Entrepreneurial Challenges for Middle Grades Math

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Materials for Design and Pitch Challenges have been authored by the SUDDS team and produced by Jason Learning

Preparing Students in a Continually Changing World

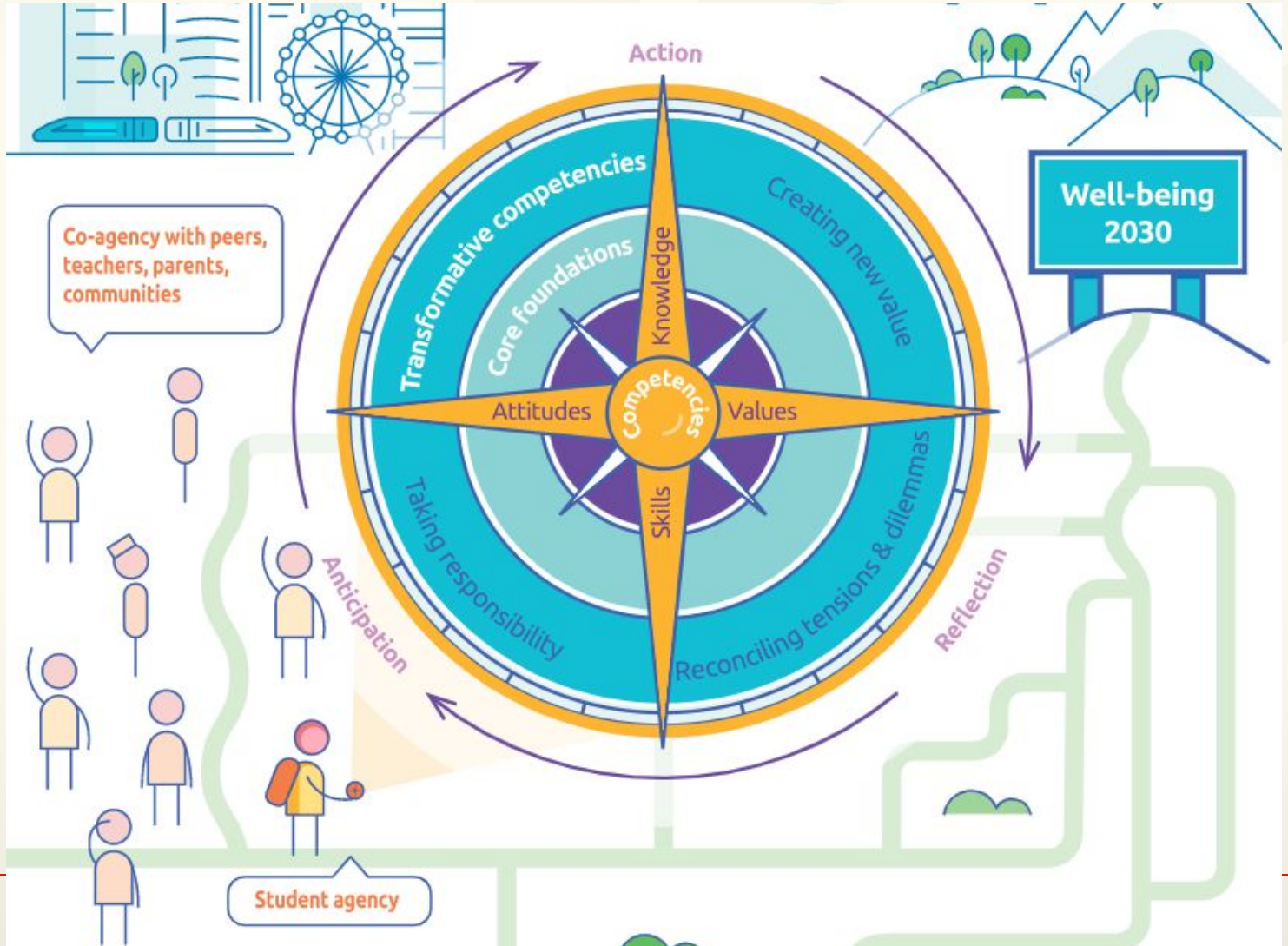
- Students want jobs that are personally and socially meaningful.
- The career landscape is changing.
- The world is facing significant problems that today's students will need to solve.

Preparing Students in a Continually Changing World

Students want to solve big problems and they have amazing ideas!

SUDDS

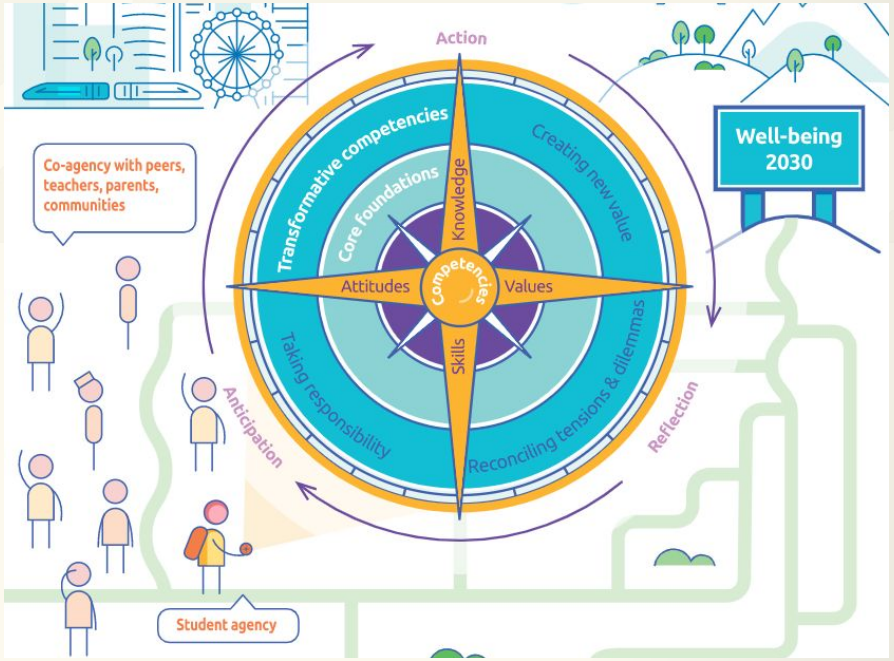
Organization for Economic Cooperation and Development (OECD) 2030 Learning Framework



Organization for Economic Cooperation and Development (OECD) 2030 Learning Framework

To prepare for 2030, people should be able to **think creatively, develop new products and services, new jobs, new processes and methods, new ways of thinking and living, new enterprises, new sectors, new business models and new social models.** Increasingly, innovation springs not from individuals thinking and working alone, but **through co-operation and collaboration with others to draw on existing knowledge to create new knowledge** (p. 6).

ED 2030 (2018) OECD.



Entrepreneurship

Why Entrepreneurship Matters

Contributions to the Economy

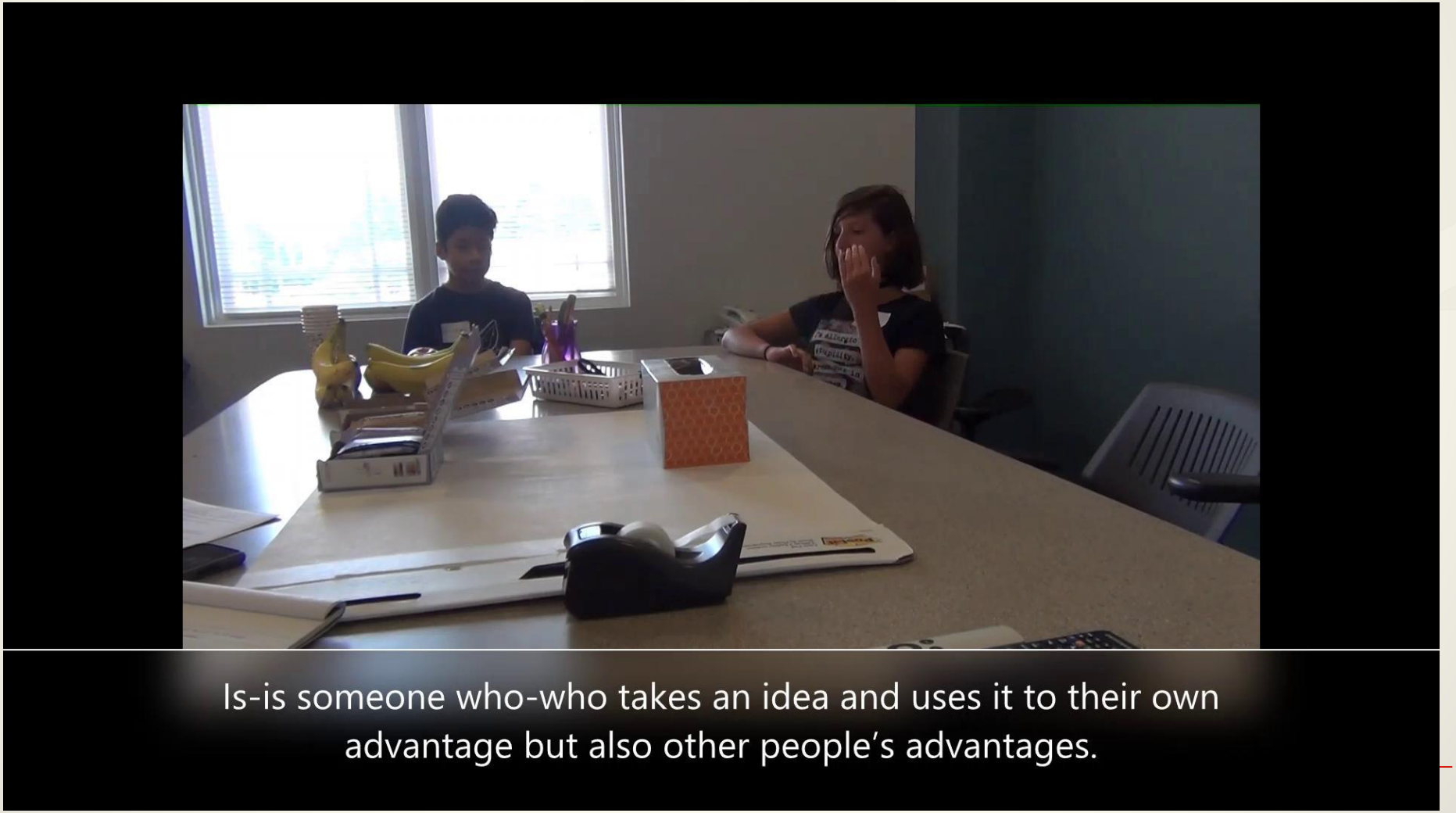
- Contributing to GDP
- Generating employment
- Generating tax
- Introducing new technology
- Assisting other Industries in the economy

Contributions to the Community

- Solving social problems
- Generating change
- Hiring locally
- Empowering communities
- Creating generational wealth

Learning to Think and Act like Entrepreneurs

Entrepreneurs take action to benefit both the “greater good” and the entrepreneur.

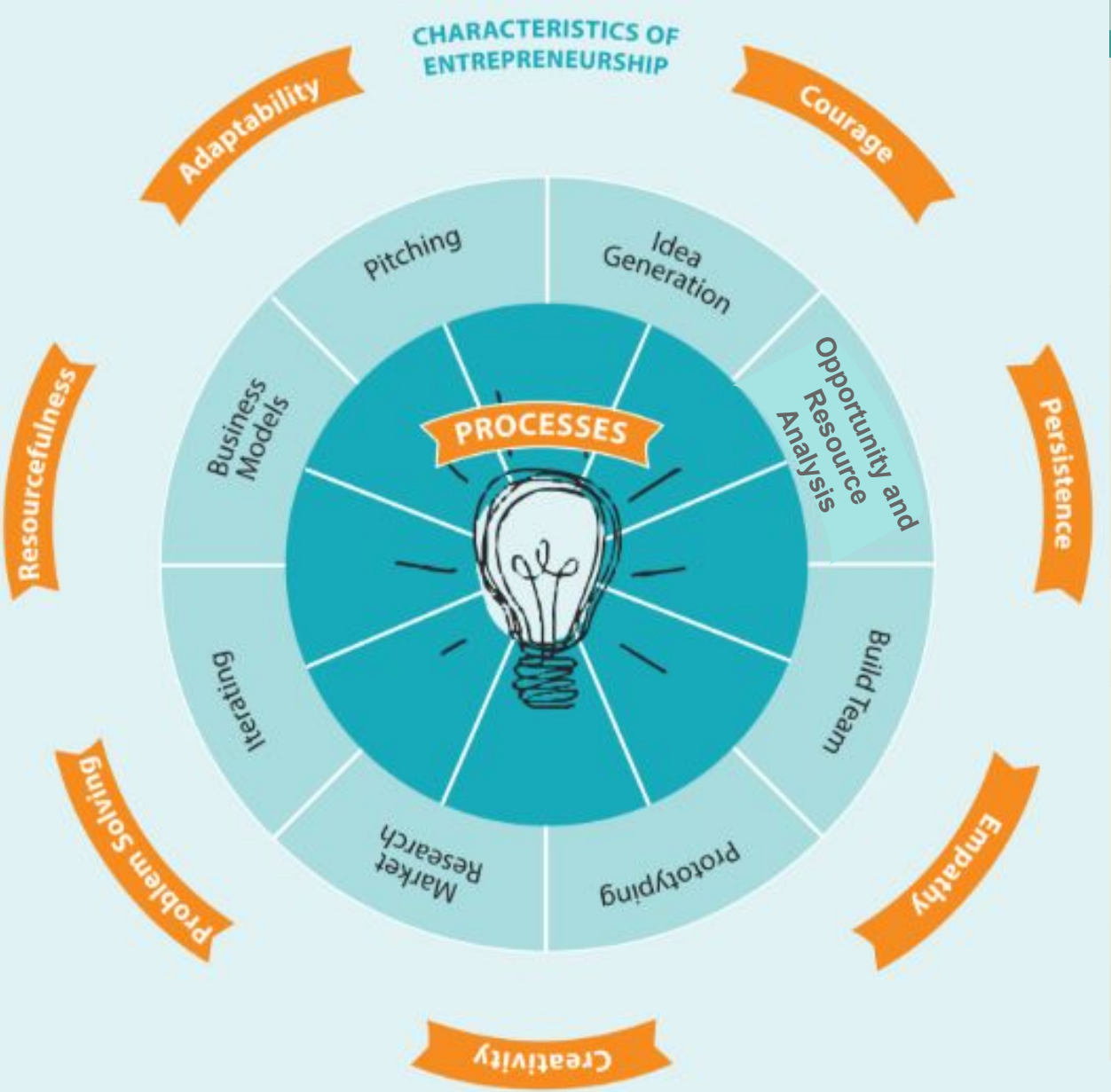


Learning about Entrepreneurship

To develop entrepreneurial skills and an entrepreneurial approach to problem-solving, students need opportunities to:

1. Engage in authentic entrepreneurial tasks (Passaro et al., 2017);
2. Collaborate, argue, and debate ideas and processes with peers (Passaro et al., 2017);
3. Reflect on their knowledge and skills relative to a specific entrepreneurial opportunity; and
4. Consider ways of providing value to customers (Lackeus, 2015).

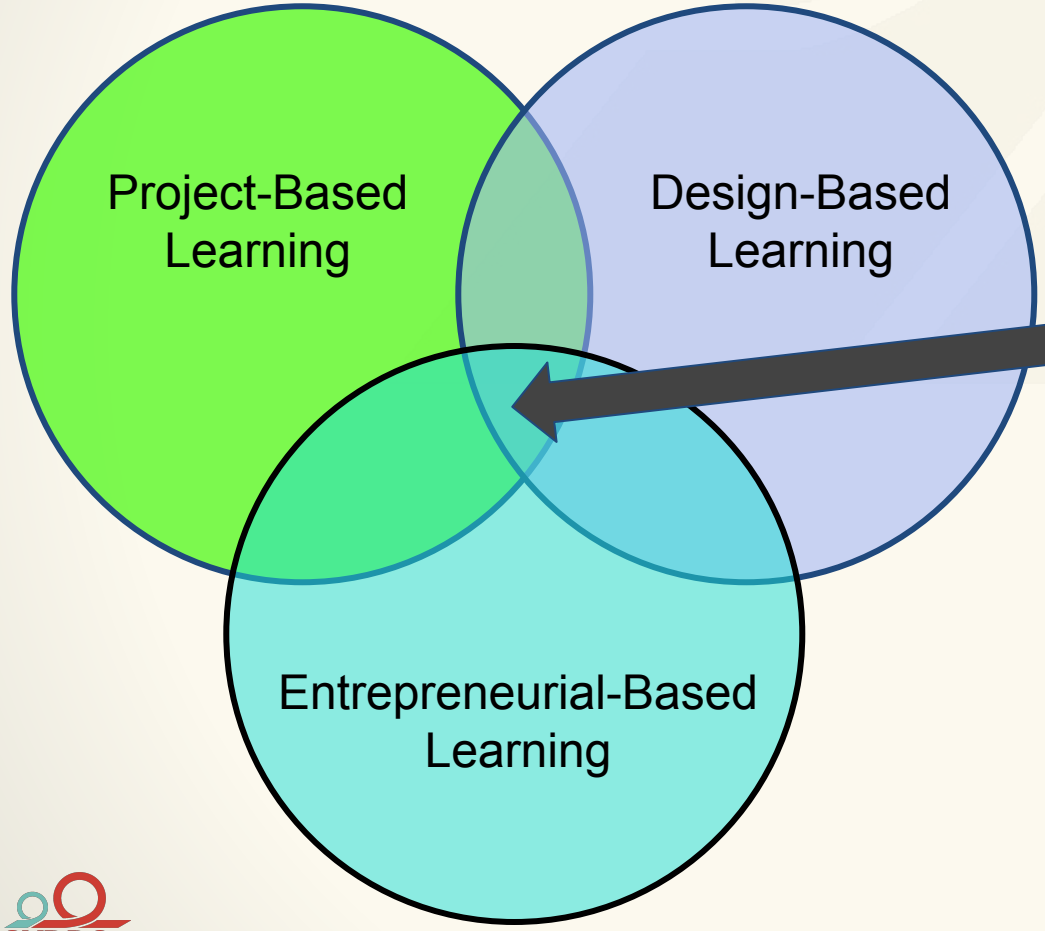
Framework for Entrepreneurship



DESIGN&PITCH CHALLENGE

Confrey, Krupa, & Belcher, 2019

Innovative Approaches to STEM Instruction



The Design & Pitch Challenges in STEM

015;

1. Introduces students to business perspectives
2. Supports students' engagement
3. Connects to disciplinary knowledge
4. Can motivate the pursuit of STEM fields

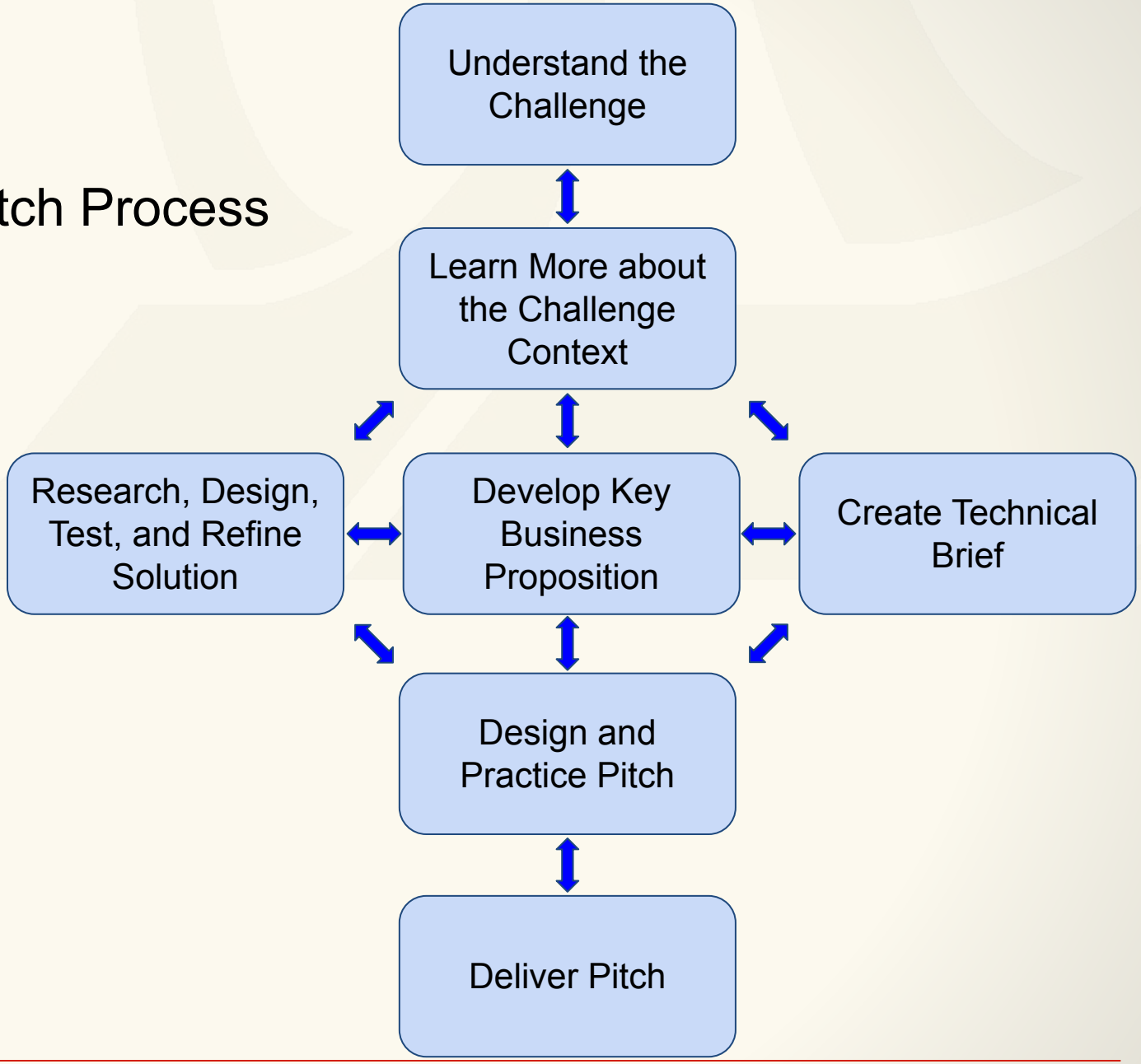
Goals of the Project

- Leverage entrepreneurship and pitch competitions to get students excited about and engaged in mathematics.
- Develop challenges that:
  - Are open enough to allow students to innovate using their out-of-school expertise,
  - Include criteria that make math central to students' innovations, and
  - Motivate the learning of new STEM content, especially math.

