



STEAMing Ahead

Our vision: To create a learning culture of curiosity in which students will engage in the world they are living in.

Term 2 STEAM Newsletter

Dear Parents and Caregivers,



We finally reached the end of another busy term and with that the end of our semester courses. Next term students will start their new semester courses. Year 9 students who have been completing the Robotics course will swap with those who have been working in Papertronics and E-textiles; whereas those in Science and Technology will swap with those in Food Technology. Year 10 students that have been completing Kinetic sculptures will swap with those who have been working in Future Tech.

What a great way to finish the term by having the privilege of hearing Victoria Mahan, CEO of HP NZ, and her team talk to our students about the Global Megatrends shaping our future and giving tips on how to prepare for jobs that don't yet exist. Victoria also reinforced the relevance and importance of programmes like STEAM at WGHS in getting students future ready.

The fact is 65% of our students will have a job that does not exist yet. By 2025 the world will lose over five million jobs to automation, and future jobs will involve knowledge creation and innovation. The world faces an unprecedented need for innovators, critical thinkers, problem-solvers and change makers. The umbrella under which all of these STEAM jobs fall keeps expanding. AI and machine learning, cybersecurity, Virtual and Augmented Reality, Space exploration, clean energy, 3D printing, robotics, self-driving cars.

Westlake Girls is at the forefront of STEAM education in New Zealand. This has definitely been reinforced in the big NZQA review, currently underway, where some of the suggested changes are already being implemented and pioneered in our STEAM programme. Therefore, we are very excited

to announce that following the successful development of our pilot STEAM programme in Years 9 and 10, we will be expanding the STEAM programme into Level 1 NCEA in 2019. Our goal is to create engaging, relevant and exciting opportunities for our STEAM students to continue to be at the forefront of innovation and able to take an active part as the problem-solving leaders of the future.

The Y11 STEAM programme will be taught as an option line and will consist of two integrated units: Inventions and Innovations.

Examples of possible projects include designing and launching their own rockets and building and programming a robot as a Mars rover to collect scientific samples as part of Space Exploration. More detailed information will be available on school point soon.

If you would like further information and clarification on the STEAM programme for our Senior School, please join us at our STEAM Showcase, in Term 3 (date to be confirmed) where you will get a chance to see what your daughter has been up to in Year 9/10 and gain more insight into the STEAM course in Year 11.

We also want to reach out to the parent community to support our students with the development and implementation of their innovative prototype solutions as part of their community projects. We need your support for proof of concept and development. We are particularly keen in making connections with App/software developers, game designers, Electronic Engineers and Auckland Council. If you think you can help, please contact me.

Susana Tomaz (Stomaz@westlakegirls.school.nz), TIC for STEAM, Robotics and FutureTech Teacher.

Year 9 STEAM

English and Social Studies

This term we focused on the theme of colonisation, exploring the conquest of the Americas and its impact on indigenous populations.



Cowgirls from the Oregon trail

Making our own totem poles

We've taken this knowledge into our English lessons, where we have enjoyed watching and analysing spoken word poetry by indigenous poets. We also took some of the myths and legends we learned about in Social Studies and turned them into our own spoken word poems, which we performed in groups. Shakespeare's *The Tempest* has been our last English unit for the term and we have been extremely



fortunate to have experts from the Science and Art departments - Ms Ali, Miss Zhang and Ms Park - share their knowledge and skill to help us create our own short films with magical special effects.

Making special effects in the Science lab for The Tempest films

The year 9 students have also been working collaboratively on their blog since Term 1, please have a look at their STEAM journey so far.

<https://kahatoasteam2018.weebly.com/weekly-blog>

Maths and Science

The students participated in two fantastic STEAM workshops run by a team of the University of Auckland students from the Engineering Without Borders New Zealand, a not for profit organisation that aims at creating systemic change through humanitarian engineering. They work to make a difference for communities within New Zealand and in the South Pacific, and partners with other Engineers without borders (EWBs) internationally to achieve global impact.

Students had the opportunity to learn more about sustainable human development and humanitarian engineering and improving their understand of future opportunities in science and engineering fields. Students were given a broad overview of engineering, development of international relations and were encouraged to be actively involved in discussions and activities in engineering and science development internationally which supports the goals for the Westlake Girls STEAM program. Our students also had the opportunity to develop their knowledge of how they can assist communities in New Zealand and abroad in the future after they finish their study.

