

STEM Sophomore Project



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Goal:

Have an interactive project for students of MC²STEM High School to engage with GE Volunteers based on real-world corporate experience.

Program Overview:

In the STEM Sophomore Project, students are immersed in a 25-day project with GE Volunteers that is a credit towards their graduation requirements. The project is based on one of the following LED concepts: a desk lamp, solar fixture or kinetic energy powered fixture. There are four sessions over the course of the school year so that each student will receive quality time with the GE Volunteers on the project. Student's self-select into one of the project sessions by choosing their top 2 project preferences, and are assigned to one of the sessions. Once assigned to a session, the students are randomly assigned to project groups. These project groups that consist of 3 to 5 students, will become their 'companies' that they will work in for 80 minutes a day over the course of 25 consecutive days. The company will determine on the first day who will be the President & CEO, GM of Technology, GM of Marketing and the GM of Operations.

Once in the project the GE Volunteers work with the students in to create a LED fixture concept and take that concept through a business process model to conception of a working prototype. The sample schedule below illustrates the flow from marketing, to technology, information technology, etc.

February	1 to 5	Project Session 2/3				Day 23 - Tradeshow & SO Project Presentations	
	8 to 12	Project Session 3	Day 20 - Finance	Day 21 - CFS / MFG - Quality	Day 22 - Wild Card	Day 1 / 2 - Intro / Marketing	
	15 to 19	Engineers Week - Project Session 3	No School for Students	Day 4 - Product Management	Day 5 - Engineering	Day 6 - Engineering	No School for Students
	22 to 26	Project Session 3	Day 7 - Engineering	Day 8 - Engineering	Day 9 - Engineering	Day 10 - Manufacturing Capacity & Cost	
March	1 to 5	Project Session 3	Day 11 Fulfillment / Wild Card	Day 12 - Manufacturing - Safety & Quality	Day 13 - Marketing / Packaging	Day 14 - Marketing	Day 15 - HR / Legal
	8 to 12	Project Session 3	Day 16 - Pricing / Sales	Day 17 - Sales / Sales Training	Day 18 - IT	Day 19 - IT	Day 20 - IT
			Day 21 - Finance	Day 22 - CFS / Wild Card	Day 23 - Wild Card	Day 24 - Tradeshow & SO Project Presentations	No School for Students

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At the beginning of each day student's receive an introduction of the function (*function* means the GE job group the students are working with on that day) and functional team members, and then begin work on the deliverable for that day. GE Volunteers take students through appropriate background material for the day's deliverable and then work through the material with the students. Most days will include 4-7 GE Volunteers working along side the 'companies' to ensure they understand the material for that day.

GE Volunteers developed all of the material created for the course and it brings real-life to the classroom for the students. This material, which has grown to 180+ pages, is given to each student in a Sophomore Project binder where they can follow along and capture the day-to-day process of the project.

To conclude the Sophomore Project, students participate in a Tradeshow and Formal Presentation. The tradeshow is an opportunity for the students to highlight their successful products to GE employees, MC²STEM staff and students. The formal presentations on the other hand, are an opportunity for students to present more detail on their concept and business plan to a panel of GE Business Leaders and receive immediate feedback.

The rubrics from the Tradeshow and Formal Presentations determine both the students' mastery and winner of the Sophomore Project.

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An example of a commercial workday looks like the following:

Instruction on Market Research and its methodologies, qualitative and quantitative research, is given to the students. The research discussion is then followed by a review of focus group results for LED project and learning how marketers identify values and benefits for products.

The two pieces below illustrate the team activity that GE Volunteers work 1-on-4, volunteer to student, for the remainder of the day.

