STEM NEWSLETTER

A Partner School of THE UNIVERSITY OF SYDNEY — STEM Teacher Enrichment Academy

STEM SCIENCE TECHNOLOGY ENGINEERING MATHEMATICS
NSW Department of Education

Ex-students in STEM careers - Great Role Models for our Students

Tammy Butow, graduate of 2002 (and now Dropbox, Site Reliability Engineering Manager, Databases,) wanted to do something for our students on her recent tour around Sydney universities talking about her field of expertise, chaos engineering. (This is risk management of systems by planning for chaos and then trusting the system you have put in place will override the chaos.)

Tammy believes Riverside prepared her for a career in IT. In 2002, Riverside, and her teacher Ms Mihailou (pictured right) were well ahead in the implementation of digital literacy courses. Tammy says her confidence and organisational skills, together with 5 years with NAB, led her to the career at Dropbox.

She is the only woman on her team and spoke to our students interested in IT about changing that gender imbalance. Her personal story of goal setting, small steps to achievement and of perseverance engaged the students. One of her messages – learn to talk about your skills but don't avoid jobs where you haven't developed all the skills required in the position. You will develop them.

Krystle Ng, graduate of 2011 and now account manager with Microsoft, spoke at the *Future You* afternoon in September. She graduated from UTS as the most employable IT graduate, after winning a $40K scholarship to study there. Krystle also spoke of the importance of sport and opportunities offered to Riversidians outside the classroom to develop the values of honesty and gratitude for others that are so important when working in a team.

One student said about Krystle "she spoke about how we put pressure on ourselves to get marks. So, her message for me was that putting effort into the community is going to pay off in the end for ourselves and our future careers."

Krystle also wanted to thank her teachers for inspiring her to apply for scholarships that have led to her successful career at Microsoft. She is pictured here with two of our inspiring TAS teachers, Ms Mihailou and Ms Tao.

The STEM education summit in 2015 identified eight themes.

The third: improving diversity and inclusion in STEM.

Gender disparity as girls are underrepresented in STEM careers.

SUMMIT STATEMENTS

"The girls who give up on STEM related studies are not doing that because they are not good at it; achievement and academic ability is certainly there."

We need to make STEM more relevant to girls.

Young people get excited when using STEM to help solve problems of concern in their communities, and when learning is placed in a context that is relevant and engaging. There is a need to start early, to hone in on the natural curiosity of young children."

Girls need role models in STEM related careers.

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STEM Action School News

STEM Workshop Hosts - Andjelka Nikic, Tracey Warzecha, Angela Turco, Angela Mihailou and Mamie McLean

As a STEM Action school, Riverside hosts professional learning days for teachers across the state to visit and hear about how we have grown in the delivery of STEM. Recently, teachers from as widespread as Narooma, Cooma and Springwood, and from Rivendell at Concord had a day of learning about cross-curricular problem based learning work designed at our school. Then four faculties showed one area of expertise in STEM:

SCIENCE: Stage 5 EcoMUVE: Integrated Ecology unit using Harvard Uni simulated aquatic world

SCIENCE: STEMSEL: Programming electronic sensors to control probes & devices applied to Science units

TAS: Design Thinking

TAS: Robotics & Computational Thinking/Coding

MATHEMATICS: STEM Enrichment & Challenge based strategies for Maths

FEEDBACK

"I just wanted to say a huge thank you for hosting the STEM workshop last Friday. I brought a team of 8 teachers along and it was a worthwhile, valuable experience.

We had a successful day programming yesterday due to being invigorated by the work of your staff and students.

Please pass on my absolute gratitude to your Executive and staff members who gave up their time to share their experiences and resources. Please pass on my huge thanks to Tracey Warzecha who coordinated the day too - I'm sure she is an asset as Head Teacher Curriculum at Riverside Girls HS.

You have a school environment which is an obvious lighthouse and a great endorsement for Public Education."
Todd Shepherd, Deputy Principal, Springwood High School

"My staff has come back with lots of ideas, so the day was worth the effort. Thanks for looking after them.

Wow, you certainly are doing great things!"
Tony Fahey, Principal, Narooma HS

"STEM Action Schools need to be celebrated more across school communities. Having attended the workshop, I have a greater appreciation for the direction of learning can take when there is a whole school focus on STEM.

Thanks so very much for demystifying the meaning of STEM in high schools and for making this such a memorable and motivating day."