In the first workshop, "Clean Water for Life" workshop students worked in teams to build and test a simple water filter, each group represented a country with a different budget to spend in problem



solving the issues around providing clean water to all individuals which was reflective of each country economic capability. For example, the group that represented New Zealand had \$80 to spend whereas Vanuatu had only \$25. Their maths and engineering

skills were definitely put to the test especially for the engineers in the less-developed regions.

The second workshop, “Construction for Life” workshop aimed at giving students more insight about another global issue relating to the challenges around house building in less developed countries around the world that are in high-risk flooding areas, such as Cambodia and how to design, within the budget given, floating houses that can sustain flooding.

Papertronics and E-Textiles

“During the past two terms, I have participated in ETPT or, E-Textiles and Papertronics. This unit was about using electronic aspects and incorporating them with textiles and other materials. In the first term, we focused on making paper circuits and started with a lesson about making circuits and about how circuits work. To create our circuits, we used copper tape (the wire), an LED, and a 3V battery.”-Hannah Hancox



Students have been exploring the science behind electrical circuitry applied to fabric to develop e-textile projects incorporating conductive sewable thread, coin cell batteries and LEDs into their design in to make it interactive. Students have applied the scientific method to test their circuits and problem solve possible issues with the lighting up of their LEDs.



Robotics

For the last 6 months as part of the Robotics program Year 9s have been learning to programme their VEX IQ robots using basic movement, sensors and program flow commands after building these from scratch to solve real world issues and logging their progress and reflections in their Engineering Portfolio that they have created in google sites. Please ask your daughter to show you her Engineering portfolio.



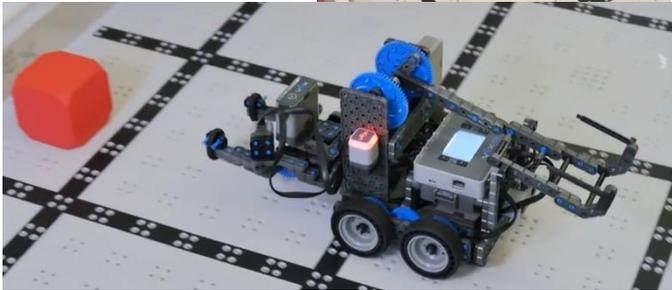
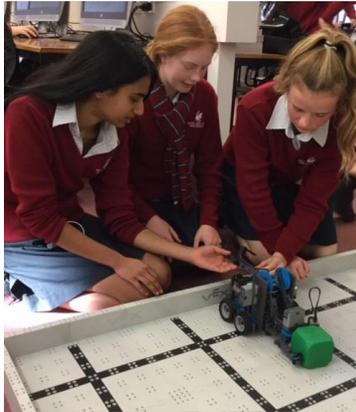
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1) forward ( 3 , rotations = , 50 );
2) repeat ( forsen ) {
3) if ( getColorName ( colorDetector ) == colorGreen ) {
4) moveMotor ( motor10 , 90 , degrees = , 50 );
5) moveMotor ( motor11 , 1 , seconds = , 50 );
6) turnRight ( 0.7 , rotations = , 50 );
7) moveMotor ( motor10 , 90 , degrees = , 50 );
8) moveMotor ( motor11 , 1 , seconds = , 50 );
9) turnLeft ( 0.7 , rotations = , 50 );
10) forward ( 0.5 , rotations = , 50 );
11) else {
12) moveMotor ( motor10 , 90 , degrees = , 50 );
13) moveMotor ( motor11 , 1 , seconds = , 50 );
14) turnLeft ( 0.7 , rotations = , 50 );
15) moveMotor ( motor10 , 90 , degrees = , 50 );
16) moveMotor ( motor11 , 1 , seconds = , 50 );
17) turnRight ( 0.7 , rotations = , 50 );
18) forward ( 0.5 , rotations = , 50 );
19) }
20) }
21)

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For their final robotics challenge, they had to work in teams to program their robot to drive different

passengers, as coloured cubes, to two different destinations. The green cubes represent the passengers going to work and the red represents a student going to school. They had to use program flow to allow the robot to pick up a random cube and decide dependent on its colour if it's should be taken to work or school and take it to the correct destination until all passengers have been dropped off.