Team Assignment

Use this list of product attributes to fill in worksheets on the Values & Benefits Exercise

Landscape Fixture Product Attribute List

Low energy use	Long bulb Life
Won't tip over	Low price
Durable design	Directional spot light
Bright light	Stylish elegant design
Ground mounted	Functional design
Outdoor rated (safety)	Cool white light
Auto On/Off	Down light distribution
4 hrs. minimum run time	

Values & benefits Worksheet

Linking Attributes & Benefits to customer values

Safety/security conscientious consumers



Path light

Customer Values

My home is a retreat where I want to feel safe and secure. It's nice to know that friends who visit can walk safely in the yard and around the house.

Benefits Sought

Affordable	Low cost to operate
Visitors can see well	No hassle installation
Increase security	Long lasting

Product Attributes

_____	_____
_____	_____
_____	_____
_____	_____

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An example of a technology workday looks like the following:

With at least 1-to-4 GE Volunteer to student interaction, students design the circuit for their LED fixture, the below steps are an excerpt from the circuit wiring worksheet that the students receive:

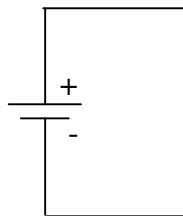
Based off your design selections from last week, we will recommend a circuit layout for each group.

Rows are parallel to other rows; LEDs in the same row are in series with each other.

Step 1 - Draw the circuit diagram for your groups recommended configuration:

Hint: See page 26 of your design guide for a review of series and parallel wiring.

Constant voltage power supply



Step 2 – Solder short lead wires to the LEDs and use a breadboard to layout the row(s) of LEDs sketched in Step 1.

Step 3 – Apply power to each row of LEDs independently using a constant current power supply set to your current level and measure the voltage:

Row 1 voltage: _____

Row 2 voltage: _____

Row 3 voltage: _____

Row 4 voltage: _____

...cont.

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GE Volunteers Involvement:

There is a STEM Sophomore Project Leader that oversees the entire project, purchasing of supplies and organization between the functional leaders.

Each GE function that participates in the 25-day project also has a Team Functional Leader. These functional leaders are responsible for:

- designing or updating the course material for the Sophomore Project Course Book
- responsible for leading their day or series of days with the students
- gathering volunteers for their day, for each session
- providing feedback when their day is complete on progress and comments/concerns

Student feedback:

"Sophomore Project is a great opportunity. I think it gives us a good insight on what working not only with yourself, but with others really is. It builds teamwork, and it helps with public speaking. We get to use all of our core subjects too. We do excel formulas and equations, powerpoint presentations and we get to use what we know from science, art and engineering to design and fabricate our product. Its like a chance for us to get a "glimpse" of the real world and what we have to look forward to."

"From this project I learned a lot about how companies work. Even though its not something I would think of doing it was interesting to design and show what I can do with little things and turn it into a product. It may have been frustrating, but it was still a great experience."

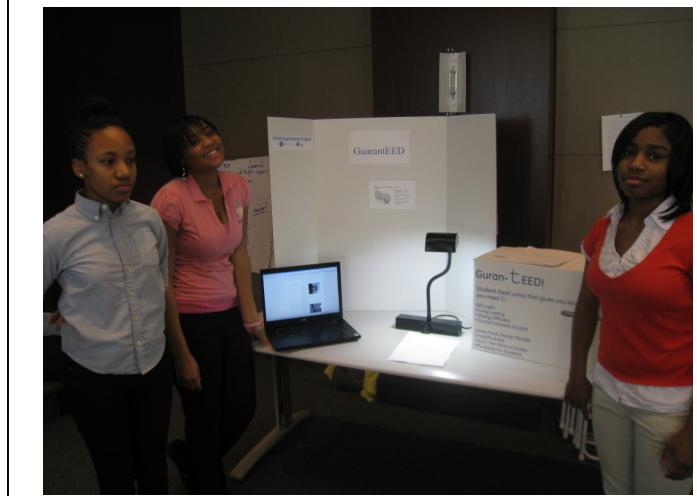
- Quotes from 10th grade students that have just finished STEM Sophomore Project



Session 1 Winner

"Eclipse Trio"

GE Lighting



Session 2 Winner

"GuaranTEED"

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Some other student designs:



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Students at work:

