

**7-15 MARCH 2019 - VISIT TO NEW YORK FOR:**

**FABLEARN**

# Flagship Conference

**What role does Maker Education play in a world with growing social and environmental challenges?**

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## Foreword

Constructionism was advanced in the 1960s by Seymour Papert at MIT Labs, drawing on educational psychology he learned from Jean Piaget and theories of learning from Paolo Freire, among others. Papert was interested in how technology could help children to learn, particularly science and maths, and to think. Papert's Agenda:

- Reject the idea of what is too hard for children.
- Reject formalised representations of subjects as the only way to know.
- Connect powerful ideas to real experiences of children.
- Create ways for children to mess about with these powerful ideas in developmentally appropriate ways.

Make, Maker Spaces, the Maker Movement, are grounded in Constructionism. However, they grew out of a frustration with traditional schooling and in the US, the development of these learning spaces has tended to be outside of schools in the community. Fablearn is a global community of educators that aims to ensure Constructionism / Make can fulfill its potential to improve the education delivered in schools.

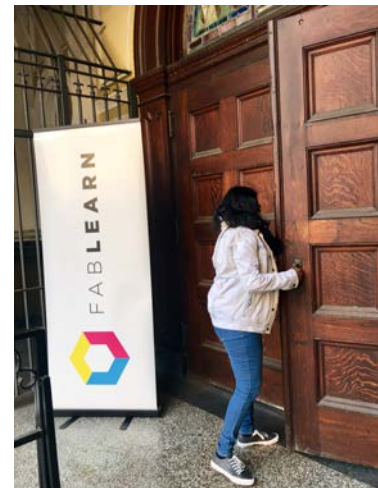
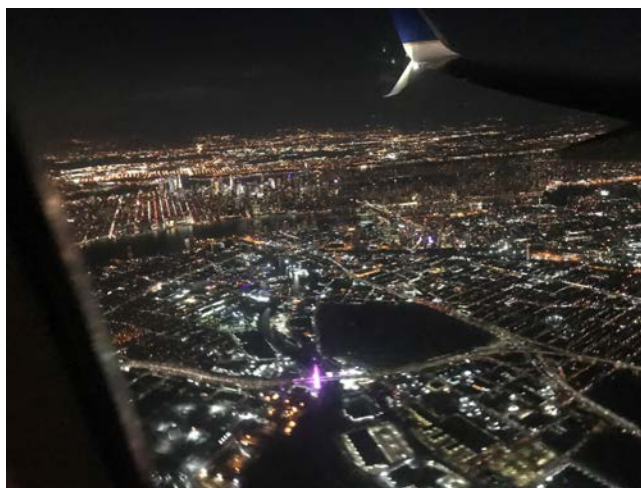
When referring to the Wikipedia definition of Constructionism, I believe this way of learning is appropriately and ideally aligned with the strategic foci at Manurewa High School for learning that is cross-curricular, project-based and provides student choice. The integration of a culturally responsive teaching approach has also been seamless in our first year of the Maker Space, with the support of our mentor, Keu Iorangi. The result of this approach is a group of students who have grown in confidence learning with creative technologies, and in their self-belief to lead a community. This was the basis of our successful submission to present at the global education conference, Fablearn.



## Introduction

This report outlines our experience travelling to New York and presenting at the Fablearn 2019 Conference at Columbia University. Yashna Kumar, a Year 12 student, was a member of the Student Panel. Her task was to describe her learning journey in our first year of Maker Space. Leanne Gibson, who has helped to establish our Maker Space as part of her role in the MHS Business Academy, addressed how our space is smashing barriers in our community to access STEAM project learning.

The report, written by Leanne, identifies a range of learning experiences delivered. It also provides suggestions on next steps as a result of what we have learnt. The report will be complimented with community presentations by Yashna.





**THURSDAY**

## highlights

- Walk from our hotel down Broadway past the Lincoln Performing Arts Center through snow-covered Central Park to Times Square
- Up the Top of the Rock (Rockefeller Center) for a perspective of Manhattan



[HTTPS://NYC2019.FABLEARN.ORG/](https://nyc2019.fablearn.org/)



## FRIDAY

Walk through Central Park to The Metropolitan Museum of Art where we visited:

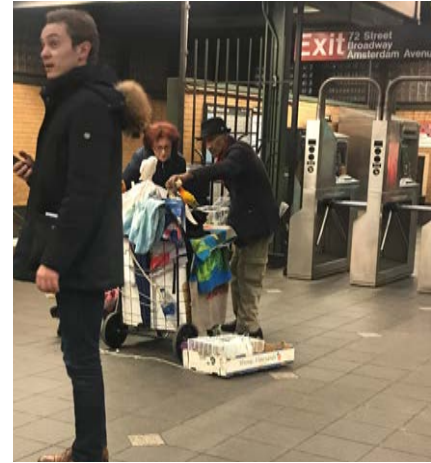
1. The Egyptian Exhibition and gained inspiration for Maker projects, as well as knowledge for Yashna's Classical Studies topic on ancient funereal practices.
2. The Genji Tale Exhibition, which Yashna had studied in school but I hadn't heard of. It was of interest to her because the author was a woman, writing to explain how women had lost their traditional place of respect in Japanese society, with the arrival of early Buddhists who saw women as evil. It was a redemptive tale.
3. Classical Greek and Roman art, again of interest for Yashna's Classical Studies.

Walk back to our home via Strawberry Fields, the memorial to John Lennon. Yashna wasn't sure who he was. I was surprised how deeply affected I was in the environment, which was nothing special except for the IMAGINE mosaic set into the sidewalk. A week later, our country suffered terrorism and horrific loss of lives. I reflect now that it must have been a foreboding energy I felt there.



SATURDAY

Our first day on the subway. We took the 1 train to Columbia University. We found our way to the Teachers College, the venue for the conference. It was very austere, academic and a little intimidating. But the people were friendly. We did some networking. We met an Australian who was jetlagged like us. It turned out she was the only other guest from Australia or New Zealand. We met an American woman who ran programmes in a community Maker Space on Staten Island. She was opening a second space in Brooklyn and it was clear from meeting her and others from all over the world that Making / Digital Fabrication / Creative Technologies is going through huge growth.



## Keynote - SYLVIA MARTINEZ

**Sylvia ([sylvia@inventtolearn.com](mailto:sylvia@inventtolearn.com)) is co-author of Invent to Learn, a go-to resource for Makers and one of the leaders of Maker Education. Key takeouts from her talk:**

- Be proud of what we are doing, and be comfortable to use non-scientific words like love and passion to describe the effect it has on students.
- Maker is not about jobs or coding - it's about learning.
- The best way to ensure understanding inside the head is through active construction of shareable things outside your head.
- We need to find the right name for what we are doing. Making is a better word than Hacking but still has negative issues for education. Constructionism might be the right word.
- The number of young people using Scratch doubles every two years. Those children are growing up knowing they're in charge of what computers do.
- Bio-making is the next thing ... eg: DIY leather (using kombucha); Biosynthesised (solvent free) dyes; Sustainable packaging from sheets of bacteria; Fabrication using bone growth algorithms; Self-healing concrete.  
*Go to [diybio.org](http://diybio.org) for more info*

[HTTPS://NYC2019.FABLEARN.ORG/](https://nyc2019.fablearn.org/)



## Student Panel

Yashna presented in the afternoon with five other young makers from around the world. She'd been preparing for weeks without any help from me or anyone as far as I know. She told me that through taking experiences like the Outlook for Someday video competition, she'd learned how to create presentations and report on projects.

She was high-energy and natural on stage as she shared her learning journey in our Maker Space. This went from experimenting with a Gogo Board microcontroller, to using Makey Makeys to make a cardboard guitar, then producing the guitar on the lasercutter, and finally to creating a craft product to sell through a social enterprise. She got huge applause, and I shed a few tears of pride and joy. One member of the audience told her that she'd coined a new term in Maker Education, when she spoke about experiencing "maker's block, kinda like writer's block". Later, he Tweeted about it and it became one of the most liked Tweets related to #fablearn.

One of the other panellists that I really enjoyed was from Learn 2 Teach, Teach 2 Learn in South Boston. This initiative has a mission to create a critical mass of Boston youth who are creatively engaged in the latest STEAM education who can help catalyse cultural change in their community. In this model, the more experienced members are developed as teachers of the newer or younger members. The values are "Learn, Build, Teach". I think we are also developing this in our Maker Space. Yashna, Timmy and Tinh especially are students who can be called on to help others learn to use the technology, including helping teachers. An idea from this then is to develop an accreditation system which records their work as teachers and competence on the equipment.

## Making to solve community problems

Sylvia Martinez introduced us to the Making Sense EU Project. Visit: <http://making-sense.eu/>. This initiative explored how open source software and hardware, digital maker practices and open design can be effectively used by local communities to fabricate their own sensing tools, to make sense of their environments and address pressing environmental problems in air, water, soil and sound pollution.

## Educator Roundtable: Making without destroying the planet - is it possible?

The conference submission process required we address challenges, issues and missteps as well as positive impacts of the Maker Space. For many educators, one of the big issues is environmental impact.