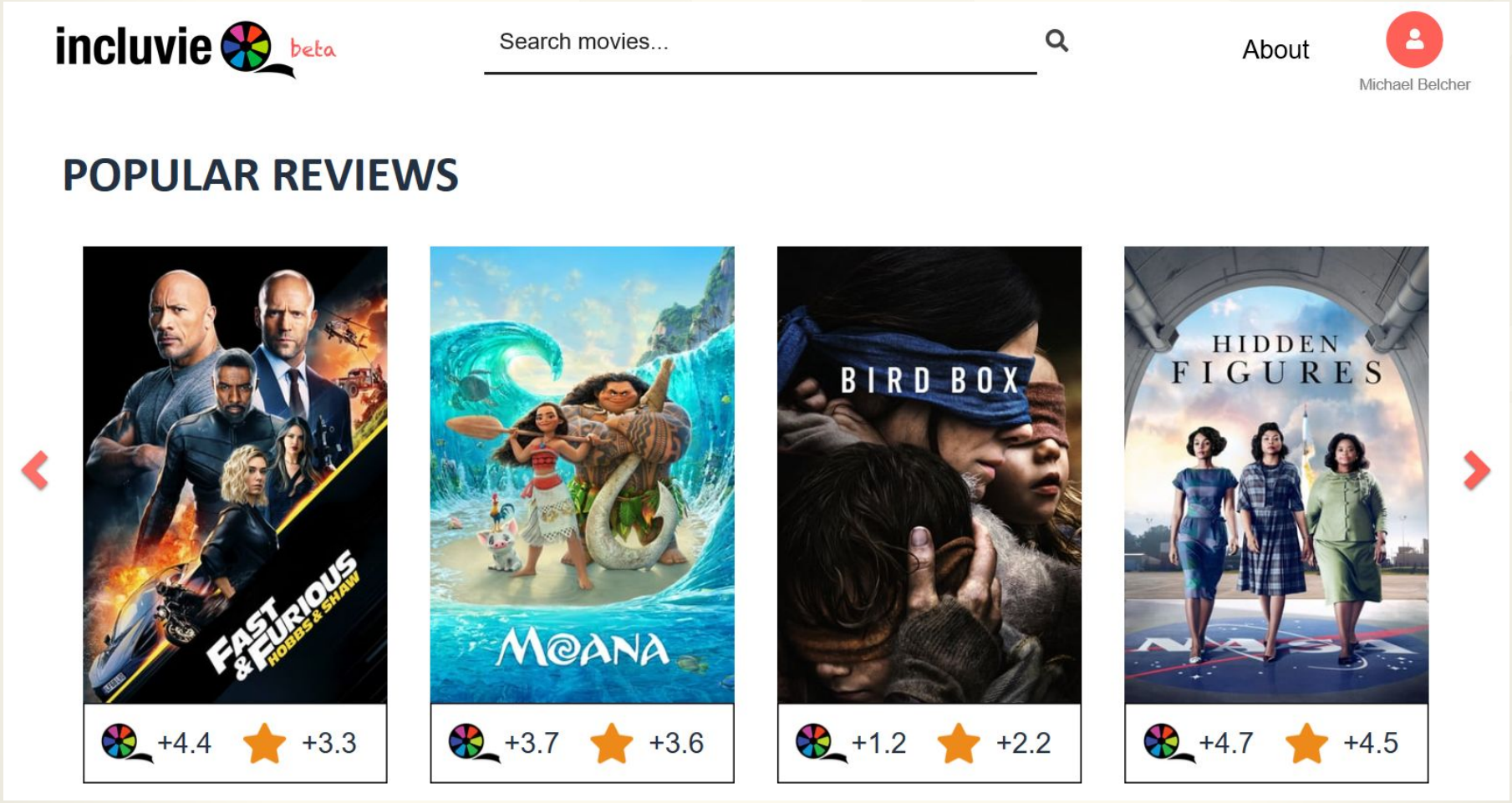
Existing K-12 STEM Entrepreneurial Educational Programs

SUDDS

The Design & Pitch Process



Design & Pitch Challenge: Building Algorithms



https://www.incluvie.com/

Design & Pitch Challenge: Building Algorithms

Launch: **Start Building Algorithms** —> Setting the Stage with your Challenge Champion

Design & Pitch Challenge: Building Algorithms

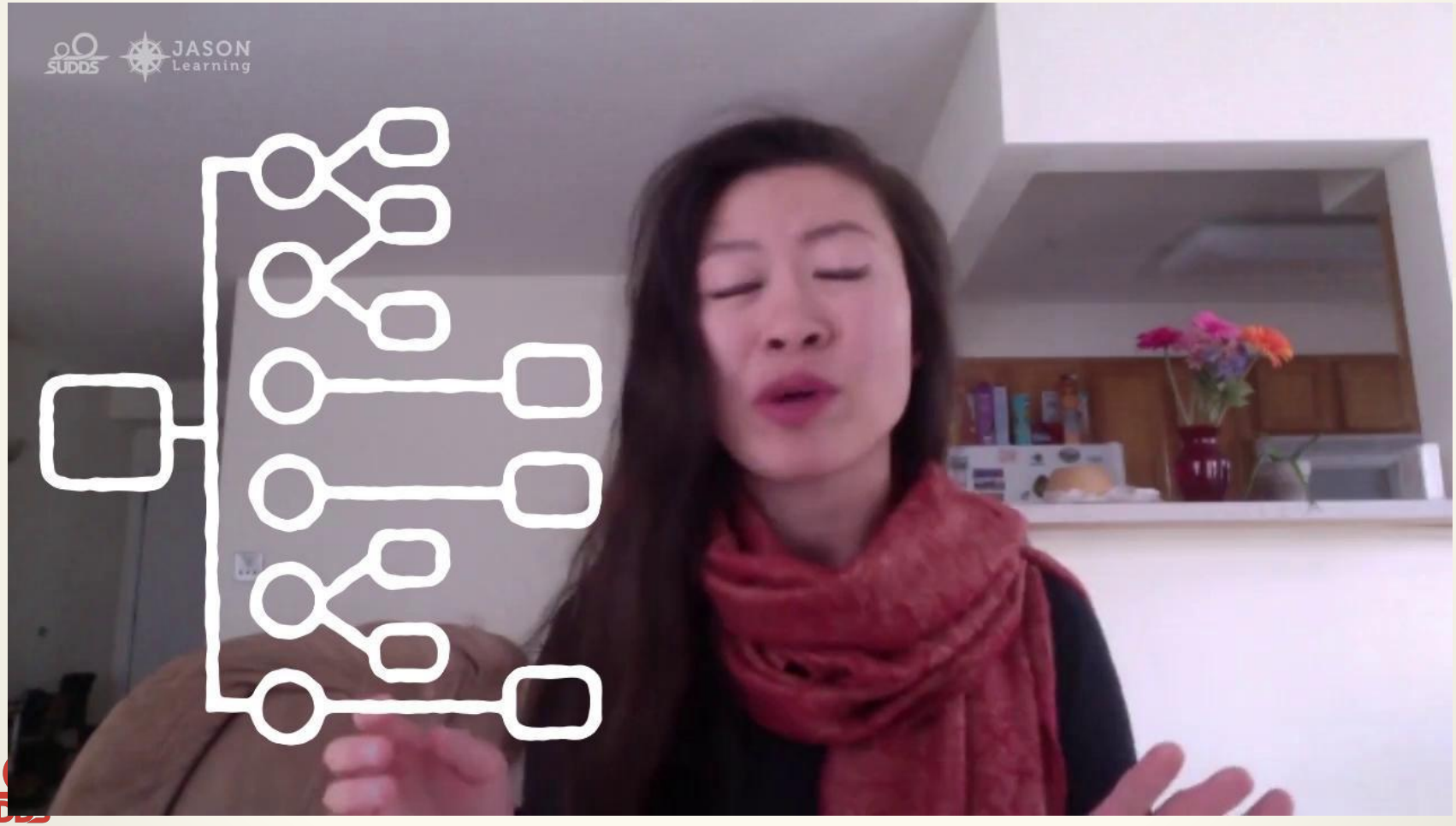
Launch: **Start Building Algorithms** —> Read Your Challenge

