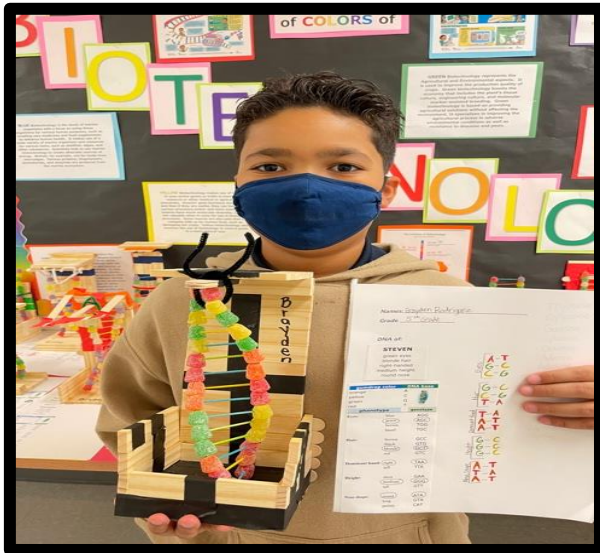




Garfield Public Schools Gifted & Talented Newsletter



Instructor: Jenniffer DeWitt – Fall 2021 Edition



Brayden Rodriguez, School 8, Grade 4 with his DNA double helix model.

Our Vision & Philosophy

The purpose of gifted and talented education is to provide opportunities for highly capable students to meet on a regular rotational basis and engage in units of studies, activities, contests, and projects that will foster individual intellectual interests and talents while promoting critical and creative thinking.

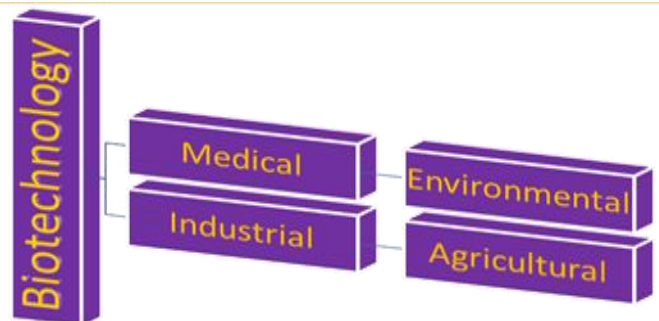
The stars are shining bright in the gifted classroom!

The Gifts & Talents curriculum has been designed to foster complex, higher order thinking skills required for critical and creative thinking. **S.T.E.A.M.** is consistently infused throughout the year to ensure that students will be continuously engaged in meaningful activities. These learning opportunities offer advanced engineering concepts that will utilize prior knowledge of Science, Technology, Engineering, Art, and Math. Self-guided learning will develop individual gifts while communication and leadership are also supported.

Topic of Study: We are exploring the world of BIOTECHNOLOGY!

Our Essential Question:

What are the different ways that **biotechnology** can be used in the fields of medicine, agriculture, industry, the environment and forensic science?



**"There is no better time than today to encourage our gifted learners to shine."
-Angie French**



Gifted students taking part in a "crime scene investigation" involving fingerprints and DNA analysis.

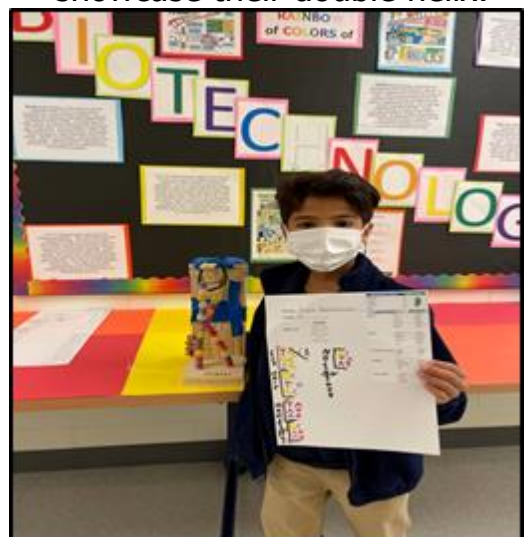
Our "Forensic Scientists" can use DNA and fingerprints to identify people and help law enforcement capture criminals. The students recorded their own fingerprints and identified/classified the characteristics of each fingerprint into the three main classes: the arch, whorl and loop. Then they compared their own prints to another classmate to see the differences. We also completed a Gizmo Crime Scene Investigation where we learned how to search for and collect evidence and dust for fingerprints. Then we classified those fingerprints according to a main pattern and subgroup. The students analyzed the evidence and matched the prints collected at the crime scene to those of a suspect. We found our criminal!



