Augmented Reality in Education

JULY 18, 2016 | PROTOTYPE I

Overview

Based on the insights gathered during our research, we've created an initial protoype of a classroom-based augmented reality platform. This platform can be used for a variety of lesson topics, but in this example we're focusing on how it might be used to teach a lesson on wind energy and aerodynamics.

Things to note:

- Orange objects are virtual objects
- This example shows two kids and a teacher, but in reality there would be whole class
- We're using a knife for sculpting in this demo, but ultimately it could be a different tool


Barney

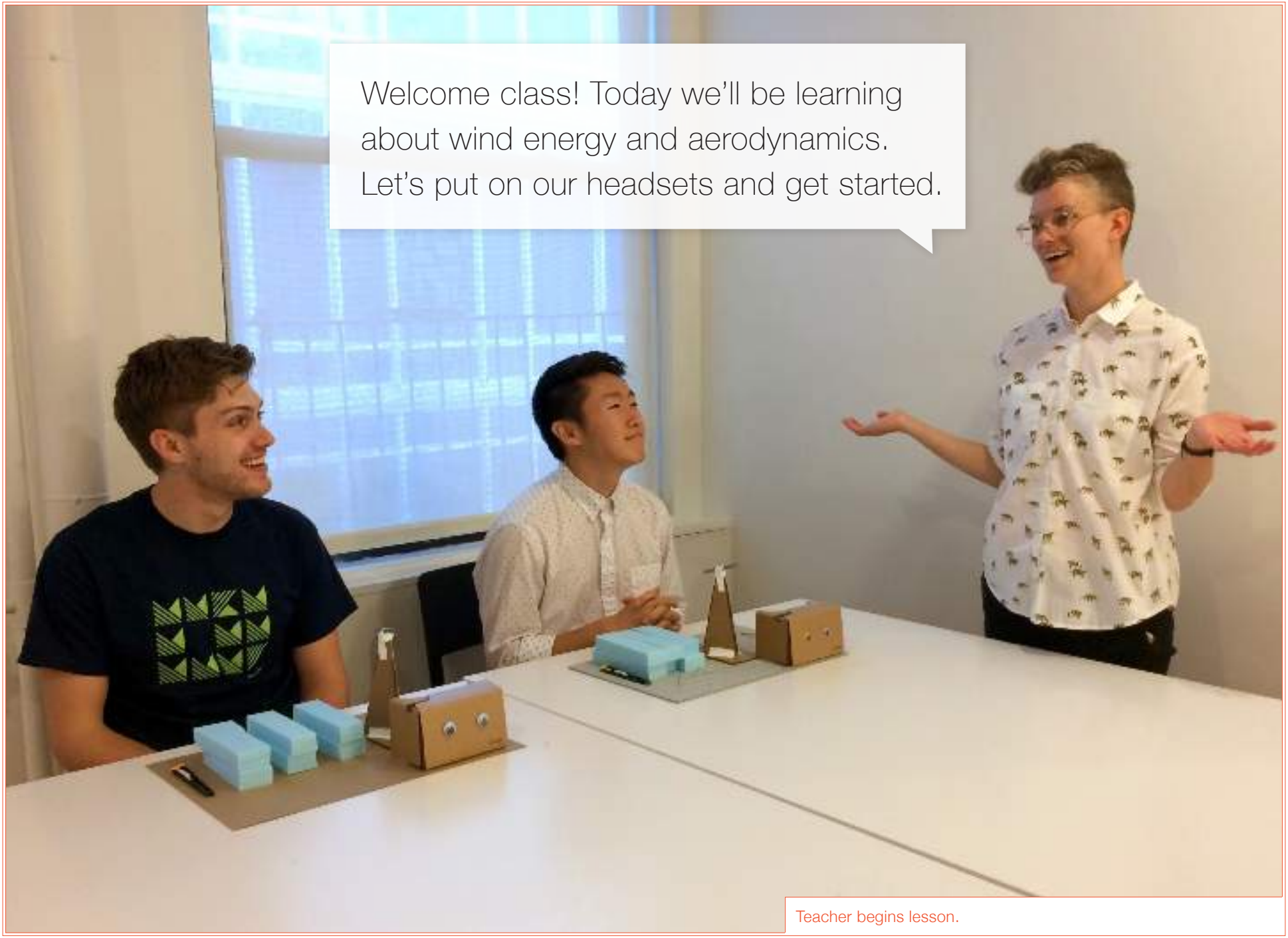

Ted


Teacher

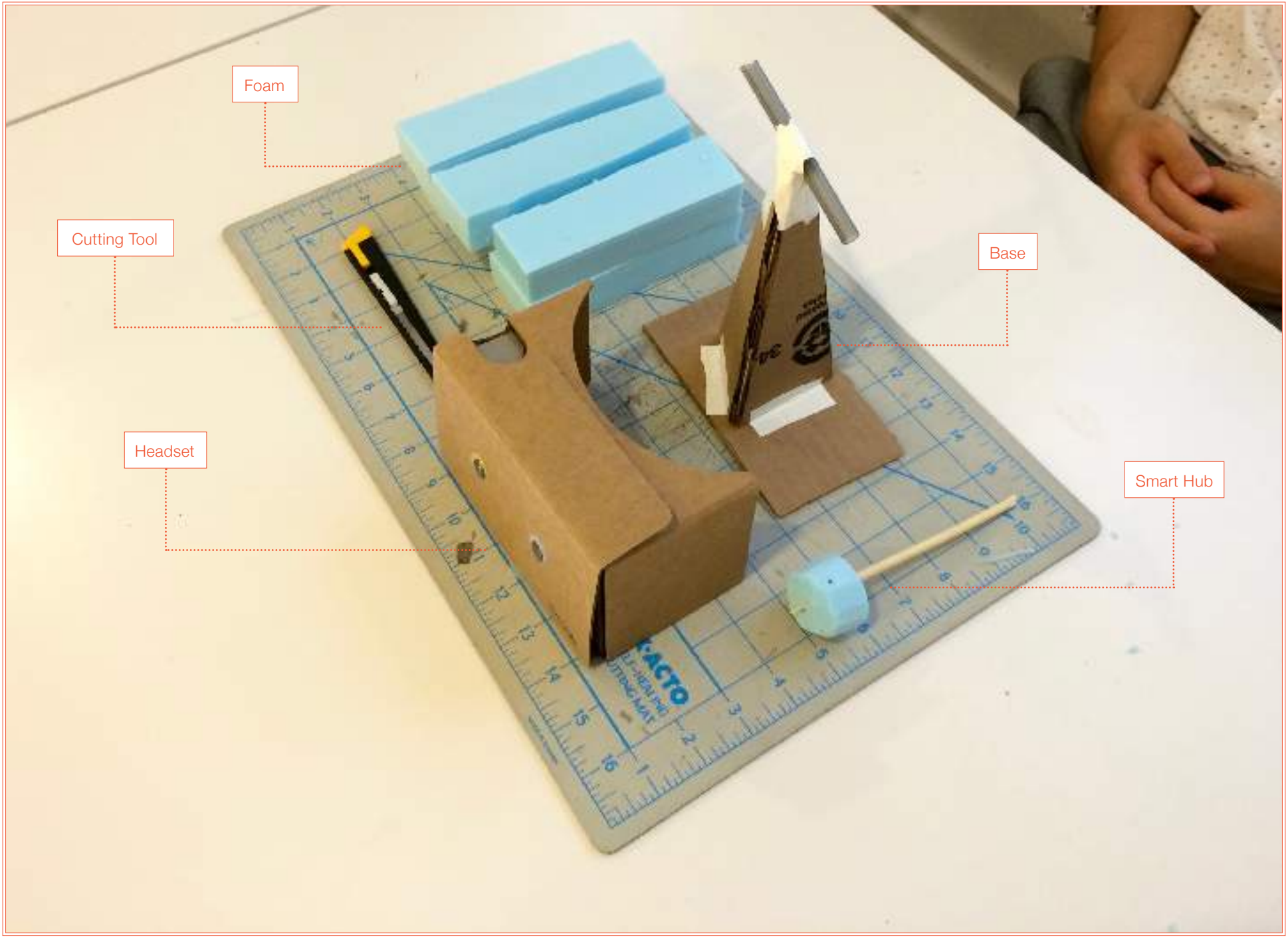
PART I

Lesson Intro

The teacher, using a virtual narrative that the students can see through the headsets, introduces the essential question that will guide the lesson. How might we power this city with wind energy?

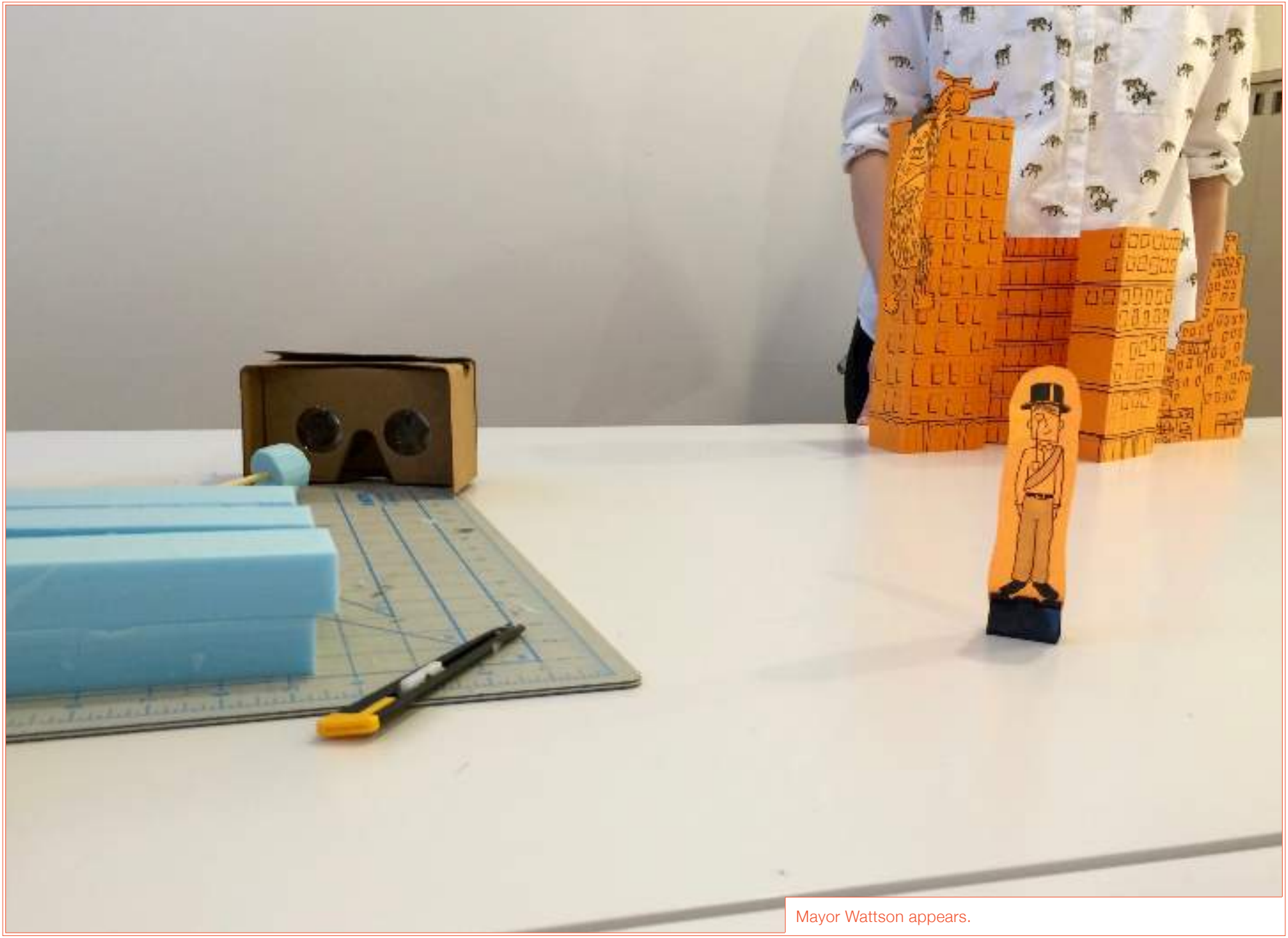


Teacher begins lesson.


