HIS
Hangzhou International School

Dragon Science

January 2025
Edited by
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Cat grass/decomposition

by Claire Sun, Yolco Mao & Yolcy Zhang

The Global Issue Network (GIN) Club, organized by Ms. Kushner and Ms. Rojas and composed of students from Grades 6 to 11, focuses on addressing environmental issues in our community. Our goal is to raise eco-friendly awareness through various student-led projects. This semester, one of our major initiatives is the decomposing group, which aims to enhance soil quality in our school's front garden. At the beginning of December, we showcased our project at the Winter Fair, where we presented cat grass grown from our decomposed soil.

In the past weeks, members of the decomposing group have explored the basics of decomposition, learning how decomposers transform food waste—primarily fruits and vegetables—into nutrient-rich soil. We utilized two types of decomposers: one that produces liquid soil and another that creates fertilizers. Each week, students brought food waste from home, added it to the decomposers, and spun them to accelerate the process. Every three weeks, we collected the liquid byproduct and applied it to the front garden.

In preparation for the Winter Fair, our team used the decomposed fertilizer to grow cat grasses from seeds, which we distributed to students and parents in the fair. To receive the cat grass, which was free of charge, the students and parents signed an agreement to use recyclable materials and support environmentally friendly practices before getting the gifts. This approach encouraged active participation in building an eco-conscious community at HIS and spreading awareness about reducing food waste and plastic waste.

This year's GIN Club is particularly exciting as all projects are student-led. In addition to the decomposing group, students have initiated other environmentally friendly projects, such as creating a self-watering terrarium on the fifth floor, setting up worm farms, and designing informative posters. Through self-guided research and hands-on activities, we have developed a stronger connection to both the environment and our school community.

The GIN Club has not only brought meaningful change to our school's environment but also inspired students to take ownership of sustainability initiatives. We are proud of what we've accomplished this semester and look forward to continuing our efforts with more student-led activities next semester, further contributing to HIS's eco-friendly community.

Transitioning to a Plastic-Free School

by Ms. Kushner

Making Your School Plastic-Free: A Step-by-Step Approach

Can schools become completely plastic-free? The short answer is yes, with the right strategies and student involvement.
In 2018, the UK's former Education Secretary Damien Hinds challenged all UK schools to become plastic-free by 2022. This sparked a nationwide movement, with over 2,000 schools signing up for the "Plastic Free Schools" program to eradicate single-use plastics from their campuses.

The goal of this program is not to eliminate all plastics, but to remove avoidable single-use plastic items, such as:

- Plastic drink bottles
- Disposable coffee cups
- Sachets
- Bathroom plastics
- Excessive food packaging
- Takeaway containers

These plastics have a significant environmental impact, and schools can make changes to eliminate them.
The "Plastic Free Schools" program outlines 5 key objectives to guide students on a journey of positive change:

1. Form a Plastic-Free Action Group: Students create a team to work on the campaign and gather evidence of single-use plastics in their school.
2. Launch the Campaign: Students present their "Plastic Free Schools" initiative at a school assembly and publish a news article on the school website or newsletter.
3. Take Positive Action: Students identify and permanently remove at least 3 single-use plastic products from their school.
4. Seek Local Government Support: Students contact their local government to ask for support in their plastic-free efforts.
5. Engage with Polluting Industries: Students reach out to companies responsible for plastic pollution and encourage them to adopt more sustainable practices.

Once a school completes all 5 objectives and eliminates at least 3 single-use plastic items, they are awarded the "Plastic Free Schools" status and receive a plaque to display proudly on their campus.

Another global movement, "Break Free From Plastic," also aims to tackle the plastic pollution crisis. This initiative focuses on raising awareness, promoting policies that limit single-use plastics, engaging communities to reduce waste, holding companies accountable, and building partnerships to implement effective solutions.

At HIS, all students, especially those involved with the GIN Club, are encouraged to develop a program around advocating for a plastic-free campus. By using the student manuals and tools provided by movements like "Break Free From Plastic," students can learn about the science behind plastic, its harmful impacts, and develop effective strategies to create a more sustainable school environment.

Schools play a crucial role in shaping young people's awareness, habits, and principles, making them essential partners in the fight against plastic pollution and the creation of a better world.

If you wish to learn more about the plastic pollution crisis visit: https://www.breakfreefromplastic.org/resources/ or email tiara@breakfreefromplastic.org. and to find out more about the "Plastic free schools" movement, visit: https://plasticfreeschools.org.uk/how-to-make-your-school-plastic-free/ or email education@sas.org.uk.

