the montessorian

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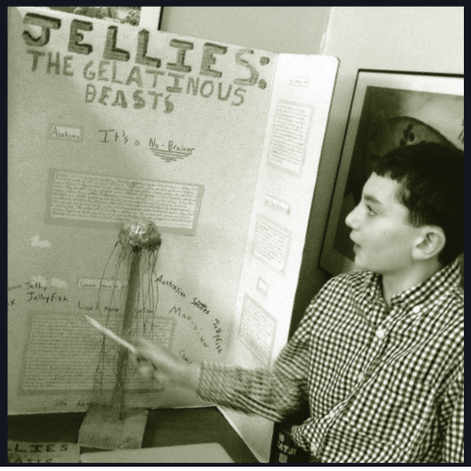

M
MATH

STEAM in our school

by JEFFREY LEVINE

At Near North Montessori there has always been a lot of talk about diversity and collaboration and exploration, but there's a new concept that's starting to be heard more and more.

STEAM — an acronym for Science, Technology, Engineering, Arts and Mathematics — has risen in prominence across the country as educators and policy-makers place a larger emphasis on skills to help students compete in an increasingly high-tech, global world.

Despite being a relatively new concept, it's easy to see why STEAM is quickly gaining in popularity among elementary educators. Its interdisciplinary focus helps students to work on projects across multiple subjects in a format that's predicated on asking questions, testing hypotheses, and working with materials in imaginative ways. As a result, STEAM and Montessori are closely aligned in principal and in practice.

"There's this buzz with STEAM but they're lessons that have been in our school all along," said NNM Head of School Audrey Perrott. "When these subjects are taught, what's really important is the way they're presented and how that information is applied. It's about the delivery of the information from the teachers. It's about sharing and guiding students in a way that hands it over to them so that they internalize what they're learning."

A prime example of students taking charge of their educations and working across disciplines involves the annual 6-9 performances, for which each class chooses a theme, writes a script and produces an entire show. One recent performance by Jesse Thompson's class combined history, engineering, art, and technology as students researched and built some of the Seven Wonders of the World out of clay, then used them in a video they produced and integrated with their live performance.

The interdisciplinary nature of STEAM also works to synergize student growth between different planes of development. Although fractions and decimals are first introduced in 3-6 as golden beads, the same concept is applied in NNM's general music classes, where whole and quarter notes are likened to a dollar and a quarter. While the conversion to decimals may be too abstract for younger students or hands-on learners, music instructor Jeff Fortin relates the concept to lessons first learned in 3-6, such as the volume differences between a cup, half cup, and quarter cup. When fractions are introduced in 6-9, and decimal conversions in 9-12, students have already been exposed to real life concepts that are meaningful and readily applied.

Although math and science can be somewhat abstract, the Montessori method ensures they're very hands-on, especially in younger classrooms. As 3-6 teacher Wendy Toan points out, "children at this level naturally sort and classify," so a lot of this work is already tailored to the student's inclination. Beginning in 3-6, students divide objects into living or nonliving things to help distinguish between plant/animal and living/dead. The exercise forms the basis of further, more refined classification, such as vertebrates or invertebrates, while supporting more practical work, such as knowing the difference between waste that can be composted and what can be recycled.

As Wendy points out, labeling like this is an important aspect of learning because it provides students with an ever-growing lexicon to talk about their discoveries and ask more questions. Labeling also helps to emphasize similarities, such as learning that both flowers and the human body have specialized parts to help them function.