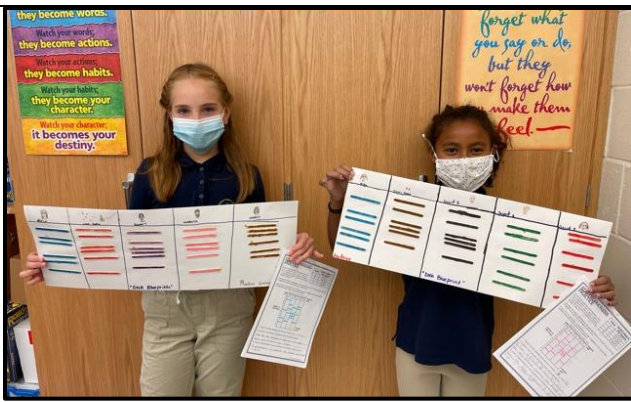
By exposing students to biotechnology, we expose them to future career fields such as:

- Biomedical Engineering
- Radiology
- Medical/clinical technicians
- Imaging Technicians
- Biophysicists/chemists
- Biostatistics
- Research & Development scientists
- Environmental Engineers
- Pharmaceutical Sales & Marketing
- Crime Lab Technicians
- Forensic Scientists

We are moving full STEAM ahead in our study of Biotechnology. The students were exposed to the medical branch of Biotechnology during Trimester 1. We examined the basic principles of DNA. The students took their knowledge of DNA and began coding genes using toothpicks and gumdrops to represent the four biochemicals that pair with each other, creating a double helix. They investigated specific DNA sequences that code for certain physical characteristics such as eye and hair color. They took it a step further and wanted to build a prototype to showcase their double helix.



Zain Abdelfattah, Grade 3, School #9 with his DNA double helix model, display prototype, & the coding sheet.



"Forensic Scientists" Martina Kulikowski and Audrey Kitchens displaying their DNA Blueprints and work with Electrophoresis.

Our "Forensic Scientists" studied DNA profiling. DNA profiling involves comparison of DNA samples. This can be done by using a process called Electrophoresis. This is a laboratory technique used to separate DNA molecules. An electric current is used to move molecules to be separated through agarose gel. The gel allows smaller molecules to move faster than larger molecules.

"Electro" means electricity and "phoresis" means movement. They also learned that children inherit half their chromosomes from each parent and thus should possess a combination of parental genes. In other words, all fragments produced in the child should also be produced by either the mother or father. We compared the profiles of three men with that of a mother and child to determine the biological father of the child using the "DNA blueprints." We also compared DNA collected from a crime scene to determine which of the three suspects was present and could have committed the crime by using "DNA blueprints." Then our "Forensic Scientists" constructed their own scenario and "DNA blueprints" and had another student read the results along with further practice of analyzing DNA samples through Electrophoresis.

Extracting DNA from a Strawberry!