Insights from a Chemistry Educator

Mr. Benton

Q: Why do you think it is important for students to learn science?
A: All subjects have different strengths. For science, it's all about critical thinking and understanding the natural world. It fosters curiosity, encouraging people to ask questions like, "Why is the sky blue?" or "Why does water move from the soil to the top of a plant?" Science is grounded in experiments, gathering evidence, and drawing conclusions about the world. Carl Sagan famously said, "Somewhere, something incredible is waiting to be known," and that's what science is about. When you look around and wonder why your hair is that color or why plants are green, it's science that provides those answers. The 'hows' and 'whys' of the world are central to humanity's curiosity.

Q: What inspired you to pursue a career in education, particularly in the field of science?
A: When I was your age, I was actually interested in art. My mom is an artist, and I loved art. I had an interview with a career counselor—this big Irish guy—and I told him I wanted to study art at university. He responded, "Art?! At university? You won't get a job. You'll be out on the street drawing on the pavement." Then he said, "You should do science!" I went home and couldn't sleep. I kept thinking about what he said and decided I had to do science. So, I did. I wasn't very interested at first. I took five A-levels, including math, physics, and chemistry, but I didn't love science back then.

When I got to university, in my second year, a professor gave a lecture on the chemistry and biochemistry of cellular respiration. It completely blew my mind. From that moment on, I loved science. I became passionate about it and wanted to make a difference through it. That passion is why I love education. I enjoy seeing students have that "aha" moment, just like I did. Education gives so much back, whether it's seeing students achieve something, enjoying the subject, or becoming as passionate about it as you are.

Q: What are some key concepts in chemistry that you think everyone should understand before they graduate high school?
A: For me, the key concepts are particles, energy, and change. These three ideas form the foundation of chemistry, and you can teach any scientific concept through them. Chemistry is a central science that bridges the worlds of physics and biology. If you're studying biology, you need to understand chemistry. Similarly, if you're studying physics, you'll find chemistry relevant. I think it's amazing how interdisciplinary chemistry is—it connects so many fields of science. The core concepts of particles, energy, and change allow you to explore everything in chemistry.

Q: How does our school's MYP science curriculum prepare students for studying science in the DP?
A: I haven't been here very long, but I hope the MYP builds solid foundations that students will need in the DP. It should be inquiry-based, encouraging experimentation, curiosity, and discovery. Critical thinking is essential in MYP and should carry over into DP. MYP also emphasizes real-world applications, which you sometimes lose in DP, but it doesn't have to be that way. There should be a lot of experimentation to develop manipulative skills, as well as collaborative projects and interdisciplinary studies. These elements allow students to dive deeper into scientific principles.

Does the MYP prepare students for the rigors of DP? I'm not sure, but it should provide the skills to handle the core components of DP: TOK, CAS, and the EE. That's the goal. Whether it achieves that, I'd rather hear from you students.

Q: What strategies do you think are effective in engaging students in science, especially those who find it challenging?
A: The language of science can be a barrier. It's full of technical jargon that can be intimidating. Science needs to be hands-on, with plenty of experimentation and observation. For example, wondering why something falls off a table and then exploring that curiosity through experimentation. Robert H. Grubbs said, "Chemistry is about making things happen." You can't do that in a textbook—you need to be in a lab, setting jelly babies on fire, blowing things up in bottles, or crushing cans. That's what science is about.

Real-world connections are also vital. Science is all around us—it's part of our everyday lives. Rosalind Franklin once said, "Science and everyday life cannot and should not be separated." Whether you're studying biology, which is about yourself and the natural world, or chemistry, which explains so much about the materials we use, it's all interconnected.

Technology can also make science more accessible. Virtual reality, for example, can bring abstract concepts to life. Imagine exploring the world of atoms or DNA through VR—you could spin around a DNA molecule, which is pretty cool. Tools like these help us see beyond our limited senses. Someone once told me that humans see the world like looking through a keyhole. We only perceive a small portion of reality—just a narrow band of light or sound. Technology helps us see what's beyond that keyhole.

Collaboration is another key aspect of science. Science today is all about teamwork. You might specialize in chemistry, while someone else focuses on math, physics, or biology. Together, you can create something amazing. Storytelling is also incredibly powerful in science. Humans have passed down stories for generations, and they remain a compelling way to convey ideas. When I share stories about my journey into science, it helps make the subject more relatable and engaging. Stories stick with us.

