-on/firsthand Activities:**

- Hands-on/firsthand activities with the 3D printer to print a 3D model of a miniature electric cars, and Earth Layers 3D model.
- Paint the Earth Layers 3D model.

**c. Students work in groups and individually.**

- Complete the KWL Chart
- Answer Exit Ticket
- Answer the Survey and read your survey answer with a classmate.

**d. Discussion**

- Discuss your survey answers with your group.

## **Special Thanks**

### **I want to say special thanks to:**

- Mr. Jesse Mathew Marzoa, one of the teachers at Jose De Diego Middle School, for helping us finish assembling the Sainsmart 3D Printer.
- Mr. Angel Johnson, a parent of one of Jose De Diego Middle School 6<sup>th</sup> Grade students and owner of FABLAB, a 3D Printing Laboratory & Workshops in Miami, for donating an Earth's layers miniature 3D model to us, demonstrating to us how to level the 3D Printer Bed, and helping us install the Auto Bed Leveling Device.
- Ms. Krauze, one of the teachers at Jose De Diego Middle School, for taking two of her Science Research Laboratory classes to watch my project's presentation and participate in my project's activities with my students.

## **References and Resources List**

### **Internet Youtube Videos**

[Climate Change for Kids | A fun engaging introduction to climate change for kids - YouTube](#)

[Electric Cars For Kids | Tesla Model X | Gecko's Real Vehicles - YouTube](#)

[How does an Electric Car work ? | Tesla Model S - YouTube](#)

[How To Build the SainSmart Ender 3 3D Printer - YouTube](#)

[Creality Slicer 4.8.2 Slicing Tutorial 2 Introduction to the basic functions of the software - YouTube](#)

### **Internet Information Resources**

<https://publicschoolreview.com>

<https://www.fldoe.org>

<https://www.cpalms.org>

<https://aseecmsduq.blob.core.windows.net/aseecmsdev/asee/media/content/member%20resources/pdfs/cmc-k12-stem-guidelines-for-all-americans.pdf>

<https://www.doe.k12.de.us/cms/lib/DE01922744/Centricity/Domain/176/CSTA%20Computer%20Science%20Standards%20Revised%202017.pdf>

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### **Amazon Online Shopping for Equipment and Materials**

<https://www.amazon.com>