Foam
Cutting Tool
Base
Headset
Smart Hub

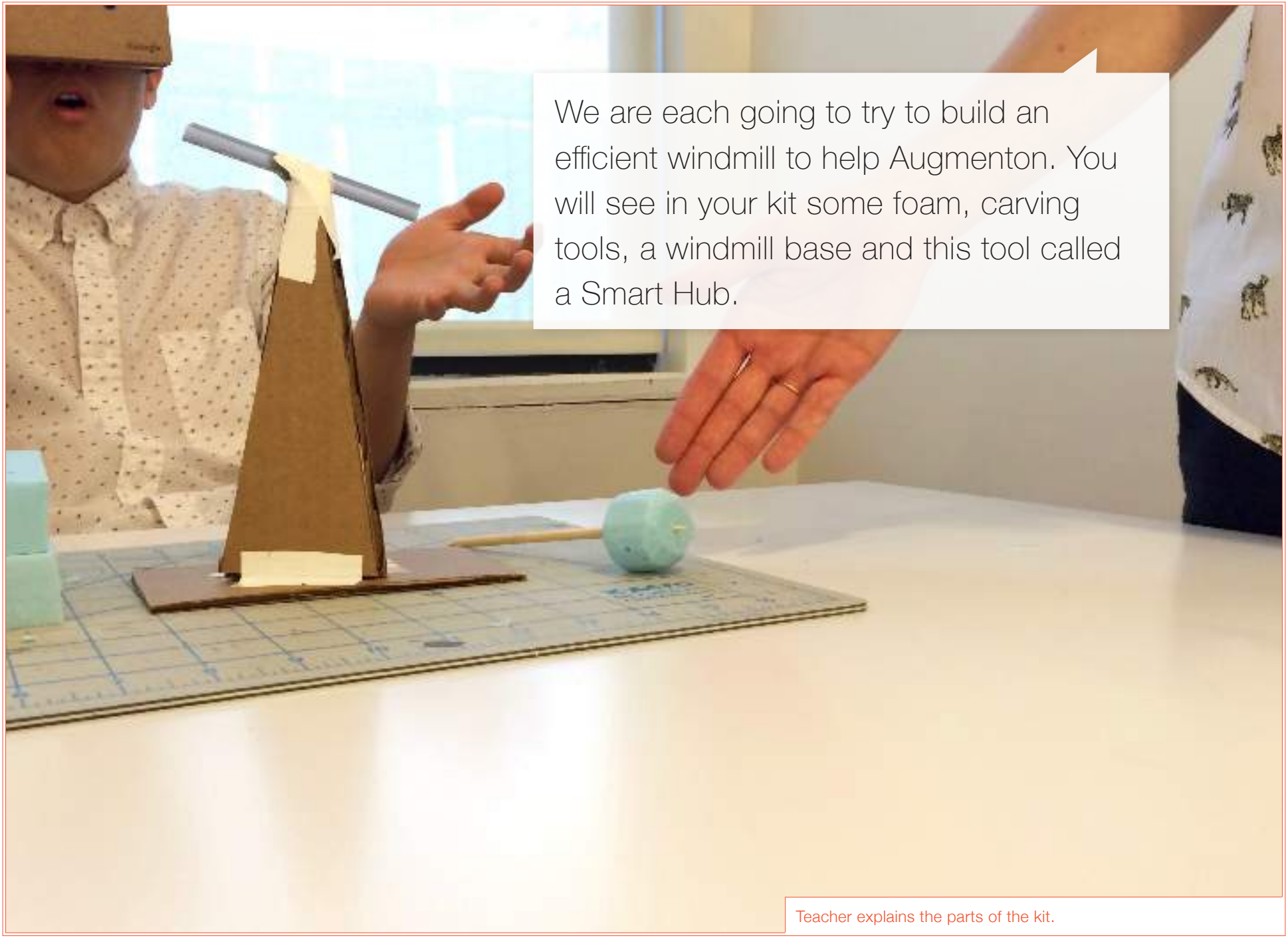
Kids put on headsets.

A virtual city appears.



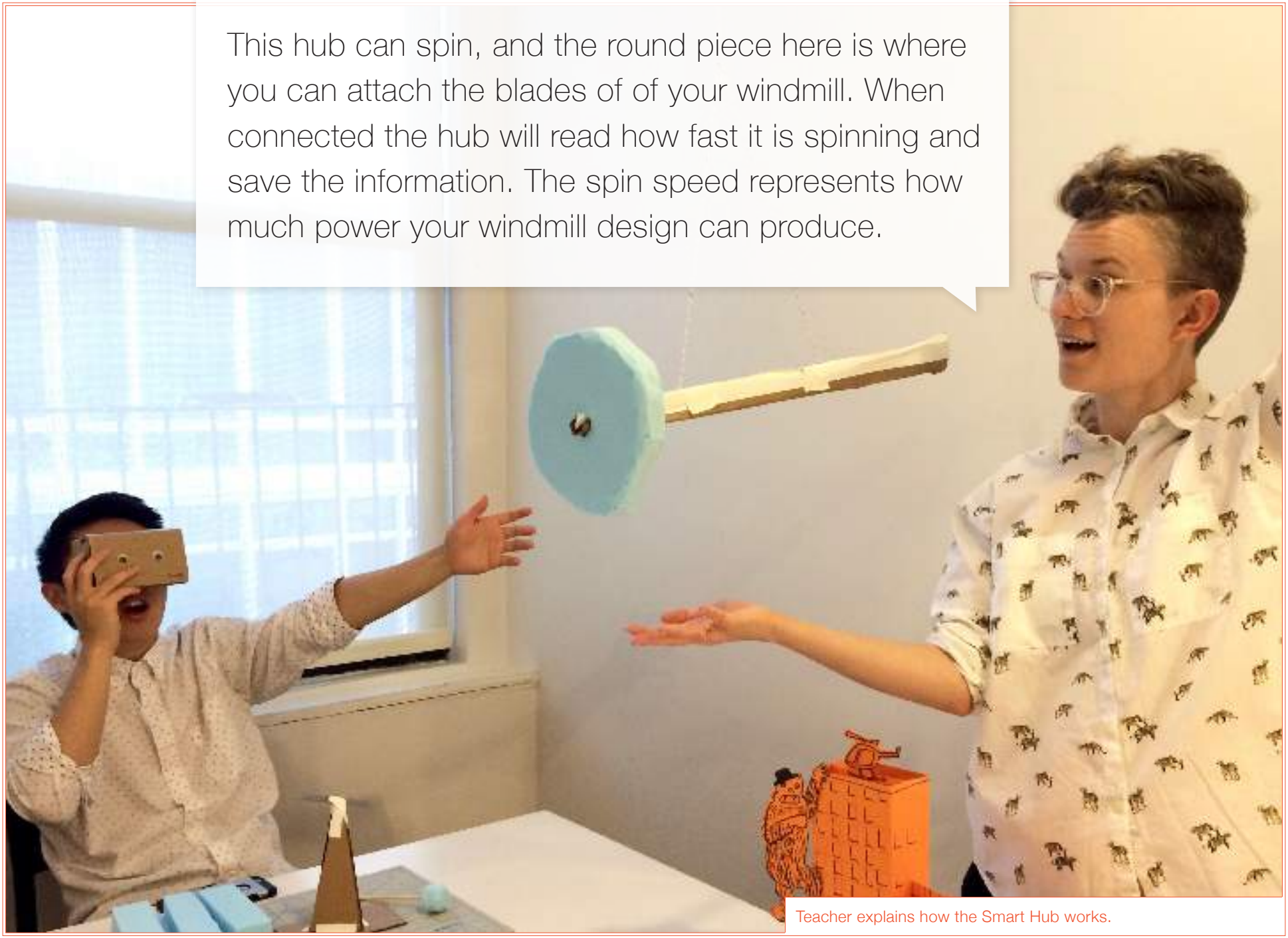
Mayor Wattson appears.

Mayor Wattson explains the challenge to the class.