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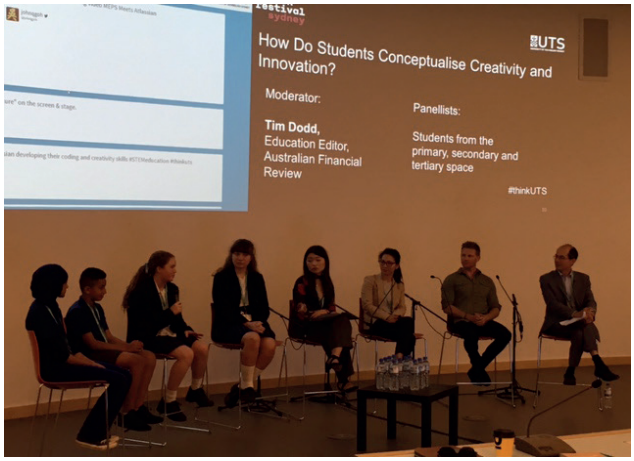
Riverside students shine at the Futures.edu. conference for the UTS Business School

The term 21st century skills is fast being replaced with 'creativity and innovation' or 'entrepreneurship' in education.

At the recent Futures.edu conference at UTS, Riverside students gave their opinion on what creativity and innovation meant to them. This opportunity came from our school being recognised for the work teachers are doing in STEM, especially design thinking and collaborative problem solving.

Our students, and some younger ones from Merrylands East Public, were on the panel. Grace Flockton, Georgia Foristal, Scarlet Orrin and Emily Simmons described their learning and how they like being innovative in problem solving.



Creativity at Riverside: our students thoughts from their panel:

'Argumentation (they used the word from Science STEM meaning justifying ideas using evidence) is helping our critical thinking.'

'Argumentation is also improving our English results as we are thinking more about our ideas before speaking and developing them further.'

'We are learning that we don't have to have all the answers as someone else in our group will. We keep quiet and sometimes let others take over and then they too learn to stop and give us a go.'

'Teachers are giving us permission to be creative with more open ended problem solving.'

'Failing is hard but we are getting more used to an idea not working and having to start again'

'We like it in maths when we have to explain our answer and how we got there even if the answer is not correct. We have always done part of it right.'

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Teacher Feedback

Mr Esdaile at the UTS Spark Festival

On Monday 24th October, I was invited to speak to a group of principals and teachers about the Young Change Agents program at the Spark Festival hosted by Australian tech-startup success story - Atlassian. The young change agent program - It was delivered to Year 9 students at Riverside in May, I was one of the 6 who also partipated so we could use the design thinking principles in our classrooms.
A three-day event that aims to build student skills through a social entrepreneurship model. The impact of YCA on students and the change to my teaching practice. I took some of the YCA lessons and applied them to our Commerce in the Quad project-based learning activity for Year 9 Commerce. By creating shorter timed tasks, giving student more space to discuss ideas, and setting high standards, the students certainly were more engaged in the design of their products. These changes (along with some elements of the design-thinking methodology) produced high quality “Commerce in the Quad” pop-up stalls, with incredible profits. Importantly, students developed a stronger link to the fundamentals of business. This was best shown by their ability to talk about their financials (profits, break-even and cost-of-goods) and empathy for the customer, evidence by strong sales.
W.Esdaile

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Why design thinking?

Previous newsletters have outlined how teachers have been skilled in the teaching of design thinking by industry experts and have held bootcamps in design thinking with yr 7 and 8. Recently, both parents and staff have also enjoyed learning about the process.

Lisa Wark, HT TAS is passionate about design thinking as a process that will bring teachers from various disciplines together to plan learning – co-creating at its best!

“Design thinking encourages collaboration and it also places the emphasis on thinking about others’ needs. We learn to be empathetic. This is really hard for most people to slow down and think about others’ needs especially for teachers as we are so solution focussed.”

As staff played with material to design the ideal wallet, they were reminded that unless the wallet was meeting their partner’s needs, the design was a meaningless task. Ms Wark gave the example of the bags that students make in yr 7. Rarely do these students bring this bag when they are in year 9 for carrying PE gear.

“Those bags then really did not meet the students’ needs for something to put PE gear in. Perhaps they would not design a bag for this purpose if we gave the students the opportunity to drive their design.”

Lisa’s new slogan is ‘drive the Sharpie”(permanent marker). “Too often we judge and deliberate, when it is the idea that is important. Fail, then do again if necessary. If its drawn with a Sharpie, the idea has to BE – that’s what we call iterate, iterate, iterate”.

There are sure to be many more Design Thinking projects across the school next year.

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A Tale of 2 Unit Chemistry with Ms Mishra and Ms Ravs 12CHE A and 12CHE B – 2016

As a first step towards their HSC, in the last term of 2015, the keen and curious ones who chose to continue on with Chemistry were fractionally distilled and cracked catalytically with zeolites. Their allegiance to the Alkene or Alkane family was subjected to a brutal investigation with bromine water, from which they came out unscathed and were overjoyed posing as models wearing the 'Molymod' outfits as their molecular model kits.