- **Read the challenge statement**. At your table, discuss what you need to do for this challenge.

- **Brainstorm**. Find something you would want to compare and start listing variables you think you would need to consider (e.g. if comparing basketball players, you might want to include shooting ability, basketball IQ, and passing ability).
    - If you're stuck, look at the resources located in the Background: **Learn More about Algorithms** folder to get some ideas

Tips from your Challenge Champion

Background: **Learn More about Algorithms** —> Tips from your Challenge Champion



Building Your Algorithms

Background: **Learn More about Algorithms** —> Algorithms Worksheet

- Now that you have a few ideas for your algorithm and have watched the background video, you can start building your algorithm (if you haven't already).

- Use the **Algorithms Worksheet** to explore several example rating and ranking algorithms - as you work through the resource, think about how you could apply these ideas to your algorithm.

A Few Comments on Spreadsheets

- Teachers play a pivotal role in helping students understand algorithms and in introducing algebraic language.

- The spreadsheets are integral to math learning:
  - Understanding functions
  - Understanding variables
  - Writing and evaluating algebraic expressions

Business Components and Technical Brief

- The goal of the challenge is to develop an algorithm that can be the foundation of a successful business - it has to be economically viable
  - How would you decide if a business could be successful?
  - Do you think Incluvie will be successful? Why? What would you want to know that would help you decide?

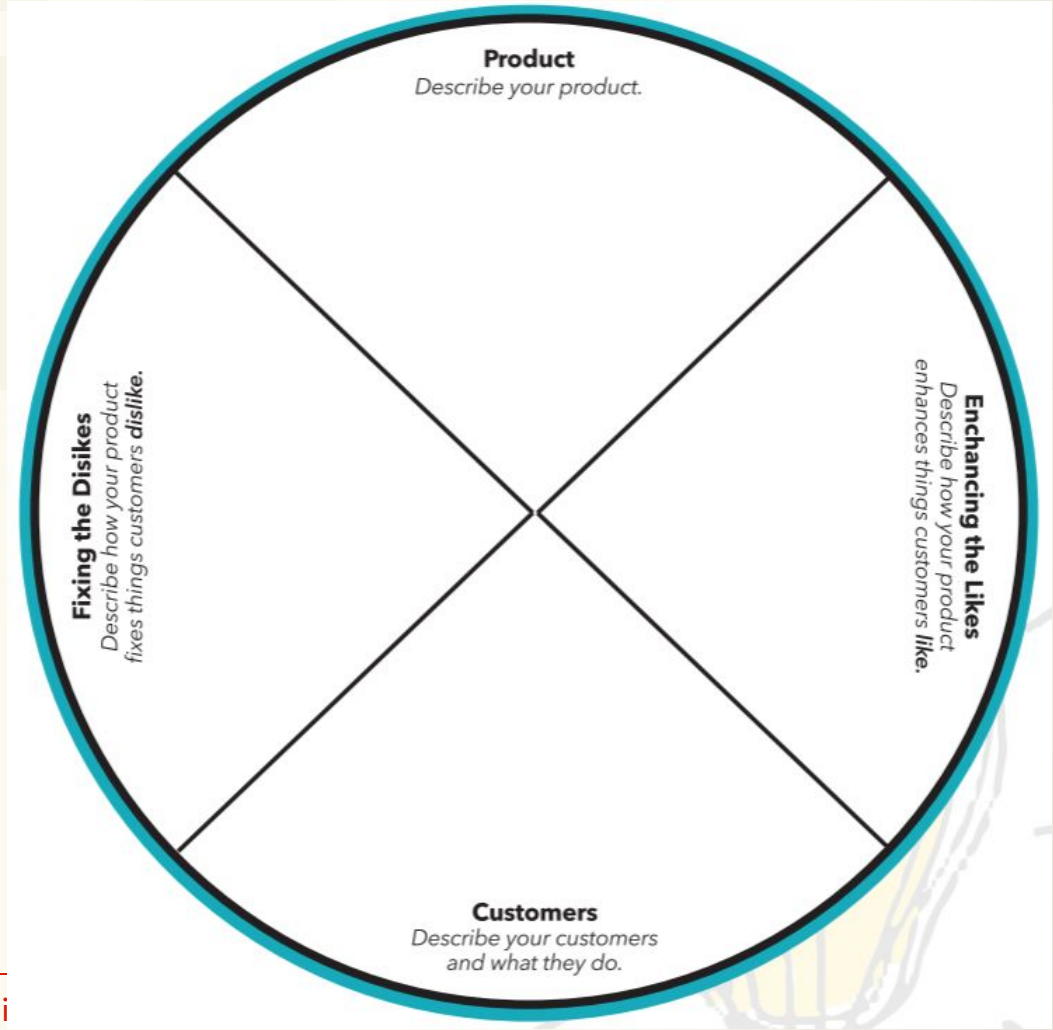
- Review the **Key Business Proposition** and the **Business Model Types** resources to help you get clear on how your algorithm business will make money (Business Model: **Start your Business**)