HARRISON KLASSMAN

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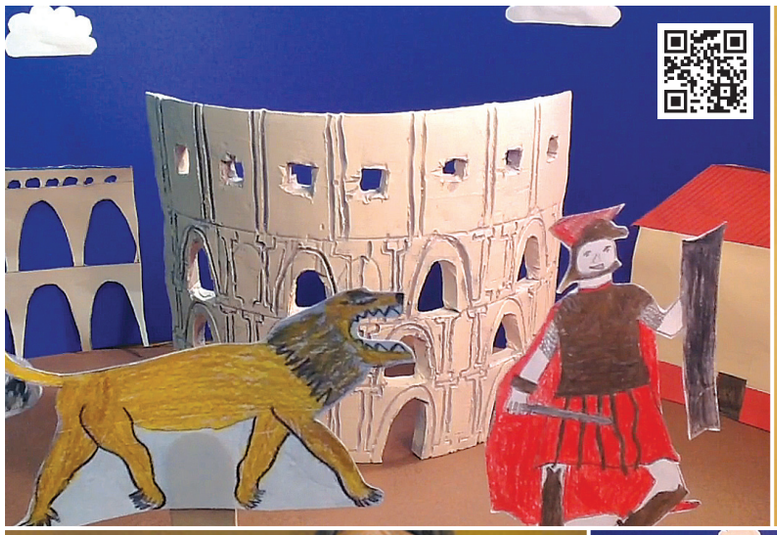
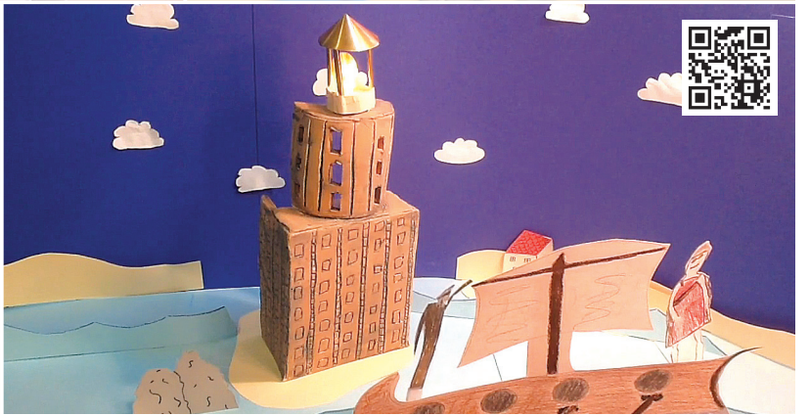




'We don't just want the students to take our word for it. We want them to be able to test on their own, to see for themselves.'

-ANNE MATERN, ELEMENTARY DIRECTOR

Other scientific hands-on examples include exploring centrifugal force using buckets of water and structural experiments to test handmade bridges with different weights.

"We don't just want the students to take our word for it. We want them to be able to test on their own, to see for themselves," Elementary Director Anne Matern explained.

"We emphasize a design-thinking model to encourage an atmosphere for innovation. You want students to take risks and to try different things," Anne explained. "Design-thinking isn't always an engineering solution. Sometimes it's a way of looking at a specific situation and figuring out what is going wrong."

To foster this environment, NNM classrooms are filled with materials for students to learn, explore, and master before moving up to more complex materials in the same classroom or at the next grade level. In the process, students take the first critical steps from imitation towards innovation.

"STEAM is all about creativity and, instead of just repeating all these experiments where the kids already know what is going to happen, they're able to create their own," 9-12 teacher Sonja Fauske said.

"Montessori will never be out of date because we're always focused on the bigger skills: how to access information; how to express yourself; how to write; how to solve problems; how to create things. It's always about the bigger picture," Sonja said. "Everything has an underlying purpose, not just about memorizing information."

NNM is investigating ways to more fully engage STEAM-oriented subjects in the future. In addition to traditional tools involving Montessori materials and related resources, ever-changing technology will play an integral role as students prepare for fields they may one day pioneer or revolutionize.

Jeffrey Levine is the Communications and Events Manager at Near North Montessori.


THEO REEVES

full STEAM ahead

innovation fair captures the essence of learning across disciplines, one improvement at a time

by MONTESSORIAN STAFF

Near North Montessori's annual 12-14 Innovation Fair may look like a bunch of cool gadgets that Junior High students built by hand, but it's actually the ultimate synthesis of STEAM at work within the school.

"In terms of STEAM, I think the Innovation Fair is the pinnacle. It's the top level for the school as a combination of science, technology, engineering, art and math," said NNM science teacher Brian Corley, who helped the fair evolve from a broader science-related focus a few years ago.