We continued their fascination with DNA. The students loved learning about the "recipe" that helps build organisms. Usually, we can't see DNA except with a high-powered microscope. But that all changed in our class! We were able to extract DNA from strawberries. We encouraged the DNA strands to release from their cells and bind together into a format that's visible with the naked eye. Strawberries are one of the best fruits to use for this experiment due to their high number of DNA strands per cell. Our cells have two copies of their DNA while strawberry cells have eight! The strawberry DNA looked like a stringy white substance. But we carefully stretched it out, so we were able to see more of the details of those strands of DNA. Then we created a slide with our strawberry DNA and looked at it under the microscope. We were able to use ordinary household items to complete our task. Dish soap helps to dissolve the cell membrane, which is a lipid (fatty) layer. Salt (NaCl Sodium chloride) helps to remove protein chains that bind the DNA. It also helps to keep the DNA proteins in the liquid, so they don't dissolve in the alcohol. Isopropyl alcohol causes the DNA to precipitate (become solid) because DNA is not soluble in alcohol, especially cold alcohol. We also took notes and created a drawing of our observations during the lab.

This was such an incredible science lab because DNA is normally something we can't see or observe, making it harder for kids to understand and appreciate. This is one incredible experiment students will never forget!



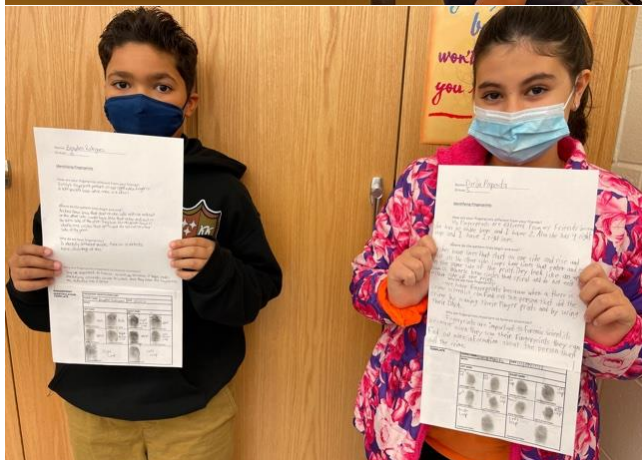
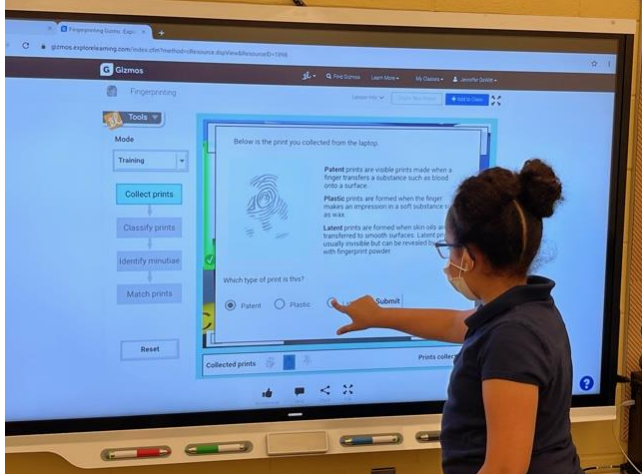
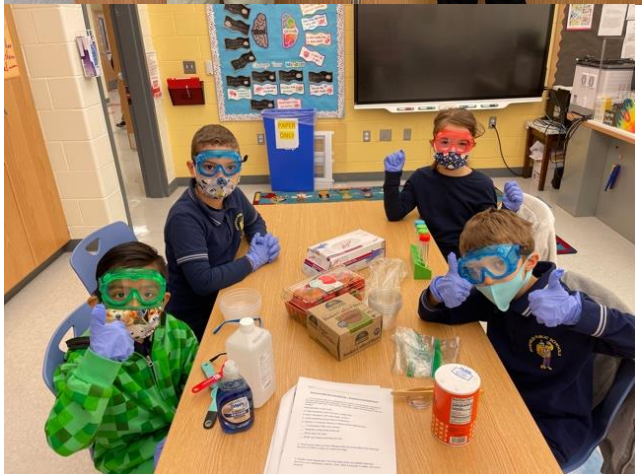
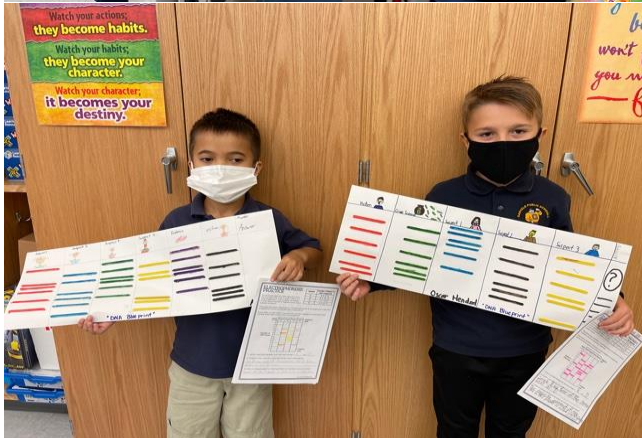
Christopher Frullo & Michelle Barba, Grade 5, School #5 examining cells and DNA under a microscope.



