Current Curriculum

"Today, we have the capability to give every child the tools, materials, and context to achieve their potential, unencumbered by the limited imaginations of today's education policy makers."
- Sylvia L. Martinez and Gary Stager, Ph.D. ***(Invent to Learn)***

Currently at Brimmer and May, neither a viable science or engineering space exists. Most of the science lessons or STEAM projects are conducted within the teacher's classroom. One of the goals in the 2015-2016 school year is to design an interactive, dynamic science/maker's space for Lower School (LS) students. This space, called the Design Lab, will not only house traditional science equipment such as beakers, graduated cylinders, rulers, and eye droppers for our future biologists and physicists, but the new space will also be home to our aspiring engineers and design architects. The room will be equipped with a variety of tools and resources that lend themselves to design-thinking and inquiry-based learning experiences. Every teacher will utilize the room to expand or build lessons using the tools that will live in this space. The shelves and walls will be filled with any tool that will spark a child's imagination to life - Legos, Lego boards, white boards, laptops, littleBits, Makey Makeys, 3-D printer, conductive thread, wooden blocks, pipe cleaners, glue, model clay, popsicles, recycled material and so much more.

Enhanced Classroom Experience

"(Students) can use their understanding to investigate the natural world via the practices of inquiry or solve meaningful problems through engineering design.
- Sylvia L. Martinez and Gary Stager, Ph.D. ***(Invent to Learn)***

Words such as innovation and design thinking have become some of the most commonly used buzz words in education today. Innovative and design thinking, coupled with the STEAM movement, turn traditional teacher-lead classrooms into dynamic, creative, student-centered maker spaces. The maker space environment allows children to engage in inquiry-based learning. Lessons are centered around an essential question, and students are encouraged to seek out the answers through hands-on experimentation, research, and collaboration. Learning becomes more dynamic and meaningful because the students take ownership of their learning. Students are encouraged and challenged to use their foundational knowledge to create and imagine solutions for today's global problems. They learn how to solve real world concerns in an original and powerful way by using high-tech tools, such as littleBits, and low-tech tools, such as play doh, of all which will be housed in the Design Lab. This in no means takes away from the traditional elements of a classroom or marginalizes the role of a teacher; students must still learn their math facts, and they must learn how to write a clear, organized paragraph. The role of the teacher, however, has shifted.

The Maker's Movement stands behind the idea that children are inherently inclined to solve problems and to seek solutions. The need for this type of space is undeniable. Why not give our students the tools and the foundational knowledge to allow them to design and create solutions for today's problems? A maker space allows students to be collaborative, innovative, flexible, persistent, and self-motivated. The skills needed to be successful as a 21st century leader. The current and future job markets demand a different set of skills than before. Organizations and companies are looking to employ workers who are innovative visionaries. They are looking for individuals who can problem-solve and who can take prior knowledge and apply it to another project in a completely different way. They are looking for individuals who

can construct something, reconstruct it, and construct it again, to use for a new function. Twenty-first century organizations are seeking employees who have the ability to integrate multidisciplinary skills to their job title. It is no longer a one-dimensional world.

Objectives/Impact on Students

"The object of the lesson was not to build a time or to program a computer. The object was to empower children to use their brains and anything they can put their hands on to solve a problem."
- Sylvia L. Martinez and Gary Stager, Ph.D. ***(Invent to Learn)***

The objective of the Design Lab is to teach our children how to be global leaders using 21st century skills. We want our students to gain a deeper understanding of the world, to think creatively and critically, to collaborate and share ideas, and to apply knowledge and create something innovative. The notion of "play" has slowly fizzled out of our classrooms. We, as educators, have become wrapped up in a cycle of "rigor" and "structure." The Design Lab will help re-introduce the idea of "play" back into our classrooms while encouraging students to be purposeful and thoughtful about their innovations. The Design Lab with all of its resources will create another place, just as in any Brimmer and May classroom, where students will be nurtured and challenged, but in a very hands-on way. It will be a space in our LS where a child's imagination can soar as they explore different low-tech and high-tech tools with the guidance of their teacher. The way a First Grader sees building a robotic arm using littleBits and Legos is different than how a Fifth Grader might see the same task. The fact that children at different ages see the same tool in completely different ways will be an asset for this room. The multitude of materials available will allow the students to create, to design and to construct understanding of how things work on a design level, but also on an analytical level. Students can share ideas with one another, collaborate on a project, or experience the rewards of persistence. This space will be designed with the intent of every student and teacher in the Lower School utilizing it.