Positively, Maker Spaces can be upcyclers of waste. But they can also produce significant waste and consume resources. Speakers had ideas around working with local businesses to establish a materials supply chain, based on what they are discarding as waste. Materials for the Arts is a community organisation in the US that takes waste from companies.

One of the schools had two plastics recycling machines – one that chipped plastic and one that melted it. They put the chip plastic in the canteen compost and it degrades within 27 days. They also cut, melt and remake 3D printed waste as keyrings.

Prototyping in cardboard, rather than the final material, is another way to save on materials waste. Connecting activities to the UN Sustainability Goals was another practical suggestion, as was having a junk box for creating robots out of things like plastic bottles.

Some projects that were shared included:

- A student-choice example in science - "Apply scientific principles to design a method for monitoring and minimising a human impact on the environment". (*Nico at Ravenswood School District*)
- Build your own microscope with a raspberry pi (*@nycmakerspace*).
- Turn Garbage into Gold, which focused on recycling toys that have motors, buttons, LEDs etc - ideal to integrate making and literacy (*Christa Flores*).
- Make with fungi, kombucha, algae and chitin to deal with the plastics problem - not from a place of fear but of creativity and curiosity. Visit: [nestmakerspace.weebly.com](http://nestmakerspace.weebly.com) - *Corinne Okada Takara*
- Mycelium can be grown from material in the pulp industry waste flow. Use to help students understand where to tap into the waste flow. Visit <https://materiom.org> for recipes.

**I note advice that in Maker Education, you should keep asking the question – what can we do next?**



# SMASHING BARRIERS TO ACCESS STEAM



## CONTEXT

Manurewa High School is a public school serving Years 9-13 (ages 13-18). In its first year, the Maker Space has had a significant impact to creating access to tools for STEAM learning in this community. Some context to the importance of our Maker Space:

1. New Zealand's largest Decile 1\* high school - 2100 students, many from families facing challenging social and economic outcomes.
2. 75% of students are Maaori and Pacifica - ethnicities that have high proportions of young people who are on pathways to jobs at risk of automation.
3. Research shows that access to digital technologies and technical knowhow are significant hurdles for Decile 1-3 schools. One impact of this is evident in workforce participation. Less than 5% of the ICT workforce is Maaori or Pacifica and this can be traced back to lack of exposure in school.
3. Our students are creative, resilient and community-minded. These strengths can be purposefully leveraged in our Maker Space.
4. We are redesigning curriculum - STEAM and entrepreneurial learning are a focus. The Maker Space is a unique space in the school to support this focus.

\* Decile is a way of describing the demographics of a school community to determine its public funding. Low-decile schools, Decile 1-3, serve families with low income and / or who have been on long-term welfare dependency.

## WHAT WE DID

1. Sourced funding from partners to set up our Maker Space. Partners were a mix of government and philanthropic who shared our objectives to develop students' 21st Century skills - creativity, problem-solving, collaboration and digital fluency.
2. Invested funds equally between equipment and expertise. Our expert had led set up of maker spaces for our demographic.
3. Established a culture in the space based on whanaungatanga (family). Sharing food, giving thanks, and involving the community are key practices.
4. Focused on development of a group of student leaders and leveraged their talents for sharing knowledge with teachers and other students. Leaders were guided by our expert, with support from a core group of teachers.
5. Integrated community problemsolving projects - like the Locker Project for homeless people and Buddy Bench, working on a solution to school-yard bullying.



## KEY RESULTS

We have created a place where:

1. All learners feel safe to experiment with creative technologies.
2. Learners can explore their STEAM ideas, individually or in collaboration.
3. We can develop educationally powerful relationships.
4. We have a mix of ages, male and female, and strengths in technology, creative and collaboration skills. This models the future world that our students will inhabit as adults and lifelong learners.

## SURPRISES AND MISSTEPS

1. The technology is the drawcard but it's not the purpose. The purpose is community.
2. Teachers have been super-keen to access the resources of the space. We weren't prepared for that.
3. How easily the students connected with the space as a place for them to learn. We think this is because whanaungatanga comes first.
4. They tell us they want MORE of this and they are happy to invest their own time into it.

# SUNDAY

## Educator Poster Session



The poster session involved a pitch and then one-on-one conversations with attendees who were interested to learn more. It was a great format for me as I enjoy one-on-one conversations.

We attracted people from Brazil, China, Finland and the US. This included the keynote speaker Sylvia Martinez, who had been to New Zealand to speak at a principals' conference. They related warmly to how we were making STEAM technologies and learning available for our community. (Equity of access is one of the Fablearn principles - view at <https://fablearn.org/principles/>)

My task was made easy with the support of Yashna, who was able to share the load of meeting and talking with people interested in our work. In the photo with me, Yashna and Sylvia is Tom, a New Yorker who had lived in New Zealand and helped to set up the Electric Garden project.