Mihajlo Miric, Grade 3, School 8 coding DNA with gumdrops and toothpicks.



The students looked at the structure of the COVID-19 virus, how it spreads through the air and on surfaces. Then our students constructed a model of the COVID-19 virus. The students completed an observation chart based on health and safety measures they have seen in their schools and if those measures are working well in the school. The students considered the least effective measure taken in their school and compared it to what other students are seeing in their school from an Excel spreadsheet of data. This lesson introduced students to the concept of industrial and safety engineering, and using real-world COVID-19 prevention procedures (from their own school and researched online). Students considered cases where schools were forced to close due to outbreaks, then collected data and evaluated real-world procedures designed to prevent outbreaks. Their evaluation led the students to determine how common processes could fall short and used that information to come up with recommendations for their own school. Safety engineers spend a good deal of time evaluating the efficacy and safety of the systems around them. In the business world, inefficiency can lead to wasted time and money. During the COVID-19 pandemic, everyone relied on similar systems to stay safe from COVID-19. Students, perhaps more than anyone, adapted to new systems within their schools. This real-world event was a great opportunity to teach students how to utilize some of the skills industrial engineers use every day to manage efficiency and safety.

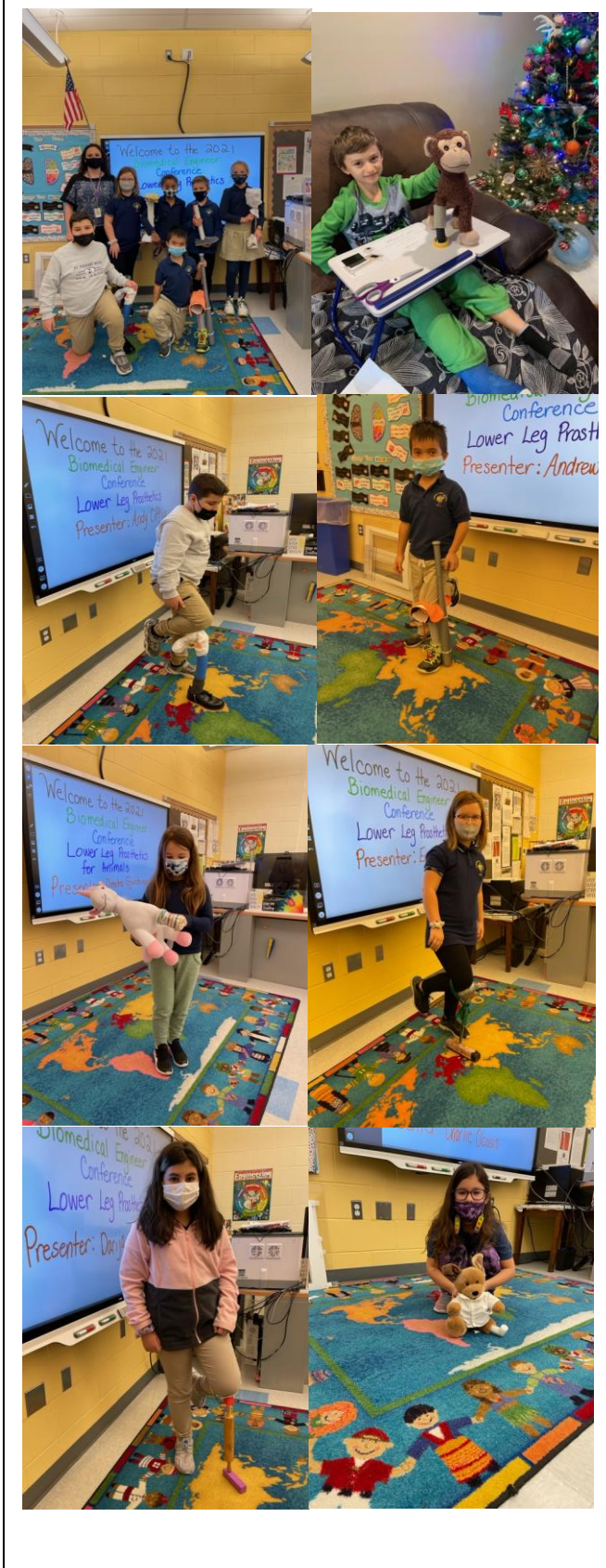


We are Biomedical Engineers!