Q: What advice would you give to students considering a career in chemistry or science?
A: Be curious. Curiosity is essential in science. In my time working in pharmaceutical research, I've seen how important it is to ask questions—every day, ask yourself questions about the world. If you're into mosses, for example, dive into research. Publish a paper or reach out to a university to see if you can collaborate with undergraduates or PhD students. Authentic research experience is invaluable.

You also need strong math skills. Good math leads to good science. Roger Bacon said, "Mathematics is the door and key to all sciences." Some people even argue that math is the only pure science. That's something to think about, maybe as a TOK moment. Is that true or not?

Adaptability is another crucial trait. Science evolves rapidly, and the days of staying in one job for 40 years are gone. You might start as a materials chemist working on alloys and later transition into molecular chemistry at the cellular level. Being adaptable allows you to thrive as the field changes.

Consider your impact as a scientist. Science isn't inherently good or bad—it depends on how it's used. For example, science has given us atomic weapons that could destroy the planet, as well as oil drilling that pollutes rivers and seas. On the other hand, science has brought us incredible advancements like medicine and technology. As a scientist, you need to think ethically and morally about your work. Are you comfortable experimenting on animals? Some people are, but others aren't. Reflect on the kind of scientist you want to be and the impact you want to have on the world.

Finally, be skeptical—not cynical, but skeptical. David Suzuki said, "Education has failed in a very serious way to convey the most important lesson science can teach: skepticism." Just because a teacher or the internet says something doesn't make it true. I once taught a class benzene chemistry for 90 minutes, and none of it was correct. When I corrected it weeks later, the students were shocked and started questioning everything I'd taught. It was a valuable lesson in skepticism. Always question what you're told and seek the truth.

Exploring the Universe of Physics

Mr. Callahan

Q: What makes physics such an essential subject in high school science education,
A: Physics is the foundational science. So all other sciences are built off of physics. Everything moves. So it doesn't matter if you're studying biology, chemistry or ESS, there is motion in that. And so science's foundation is physics.

Q:How do you help students to connect physics concept to real world applications?
A: So a lot of physics is about taking larger problems and breaking them down into smaller, manageable pieces. And so I think this is a skill that is applicable to any area of life. If you've got a big problem, normally, the way to approach it is to break it down into smaller, manageable pieces and then solve those one by one.

Q: What strategies do you use to engage the students who find physics difficult?
A: Lots of practice problems, making students kind of struggle through working through those problems and having a good personality.

Q: What skills does the IB physics program develop beyond scientific knowledge?
A: Like I said earlier, general problem solving skills and applying mathematics in areas that you wouldn't expect it

Q: What inspired you to become a physics teacher?
A: I found out that I enjoyed teaching secondary to what I was actually studying, and so I pursued that. I pursued physics because I was self conscious about not being smart, and so I wanted to prove to myself that I was smart, and so I studied biophysics, and I did research in biophysics, and I did some research in quantum optics. And so I found research to be very boring because it was in a basement by myself a lot of times because a lot of times you're trying to minimize vibrations, and so if you're on a higher building, building sway, and so it gives you more vibrations. Therefore if you're in a basement, you have less vibrations. But also, we had to minimize vibrations enough that we could only really do research at night. So we would do it at a time when there was less traffic. And so yes, at night alone in a basement is not very fun for me. So yes, I decided to be a science teacher.

Q: How do you spark the curiosity about physics in your students?
A: Lots of demos, and showing different physical phenomena that maybe they don't expect would happen, but kind of shows that how mathematical model holds in reality. We do experiments, less experiments than chemistry or biology, just because students will have enough skills with trying to solve actual physics problems. So we spend more time on that, but we do experiments for air drag, waves, etc.

Q: What like advice would you give to students who want to pursue physics in college?
A: Be okay with being wrong and be okay with not knowing what to do right away. And so don't always search for somebody else's answer. Take time to find your own.

Unlocking Minds with Neuroscience

Mr. Gerhard

Q: What core concepts in neuroscience are essential for understanding psychological theories in this course?
A: This question has many potential answers, but the most productive way to approach it is to consider where psychology is heading. Psychology, neuroscience, and scientific inquiry into the brain and behavior are interconnected fields, and the future of these areas is particularly intriguing. Ideas about neuroplasticity, the brain's ability to change in response to cognitive and environmental stimuli, are evolving rapidly due to research, technological advancements, and new perspectives. For example, we can now discuss the application of chemical compounds for disorders like MDD or PTSD. These advancements are providing new ways to understand the brain, shedding light on mysteries such as how humans learn and how we create and access memories.

