CreositySpace
Connecting Kids to STEM Through Entrepreneurship

*My STEM Stories™*

## Introduction to Invention

Did you know that ideas are valuable?

**STEM Inventor:**

# Vocabulary

| Term | Definition | Picture or Simplified Definition |
|---|---|---|
| **Brainstorming** | Brainstorming is collecting and sharing a lot of ideas to solve a problem. | |
| **Creative Thinking** | Creative thinking is using your knowledge and things you learn in school to come up with a new idea. | |
| **Inventor** | An inventor is a person who comes up with a new way to solve a problem. | |
| **Intellectual Property** | Intellectual property is a law that protects inventions. | |
| **Entrepreneur** | An entrepreneur is someone who turns ideas into a business and then gets to be their own boss! | |

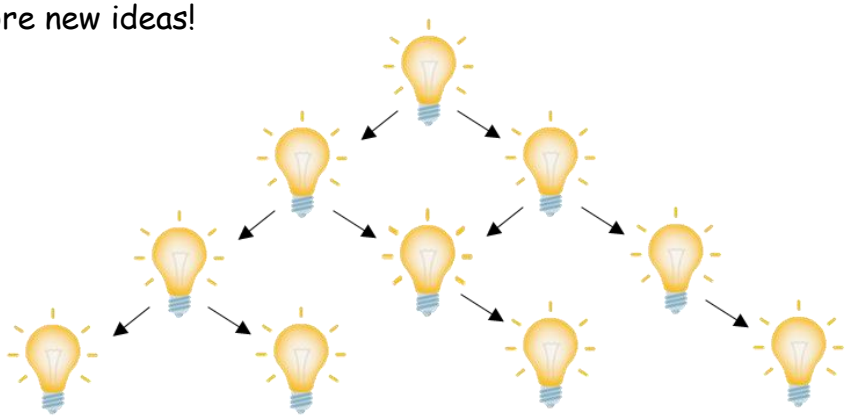


# Ideation and Innovation

We all come up with ideas. Sometimes they are about something we wish we had to play with (like a cool piece of playground equipment). Other times they are about something we wish we could change (like how we could make it easier to clean our room). But how do you know if your idea has value? Would you believe me if I told you that ALL ideas have value?

**It's True!**

Even if an individual idea may never become something you can hold in your hand, or turn into a product or service, it still has value. This is because all ideas are sure to do at least one thing—they lead to new ideas. And those ideas lead to even more new ideas!



New ideas are what drive innovation and inventions like rain and sunlight help make new plants. Just like you need a lot of rain and sunlight for a single plant, a single invention is the result of many, many, many ideas.

Did you know that many famous (and many not so famous) inventors carry a small notebook with them? This is so they can write down their ideas as soon as they think of them. They know that every single idea they have has value. They know that all ideas deserve to be written down, so they aren't forgotten. They know that even if they can't use their idea right away, they might be able to use it in the future—either as it is, or as the spark for another idea.



As early as 500 BCE, people wanted to protect their ideas and inventions. They wanted to encourage new ideas but also wanted to stop others from imitating or copying their ideas.

Giving value to an idea is an important part of **intellectual property law**. Intellectual property laws are designed to protect ideas and innovations. However, they are complicated and continually being updated as new innovations are created that don't fit old patterns. Professionals who work in this field must have a good understanding of law, business, and technology.

"You can't hold an idea in your hand like you can money or jewelry, however, ideas still have a lot of value."

Explain why you think the previous statement is true or not true. Use examples from the introduction to support your answer.

# LET'S MEET SOME INVENTORS

**Andrea Sreshta and Anna Stork,**

**Co-Founders of LuminAID**

**The Challenge**: Anna and Andrea were architecture students in New York City in 2010 when they heard about a massive earthquake in Haiti. They wondered what they could do to help the people affected and rescuers. In addition to the need for food, water, and shelter, they heard about increasingly dangerous night conditions caused by the lack of reliable sources of electricity. This inspired them to turn their attention to light.



**The Solution:** The two students turned innovators and entrepreneurs designed an inflatable solar-powered lantern. In 2015, they pitched their product on *Shark Tank* and received offers from all five investors and has helped them get their lantern to people in more than 100 countries.

Anna's and Andrea's invention is inexpensive and packs flat to make shipping thousands of lights to areas affected by natural disasters or other emergencies easy. The light battery can be recharged using the small solar panel on the top of their lantern. There also is a built-in USB port to recharge your cellphone or mobile device. LuminAID's lantern replaces reliance on candles or kerosene lamps, which can cause fires and contribute to unhealthy indoor air quality —and can't charge their devices. LuminAID not only helps people who lose power or rely on unsafe sources to provide light, but also those who enjoy hiking and camping in the outdoors and remote areas.