They played with the reactive double bonded ethene to be polymerised into polyethylene, PVC and polystyrene, explored cellulose and biomass to form biopolymers to replace crude oil, underwent hydration and dehydration reactions, fermented to produce ethanol, burnt to be counted for molar heat of combustion and became Galvanic cells to generate electricity to provide energy for various devices.

They had a big investigation to carry out during the summer break for which they would have to sharpen their skills before presenting their findings to a commission for judging. At the start of 2016, they radiated with joy emitting α & β particles as they visited ANSTO at Lucas Heights, beamed Ɣrays to verify the claims of the various benefits these energy waves were bringing to Medicine and Industry.

They thought of Chemistry as a wonderful place to be.

More interesting things greeted them as they entered the world of colour, the choice of indicators swinging them on a see-saw from pH1 to pH 14, from being an acid to an alkali. While they were dismayed by the actions of acids pouring rain destroying buildings and lakes, pH meters made their appearance trespassing buffer zones along the way. Undergoing titrations and neutralisation reactions transformed them into salt and water, with digital technology verifying their claim, plotting graphs to ensure that the pathways taken by the acids and alkalis were valid and reliable. The mere thought of keeping track of moles, masses, volumes and concentration was confronting but there was no escape route. The moles and molarity with all their intricacies had to be taken on board and doing so was a necessary evil, one had to tread the path carefully so as to avoid pitfalls. Those were tough times. However, undergoing esterification using organic acids was a welcome retreat, R17 and 18 filled with bannana flavour was the ultimate experience.

Life seemed flavoursome again. There was curiosity to find out what exactly being a "Chemist" involved.

They didn't have to go too far to find out the answer to that question as the food on their plates introduced them to Haber the Chemist who was instrumental in engineering the process enabling the farms to increase their produce using Le-Chatelier's Principle.

Along came the AAS with its splendid technology splashing colour again into their lives, the flame tests showing off unique colourful flames to identify the metal ions AKA positive ions or the cations, but the negative anions were too involved in becoming precipitates.

Then came the desire to fly high into the upper atmosphere by hitching a ride on the backs of various refrigerants and aerosols right up to the stratosphere to peep into the world of ozone to seek answers to how and why the chlorine molecule in the CFC's was being so nasty in depleting it. Ozone had other plans and chased them down to the troposphere particularly on hot sunny days appearing as smog when the entire populations including the many Year 12's who were P-platers, drove cars in a frenzy, with their exhaust pipes releasing unburnt hydrocarbons.

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They weren't too impressed with the outcome and remained indoors to avoid nasty pollution. It was now time to meander the water ways to test for turbidity, soluble and insoluble ingredients in water, to test for dissolved oxygen and bio-chemical oxygen demand the Winkler-way. Eutrophication seemed like a far off exotic location, searching for phosphate-rich waterbodies with their algal blooms and the desire to meet up with mercury, cadmium and lead was a fanciful thought. That didn't stop them from sneaking into Sydney Water premises to check if their drinking water supplies were being sanitised, free of E Coli and fluoridated so that they would confidently beam their smiles.

They had a twinkle in their eyes as their investigations extended far and wide to the waters of Putney and the shores of Meadowbank. Why would anyone miss the exciting world of Industrial Chemistry? It is so full of interesting investigations. These last few weeks our students have explored Chemistry in Industry which drives the economy of a nation. They have seen the fury of the 'Oil of Vitriol' (concentrated sulfuric acid) when it sucks up water from a mundane substance such as sugar and leaves it charred.

Riverside hosts young entrepreneurs to inspire students

Sam Hamrosi, parent and P and C member, came to the principal with this concept of:

an afternoon of Ted style talks - having a range of presenters share their story on how they found their passion and career path. In listening to the stories, students would have an insight into what drives the speakers and how they discovered their passion and career path. This may lead to students discovering their true self, true passion and start creating their dream future. So….began Future You.

Excerpts from the paper:

Eight young entrepreneurs shared their stories of finding their passion and career with senior students at Riverside Girls High School. The school decided to hold the event to encourage students to see the 'big picture' ahead.

Riverside Girls High School Principal, Ms Belinda Kelly, said she wanted the students to get an insight into what drives the speakers and how they discovered their passion and career path.

"Many of the career paths our students will follow don't yet exist," Ms Kelly said.

"That poses an interesting challenge: How do we prepare our students with the skills to create, excel at and stay motivated in careers we don't know about yet?

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"All 8 successful young entrepreneurs who visited the school said to do that you have to follow your values and passion."

"They all also stressed that developing transferable 'soft skills' like networking, using mentors and problem solving is invaluable to pursuing any career at any time."

Year 12 student, Sathaki, said she learnt that skills and experiences from outside the classroom will be an asset for her after graduating.