Q: How do you think learning about neuroscience changes the ways students view human behaviors?
A: My hope is that students come to class not just for a grade but to gain a deeper understanding of how their brains and the brains of those around them work. This is especially important in high school, a time when students are forming views of themselves, others, and the world. Whether students are learning neuroscience, psychology, or theory of knowledge, I hope they realize how complex and challenging it is to be human. I often describe humans as operating on 250,000 to 500,000-year-old hardware with constantly updating software. Understanding the biological structures, chemical processes, and cognitive frameworks that influence human thought and behavior can help students navigate life.

Q: In your opinion, how does neuroscience evidence support or challenge traditional psychological theories?
A: New technology provides fresh perspectives on old concepts almost daily, and students, especially those trained in critical and creative thinking, are constantly developing new ideas. Even the research we study in class is regularly affirming or refuting earlier findings, reflecting the dynamic nature of psychology.

Q: Do you see neuroscience becoming more influential in the field of psychology in the future? And how should students prepare for that?
A: Absolutely. While high school isn't just about learning content, students preparing for careers in psychology, psychiatry, or research should focus on mastering hard science skills and approaches. Understanding the three core approaches in psychology and remaining open to new possibilities will be crucial for success.

Q: If students want to pursue psychology in higher education, how useful would the neuroscience foundation from DP psychology be?
A: The IBDP provides the best approach to understanding contemporary psychology. Unlike AP or standard psychology courses, which can feel like a casual walk in the park, IBDP psych immerses students in foundational and contemporary research. For instance, DP1 students study Bandura's 1961 research, while DP2 students examine studies as recent as 2019. This foundation is like planting a seed that can grow into a flourishing tree.

Q: Do you have any tips for students who want to do psychology at university?
A: Work hard and use your brain as much as you can.

What are we learning in MYP Science?

Rhema Hong, Tonya Liu, Anna Lu

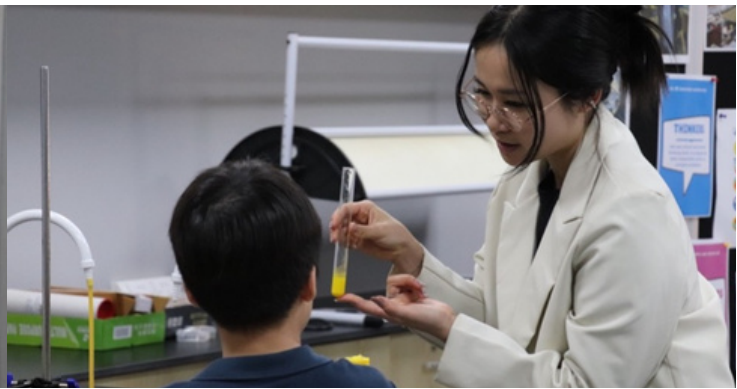
Q: What has been the most interesting experiment or project you did in MYP science, and why did it stand out to you?
Rhema: The most interesting experiment I did was the leaf lab. Although it wasn't exactly an experiment, looking at the leaf structure under a microscope was really cool. Observing details that are invisible to the naked eye sparked my curiosity and made me think more about the hidden intricacies of the natural world. However, my personal favorite experiment has to be the Coke and Mentos experiment. It was memorable because it was my first-ever experiment as a 6th grader and it introduced me to the fun and excitement of science.