- Review the **Technical Brief**, which will help you describe what your algorithm does and how it works (Guidelines: **Build your Solution**)

Business Components and Tech Brief (Rationale)

Business Model: **Start your Business** —> Key Business Proposition

- Support an iterative process
- Can encourage students to reflect on the purpose and structure of their algorithms
- Expert Check-ins provide an authentic way to encourage revisions and drive at the target math



The Pitch Competition

Pitch Resources: **Build a Winning Pitch**

- Explore the **How to Build a Pitch** resource and start thinking about how you would pitch your business idea to investors.

- Students also have access to sample pitch decks from real companies and the **Pitch Judging Sheet,** which judges will use to evaluate their pitches.

Pitching

Pitch Resources: **Build a Winning Pitch**

- Teams have 5 minutes to pitch - no questions after the pitch.
- Pitching ups the stakes of the competition, especially when done with external judges (not the teacher).
- One day before the competition, students do a practice pitch. This serves as another opportunity to encourage revisions within an entrepreneurial framing.

Share-Out

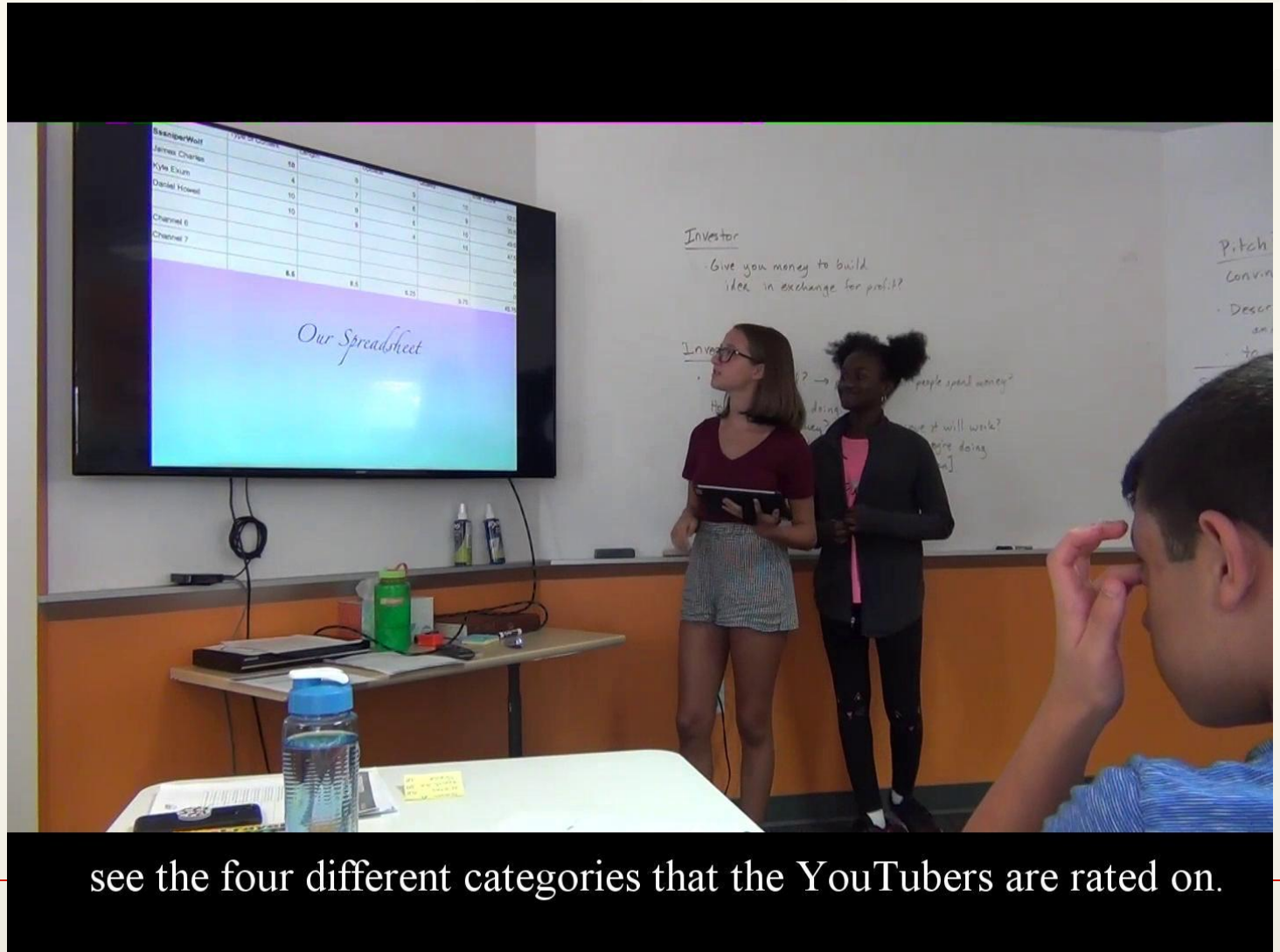
- Share your ideas for your algorithm
  - What are you ranking or rating and why?
  - What variables would you want to include in your algorithm? Will any be weighted more heavily than others? Which ones?

Implementing a Challenge

Day	Activities/Benchmarks
0	Launch the competition, introduce the components, and discuss entrepreneurship
1	Teacher launches the challenge and reviews guidelines. Students begin researching and brainstorming solutions
2	Teacher introduces the technical brief and grading rubric. Students continue researching and begin building prototype solutions
3	Students work on the business aspects of the challenge
4	Students begin building their pitch decks as they continue building and revising their KBP and prototypes
5	Students finalize business propositions and prototypes. Students practice their pitches with a coach (teacher or community member) and revise pitches based on feedback.
6	Students participate in the final pitch competition.

