

PROFILE

Maths Craft



A Maths Craft volunteer (in red shirt) explains the topology of the Mobius strip to curious visitors at the Martinborough Maths Craft Day in 2019.

Maths Craft was born out of a collaboration between Jeanette McLeod, from the Department of Mathematics and Statistics at the University of Canterbury and an investigator in Te Pūnaha Matatini, the Centre of Excellence for Complex Systems and Networks, and visiting UK academic Julia Collins. Combining their love of craft and mathematics, Jeanette and Julia first came up with the idea for a public event in early 2016. When Jeanette approached Te Pūnaha Matatini for sponsorship for an event later that year, they told her to “think big” and agreed to underwrite the first festival. It has now become the most successful mathematics outreach programme in recent New Zealand history.

The first event was held at the Auckland Museum in September 2016. Jeanette and Julie brought together a team that included Nicolette Rattenbury from the University of Auckland, Phil Wilson, another mathematician at Canterbury, Sarah Mark, a PhD student at Canterbury, and a small army of student volunteers. But despite offering the venue for free, the Museum wasn’t quite sure what to make of the event. It was quite unlike anything they had hosted before.

Jeanette and her team set up a series of craft stations around a room at the Museum, each staffed by one or two volunteers. At one station you could learn how to French knit a tube, learn about the mathematics of knots, and then use your French knitting to make those knots. Other stations involved activities ranging from origami to the crochet of Mobius strips. I went along on the Saturday of that weekend and was amazed to watch an audience of pre-teens and teens listen intently to a 45-minute talk on the proof of the four colour theorem, while their parents knitted or did origami. Jeanette and her team had tapped into a completely new audience for mathematics in a very different way.

It turned out that the Maths Craft festival was the most successful externally organised event held at the Museum that year. It attracted more than 1800 visitors that weekend, making it one of the largest mathematics outreach events to take place in New Zealand. The Museum later told us it was also the largest and most diverse audience they had had for an outside event that year. It even made the evening news on Television New Zealand. It was a revelation.

The team was invited back to the Auckland Museum in 2017, and were given the Museum’s largest exhibition space, the Event Centre, for three days, once again for free. This festival attracted more than 3,400 people. The team has also run day-long events around the country: the 2017 and 2018 Christchurch Maths Craft Days in The Great Hall, the 2018 Dunedin Maths Craft Day at the Otago Museum, and the 2019 Martinborough Maths Craft

Day in the Martinborough Town Hall. These events have attracted more than 5000 people. More recently the team has begun to build a relationship with Ngāi Tahu, a highlight of which was co-organising an ethno-mathematics wānanga at the Te Wheke Marae in Rāpaki in 2019.

In 2018, in response to requests from school teachers, the team ran Maths Craft in Class, a pilot programme of professional development for school teachers, to help them bring Maths Craft to their maths class. Workshops were held at the 2017 Primary Mathematics Association Seminar Day in Auckland with 60 participants. Maths Craft has produced over 30 instructional handouts on the mathematics of a range of crafts; these are the cornerstone of their events and are available from their website (see www.mathscraftnz.org/resources).

The depth of engagement that Maths Craft events achieve is unmatched by any other medium for science communication. Adults and children spend hours at events, learning mathematics and participating in hands on crafting. The learning that takes place is not limited to facts and concepts – participants actually learn what it is like to do advanced mathematics, and often learn how mathematics underpins things they already know or are skilled at. It is difficult to think of a comparable medium for mathematics outreach (even science outreach for that matter) that blends learning and engagement in this way.

Maths Craft has now become a flagship public engagement programme, having reached more than 10,000 people and continuing to grow in popularity. The team has obtained several Unlocking Curious Minds grants to build on their early success and it can now claim to have a national profile. Jeanette and Phil won the New Zealand Association of Scientists Cranwell Medal for Science Communication in 2019, and later that year Jeanette was invited to be one of four plenary speakers at the New Zealand Maths Colloquium. Julia is now based at the Australian Mathematical Sciences Institute, where she now runs Maths Craft Australia, while Jeanette and Phil are still running the original Maths Craft here in New Zealand.

It is also important to note Maths Craft's influence on a wide range of young mathematicians and scientists who volunteer at the event. For many, this is their first experience in science outreach and communication, and several have gone on to excel at further outreach activities. Tristan Pang, an undergraduate physics student at the University of Auckland, was one of Jeanette's volunteers for the 2017 Maths Craft event in Auckland. He went on to become one of forty finalists in the global Breakthrough Junior Challenge out of ten thousand entries. Through Maths Craft, Jeanette and Phil have trained and motivated an army of young science communicators.

The team also has a commitment to a rigorous evaluation of each Maths Craft event. For something that is largely organised in their spare time, it would be very easy to forgo evaluation of the events. However, participants are surveyed before and after they participate in an event to gauge impact on their perceptions of mathematics and to improve the way the next festival is run.

Maths Craft is motivated by a desire to share a passion for mathematics with a wide range of people, both adults and children. Maths Craft events have resonated with a very diverse audience, in terms of age, ethnicity, gender, and socio-economic background. It should not be underestimated how much time and energy has gone into making Maths Craft work: for events of this size, their budgets have been small and the logistics have been formidable. Only a team with real dedication and drive could have pulled these festivals off and made them the success they have become. It is remarkable that Jeanette, Phil, and their team have done this largely out of work hours, taking annual leave to prepare and organise the major events, and giving up entire weekends to run them.

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