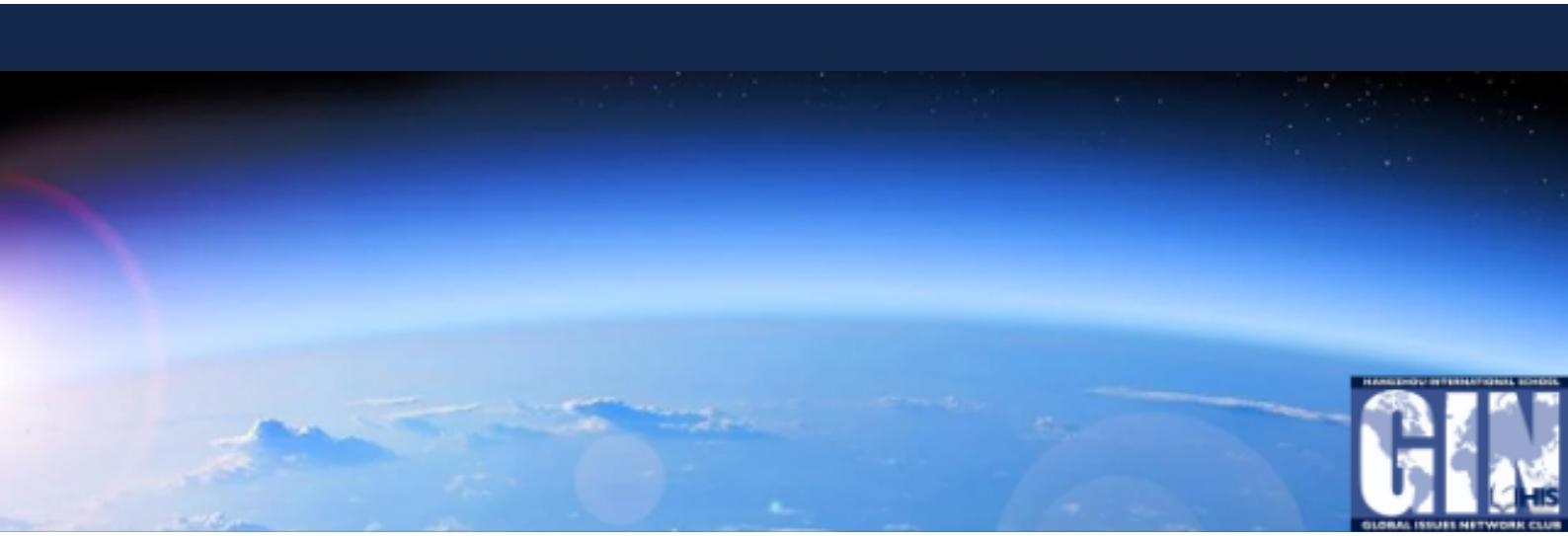
Q: How has studying science in the MYP changed the way you think about the world around you?
Anna: Studying science in the MYP has encouraged me to question and analyze information critically rather than just accepting it at face value. It has taught me valuable problem-solving skills, pushing me to approach challenges methodically and creatively. In addition to foundational knowledge, the curriculum often asks us to connect fundamental concepts with unfamiliar situations, prompting us to use critical thinking and come to evidence-supported conclusions. Lastly, MYP science is inquiry-based, which has helped me develop an analytical and informed perspective on both science and the world around me.

Tonya: Studying science in the MYP has challenged me to expand my thinking beyond the textbook and to consider the real-world implications of what I'm learning. While lab reports can feel tedious, they are structured in a way that helps us understand how professional science lab reports are formatted. This kind of practice has made me appreciate the rigor of scientific work. Additionally, the teachers make science engaging by initiating interesting conversations, whether about black holes or the minerals found in mountains. Their enthusiasm makes the subject more dynamic and thought-provoking.

Q: What's one topic or concept in science that you struggled with but eventually understood? How did you overcome the challenge?
Anna: A topic that I initially struggled with was stoichiometry. To overcome this challenge, I made sure to utilize all the resources available to me. I frequently asked my teachers for clarification and guidance, which was incredibly helpful. I also took advantage of online courses on platforms like Khan Academy and watched YouTube tutorials for alternative explanations. However, the most effective tool for me was using AI. By asking follow-up questions and exploring detailed explanations at my own pace, I was able to develop a clearer understanding. I also accessed practice sheets from the Science Department's SharePoint folder to apply what I had learned. After completing the practice questions, I returned to AI for feedback, checking my answers and addressing any lingering doubts.

Q: What role do you think science plays in solving global issues, and did you cover any topics that connected science to real-world problems?
Rhema: I believe science plays a huge role in solving global issues by providing us with the knowledge and tools to understand problems and develop solutions. For instance, climate change remains one of the most critical global challenges, and scientific research, including data collection and analysis, allows us to predict its impacts and identify effective strategies for mitigation. One unit we studied focused on making cities more sustainable through scientific innovations. I specifically remember exploring the concept of floating wind turbines and renewable energy. Learning about these innovative solutions demonstrated how science can address real-world problems and contribute to a more sustainable future.