Food Technology

What does Food Technology have to do with STEAM? Students in this semester course have explored the role of maths, design, communication, construction, planning and science in Food to create new products their own unique Street Food product for adolescents. Students identified and discussed the importance of using a variety of math concepts to create a successful food product and how this is then used in our food industry. They also researched how ingredients function in food and the role of nutrients in our body, enabling them to create a product to



meet a specific need. They identified specifications in consultation with their potential customers (stakeholders) to create a Street Food that was fit for purpose and appealing to their peers. They also planned and designed suitable, sustainable packaging for their products, taking their whole project to the final stage of development.

Science and Technology

Following through with our theme of sustainability, the class designed and made Pop-pop boats from recycled materials and in early term 2 they were able to test their designs, some were more successful than others.



Three of the most efficient designs – “Chinese Junk”, “Westlake Swan” and “Ribena”

Alongside this we have learned about heat and energy transfer, fluids, buoyancy and other associated scientific principles.

We continued to look at alternative energy and investigated the Stirling Engine and its potential for future use as an alternative power source.

The final part of the term we have been investigating wind power and after testing existing designs of windmills and pin wheels, have designed and tested our own HAWTs and VAWTs (Horizontal and Vertical wind turbines).



Year 10 STEAM

English and Social Studies

Students have been focused on the topic of **Change** this term. In English and Social Studies they have been looking at the experiences of refugees, both in the past and currently.

In English, we have been studying our choice of novels - either The Bone Sparrow or Refugee - and then we created an online study guide of our chosen book.

The Bone Sparrow

The Bone Sparrow is about a boy named Subhi who lives in an Australian Detention Centre with his mother, sister and best friend, Eli, awaiting their release day, which may never come. One day, he meets a girl called Jimmie from the Outside and they find friendship and hope in the unlikeliest of circumstances. – by Sabine

Refugee

Refugee is the story of 3 different children living in 3 different time periods. They all need to flee their countries, they all become refugees. One refugee is a Jewish boy who escaping Hitler's Reign with his family in World War Two aboard a ship to the other side of the world. Another is a Cuban girl living in 1994 who set out in a raft to a better life in America with her family after riots and unrest in her home country. The last is a Syrian boy in 2015, who fleeing terror and violence, sets out with his family on a trek towards Europe. – by Ariana

In Social Studies, we have been studying our 30 human rights and reading the nonfiction text "Borany's Story". This is about a Cambodian refugee and her journey from Cambodia to New Zealand. We have found that it has been extremely beneficial to study human rights and refugees in both subjects at the same time. It really enhances our learning experience and it helps us to better understand the background and the emotions the refugees experience. -by Ariana and Sabine

A Humanitarian Approach to Engineering

Volunteer Service Abroad was found by Sir Edmund Hillary in 1962 and is now New Zealand's largest volunteer agency working in international development. VSA's current projects focus on building long term partnerships between New Zealand and our neighbours in the Asia-Pacific. *VSA enriches New Zealand society through the cross-cultural exchanges it creates and the new knowledge that returns with its volunteers. We offer both long (12 months and over) and short-term assignments and currently work in Melanesia, Polynesia and Timor-Leste."*

Our Year 10 STEAM students met one of the 3500 Kiwis who has volunteered under VSA's programme. Hydro-engineer, Nicky Thompson, volunteered for several months in the Cook Islands. Water is an essential human need and her expertise helped ensure positive outcomes for local communities. She also talked to our students about her experiences working in a male dominated field in relation to reconstruction after the devastating Christchurch Earthquakes. STEAM students Revathy Gunasegaran and Zoe Wu commented:

"We admired her values because she volunteered and used her skills to help different communities with their problems. Not only that, she made sure her solutions for the communities she worked in were permanent or long-lasting, instead of only helping for the time that she stayed. This makes her a very inspirational person as she influenced us to think about what we can do to help those in need- not only when we are older and can-do volunteer work overseas but at our current age and what we can do to help out in our community through projects".



