

Overcoming Barriers to STEM Engagement: A Cross-Curricular Structural and Wind Energy Project Using Sketching as the First Step

Grade Levels

6-12

Educational Setting

Both in school and/or out of school. (Ideal for CTE, Engineering, Physics, and Science.)

Informational Webinar(s)

Jan. 27, 4:30 p.m.

[REGISTER HERE](#)

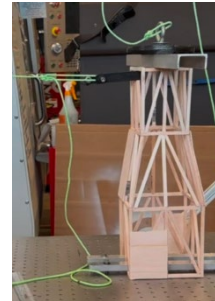
[Recordings on Iowa STEM's Website](#)

Award Provides

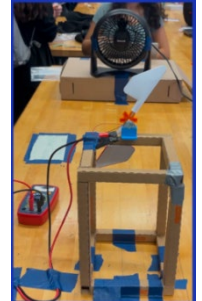
- Professional Development
- Two 3-hour live synchronous zoom sessions (required)
- 6 hours of asynchronous activities (required)
- Four office hour Zoom sessions (optional)
- \$240 educator stipend
- Spatial Vis Classroom Kit (non-consumable)
- Wind Turbine Project Test Kit (non-consumable)
- Wind Turbine Design-Build Kit (consumable)
- Spatial Vis software (1 year)

2025-26 STEM Scale-Up Program Summary

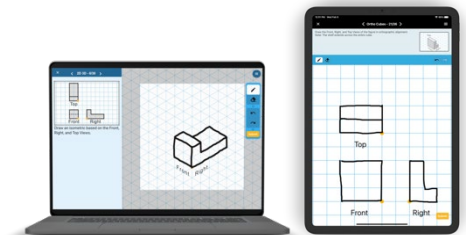
A hands-on project with wind energy technology builds engagement with STEM. This project includes design of a scale tower to support a wind turbine, with load and deflection testing. Students also build a turbine, and then test the efficiency of the turbine by connecting it to a generator and applying a wind load. During this project students learn technical sketching using the Spatial Vis software. These skills help with concept generation, communicating among team members, and prepares them for success in Computer Aided Design (CAD). The curriculum highlights Iowa's leadership in wind energy and will prepare students for careers in Iowa.



Lateral Load-Displacement Test



Wind Energy Generation Test



Spatial Vis Software

The Spatial Vis software teaches sketching of 2D and 3D views, which form the foundation for reading blueprints and using CAD. The software automatically grades freehand sketches and provides personalized hints. Spatial Vis increases spatial visualization skills, which in turn have been shown to improve GPAs and graduation rates in STEM. It is a great way to get your class engaged with STEM.

Requirements to Implement the Program

- Complete full professional development: two 3-hour live synchronous Zoom sessions and 6 hours of asynchronous activities.
- Students will need access to at least one of these devices: Chromebook or Computer, Apple iPhone, Apple iPad, Android Phone, or Android Tablet.
- Participate in the STEM Council Scale-Up Educator Survey.

Iowa Standards Alignment

Middle/high school science standards in Forces and Interactions (MS-PS2/HS-PS2) and Energy (MS-PS3/HS-PS3) are addressed, as well as Iowa Core Science Standards in Engineering Design (MS-ETS1, HS-ETS1) such as defining criteria and constraints, evaluating solutions and trade-offs, analyzing data, and developing models for iterative testing.

Additional Cost(s) to Awardee During Award Period

None

Approximate Sustainability Cost(s) After Award Period

- \$15/student annual license
- \$100 - \$600 for Wind Turbine Design-Build Kit replacement consumable materials.

Website

egrove.education/iowa-stem-scale-up

Video

youtube.com/watch?v=RaHZt3diccY

Social media

Facebook

[@egroveeducation](https://facebook.com/egroveeducation)

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[@egroveeducation](https://twitter.com/egroveeducation)

Iowa Standards Alignment (continued)

- High School CTE - Applied Sciences, Technology, Engineering and Manufacturing Standards (Drafting and Design (DFT4, DFT10), Engineering and Design)
- Middle School CTE - Applied Science, Technology, Engineering and Manufacturing Service Area Standards (3. Understand the engineering design process)
- 21st Century Skills in the area of Employability Literacy (21.6-8.ES.1, 21.9-12.ES.1, 21.6-8.ES.4 and 21.9-12.ES.4) related to communication, productivity, creativity, skill mastery, and engaging in effective problem solving.
- Technology Literacy (21.6-8.TL.2, 21.9-12.TL.2, 21.6-8.TL.4, 21.9-12.TL.4, 21.6-8.TL.6, and 21.9-12.TL.6) related to collaboration and critical thinking skills using interactive technology and facilitating learning technology applications (CAD) to produce finished products (technical design drawings).
- [More cross-curricular standards](#)

Professional Development

Duration:

Two 3-hour Synchronous Webinars, ~6 hours of asynchronous training

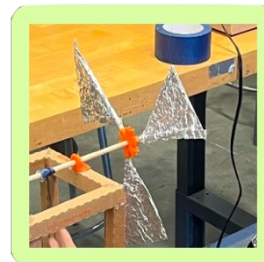
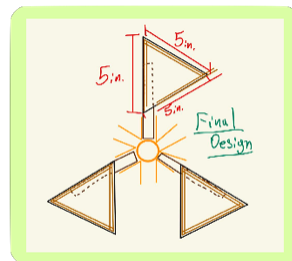
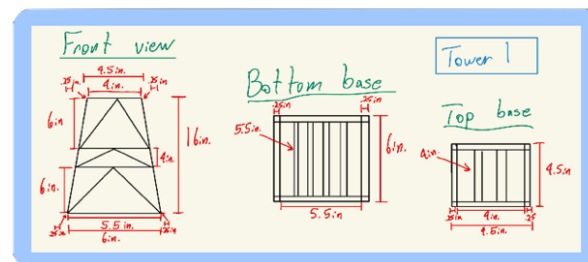
(Optional: Four 2-hour optional office-hour Zoom sessions.)

Date(s):

Will be determined by the awardees

Location:

Virtually



To Learn More or To Apply: educate.iowa.gov/STEM/ScaleUp