"We put pressure on ourselves to get marks,"Sathaki said. "But for one of the speakers, she is so successful because of all the other things she did. So, her message for me was that putting effort into the community is going to pay off in the end for our future careers."

Ms Kelly said Riverside is providing more opportunities for students to develop their skills and values outside of the traditional classroom.

"At Riverside we are leading the way with Design Thinking courses for high school students and are placing an emphasis on soft skills and entrepreneurship."

"I'm thrilled that our senior students were able to hear these stories from the 'horse's mouth'. It means as a school we are on the same page. It gives context to our students around why we are moving in this direction."

Ms Kelly also said she was pleased to include a former Riverside student on the line up. "Krystle Ng graduated Riverside Girls High School in 2011 and when she graduated from her university degree at UTS she was named the Most Employable IT Graduate in Australia."

"She spoke about developing team skills during her time at Riverside through playing netball, and the importance of the network she has while at school."

"That's the sort of environment we have at Riverside. Our students develop their academic skills as well as their values during their years at Riverside."

"Our school grounds are becoming a hotbed of new ways of thinking and there is a flow of ideas between industry leaders in the entrepreneur space and our students."

"I am confident our senior students will go on to produce fascinating stories of their own, and hopefully will return in future years to share their unique career path story with more Riverside Girls."

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The speakers included:

Jack Delosa

- founder of **Australia's largest education institution for entrepreneurs**, The Entourage, which has a community of 300,000 members.
- **The Entourage was awarded the 4th Best Place to Work in Australia by BRW** magazine.
- Jack co-founded MBE Education which assisted SME's to raise money from investors.
- MBE quickly became one of **Australia's fastest growing companies**, assisting their clients to raise hundreds of millions of dollars from investors.

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Priyanka Rao

Priyanka Rao runs Luxmy Furniture with her father and sister. Prior to this she worked at a major record label, marketing the work of Australian and International musicians. **Priyanka was listed as BRW's Top 5 Young Entrepreneurs** to watch in 2013, has been listed twice in the Smart Company 30 under 30, and was **invited by former Treasurer Joe Hockey** to be one of the 2 Small Business representatives at the **G20 Finance Minister** gathering. She was also **invited by former Prime Minister Tony Abbott** for a gathering of young leaders in business to **meet Prince Harry** and on another similar occasion **Prince William**.

Anna Hopkins

Since finishing school in 1999 Anna's had a diverse and exciting journey to where she is today - Co Founder of The Protein Bread Company. Anna created the recipe for Protein Bread - Australia's Lowest Carb Bread, which is now sold in thousands of retailers around Australia, as well as direct to consumer online, and has just expanded into New Zealand. Anna believes that self awareness is the path to living your dreams, and that we all have the ability to achieve what we desire, but the stories we tell ourselves often stop this from happening.

Sarah Warmoll

A Bachelor of Business graduate, Sarah was most recently working in the Digital & IT team at NRMA and prior to that, managed digital client campaigns within agencies and as a freelancer. She **currently works in the media company she co-founded in 2014, The Footnotes** and have just enrolled in a coding course.

Rix Lee

Born in apartheid South Africa, **Rix was exposed to real problems that face humanity from a young age**. This made a strong impression on her to seek unity in all that she does. **Rix is passionate about design and creating organisations** and products that will contribute to the positive change and disruption of industries towards a new paradigm. If you're looking for **Rix she'll either be brewing a new craft beer, in yoga standing on her head or discussing world issues** at a cafe in Marrickville.

Lynette Carroll Bolton (MC)

TV Presenter and Mum, Lynette is a regular face on our small screen having, amongst a tonne of other things, recently starred in the **2015 series of Dancing With The Stars**. In 2016, she joined both the **Sydney Weekender** and the **Yahoo7 Be** teams, quickly becoming an integral part of both teams. You will often find her giving her two cents worth on current events with **Newsfeed on Sunrise**, chatting about the latest **Wedding and Event trends** on **The Morning Show** and basically sharing her thoughts on **everything from footy to fashion**. She is regularly called into the TV studio to discuss the trials and tribulations of being a parent and has featured on many other prime time shows such as **The Daily Edition, Better Homes and Gardens, Studio 10, Game Day and HealthyMeTV**. She has also joined both Channel 7's **AFL and Racing coverages**. She has two gorgeously crazy kids at home, Siarra (4) and Piper (1), plus her own version of a zoo comprising Stella the dog, Kitty the cat and a handful of frogs in the backyard (plus hubby Jude but don't tell him we said that!). Since turning 21 (over and over and over and over again for the last ten-ish years!) Lynette has also embraced a very healthy lifestyle incorporating meditation, yoga, pilates, mindfulness and exercise. She has completed her Kids Yoga Foundation Course and is currently completing her Meditation Facilitators Course.