English - Auckland Writers Festival Trip

Year 10 STEAM classes headed off to the annual Writer's Festival held in the Aotea Centre. Throughout the day, we were able to experience the presentations of many talented writers and witness live readings from Selina Tusitala Marsh, Alex Wheatle, A.S. King and Bonnie-Sue Hitchcock. It is fair to say that many of us, budding writers, were starstruck by the authors' talks as they provoked thought within us and we were able to learn more about the art and pleasures of writing. We learnt so much about each one of the writers; their individual writing styles, the pieces of work they've done and where they gain their inspiration.

Selina Tusitala Marsh is New Zealand's poet laureate, meaning she produces poems about and to represent New Zealand during her two years in the honourable role. During her presentation, she talked about her experiences of being the first woman of Pasifika blood to obtain such a role in New Zealand. She told us stories about her tokotoko (traditional Māori carved ceremonial walking stick), which she brings along with her on her many journeys around the world. Instead of keeping the tokotoko encased in a room, she shares her gift with the world, bringing it to people around the world to touch. Even President Obama has got his hands on it! We received many passionate poetry readings from Selina's book, 'Tightrope'.

The takeaways from the Writer's Festival allowed us to delve deeper into our individual writing styles and enjoy writing more as an art form. It was truly inspirational to watch and hear all of these authors talk about their lives, as well as the lives they'd written about in their books. Grace Chen - Year 10 English - STEAM

Maths and Science

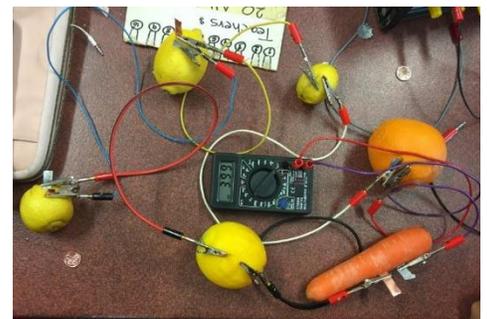
This term we have been preparing for the NCEA internal assessment on the Number topic. We have studied fractions, percentages, ratios and rates and their application to real life scenarios such as budgeting, planning a trip and organising a party. Students had to calculate costs involved and then give recommendations for the best option based on some restrictions like the amount of money available or limit on time to save the money.

We have also studied linear graphs and their application to real life problems. Students had to compare the fee structure of a range of businesses presented as linear graphs or equations and give recommendations for the best option based on different types of services needed. They also had to create their own fee structure for a fictional new business which ensured to provide the lowest realistic cost out of all other businesses available.

The linear graphs concepts have also been linked to concepts of speed and acceleration studied in Science. This demonstrated the mathematical foundations of these scientific concepts and at the same time provided the context for mathematical skills and their greater appreciation.

Designing electric cars in Science

The project brief is to design and build a car that is powered by a 3V DC motor. The motor must be powered by a battery that is producing electricity through a chemical reaction (no commercial cells allowed) such as lemons, potatoes, acids. All they have to do is to make it move, so how to deploy the thrust, weight, layout will be important. The brief was deliberately kept vague (much like NCEA!) to encourage them to think outside the box e.g. the battery doesn't necessarily need to be on board, the car can be driven by a fan. I'm hoping they will 3D print or laser cut some parts.



To give the students a real world spin we invited Dee West in to talk to our students about the future of Electric Vehicles (EVs) in New Zealand. Dee is a

passionate social and environmental sustainability advocate, Managing Director of solPR and Public Relations Manager of ChargeNet. Dee shared her extensive knowledge of EVs and drive to turn New Zealand into a sustainable community and reduce the country's carbon footprint with the students. Dee is an inspirational role model to all of us, a true change maker and pioneer.

Kinetic Sculpture

Year 10 STEAM's Kea group has been working in Kinetic Sculptures since Term 1. As a class, we've combined our efforts of imagination and construction to create sculptures made entirely from toothpicks, ice block sticks and hot glue. These sculptures were then joined together by student-made ramps and plinths, forming one long marble run. The working marble run is now displayed in the far right wing of A block; feel free to bring your own marble and try it out!

Here is a little visual introduction to our first ever project, 'The Marble Run'.

https://www.youtube.com/watch?v=i4aJ2F_hVEQ

Kinetic Sculptures has immersed students in a dynamic field, fostering curiosity while nurturing insight and innovation through tactile experience. Students worked collaboratively utilizing a range of materials and investigational processes to delve into 3D forms. Employing a range of design methods, they created a gravity feed marble run and made intuitive observations to respond and plan for their kinetic sculpture. The act of thinking through making, allows students to drive the creative process through trial and error and a student-centred learning approach. The hands-on approach develops a passion for and gives insight into the diverse applications of the Arts in the real world.



