

# FabLab@Lauriston

Lauriston in Melbourne introduces its students to the future of manufacturing, *ET Staff*

It's no secret that technology has touched just about everything you can think of, everything it seems but the gender divide – any way you look at it, tech and high tech manufacturing are persistently, stubbornly blokey.

The reason why isn't that hard to pin down, it has to do with expectations, roles and exposure to technology. Independent Lauriston Girls' School staff are used to seeing students' interest in science and maths tail off as they progress; not great. Rather than accept it, the school has been among the first to join the burgeoning FabLabs@school program out of Stanford University's Graduate School of Education.

FabLabs@School grew from the FabLab program at the tertiary level. Its champion Paolo Bilkenstien has been spreading the word on the benefits of having students work with new manufacturing technology, with the program taking root in Thailand, Russia, the US, Denmark, Brazil and now Australia. Besides Lauriston there is a tertiary-level FabLab in Adelaide.

The program is ambitious, seeking to establish a global network through which students can blog, cross pollinate ideas and experiences and lessons around modern manufacturing techniques, mediated via a community website. It's worth having a look at the projects that the students have produced [<http://fablabatschool.org/>], they're as varied and creative as could be imagined.

Students have used the facilities to build projects like BeatTable, an interactive music table that uses the relation between mathematics and music to engage learners in using ratios and proportions to create rhythms and learn about musical composition. It consists of a physical table with a digital environment that can be controlled by tangible instruments, that control auditory and visual feedback in real-time.

BeatTable provides learners the opportunity to build on their conceptions about music and proportions to discover new realms of beats. Technologies used included laser cutting, programming, video processing, video tags, processing and ReactIVision.

The Steps of Photosynthesis is an educational toolkit design to teach photosynthesis to middle school students. If the correct step is placed in the correct order, an LED lights up to show the student is correct. If a wrong step is placed, the LED does not light up. The project was made using laser cutting, GoGo Board and electronics.

Varied the projects may be, but the point



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of commonality and perhaps the point of the program itself is to inspire creative, problem solving thought and to take advantage of the learning around it.

## Consultative learning

The labs encourage a freer, consultative type of learning. Even a cursory look reveals a number of disciplines being touched on at once. Almost by stealth, students are exposed to maths and programming, combined with design and manufacturing within a practical context. It's also good fun.

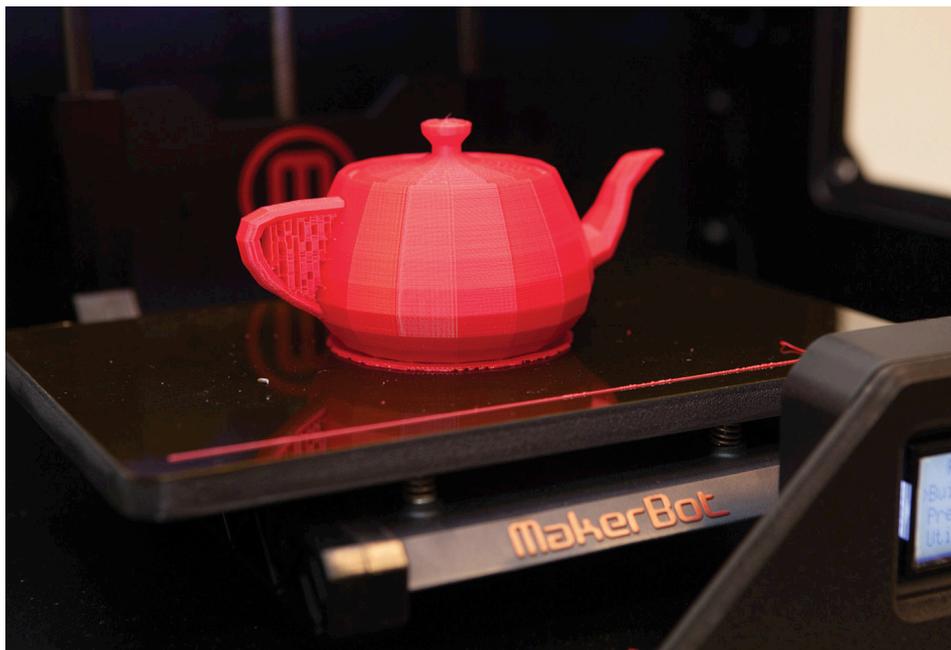
Dr Michael Street who coordinates the program at Lauriston says that this constructivist learning approach is an ideal way to appeal to different types of learners. This includes students who enjoy traditional classroom environments and students who like practical, hands-on learning activities.

"Students learn in different ways and the FabLab will have a strong appeal for all learners especially our more hands-on girls," he says.

As an industry, manufacturing has come a long way from the days of overalls and grimy faces, a modern facility is more likely to resemble an operating theatre.

"We need to expose students to the new type of manufacturing, which is a cleaner quieter process. That has appeal to both sexes," Street says.

As of now, Lauriston is the only girls' schools in the country to have an advanced design and manufacturing facility available to its students.



The facility is equipped with 3D printing, CNC routing and cutting equipment which runs off industry standard CAD/CAM software.

FabLab Technician Jeremy Kemp says that while the equipment prescribed in the Fablab program is quite expensive, operation and set up hasn't been as problematic as might have been imagined.

"Basically the 3D printers run in a very similar way to regular printers, they're a lot less complex than the photocopying, binding and collating machinery we run in administration."

Autodesk software will drive the design and manufacturing process, most of it downloadable free. The stripped down version that students will initially use is very easy to learn and software is well suited to the iPad and its touch screen.

#### Physics, music, languages...

Lauriston's FabLab is soon to take its first classes, and because the program is so new Street admits it's a process of jumping in with both feet and developing and streamlining the labs activities on a rolling basis.

"We're working on our lesson plans now and we want to make sure that what happens in the lab is pertinent to the curriculum. There will be an element of 'blocking' where part of a class will work in the classroom and others on

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related work in the FabLab.

"I am currently printing some propellers. That will be both a design and manufacturing process as well as a link to our physics program investigating energy and different types energy transfer.

"It's not about producing stand alone projects. We've had the music department visit and there's scope for an investigation into the making of a flute. That will lead to conversations about the size of a flute's holes and the notes that will be produced, which is pure physics," he says.

The language department has also visited and the lab will be using its CNC laser cutters to produce Chinese characters to help students familiarise themselves with the trickier ones.

#### Assessment

Assessment will be another challenge given that much of this is new ground. "I have been in contact with Stanford and asked them this very question. The truth is that because this is all so

new, no one really knows how to assess learning in the FabLab. We will probably have to take the approach of Drama and the other technology teachers who work from an assessment of process; students will be asked: 'What did you do in the design phase? Why did you choose that?' and asked to justify those choices.

"Most of the girls use mobile phone and technology every day, but those devices are only as smart as the programmers and designers, I want them to get interested in and investigate what was required to get those pieces of technology to where they are," Street says.

"Even if they don't have a high direct competence in a technology then at the very least they'll have a good practical understanding of it."

Learning the skills in high tech manufacturing will take some doing and by starting them young at Lauriston, in Year 5, students will be expected to have a very sophisticated understanding of the equipment and software by the time they are at senior level.

"When the girls enter science and engineering courses they will arrive with a strong competency with modern manufacturing processes which should lead them to push boundaries," Dr Street predicts

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