Teacher explains the parts of the kit.

This hub can spin, and the round piece here is where you can attach the blades of of your windmill. When connected the hub will read how fast it is spinning and save the information. The spin speed represents how much power your windmill design can produce.



Teacher explains how the Smart Hub works.

Teacher explains how Hub will show their windmill's performance.

PART II

Build & Test

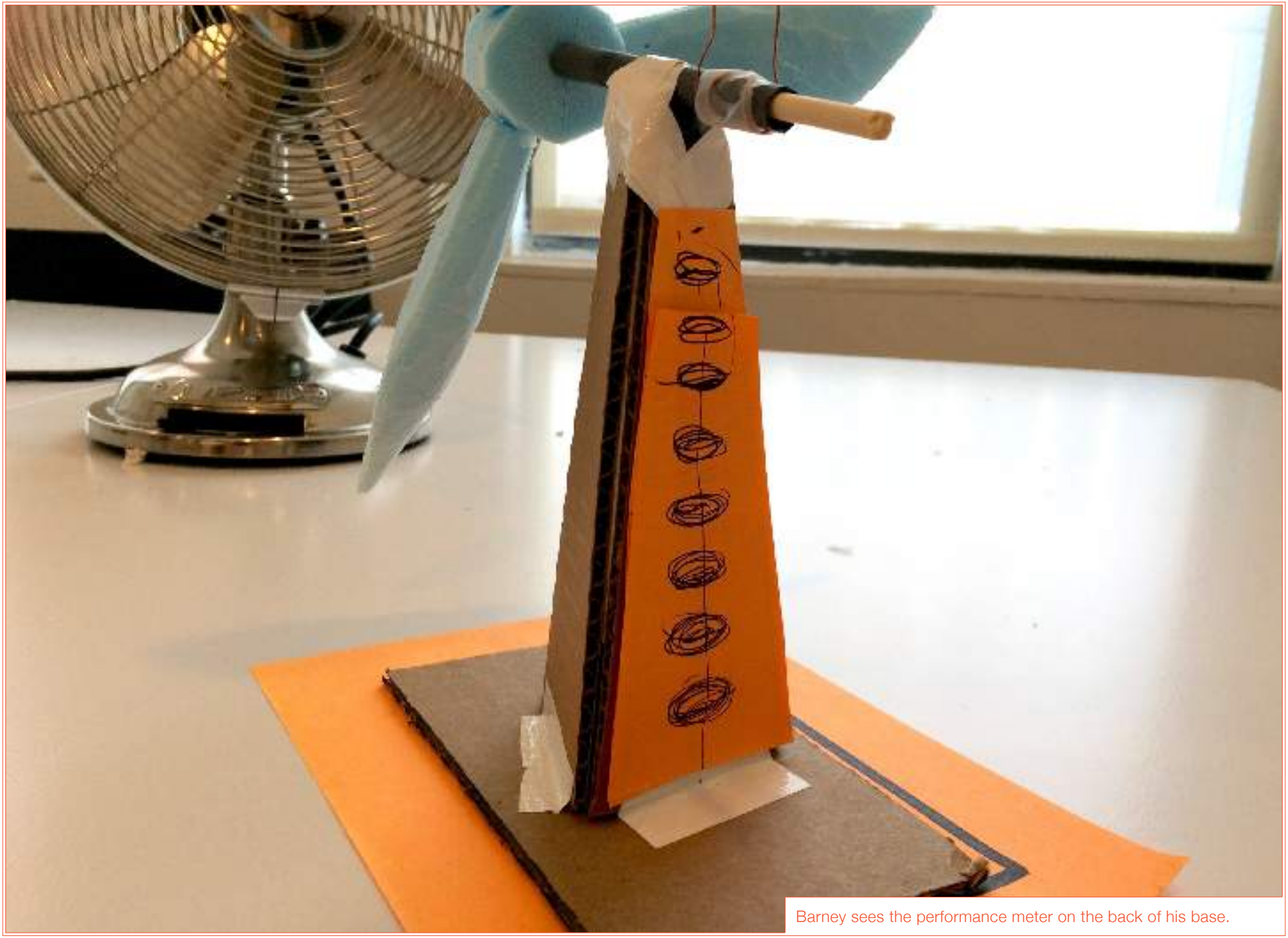
The students carve their blades, attach them to the hub, then test their design to see how much power it produces.

Students take off their headsets, and begin to carve.

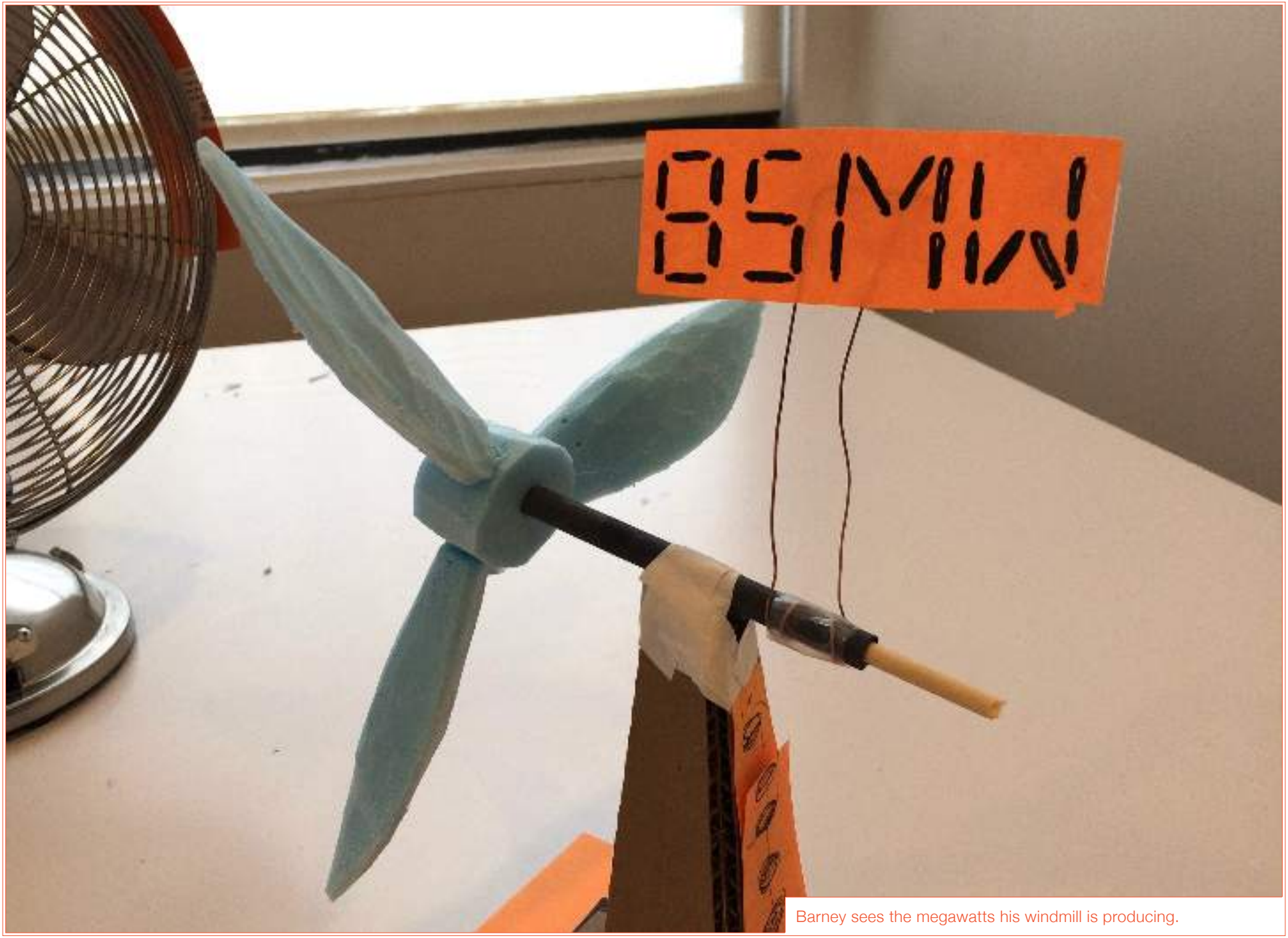
Ted finishes his windmill.

