Duluth, Energy Problem-Solving with STEM Skills

Bill Mittlefehldt, wdmittle@gmail.com, Emily Krebsback, emily@ecolibrium3.org

Overview:

We have assembled a community team that is planning to add STEM skills, clarify character priorities and harness leadership in Duluth students. This pilot project will focus on students at Lincoln Park and Ordean Middle Schools, Duluth East and Denfeld High Schools and Woodland Hills School. We will challenge and support these students in ways that enable them to contribute to the city's competition in the Georgetown University Energy Prize (GUEP). Students will be rewarded with Service-Learning and Civic honors for contributing to the increased energy efficiency of our community while addressing energy and climate concerns. This problem-solving learning is consistent with state, city, and school system goals for civic engagement, service-learning and STEM skills.

Learning Challenge and Support:

As a Duluth student, we need your help. Working alone or together, you can help our community compete in a national contest which focuses on saving energy, money, and emissions over a two-year period. Duluth is the only city in Minnesota out of a group of 50 US cities who are competing for the $5 million dollar prize. This is why we need your talent and teamwork. If you will join our team, we will support you with hours of service-learning. And if you complete a successful energy saving project, there may be a chance to earn a Certificate of Civic Service from the City of Duluth.

Learning Sequence for YES Problem-Solving:

1. Define the energy problem that interests you. (How did you notice it? Where was it: home, school, faith, work, community, play-leisure, driving?)

2. Design a solution for the defined problem with data. (Who, what, why, how, how much, with what outcomes? What systems are affected by this problem? What systems need to change to solve the problem?)

3. Explain a plan that can solve your problem; then implement your plan. (Who does what for how long to cause results?)

4. Gather data as you experiment to solve this energy problem. (Record data from your energy experiment to solve the problem. Organize the data so you can explain what happened.)

5. Evaluate your data and explain either how well you did or why you did not solve the energy problem. (Analyze why the design and process were or were not successful.)

6. Present a brief explanation of your energy problem, solution, systems, plan, process, data and conclusion to others. Use creativity when explaining your experiment. Then answer questions about process, data and analysis. (Did your energy project help to the city in the national energy contest?)

Teachers and Coaches can use MN Academic Standards to guide this project-based learning:

Standards within the Nature of Science and Engineering can help guide this project learning activity for Middle and High School students. The MDE website can help teachers work on a number of Strands, Substrands and Standards (www.scimath.org/stemnet/). These STEM standards can be linked to student activities in the following courses which build a **foundation for Science and Engineering**:

- Physical Science: Matter, Motion, Energy, Human Interactions
- Earth & Space Science: Earth Structure & Processes, Interdependence in Earth Systems, Human Interactions.
- Life Science: Structure and Function, Interdependence in Living Systems, Evolution, Human Interactions
- Chemistry: Interactions of Science, Technology, Engineering and Society
- Physics: Interactions of Science, Technology, Engineering and Society