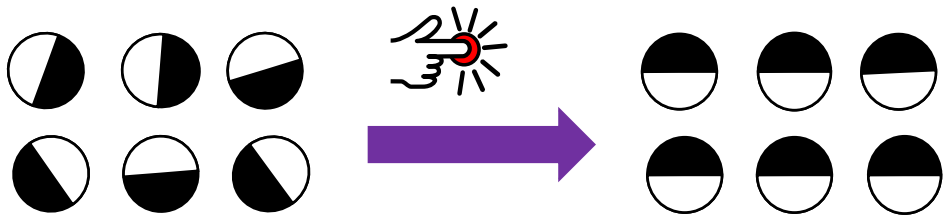
## JD Albert and Barrett Comiskey, Co-Founders of E Ink

JD Albert and Barrett Comiskey met when they were in college in Cambridge, Massachusetts. Even though they were studying different subjects—JD was studying mechanical engineering while Barrett was studying math—they both joined the MIT Media Lab. The MIT Media Lab is an organization that focuses on bringing together ideas and ways of doing things that people normally don't think go together. (Read more about the MIT Media Lab here: https://www.media.mit.edu/about/mission-history/.)

While they were at the Media Lab, JD and Barrett got the idea that they wanted to make electronic paper. Electronic paper is something that would feel like paper but would work like a tablet. They also wanted it to be thin, lightweight, and flexible so you could roll it or fold it as you would a newspaper.

They tried out a lot of different ideas. The first idea they tried was to make tiny balls the size of a piece of birdseed. These





balls were white on one side and black on the other. Electricity could make them spin around so that the black side would show any writing on the paper. However, when they ran more experiments with them, they figured out that it was going to be very hard to produce these little balls on a large scale. They also discovered that someone else already thought of the idea and had a patent. A patent is like a note from the government saying that you are the only one who can use a specific idea for 20 years. So, it was back to the drawing board!

JD and Barrett were a little disappointed that they had to start over again, but that is how it goes sometimes. They went back to the library and back to the lab to research and test new ideas. In the end, they discovered that when they combined two ideas from different areas of science—medicine and electronics—they could create a new way to make electronic paper that no one had ever thought of before.

Their idea was to make very small rubber "bubbles," and inside they would put some liquid and very small pieces of special colored sand-like material. This sand-like material could move around inside the bubble, or "microcapsule," and allow you to write different things on the electronic paper.

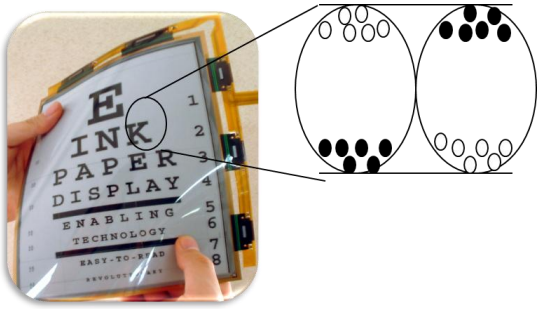
JD and Barrett tested their idea and shared it with people they knew. Eventually, they decided to start a company called E Ink and asked people from around the world to join their company and help them. They hired people from India, China, England, and Canada to help them improve their idea and to turn their idea into a product.


*Barrett, Katharine, and Kim from the E Ink research team.*



Everyone worked together sharing ideas, successes, and even failures. Sometimes, when they had to solve really hard problems and needed more ideas and different perspectives, they would form collaborations with other companies.

After years of hard work, JD, Barrett and the team at E Ink started selling their electronic paper! The first product didn't look exactly as they imagined it back in the Media Lab, but that was OK. They had invented something totally new even if there was still a lot of room for improvement.




After working on their inventions and company for almost 10 years, both JD and Barrett decided to try something new. Barrett went to business school and has since built a number of new companies. JD wanted to help other people with their ideas and splits his time between consulting as an engineer and teaching new inventors at the University of Pennsylvania.

# LET'S MEET SOME YOUNG INVENTORS

Alexander Deans, a 16-year- old from Ontario, Canada, developed the iAid device to help visually impaired people get around more easily. He designed a joystick device that hooks up to your phone and helps the user move around without hitting things. Alex has a number of YouTube videos where he explains his inventions.

Christopher Egalaaq Liu and Lonny Alaskuk Strunk, two young Yup'ik engineers from Alaska, developed the first online translation and grammar tool for the Native Alaskan language Yugtun. The lightbulb moment came when Christopher realized the Yugtun language followed strict rules. "I had no idea that there was this mathematically based system or these formal rules you can follow to form the Yugtun words," Liu said. "It's like the combination of math and Yup'ik." Christopher built the first version of the tool when he was in college and has been working with Lonny and another friend to improve it since then.



