Monteverde Friends School/Escuela de los Amigos

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www.mfschool.org

Our 3/4 class was asked to imagine they were making a new sled for Santa and test their creation on our playground slide. Here's a team whose "sled" survived the slide run and landing, and protected the "present" (plastic block) it carried.

Focusing on Academics

As we start our second semester, there is a palpable sense that finally, after two and a half years, we can settle down and focus on the academics we are here to teach.

For once, we didn't have to change our school format as we moved from first to second semester -- no changes to virtual, or hybrid on two campuses, or to our one campus but separating young and older students, and no adapting back from those formats.

So with deep gratitude to the donors who brought us this far, and to our students and families and staff, we work to provide a high-quality, Quaker values-driven bilingual education.

Given that focus, we share in this issue some ways that our school emphasizes Science, Technology, Engineering and Math (STEM). Our articles are primarily about STEM with our older students, but our primary teachers build the necessary skills for students to work on STEM courses as they reach older grades.

Our goal at MFS is to develop well-rounded students who graduate with the tools they need for successful lives and employment in life. More and more, STEM skills are required for many professions, so we want our students to be well prepared.

Sometimes, we have a lot of fun with STEM, as in a recent "egg drop" experiment completed by our 7/8 science class, described below!

A Hands-On Science Lesson: The Egg Drop

Some relied on sticks to absorb the impact ...

While others relied on plant materials.

Most of us know how dramatically a hands-on experience can improve our understanding of something theoretical as opposed to simply reading about the idea. Those who have ever broken a bone know how different that experience is than any written description!

We work to incorporate hands-on experiences in many of our classes. Recently, our 7/8 science class completed a common example -- the egg drop lesson -- with a discussion of brain injuries and what it takes to protect the brain with helmets. While we do not have U.S.-style football helmets here, helmets are quite common as they are required for any driver or passenger on the many motorcycles in Costa Rica.

For the exercise, a raw egg represents the brain. Students are challenged to construct a container that will allow the egg to remain unbroken when thrown from different heights -- including from a second-floor balcony. Our local twist on the lesson is that students may only use objects from nature, or already-used materials from the school's recycling bins. In addition, they are given a very small "budget" for string and tape to secure the protective materials.

Each team of students filled out a form illustrating and describing their approach and why they thought it would work, what their results were at all three test heights, and a drawing and description of another team's approach that worked.

It is always a delight to see the many creative approaches that emerge! For some, recycled plastic bags served as a parachute to slow the descent and soften the landing. Others focused on many layers of protection -- leaves in some cases, recycled plastic bottles and cardboard in others. One very creative but simple approach was to simply place the egg in a large amount of water in a plastic water bottle. While the bottle cracked, the egg survived!

Impressively, 5 out of the 9 teams had successful results at all levels! The exercise was so much fun that several other classes joined to watch.

Two female students explain why they used recycled bags as parachutes to soften the landing for their egg.

Teacher Lewis tests the egg in the large water bottle at medium height -- and yes, that is egg yolk and a failed experiment on the cement.

Limited Study Abroad Opportunities, 2023-24

Have a student who will be in 11th or 12th grade for 2023-24? Would they be interested in a study abroad with us? We anticipate that we will have 1 or 2 seats available in our combined 11/12 grade classroom for the 2023-4 school year (August to May).

There is more information, including costs, on our **web page**.
After reading that, please fill out this **short form** if you have a student who is interested.
If we have an opening in their class, we will be in touch to see whether it makes sense to fill out the full application form.

Math and Science, Our Core STEM Classes

Depending on the student, math and science might be their favorite -- or their most hated class. But our two colegio teachers, Jeynor Trejos Ramirez and Lewis Stellar, truly put their hearts into making math and science understandable and interesting for our students. They each have to cover a lot of territory!

In math, rather than isolate a particular topic to an particular year, Jeynor teaches different levels of numbers, algebra, and geometry each year. In grades 7/8 he works with students for an understanding of numbers (integers vs. fractions, odd/even, prime numbers, etc.) along with the basics of algebra.