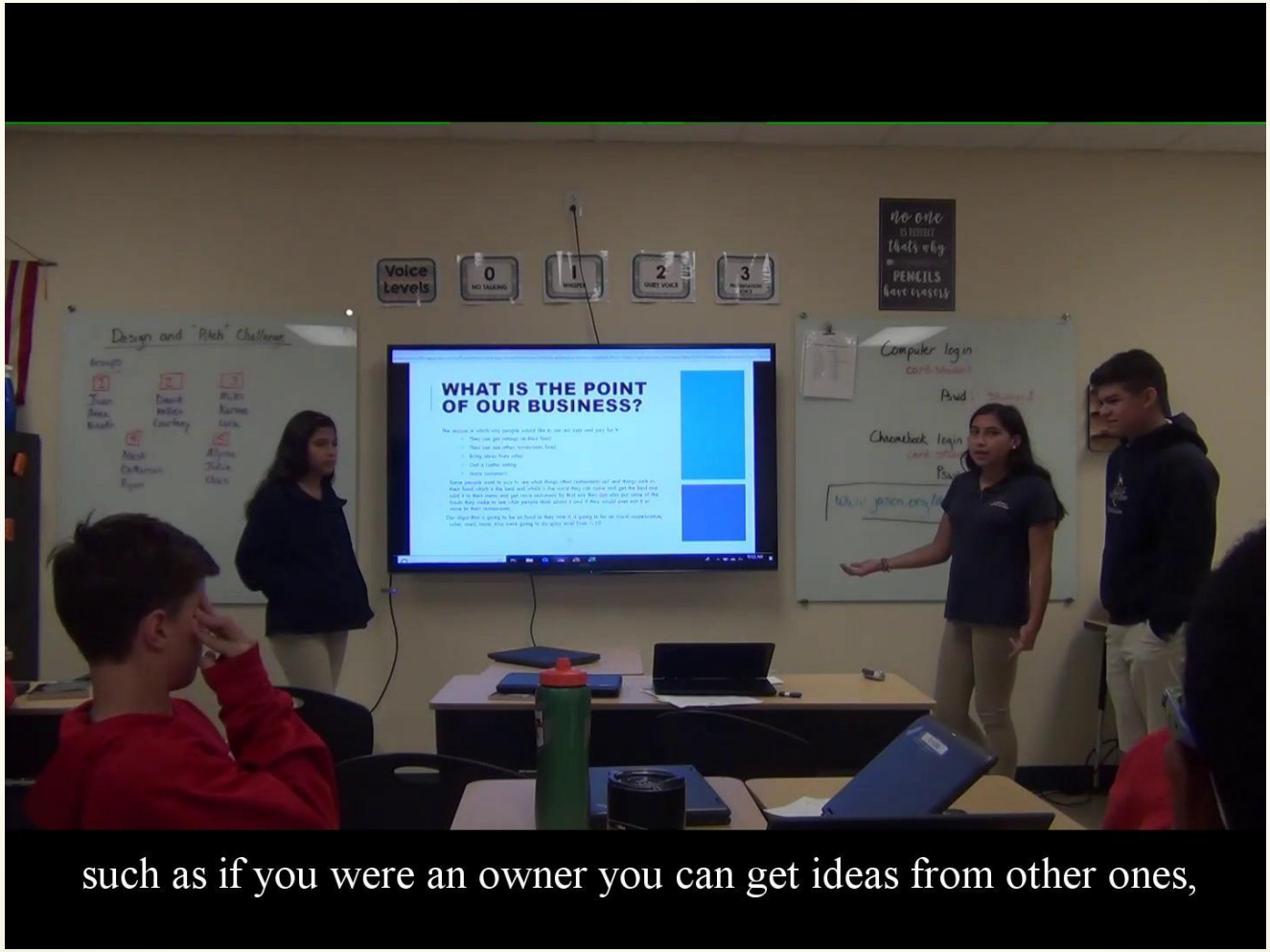
Early Findings: Mathematical Reasoning in Building Algorithms

A weighted algorithm for rating YouTube channels



Early Findings: Mathematical Reasoning in Building Algorithms

An algorithm for rating foods



Student Solutions

In early testing, we have seen a variety of solutions.

- Video games
- Restaurants
- Books
- Puppies
- Horse Racing Tracks
- Pizza
- Filtering Music
- HBCUs
- Sneakers

Where's the Math?

Where's the Math?

- Functional language and reasoning: inputs, outputs, and a systematic way of mapping inputs to outputs.
- Understanding variables
  - Referencing cells to referencing columns
  - Representing a single value, multiple possible values, or expressions

Early Findings: Entrepreneurship and Authenticity

Entrepreneurship connects math to real and familiar contexts.

and then I was like, "Oh! I use-we use-I use that,". And then-and it's just kind of like and it kind of connected everything for me.

The Design & Pitch Challenges in STEM

Operation Lifeline

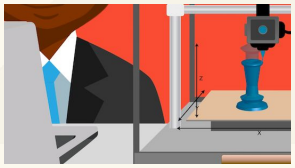
Power Me Up

Keep it Real

Building Algorithms

Prototype to Profit

Erase Food Waste



Fix It: Design for Community Impact

Flashy Fashion

Pollution Solution

Conclusion

- Situating mathematics teaching in a project-based pitch competition can be engaging and empowering for students.
- Access the challenges at https://www.jason.org/design-and-pitch
- If you use a challenge, please consider completing this survey to help us with our research:

  https://go.ncsu.edu/design-and-pitch-feedback

Partner with Us!

- We are looking for teachers to test the challenges with their students.
- All materials are **FREE** and we offer **FREE WORKSHOPS**.
- If interested in partnering with us, please complete the Google form found by following the QR code below.