Held in the spring, the Innovation Fair involves about two-months of student research and construction, during which they plan and execute improvements to existing objects, such as adding heating and chilling elements to a pillow, refining a recycling bin to make it more user-friendly or rebuilding a shelving unit to better accommodate electrical devices.

Unlike an "Invention Fair," the challenge of innovation allows students to apply their STEAM-related skills in different ways than just coming up with a new product out of thin air, Brian explained.

Students start the process by isolating a problem that's identified by a "client," typically a teacher, then work independently or as part of a four-person team to innovate an improvement. As part of that process, they're required to prepare a marketing plan, allocate funds from an Innovation Fair financial kitty, acquire materials, build prototypes, and demonstrate their effectiveness during formal presentations to their clients and classes. The day-long Innovation Fair showcases the results for younger grades, parents and other admirers.

"The fair requires students to fulfill a need for the school community by using their own creativity and other skills they've acquired since they've been here," Brian said. "It can be really frustrating and a vulnerable experience for them, not knowing if they have the ability, or not knowing if their client would like it or not. But once they get into the process, they learn to take ownership of their innovation by directly addressing the problem, not the client."

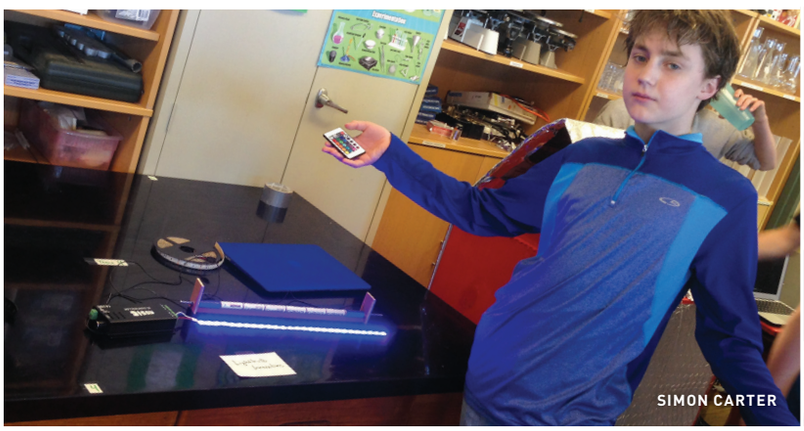
Each team has specific role-players that involve a construction leader, marketing leader, communications leader and team leader. Each member is graded on his or her contribution to the group. Students that work independently are evaluated using the same core responsibilities. Groups and individuals are also assessed on their ability to document and communicate the innovation process during a four-minute presentation to the class. Known as a "PechaKucha," each presentation involves 24 slides that students discuss for exactly 10 seconds each without looking at the screen.

According to several teachers, the entire Innovation Fair process can take participants way out of their comfort zones while applying a broad spectrum of STEAM-related skills, especially with construction tools.

Kids that aren't accustomed to using drills and hammers receive supervised lessons and are allowed to practice before, during, or after class to develop proficiency prior to building their prototypes.

"These situations, where students struggle or maybe not succeed right away, helps them to take ownership and build confidence. It's something you can't teach in a traditional school," said NNM 9-12 teacher Jessica Parman. "Failure is a word parents don't like to hear but it's something we celebrate: Fail often in order to succeed sooner."

Another issue involves funding. 12-14 student Sofia Belabbes estimated that her solar-powered chicken coop would cost more


SIMON CARTER


AVERY SELZ

than $200, but she was only able to raise $85. As a result, she borrowed from neighbors and searched Ebay for cost-effective design alternatives. She also had to learn how to saw, drill, and deal with electricity in finalizing her design.

"The hardest part was probably connecting all the electrical wires as well as finding instructions and finding where to start out. I had no idea what I was going to do in the beginning and I'm not good with sharp saws. It was a bit scary," Sofia said. "There was a point where I had two days to make the whole project and I was panicking and thinking I wouldn't make it and I'd get an F. Then you just have to take a deep breath and remember: You need to try your best and that your best is enough.