Barney finishes his windmill.

Barney brings his windmill over to the testing station to test.



Barney sees the performance meter on the back of his base.



Barney sees the megawatts his windmill is producing.


It works!!


It won't spin :(

PART III

Reflect & Analyze

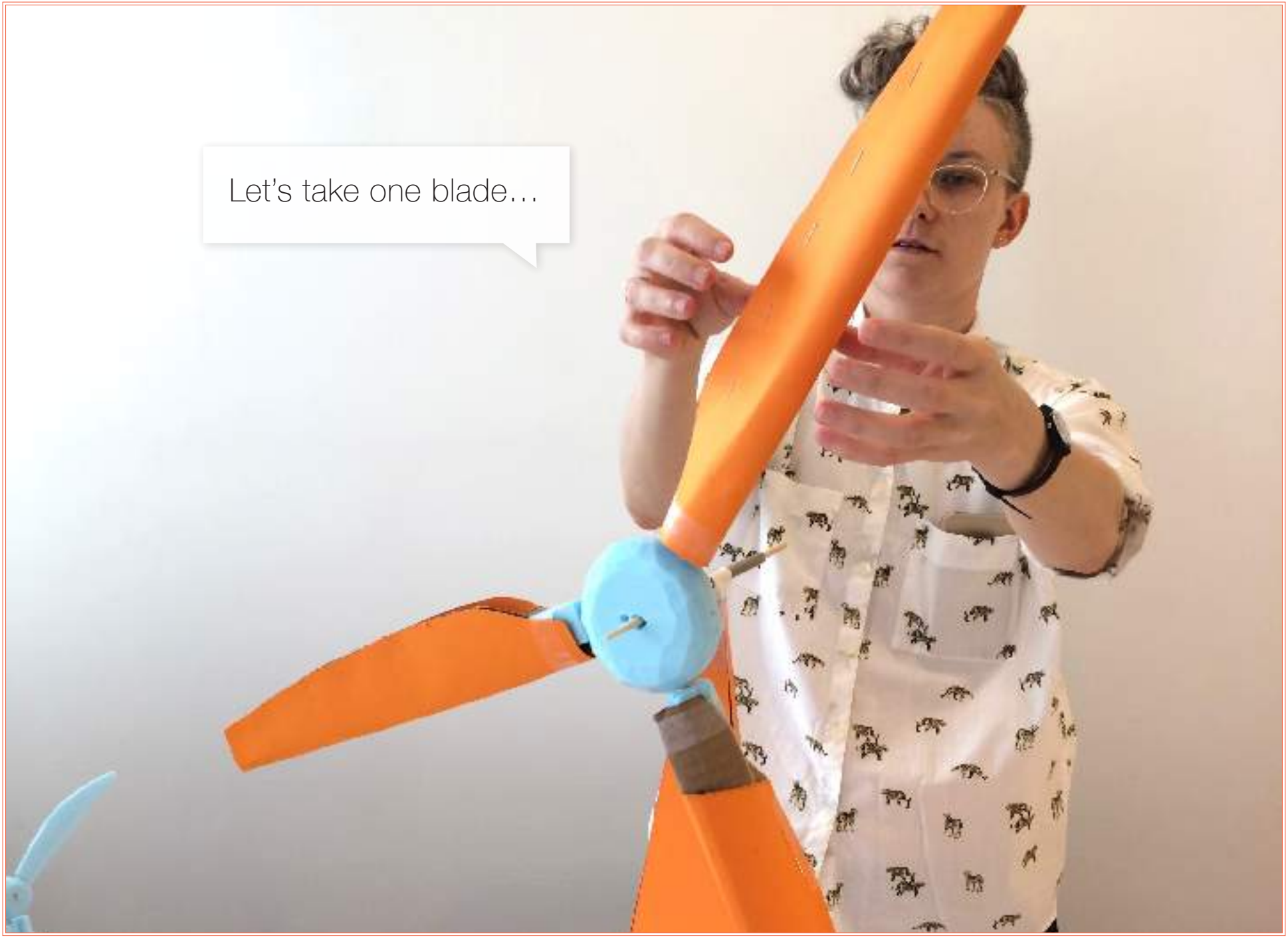
The teacher helps the students reflect on what they've made, analyze why some designs work better than others, and understand the aerodynamics behind it.

Teacher asks class to reflect on their designs.

Teacher uses a virtual windmill model to explain aerodynamics.

Ok, so you can see how the air hits the turbine blades and make turbine spin. Let's look closer at what is really happening to the air moving over this shape.