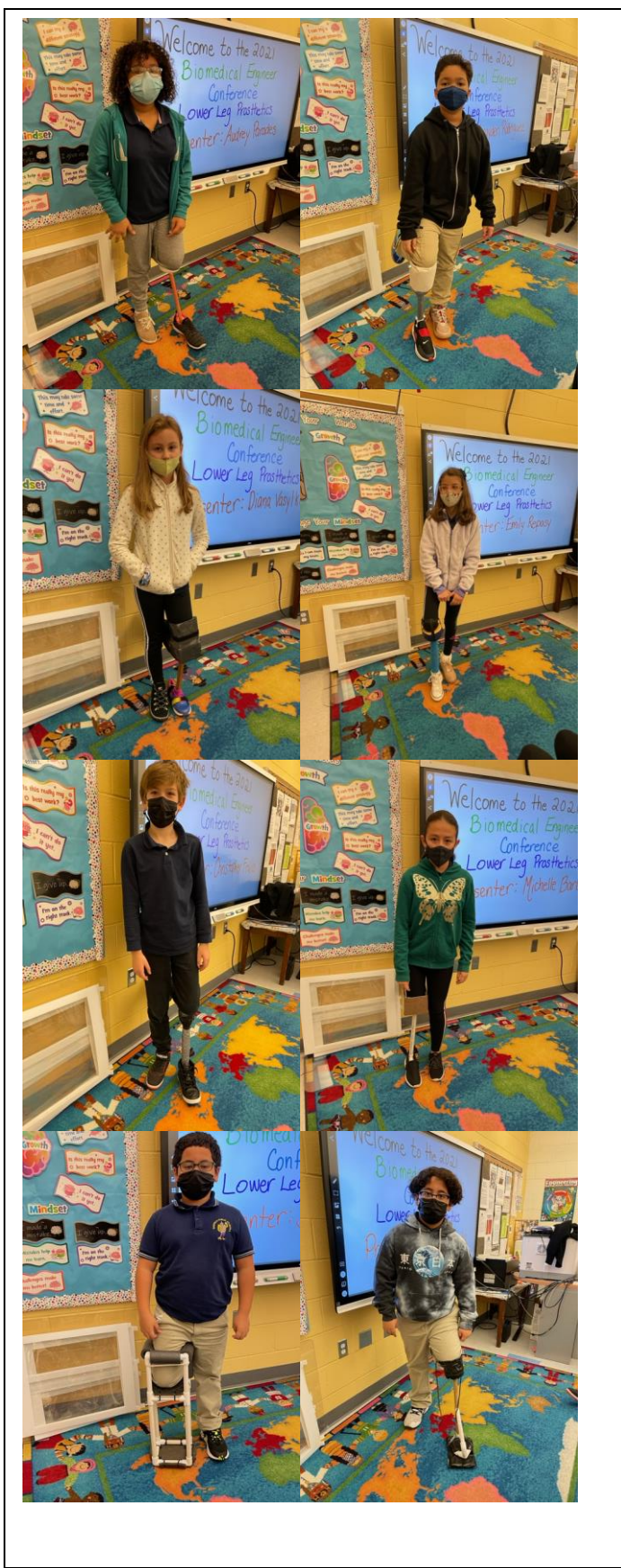
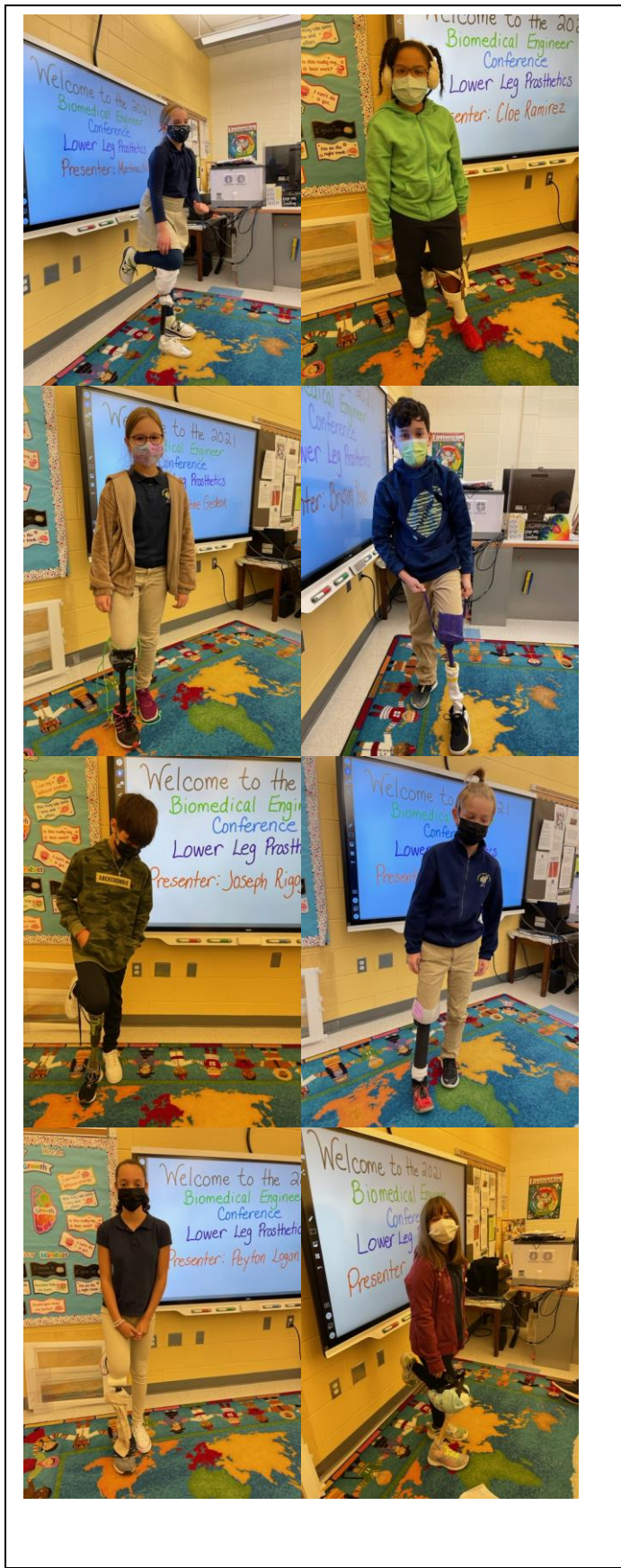
Our first trimester home project was to create a prosthetic for the lower portion of a leg. Biomedical Engineers and doctors work together to creatively invent and improve amazing prosthetic devices to enable people to complete daily life tasks efficiently and effectively.