"The most important thing was to never give up," Sofia added.

Innovation Fair participants were offered extra credit by attending a similar Innovation Fair at Northwestern University's Segal Design Institute, which aims to educate "people who are able to move across domains and industries, identify convergences, and create impact through the lens of human-centered design."

According to NNM parent Steve Jackson, the Segal Design Institute's and Near North's fairs were strikingly similar in scope and execution, despite the wide age and experience gap of participants.

"Segal representatives noted that so many of their students come to Northwestern with strong academic abilities, but often lack the critical experience of being able to link disparate skills together in useful and innovative ways to solve problems, as well as to communicate effectively in order to understand the problem and present solutions," Steve said following a tour of the Northwestern fair. "It was clear to me that Near North students are already learning those invaluable skills, and in fact in many ways are already on par with Northwestern college students.

"If you removed the school names, you would be hard pressed to discern the difference between the objectives of the Northwestern course and those of the Near North Innovation Fair," Steve added. "The innovativeness, creativity, organizational skills, teamwork and poise of the Montessori students was remarkable and every bit the equal of the Northwestern students."

teaming STEAM with diversity

by JEFFREY LEVINE

Before Near North Montessori students sit down for their first science or math class in junior high, they are exposed to more diverse instruction than many of their peers across the country.

"To have two people of color teaching math and science is a great thing that I don't know if they'd get elsewhere," said Brian Corley, Junior High teacher and Diversity Director. "As an African-American male, I know that we represent about two percent of teachers. The chances they'd have another black teacher is slim."

While a STEAM-oriented curriculum like NNM's stresses cross-disciplinary education involving science, technology, engineering, arts and mathematics, the school takes it a step further, ensuring the subject matter is taught by an increasingly appropriate cross-section of the broader community.

NNM's diversity goals are noteworthy, Brian said, because minority teachers are relatively rare nationwide: African-American and Latino men and women have single-digit employment rates as teachers, despite representing 13.2% and 17.1% of the U.S. population respectively, according to the most recent Department of Labor statistics.

"It's one more experience for our students that tears down a lot of stereotypes. It tears down walls and allows students to see teachers as individuals," Brian said.

The ramifications may be especially significant for females, who are employed at a rate of 25.6% in computer and mathematical occupations and 15.4% in architecture and engineering, despite comprising more than half of the population.

"Women who were brought up during my generation were not necessarily led or welcomed to take this path," 6-9 teacher Marcela Gómez Sixto recalled about her decision to teach. "It wasn't just the women either. I recall many of my Latino peers being guided towards the business realm."

As a result, Marcela makes special considerations when illustrating career-oriented images to her students. "Do I offer both female and male representation? Am I including scientists, the technology savvy or mathematicians who think in a way that is not considered mainstream? Often times, my lesson planning takes longer because diverse examples of people in these fields are not easy to come by," she said.

BRIAN CORELY

Recent employment demographics indicate that STEAM-related professions are becoming increasingly diverse every day, but the overall impact is not always immediately felt. It can take a long time for someone to distinguish themselves in a given field so examples of minorities or females in a chosen career may not always be available to serve as examples for the next generation, though the overall numbers are trending up. This is why it is even more crucial that the school provides a wealth of "windows and mirrors" with which students can gain a useful understanding of their current and future roles in society.

That means students are exposed to an inclusive curriculum that doesn't make distinctions by gender or race.

In the context of diversity, NNM expects that all students, regardless of their backgrounds, challenge themselves and tackle projects that reflect both a diverse economy and a diverse population.

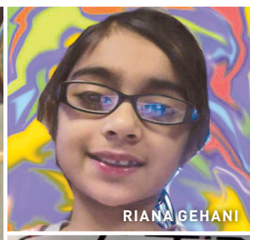
Jeffrey Levine is the Communications and Events Manager at Near North Montessori.