## Research presentations

Some of the research papers presented were of interest to me and possibly to some of our teaching staff. The papers will be uploaded to the conference website.

Some of the high-impact projects that I learned about included:

- Mousetrap car – a simple prototyping exercise where you integrate a mousetrap spring to make a car move.
- Fabricated T shirts.
- Sol Lewitt logic-based drawing as the basis for an Arts and Coding unit (second photo).
- Game design with students as part of their own games – by modelling a pose, green-screening it, taking it into Scratch and coding it into the game.
- Creating User Interfaces with unfamiliar things, eg a seesaw. (*bottom photo - John Riley – [www.explodethecontroller.com](http://www.explodethecontroller.com)*).
- Solutions to problems in a remote Thai island community – using microcontrollers to help automate food preparation onsite at a local market; and to create a rudimentary fish-scaling machine. (*Nalin Tutiya Phuengprasert*)

The assessment of learning in Maker Spaces was also addressed by a number of speakers. In many cases observation of deep learning by teachers is considered sufficient. One teacher from Escola SESC in Brazil shared a rubric that looked useful (*top right*). This was for a qualification in Design in Digital Fabrication.

Research from Northwestern University on development of a Maker Space for refugee communities highlighted the opportunity to integrate intergenerational storytelling concepts (*second from top*).

## Thailand's transformation

Speaker Nalin Tutiya Phuengprasert explained how the Ministry of Science and Technology of Thailand has rapidly created 150 fabrication labs, also known as maker spaces, in 150 schools throughout the country in one year following the policy called Digital Thailand 4.0 in early 2018. She was charged with helping to train teachers to work in the spaces.

	First semester		Second semester	
	Student X1	Student Y1	Student X1	Student Y1
<b>Dedication</b> Quality in the result Maintains attention Gets over obstacles				
<b>Teamwork</b> Participates actively Respects ideas Accepts and delegates activities				
<b>Reason</b> Research skills Creativity				
<b>Prototyping</b> Technical knowledge Software skills Expertise on machines Manual skills				

Legend:  
Red: Below basic knowledge  
Green: Adequate knowledge  
Yellow: Basic knowledge  
Blue: Advanced knowledge





## LAST 2 DAYS

- Three Bridges – Brooklyn, Manhattan and Williamsburg.
- Wall Street / the Stock Exchange.
- Ground Zero.
- Washington Square Park in Greenwich Village
- Empire State Building (a night time view of the city).
- Times Square at night where street theatre was enthralling.
- Gerswhin Theatre where we saw the hit Broadway show WICKED.





# Reflections

- Fablearn conference attendees came from 23 countries. We represented New Zealand!
- There were a record number of applications to present at the conference. In this context it was significant that we were chosen. We provided inspiration and insights for a first-year of Maker Space in a community where learners have many barriers to access to technology.
- There is massive investment by Brazil, Israel and Thailand in Constructionism as the focus of school transformation. Finland is already advanced in this. In Finland, they don't have Maker Spaces per se, as the resources are spread and integrated across the school (as was explained to me by a Finnish educator).
- The name Maker Space can be problematic. The Fablearn global community has been tasked with considering if there is a better name for this type of hands-on learning through objects to think with.
- In her presentation, Yashna explained how her course timetable did not allow her to integrate Technology. The Maker Space after-school programme had been important in meeting her need to learn with Technology.

## Next steps

- Continue to iterate the design of the space, and the design of our interest-based, after-school programme.
- Meet the interest of teachers for professional learning workshops.
- Explore a curriculum – Designer in Digital Fabrication.
- Develop our space as a creative technology hub for the community

**MANUREWA HIGH SCHOOL IS ON THE GLOBAL STAGE AS A SCHOOL THAT IS TRANSFORMING ITSELF FOR THE 21ST CENTURY - EMBRACING OF ENTREPRENEURSHIP, TECHNOLOGY, CREATIVITY AND CULTURAL RESPONSIVENESS.**

**I WOULD LIKE TO THANK THE BOARD OF TRUSTEES FOR HELPING TO MAKE THIS TRIP POSSIBLE. I AM ALSO GRATEFUL FOR THE WISDOM AND SUPPORT OF PETE JONES, JOHN HYNDS, ROBYN HYNDS, KEU IORANGI, PENNY BRADFORD, EMMA O'RIORDAN, AMBURE GIBOREES, THE SOUTHERN INITIATIVE, WAIKARE KOMENE, JACO VAN DER MERWE, PERPETUAL GUARDIAN, UNLEASH SPACE, THE MHS 1968 ALUMNI, AND THE FABLEARN TEAM**

**LEANNE GIBSON, MARCH 2019**