The students used their creativity for constructing their own prosthetic device using various ordinary materials. Our students investigated biomedical engineering and the technology of prosthetics. Then each student demonstrated its device's strength and considered its pros and cons, giving insight into the characteristics and materials biomedical engineers consider in designing artificial limbs.

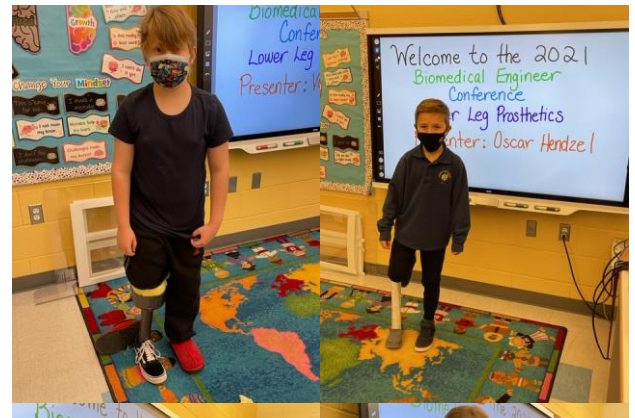
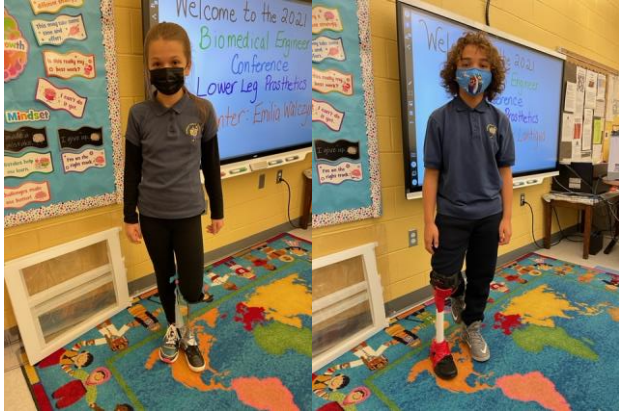
Human bodies can withstand great forces and destroy unwanted foreign bacteria. However, the body can only handle so much. Sometimes, the effects of car accidents, war, animal attacks and bacterial infections cause excessive trauma with the only means of saving a person's life being amputation. For one reason or another, many people as well as animals require replacement body parts. Those who need artificial legs must have a structurally stable one to replace a critical part of the skeletal system. One specialty of biomedical engineering is designing and creating new and better prostheses. Biomedical engineers are continually improving the strength, durability, longevity, and lifelikeness so amputees can lead full lives. Our gifted students have now been exposed to this opportunity. Some of my students in Grade 2 did the same type of project except they created a prosthetic for a stuffed animal representing a real animal!