As students move into grades 9/10, they move into more abstract functions of numbers -- e.g. the infinite decimals of Pi, and how those are addressed in poems and sound in music.

That's Jeynor in the middle (light blue shirt) with a large Robotics club group pre-pandemic.

They also move on to topics like the Pythagorean Theorem for numbers, polygons for geometry and hands-on projects with statistics and probabilities.

By 11/12, math class tops off these areas but also pursues topics of particular interest of the students. As Jeynor notes, "At this level we also focus on topics that students show interest or need. Last semester we did an online course on managing databases in Google Sheets."

In case all that isn't enough to keep our students busy, they are simultaneously moving through a series of types of science, often with hands-on experiments. Lewis is creative in finding materials for the class. At one point a family member spotted a dead armadillo on the road -- road kill, sadlly -- and brought it home, kept it in a freezer and Lewis and class dissected it the next day!

That's Lewis on the right with a team out on a recent community service day.

Lewis describes his work with the 7/8 class as "a 2-year introductory lab science sequence that covers physical science, earth science, and basic biology concepts (cell theory, etc.). Emphasis is on students learning how to use scientific tools, such as microscopes, rulers, graduated cylinders, etc. and the basics of the scientific method/engineering design process."

For our 9/10 and 11/12 classes, given our combined grades, he is able to alternate topics across two years. For example, the 9/10 class studies one year of Biology with some emphasis on biochemistry, while the other year is devoted to Physics and Chemistry.

The 11/12 class covers Advanced Physics and Green Chemistry one year, basically finishing the cycle from 9/10, and the other year focuses on Environmental Science. Pre-pandemic, students in Environmental Science were measuring nearby streams and dirt samples and providing the data to the Monteverde Institute, which tracks the impact of farms and industry and of climate change locally. Another exercise was to weigh and measure how much recycling is generated by the school, and measuring its carbon footprint.

As if all this isn't enough territory to cover, many of our students elect to devote some of their free time to a Robotics Club and/or complete college level credits in Calculus and Pre-calculus! Read on ...

We are deeply grateful to the many who offered year-end donations!

It is with support from our donors that we are ableto offer these great programs and continue them next year.

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Extracurricular: Calculus and Robotics

Not even the pandemic discouraged these students from earning college credits for Pre-Calculus in 2021.

Below, Jeynor works with young students in a Robotics club meeting.

Looking at all that our students and teachers do for math and science, much less their other classes in English and Spanish language arts, humanities, music, physical education, it is hard to imagine that they still have energy left for extracurricular activities, but they do.

Robotics is an ever-popular after-school club that is restarting in our current semester. Students of all ages participate, fascinated to use Legos to build robots and to program them to do different things. We have offered Robotics at times over the last few years, and colegio science teacher Lewis Steller will be leading the club this semester.

To most of the students, this is geat fun, but behind the fun are a lot of important lessons. Robotics is known for developing all sorts of skills -- computational thinking, teamwork, creativity, self-assessment and new ways of communicating.

Our Robotics Club will be using a Lego EV3 kit this semester, and hopes in the future to add Arduino kits.

Not just after school, but sometimes before school, during vacations and on weekends, Jeynor Trejos Ramirez has met with a select group of older students who are committed to earning college credits in Pre-Calculus and Calculus, similar to Advanced Program classes in the U.S.

Jeynor works toward the requirements set by the University of Costa Rica. Since Costa Rican schools operate on a February through November or December, the test that determines whether students have earned college credit is administered toward the end of their school year. To meet that schedule, Jeynor alternates Pre-Calc and Calculus on a calendar year basis -- with pre-calculus one year, and calculus the next.

His loyal students truly work hard to earn those credits, as they help the students gain admission to Costa Rican colleges, move ahead to more advanced courses and concentrate in the fields they seek for their careers.

We are immensely proud of these programs, the teachers who lead them and the students who take their free time to participate. If that's not enough, Lewis plans to add an AP Biology class in the first semester of the 2023-24 school year.


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