“An assemblage made up of parts designed to be set in motion by an internal mechanism or an external force.” Our topic for this Term is to make a sculpture that when acted on by a force, moves. We started off by researching a bit about current kinetic sculpture artists and deciding what we would base our design off. We looked at Lyman Whitaker, Anthony Howe and Theo Jansen. Our brief was to create a kinetic sculpture using found or recycled materials. Personally, I am finding this exciting. Our idea (Abbey Armstrong and I) was to try and recreate a garden ornament that I have at home.

Over a few weeks, we had curled the wire, painted the ball and made sure that it turned in the wind. We still have a few weeks left so we have decided to try to make the ball and wire glow in the dark for an extra challenge. We wonder how this will turn out and whether our glow in the dark idea will work. We can only wait and see. Cate O'sullivan-Watts



Students will develop problem solving and critical thinking skills as they engage in concepts relating to physics, engineering, sustainable energy and the Arts to develop and create a Kinetic Sculpture. This hands-on approach develops a passion for and gives insight into the diverse applications of the Arts in the real world. Students will also extend their perceptions of reality as prior knowledge by creating their own virtual world by using the amazing “Vive”.

Future Tech

As part of Future Tech, Year 10 STEAM students have been creating an immersive 3D and 360° environment. Students loved creating their VR content. Discovering and exploring your own 3D creations in virtual reality can add value to the learning experience, as it gives students the possibility to get immersed in their creations using computer programming to make their VR creations interactive using scripts. Here are two examples of students' creations.



"We often hear and read about climate change, how it is going to affect us in the future. Many people today are not aware that climate change is occurring in today's world and it is not an issue that we can leave for later. We as global citizens need to take action. As a part of my action, I created a 3D game which let me integrate my passion for advocacy for climate change with my love of STEAM. I made my



VR (virtual reality) in Co-spaces, a website which is used to make 3D worlds. The game is set in future Earth, where people are forced to live at sea due to sea level rising in artificial islands made of compact houses. The player learns more about climate

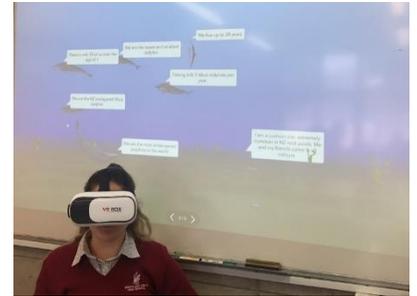
change, its effects as they move through the game by talking to the characters who give advice to the player so that they can be part of the solution. I hope that my game can be used so that people especially students like myself learn more about the dangers of climate change." Parmida Raeis-Hosseini

Checkout Parmida's VR world:

<https://www.youtube.com/watch?v=NKrU87Hipts>

"I used 'CoSpaces' to create a virtual reality world with the purpose of educating people about endangered native NZ animals and trees because I believe that it is a huge problem which people need to be more educated about in order for a change to happen. NZ is

known for having a clean, green environment, many kiwis do not realise that we still have major problems with animal



endangerment and our trees dying.

My world has two separate scenes, a tree/forest scene and an underwater scene with dolphins, whales, crabs etc. The animals/trees all have either speech or thought bubbles which say their name and a fact about the animal/tree." Sabine Ranson

Students have also been developing game for learning using gamefoot.

Here are some examples:

Juliette La Ville- Teaching Year 9s about the Smart Swans programme at WGHS-

https://youtu.be/pyuLLI_HVpk

Arian's Mahi- https://youtu.be/oo7GA_1BIMc

Shella's dystopian future-

https://www.youtube.com/watch?time_continue=88&v=flholn4iWEs

Community projects

The Year 10 students have been busy working on their community projects and developing innovative solutions.

We are reaching out to the parent community to support our students with the development and implementation of their innovative prototype solutions and explore sponsorship for proof of concept and development.

We are particularly keen in making connection with App developers, game designers and Auckland Council. If you think you can help, please contact me on Stomaz@westleakegirls.school.nz