In the Fourth Grade, specifically, students will learn how to code using a freely available program called Scratch which was developed by the MIT Media Lab. I am currently taking a class on how to use this program and how to teach it to elementary school students. Once students have learned the basic coding language of Scratch, students will be challenged to build a moving robotic arm using the knowledge they acquired about how bones and muscles work together to make the body move. Suddenly a basic life science unit becomes an active, collaborative, and design-focused unit on how the human body works and how engineering can help biomedical engineers develop artificial limbs.

The third grade teachers and students are excited to try their hands at e-textiles. Students will learn basic electronics using fabric, conductive thread, LEDs, and batteries. Students will learn how to sew a basic circuit using conductive thread. They can adorn their felt fabric with various materials such sequins and beads. Students can make insect designs that light up on their newly sewn pillows or make a light-up quilt that reflects their insect unit.

Kindergarten studies the life cycle of a butterfly. In this unit, students also investigate what caterpillars and butterflies need in order to live. Instead of buying a pre-made containers to hold the cocoons and butterflies this year, the kindergarteners will build their own containers (aka home) for their insect friends using inquiry-based learning with the supplies in the Design

Space. Science, social studies, and language arts are no longer isolated content areas. So much of education today is cross-curricular and experiential. This type of design thinking and inquiry-based learning allows teachers and students to pursue projects that are thoughtful and reflect a deeper understanding of the content.

Sustainability

"*Sometimes the questions are complicated and the answers are simple.*"
- Dr. Suess

As one of the Lower School science coordinators, I will oversee the running and supply upkeep of the space until the librarian is ready to take it over. I will provide assistance to our faculty to look at each grade level's curriculum to determine which units can be expanded through the lens of inquiry-based learning and design thinking. I will also provide learning opportunities during Lower School meetings for the teachers so that they can become comfortable with the space and the new tools. I will meet with each grade level group monthly (or as often as they like) to ensure they feel comfortable with the materials. We are even available to help teach lessons in the Design Lab if needed. With the help of our technology team and well-researched lessons, I am equipped to help plan lessons with the LS teachers. I have already met with the technology department who will be able to dedicate 6 laptops to the Design Lab in December. This will allow students to bring some of their creations to life through Scratch programming and Ardunio, thus making the limits of this room endless and even more exciting. The new librarian will also assist in keeping the space organized and ready to use for the next class. She will also provide assistance to a class who needs an extra set of hands. With her help, the Design Lab will be equipped to meet the needs of our faculty and students.

The materials for the Design Lab will encourage the students to recognize the importance of the design process as well as the importance of revising. Giving them an opportunity to play, to make mistakes, and to re-design is a skill they must learn in order to succeed in today's world. The advent of technology and the internet have made skills such as memorization and step-by-step experiments obsolete. We must teach our students the 21st century skills in order for them to succeed. The most tangible way to accomplish this goal is through hands-on experiences and the design process.

High-tech tools	Unit Price	Amt Needed	Total
MaKey MaKey	$49.99	6	$299.94
littleBits Workshop Kit	$1999	1	$1,999.00
littleBits Sense IT module	$47	6	$282.00
LittleBits Wireless module	$89	6	$534.00
littleBits Touch IT module	$41	6	$246.00
Elenco Snap Circuits (750 piece kit	$125.00		$125
Squishy Circuits Kit	$25.00		$25
Teknikio Kit - Origami Workshop	$300.00	1	$300
Teknikio Kit - Sparking Sense Workshop	$400	1	$400
Teknikio Kit - Sewing Workshop	$320.00		$320.00
Arduino Starter Kit	$98.00		$98
coin batteries	$9.91/50 batteries	5	$49.55
conductive thread	$39.95	2	$79.9
Squishy circuit kits	$25.00	25	$562.5
high tech total:			$5,320.89

Low-tech tools	Unit Price	Amt Needed	Total
Lego Education Kits	———————		
Wheels set (287 pieces)	$49.95		$49.94
Windows & Roof Tiles Set	$49.95		$49.95
Brick Set (884 pieces)	$54.95		$54.95
Building Plate	$4.99		$4.99
Minifigures Set (256 pieces)	$51.87		$51.87
K'nex Education Kits	———————		
Motor Pack	$22.99		$22.99
Rolobox Reuseable Wheel Kit	$13.95		$13.95
modeling clay (clay bucket)	$15.38		$15.38
Wire mesh drawer set(open top)	128.20	1	$128.2
Wire mesh drawer set(closed top)	118.42	1	$118.42
Lego case organizer	$63.99	1	$63.99
Lego case organizer	33.29	1	$33.28
low-tech total:			$607.91
GRAND TOTAL:			$5928.80

Faculty Innovation Grant

Name: Ina Patel

Grade: 4th Grade

Total Years of Teaching Experience: 10 years

Years at Current School: 11 years

Degrees Held: BS: Biology, Master of Public Health, Master of Elementary Education

Signature of Applicant:

Date of Submission: 9/25/2015