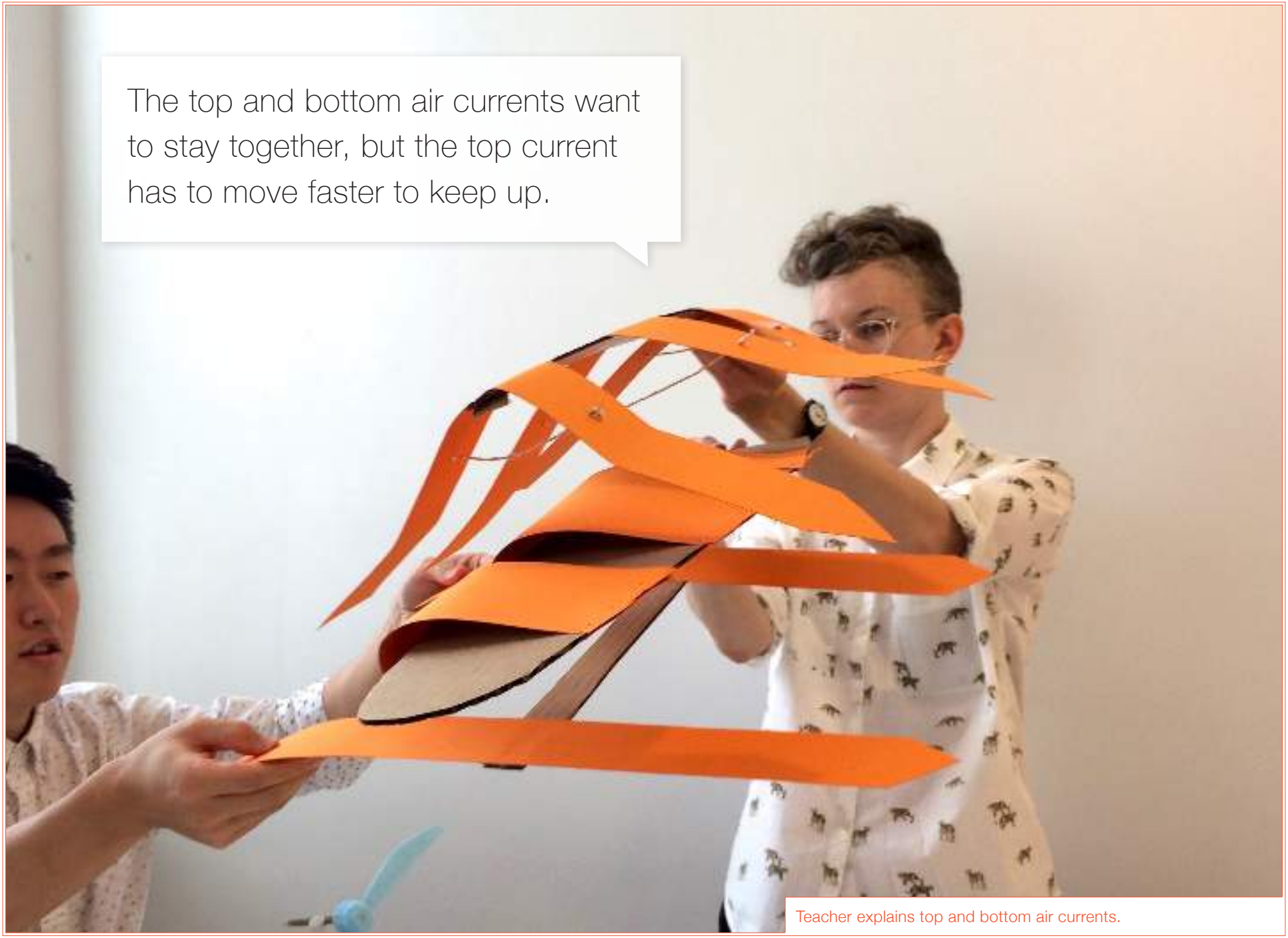
Teacher explains how the angle of the blades interacts with wind.


Let’s take one blade…

Teacher pulls off and blows up one of the blades as an example.

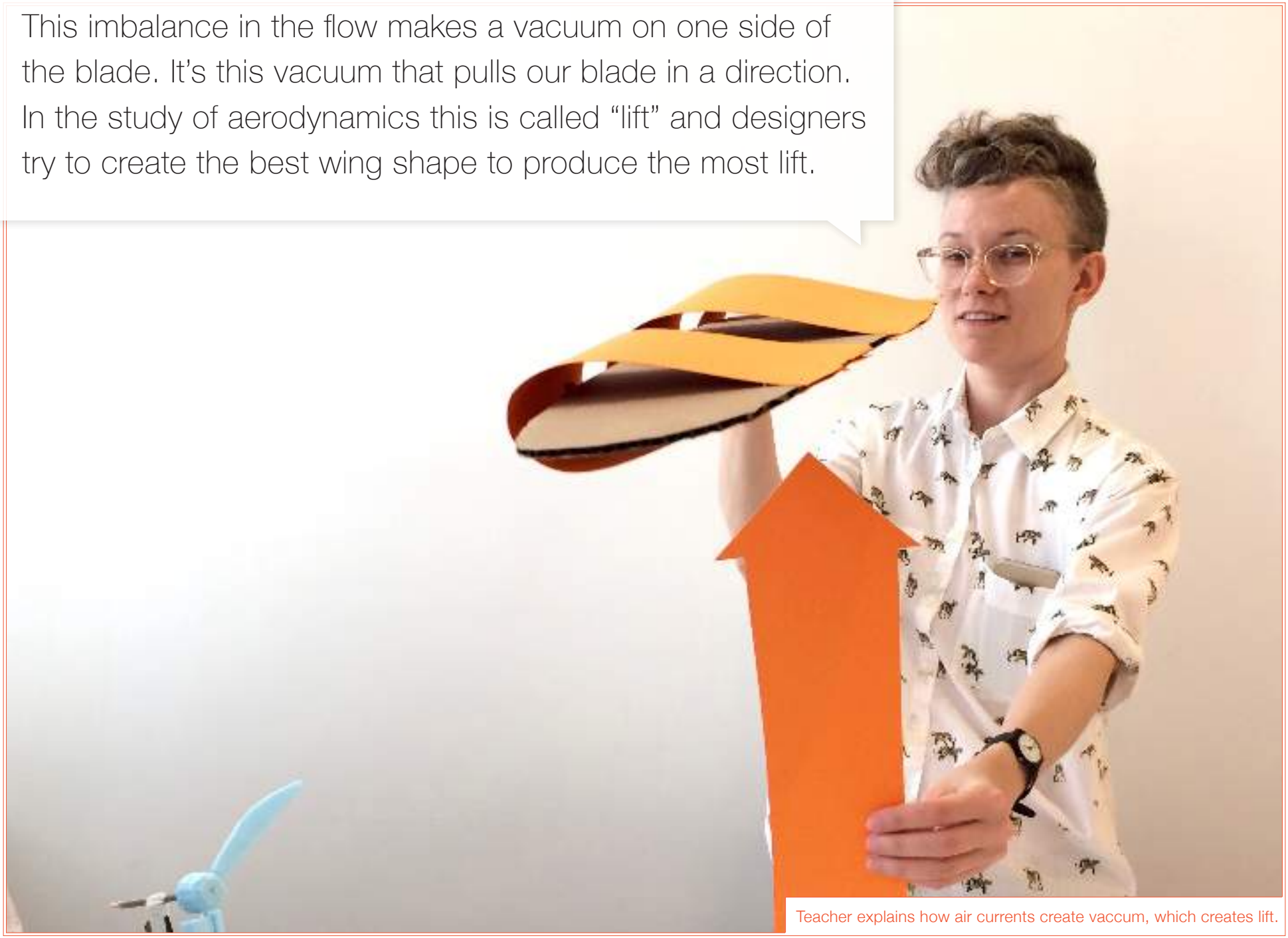
Teacher cuts blade in half to make a cross section.