Alexis Lewis of Chapel Hill, North Carolina, has been inventing since she was 12 years old. By age 17 Alexis already had a number of inventions to her name. One is the Bamboo Travois. Inspired by the travois used by the American Plains Indians, the Bamboo Travois is a triangular cart with wheels that can be used to provide transportation of people or materials in poor communities. Another invention is her Emergency Mask Pod. This 3D-printed football-shaped container holds an Xcaper smoke mask, goggles, and a glow stick. The Pod can easily be thrown into an open second-story window in an emergency—such as a house fire—to help people until emergency response personnel arrive.

Dasia Taylor, a 17-year-old high school student from Iowa City, Iowa, was reading an article about sutures (a special kind of bandage) that uses fancy technology to tell you if your wound is infected. She wondered if there was a lower cost, more accessible way to accomplish the same thing. There is—and she invented it! By using beet juice to dye the fibers, she was able to develop a bandage that changes color if the injury becomes infected. Dasia's first passion is equity and is hoping her invention will improve medical accessibility for underserved communities.

Harry Paul, of Long Island, New York, was born with congenital scoliosis, which meant he had to have more than a dozen spinal surgeries to help correct the problem as he grew. The surgeries were painful and time consuming, and Harry thought there needed to be a better way. In high school, he started development on a 3-D printed spinal implant that would expand as you grew, reducing the number of surgeries needed.

Ayla Hutchinson, of Taranaki, New Zealand, was 13 years old when she developed the first prototype of her Kindling Cracker™ for her 8th grade science fair project. She was inspired to create her invention after watching her mom cut her hand while splitting wood. The Kindling Cracker™ is a one-foot-tall cylinder-shaped cast iron frame that has an iron splitting wedge in the middle. You place a piece of kindling in the cracker and then hit it with a hammer or mallet. The Kindling Cracker™ holds the wood for you, keeping hands and fingers safely out of the way. Over the past 6 years Ayla has built a thriving business which ships tens of thousands of Kindling Cracker™ around the world each month.



Sophia Nobles, grade 4, and Joseph Santana and Catherine Tomasello, grade 5, of Land 'O Lakes, Florida, were inspired to invent the WateRenew desalination device to utilize the energy of ocean waves and address the global need for clean drinking water. The WateRenew is a device that has underwater "wings" to capture the energy from the ocean waves which it uses to run the desalination mechanism that removes salt and other contaminants from ocean water to make it suitable for drinking. Although their invention is still in the prototype stage, they hope to see a large-scale version of it in the near future.

Erin Smith of Shawnee Mission, Kansas, was 16 when she first had the idea to use facial recognition to detect early stages of Parkinson's disease. She was watching old videos of Michael J. Fox and she noticed his face seemed "blank" even when he was laughing. What she was noticing was the very real early symptom of Parkinson's called masking. This set Erin on the path towards developing FacePrint™, an artificial intelligence tool that uses video footage to detect early signs of Parkinson's disease.

When you are working on a new product or idea it is important to have a lot of different ideas and perspectives.

Do you agree or disagree with that statement and why? Make sure you justify your answer.

# TELL US ABOUT YOU AND YOUR INVENTTION

# Useful Phrases for Having Constructive Discussions

### Asking Clarifying Questions

Can you be more specific?

Why do you think that happened?

Can you please explain your thinking?

Can you give me another example, so I can understand?

### Adding to an Idea

I agree, and I have an addition: _____.

I believe this is true because _____.

Yes, that makes sense, and I would also like to add

.

### Respectfully Disagreeing with an Idea

Could you explain, because I have a different idea?

I respect your opinion and _____.

I see your reasoning and disagree with some of the idea because _____.

| Term | Definition | An example of the term in the inventor stories |
|---|---|---|
| **Brainstorming** | Brainstorming is collecting and sharing a lot of ideas to solve a problem. | |
| **Creative Thinking** | Creative thinking is using your knowledge and things you learn in school to come up with a new idea. | |
| **Inventor** | An inventor is a person who comes up with a new way to solve a problem. | |
| **Intellectual Property** | Intellectual property is a law that protects inventions. | |
| **Entrepreneur** | An entrepreneur is someone who turns ideas into a business and then gets to be their own boss! | |

Is there something cool about science, math, engineering, or technology that you want to share with your class and family?

Write about it here.

CreositySpace
Connecting Kids to STEM Through Entrepreneurship