**"It is not enough to have a good mind; the main thing is to use it well."
– Rene Descartes**

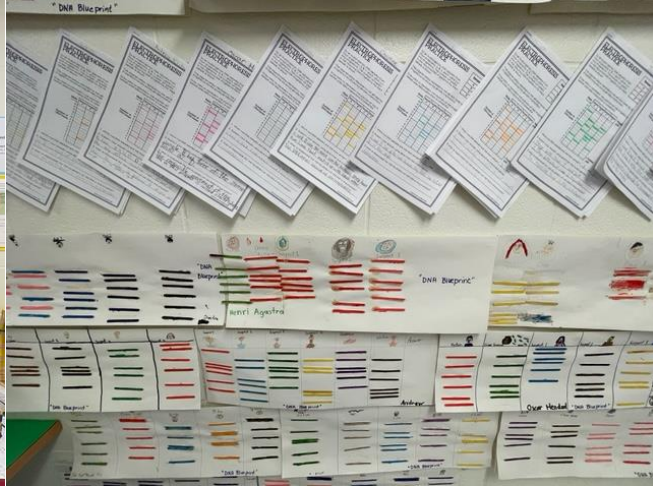
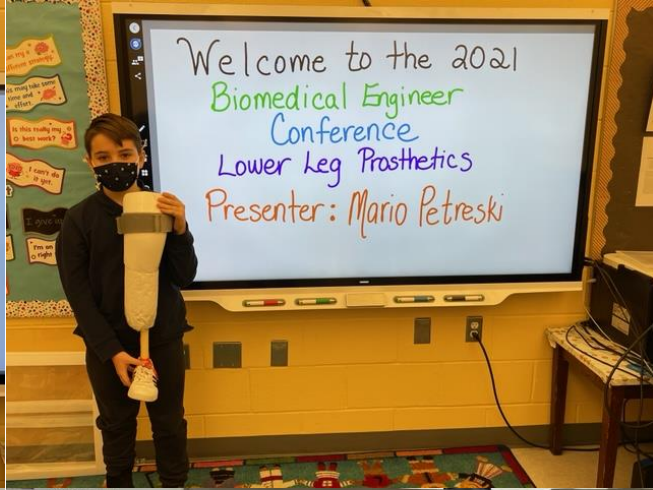
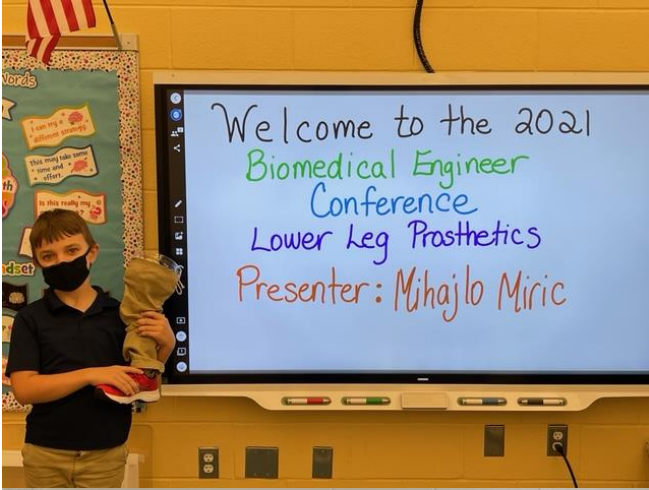
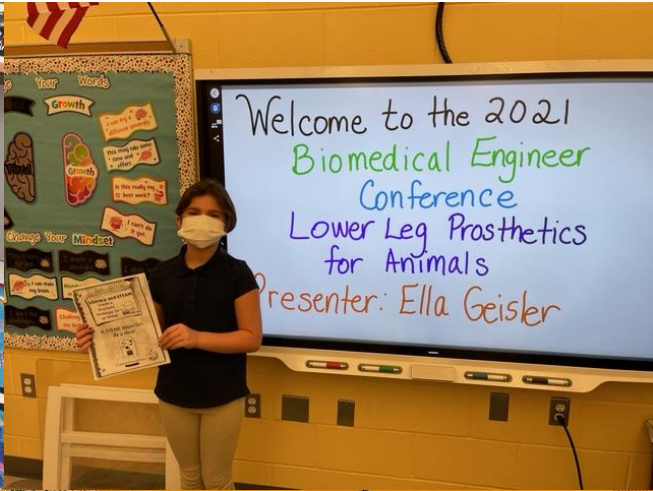


"Find out what you've been gifted with and share it with all your heart. This is your gift to the world!" – April Peerless



**Gifted kids don't need more work,
they need more meaningful work.
— Miss Giraffe**

**A gifted teacher is not only ready to
meet the needs of today's child,
but is also prepared to foresee the
hopes and dreams in every
child's future.
-Robert John Meehan**



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Resources

New Jersey Association for Gifted Children

Hyperlink

[Http://www.njagc.org](http://www.njagc.org)

Gifted Child Society, Inc.

Hyperlink

<http://www.gifted.org>

Montclair State University Academically Gifted and Talented

Hyperlink

<https://www.giftedstudy.org/montclair-state-university-elementary>

Please visit gboe.org and navigate to the Gifts and Talents page. There you will find more student pictures and more information about the Gifted & Talented Program.