Teacher explains how air flows over the blade.



Teacher explains top and bottom air currents.

This imbalance in the flow makes a vacuum on one side of the blade. It's this vacuum that pulls our blade in a direction. In the study of aerodynamics this is called "lift" and designers try to create the best wing shape to produce the most lift.



Teacher explains how air currents create vaccum, which creates lift.

Let's look at some more blade cross sections and you can tell me where the vacuum and the lift should be, now that you know how the air flows over the shape!

Students explore how different shapes create different lift.

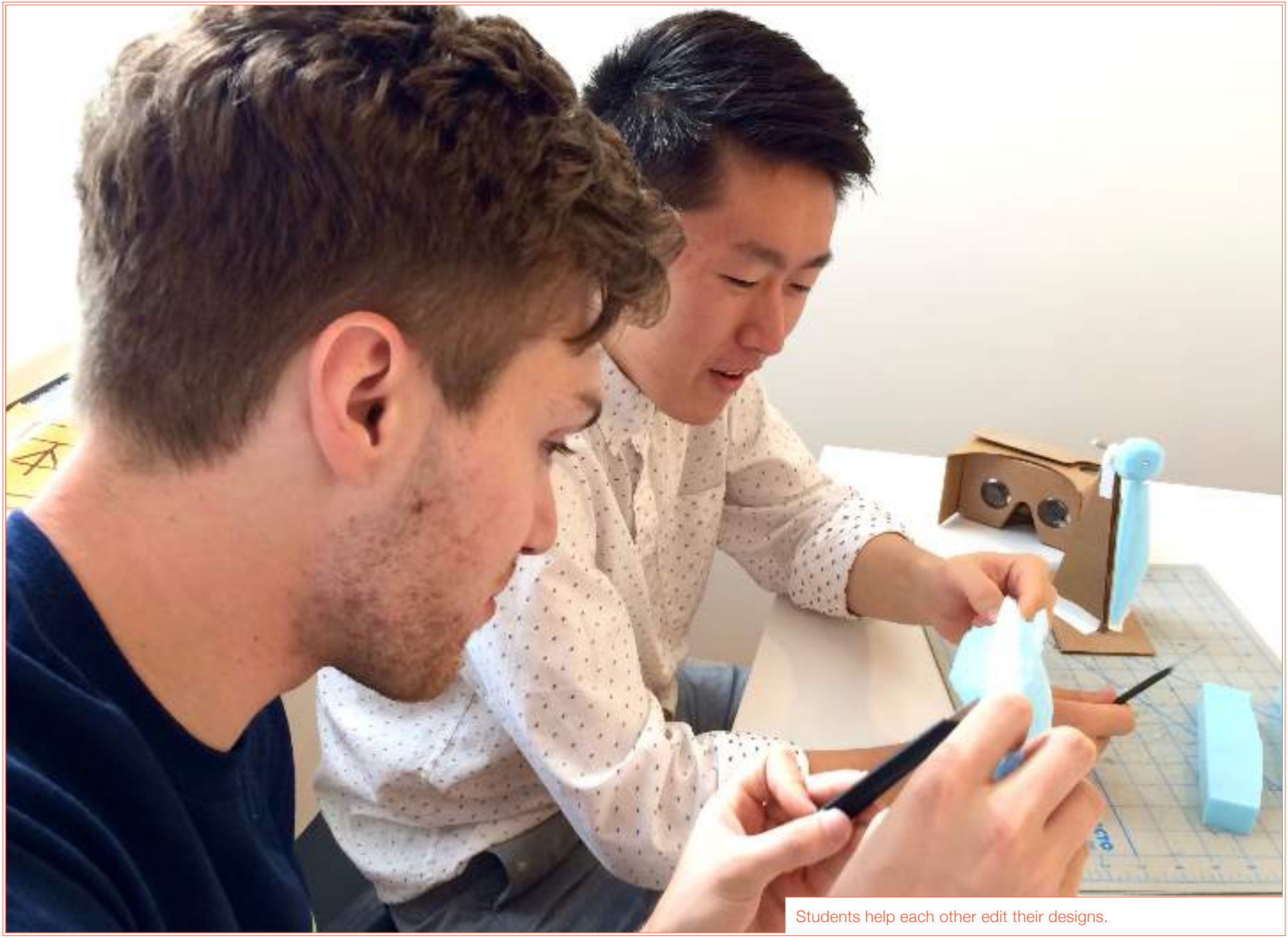
PART IV

Revise

Students have the opportunity to rework their designs based on what they've learned about aerodynamics.


Ok, now that you know a little more about form and airflow let's see if you can improve your design a little more. Once you have tested your latest version—so your windmill hub is up to date—try plugging your windmill in to your group's ElectroCity and let's see how much power we can produce! To plug in, point your windmill at the city and set it inside the city's border line.

Students edit their windmill blade designs.