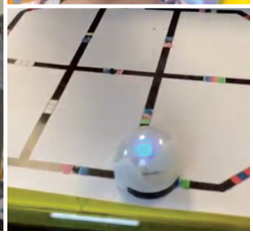
beyond the technology lab

by JEFFREY LEVINE


GIDEON BURNETT


CAMERON WHITE, HALLE BERNARD, FELIX RHEUDE, OLIVER BRUCE


RIANA GEHANI



Ask any student at NNM where the technology lab is located and he or she will direct you to the west side of the fourth floor, probably with a smile on their face.

The lab is command central for incredible school programs like keyboarding, coding, and Lego robotics, but it's just one place in the school where technology is utilized.

The difference between science and technology is that science is the study of how things work and technology is making something that has the potential to improve our lives," said NNM Director of Educational Technology Janeen Cohen. "My phone, my pencil, anything that serves mankind is technology. When you go to Whole Foods and the container you get is made out of corn, that's technology.

"In other words, science is knowing, technology is doing," she said.

From photography equipment to computer software to robotics, every classroom has its own tech-related resources. Their implementation involves a model based on substitution, augmentation, modification, and redefinition. In younger grades, it may be something as simple as a teacher illustrating a point using a video instead of a static image from a book (substitution). For older students, it may involve a group collaboration using online tools like Google Docs (augmentation), adding media to a live presentation (modification), or submitting a computerized Flash animation instead of a written report (redefinition).

Technology not only enhances the work of students but also changes the nature and delivery of the work they do, Janeen said, adding that timing is everything.

"When we present technology to children, the insertion point is crucial," she said. "Demonstrating to children from the beginning what we use technology for is the most important...We nurture the idea that it's the child who makes the choice to use the technology, that she's trying to accomplish something and that this tech will help her fulfill her own goal.

"We want to give students access to creative ways of thinking. Our goal is to nurture the competency, perseverance and optimism necessary for them to succeed in their life objectives through creativity," she added.

In early afterschool programs, bottle-cap sized robots called Ozobots are used to combine problem solving with coding and programming skills. The robots are capable of recognizing signals on a flat surface, enabling students to create paths for them to follow. A recent exercise required students to navigate the robots through a timeline involving Presidents Washington, Adams, Jefferson and Madison.

Other age-appropriate activities have students exploring programing in educational-oriented computer games like Crack the Code, expressing themselves with imaging programs like Photoshop, and experimenting with mechanical exercises to see how simple machines such as pulleys and belts affect movement.

Additional opportunities are being introduced for older students, including a new, online course offered by Stanford University that NNM associate teacher Courtney Peterson is utilizing. The program provides opportunities for remote learning, which an increasing amount of higher educational institutions are implementing for students. The course includes subjects like "Number Flexibility, Mathematical Reasoning and Connections," "Number Patterns and Representations" and "Math in Life, Nature and Work."

From cameras to computers, technology is evolving every day. What was unaffordable or unthinkable only a decade ago is now seeing widespread use. As the technology continues to change, NNM intends to match it keystroke for keystroke.

Jeffrey Levine is the Communications and Events Manager at Near North Montessori.

alumni news

grads are achieving great things in diverse fields

by LIZ BRANDT

Ona Papageorgiou ('86)

Since graduating from Near North Montessori, Ona has spent 20 years working as an environmental engineer in both the private and public sectors. Her current position with the New York State Department of Environmental Conservation has many responsibilities that include monitoring air emissions, reporting on air quality, and

writing air regulations. Chemical reactions and atmospheric science are major components of monitoring air emissions. Science, technology, engineering, arts and math also play a major role in Ona's work.

For Ona, a Montessori education made all the difference in deciding what she wanted to do with her future. "Montessori instilled in me the ability to take responsibility for myself and the world around me, so while I did not realize I was an environmentalist, the values which they hold were in me from the beginning. As I worked through my educational path, it soon became clear that I could take my passion for caring about the world and my STEAM interests and mingle them into one; environmental engineer," she said.