Ozone Depletion - What can we do about it?

by Jia-heng and Alex

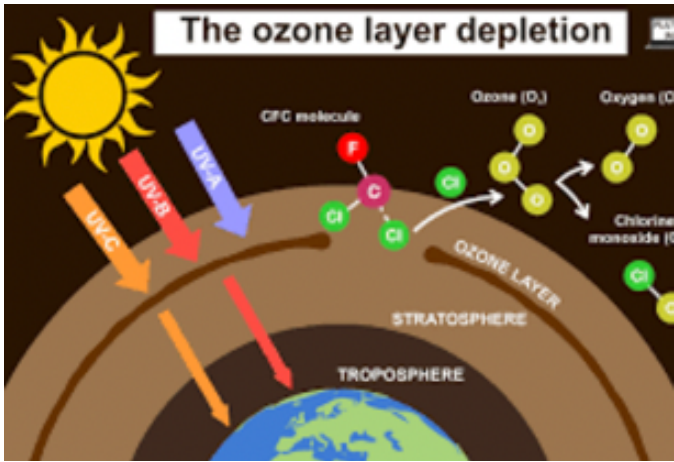
What is the ozone layer? The ozone layer is an invisible shield surrounding the Earth that protects us from harmful sun rays, prevents skin cancer, eye cataracts (which cause blurry vision), and immune system damage. Without the ozone layer, we would face severe health and environmental issues. The ozone layer is a greenhouse gas with both pros and cons, unlike most greenhouse gases that only have negative impacts. However, excessive ozone can damage the respiratory tract, leading to inflammation, irritation, coughing, chest tightness, and worsening asthma.

The Damage Done

Currently, there is a hole in the ozone layer over Antarctica. This is due to the unique chemical and atmospheric conditions present there, such as extreme cold and the formation of polar stratospheric clouds, which are not found anywhere else in the world. These conditions make the ozone layer in polar regions particularly vulnerable. Additionally, emissions, urban pollution, and climate change exacerbate the depletion of ozone levels worldwide. Protecting the ozone layer requires international collaboration, continuous monitoring, and strict adherence to environmental policies to shield the Earth from harmful UV radiation.
Causes and Solutions

One major threat to the ozone layer is chlorofluorocarbons (CFCs). These non-toxic, non-flammable chemicals contain carbon (C), chlorine (Cl), and fluorine (F) and are commonly found in old refrigerators and air conditioners. When released into the atmosphere, CFCs break down ozone molecules, causing significant damage to the ozone layer. Reducing the use of products that emit CFCs is crucial to mitigating this problem.

To address ozone depletion, individuals and industries can take action by replacing old refrigerators and air conditioners with newer, environmentally friendly models. Donating to organizations like the Environmental Protection Agency (EPA) and supporting initiatives aimed at ozone restoration can also make a difference. Additionally, raising awareness about the importance of the ozone layer and encouraging sustainable practices can contribute to its recovery. Through collective effort, we can protect this vital shield and ensure a safer future for our planet.



Varsity Robotics Team News Article

by Jiachen Qu

The varsity robotics club, organized by Mr. Malloy, is a team of robotic engineers that work on the Vex V5 competition. We aim to build robots and practice driving them to compete against other international schools in robotic tournaments, in a very similar fashion to ACAMIS sports teams. We have several competitions in the upcoming academic year, some of which are friendly challenges and others are official Vex events. The final event, hosted in March in Guangzhou, will decide one winning team and grant them a golden ticket to enter the Vex V5 World Championships. Using the hardware devices and materials from the Vex organization, we must assemble the robots piece by piece to organize the motors to perform well-designed and coordinated actions to our command. The current robotics team consists primarily of Grade 11 and Grade 10 students.

The game we are currently playing is called "High Stakes," and it involves putting donut-shaped plastic rings onto stakes around the field, which earns points. Scoring on each of the stakes earns points. At the center of the field is a ladder four feet high, which the robots can also climb to earn points. There is also one incredibly difficult stake at the very top of the tall ladder, which can only hold one ring (and, for some absurd reason, earns the same number of points as all the other stakes on the playing field...).

One very interesting part of the Vex V5 competition is how the game rules change completely every season, with a brand-new playing field and completely different objectives. This keeps the competition fresh and exciting each year, as we discover new engineering tactics and game strategies to gain an advantage over opponents at other schools.

The varsity robotics team is currently working on building robots and then refining and testing them so that we can continue to improve their performance. Our common meeting time is every Tuesday after school, but many members also work overtime on other days so that we can prepare more thoroughly for the upcoming competitions. We also discuss the competition rules and strategies with each other so that we can inspire and be inspired to innovate new ideas. We often help each other out with construction issues by providing suggestions and discussing possible solutions. Even though we are all building our own robots and competing in different matches, all of us are still one team, united together, representing our Hangzhou International School.