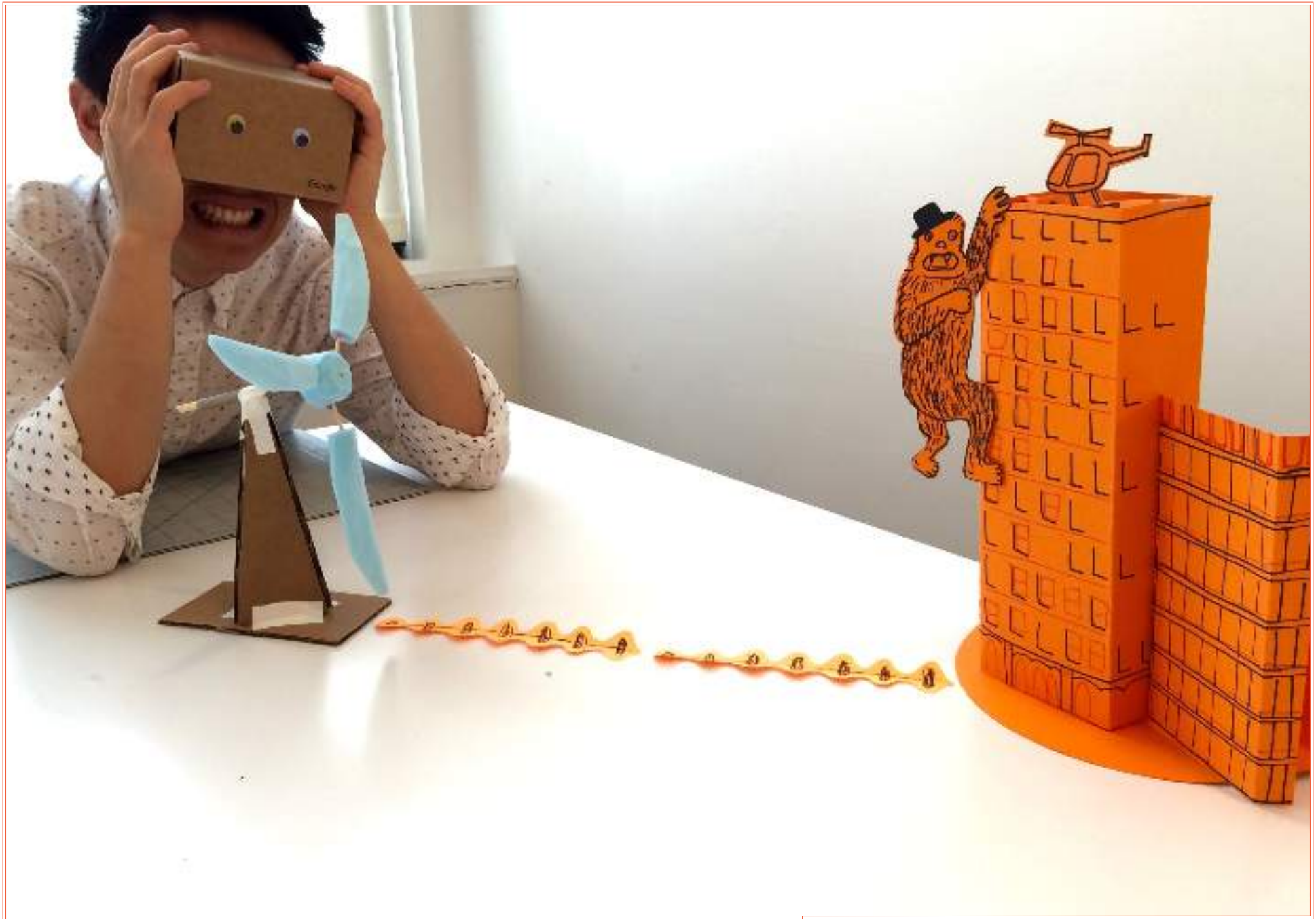
Students help each other edit their designs.

Students test designs at the testing station to see improvement.

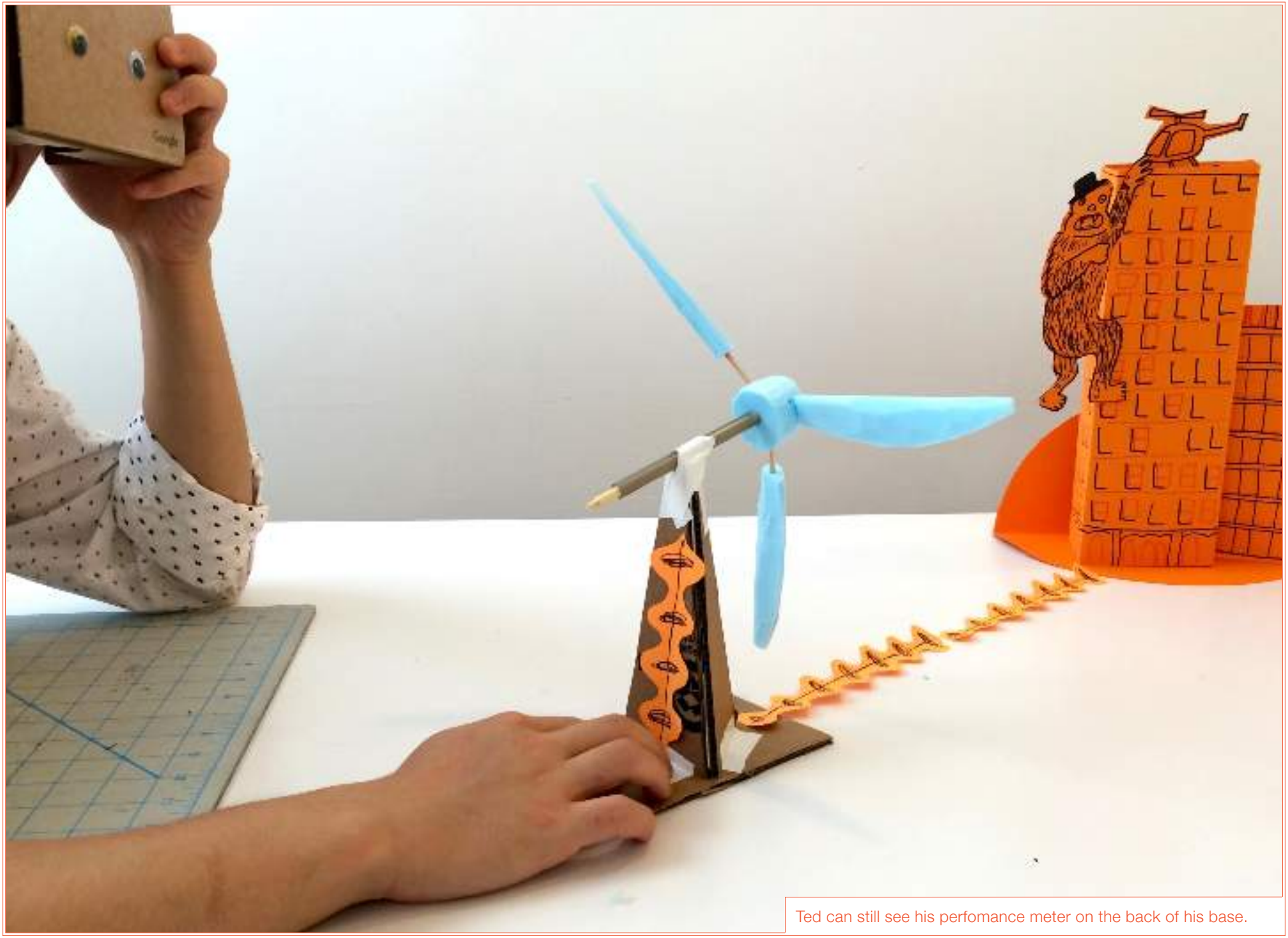
PART V

Payoff

The students plug in to the city and see the collective power their windmills can generate. The city grows and flourishes with all the power they've produced.



Ted plugs his windmill into the city—it grows / lights up in response.



Ted can still see his perfomance meter on the back of his base.

Barney adds his windmill to the city.

The city grows...

...and grows...

...and grows!

Success!

Feedback Questions

1. Is this a realistic activity? Could you see it used in the classroom?
2. Does this align with how you might teach aerodynamics and wind energy in your classroom?
3. How do you think kids would respond to the narrative, prototyping exercise, testing, etc?
4. What problems do you forsee with this lesson? Where would kids drop off or lose interest?