Ona decided to major in chemical engineering and take as many environmental classes as she could to supports a career preventing and reducing air emissions. She said people are often surprised to hear how she learned long division on an abacus and multiplication on cubes, but it was in a 6-9 classroom that she acquired her skills. She still credits Montessori methods when it comes to working out complex process problems in her field.

For Ona, one of the most rewarding aspects of being an environmental engineer is simply being able to clean up the air. It's a task she finds hugely rewarding, especially when reading reports about reductions in childhood asthma, elderly emphysema and other respiratory ailments.

Cole Goldenberg ('04)

As a pilot flying an Embraer 175 twin-engine passenger jet, Cole utilizes diverse disciplines such as psychology, design,

management and engineering to promote safety. Cole graduated from the University of Illinois with a degree specializing in aviation and human factors, which helps him better understand how people and machines interact. He then interned in American Airlines' flight training and safety departments before starting a career with Mesa Airlines .

Although aerodynamics is considered a science, Cole tends to see it as more of an art that can be approached through multiple directions. "I think Montessori ingrained in me an appreciation for puzzles, art, science and the fact that there is no one way to do anything," he said. In this spirit, Cole believes that, in order to advance safety, the machine must fit the human. He said that while certain human aspects of aviation such as training and company culture can be changed, an aircraft can always be built to better suit the human need.

As with any career, being a pilot comes with its own set of challenges. Weather can be a blessing or a curse, so knowing the science of how weather systems operate, being able to predict the progress of weather fronts, and understanding the effects of wind, temperature, pressure, clouds and systems, is crucial to promoting a safe flight environment.

While the journey to becoming a pilot and flying a commercial airliner was a rewarding experience in itself, Cole said the most satisfying part of his job is knowing that people depend on him to ensure their own safety. He looks forward to his future and is grateful for the foundation he developed at Near North.

Seth Stephens ('98)

Seth graduated Earlham College in Indiana with a degree in biochemistry and, after a stint as a high school science teacher, he joined the Illinois State Police as a Chicago patrol officer. He then became a crime scene

investigator in Galesburg, IL, before relocating back to Chicago. Seth says that he's always been interested in problem solving and investigation and is thrilled to have found a career that indulges his inquisitive nature and integrates his passion for equality and justice.

Seth said his Montessori experience enabled him to discover and pursue his own interests and led him to investigate various scientific principles at an early stage. "I remember learning some atomic theory and vertebrate anatomy while at Near North. I've always been independently focused and being allowed to follow my passion helped me discover the wonders of the natural world that have fascinated me to this day," he said.

The trademark, hands-on approach of a Montessori education showed him that, "science is more than just something you learn in a book. It's truly a system of rules and theories that govern all action," he said.

Being able to provide people with closure following a crime is what makes his career so fulfilling, he said. In what may be someone's most traumatizing experience, Seth provides answers to potentially daunting questions by remaining level-headed and keeping an open mind.

Liz Brandt is a Development Assistant at Near North Montessori.

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PRODUCED BY THE PARENTS, STUDENTS AND FRIENDS OF NNM
EDITOR: PETER STRAZZABOSCO | DESIGNER: GODFREY CARMONA

MOVING UP, MOVING ON

This spring, NNM eighth graders gained acceptance to the following high schools. Most students were accepted to more than one school, giving them the opportunity to make a choice.

- Amundsen International Baccalaureate
- Beacon Academy
- British School of Chicago
- Chicago High School for the Arts
- Chicago Waldorf School
- Currie International Baccalaureate
- Disney II Magnet School
- Francis W. Parker School
- George Westinghouse College Prep
- Jones College Prep
- Lake Forest Academy
- Lane Tech College Prep
- Latin School of Chicago
- Lincoln Park International Baccalaureate, Double Honors & Performing Arts
- Nicholas Senn High School
- Northside College Prep
- Ogden International Baccalaureate
- Prosser Career Academy International Baccalaureate
- Schurz High School
- Senn International Baccalaureate
- St. Ignatius College Prep
- University of Chicago Lab School
- Von Steuben Scholars Program
- Walter Payton College Prep
- Whitney Young High School

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