*MAKE IT COUNT*

BIG DAY OUT

HEALESVILLE CLUSTER

4 September 2012

* What happened at the Big Day Out?
* How do we build partnerships and relationships in Indigenous Mathematics education?
* What curriculum and teaching can be used?
* Is there a way to achieve deeper, more realistic engagement when intersecting with community, teachers and students?

On 4 September 2012 students from the Healesville *Make it Count* Cluster gathered at Worawa Aboriginal College for what was termed the Big Day Out. The students came from Worawa, Healesville Secondary College, Healesville Primary School and Badger Creek Primary School. The day commences with a smoking ceremony and Acknowledgement of Country. A welcome was given by Worawa Principal Lois Peeler, and local Wurundjeri Elders Uncle Roddy Briggs and Aunty Dot Peters participated. All students participated in a Yarning Circle in which the story of Coranderrk was shared.

Uncle Roddy talked about how the Coranderrk settlement came into existence in 1863 when Aboriginal people were forced from land around Melbourne and in the districts where white settlers were establishing farms. It was formally closed in 1924 when the land was taken by more farmers. Uncle Roddy talked about the massacres and he sense of dispossession, initially when sent to Coranderrk and again when forced away from that land. He also talked about the day-to-day lifestyle of the ancestors who lived in the area. “There were a lot of scarred trees because they would cut the bark off the tree to make a canoe, or coolamons to carry water or food,” he said. “A lot of the grasses around here were used for weaving baskets and making fish traps. This actual garden has a lot of the bush tucker foods they used in those days and plants from up in the hills like mountain peppers. They made stone axes and stone knives.” Uncle Roddy demonstrated how stone knives and axe-heads were made, and students were given stone tools to hold and examine.

Subsequently the students split into four groups and worked across four rotations. Each activity married Mathematics and culture.

1. **Basketball.** *Make it Count* Patron Dr Chris Matthews from the Faculty of Environmental Sciences, Griffith University, devised an activity where students were split into two teams. Each team competed to be the first to work out the value of three variables. Basketballs were thrown at a hoop from three positions, designated by a red, blue or yellow marker. Each team was given three trials. Each team member had two shots per trial. The tally of baskets from each marker was recorded, after which Dr Matthews gave each team the overall point value of their trial. Some students were able to solve the puzzle using trial and error – testing different number values and arriving at a hypothesis, then checking it on subsequent trials.

This is what happened on the first rotation when Cira, a Warawa Year 9 student, sat down and tested different number values. In trial one they scored two yellow baskets, two blue baskets and two red baskets for 20 points. In the second trial they scored the same on the yellow and blue baskets but only one red basket for a total of 16. Dr Matthews then drew the relevant algebraic equations, and showed the students how because of the way the data was spread, equation one could be subtracted from equation two to isolate one variable.

2. **Maths is everywhere.** Critical friend Andrew Peters and AAMT National Manager Indigenous Programs Caty Morris talked with students about finding Mathematics in the everyday environment. In the observed rotation, Mr Peters showed students various photos including seats on a dreaming trail, ceremonial poles and native vegetation and asked them to find the mathematical aspects. One photo showed a bridge made of four planks. Some students mentioned features including length, height and the number of nails. One student suggested that it could illustrate fractions, with each plank being one quarter of the bridge. Students then used iPads to take their own photos in the Worawa environment, which were then analysed for mathematical content and shared with other students.

3. **Maths in Art.** Worawa Aboriginal College Head of Teaching and Learning Ann Baxter displayed a student artwork that included traditional motifs. Students analysed the elements in the painting, which were then rephrased in mathematical terms. A discussion about using maths in art touched on ideas such as shapes, patterns, multiples and angles. Ms Baxter said, “Art is part of culture, and it is about telling a story, with a message the artist wants passed on. It could be something like a map expressed in art.” She explained that, in a similar way, some stories can be expressed through maths.

Pieces of paper and art materials were distributed and students were asked to draw their own story, enumerating things that matter to them. These artworks will be used at the different schools where students will analyse their own work and attempt to rephrase the information mathematically.

4. **Maths in culture.** Some groups did flax weaving with Aunty Dot, and others made Mia Mias (humpies) or spears with Uncle Roddy. The Elders told stories while they worked.

At the culmination of the day the groups came together for final reflections. Students completed evaluation sheets for each activity. Aunty Dot told the gathering that, “True Aboriginal culture is respect, caring and sharing.”

Throughout the day there was a high level of student engagement. Several teachers from different cluster schools remarked that their students were more focussed and involved than usual. A few students spontaneously expressed their enthusiasm for mathematics. Cira, the Worawa Year 9 student who wants to become a paediatric neurosurgeon, said, “I think maths is a bit like playing football because of the adrenalin rush it gives you when you solve a problem. I love algebra and trigonometry.”

**Andrew Peters**, a Wurundjeri and Yorta Yorta man who lectures in Indigenous Studies and Tourism at Swinburne University of Technology, was both a leader and observer on the day. “The teaching of mathematics is a non-Indigenous construct,” he said. “The idea of ‘maths’ as a label is not something that belonged to Aboriginal people but it is an inherent part of living – so you can’t learn in an Indigenous context without encountering some level of maths. Most Indigenous cultures around the world have known maths and used maths, but just haven’t used it or defined it the way we have in the Western educational system. Part of what we were doing today with the kids was showing them that there is maths all around them, there was maths in the things their ancestors did, and that maths is an integral part of everyday life.

“I believe that with Indigenous ways of learning, everything is tied together rather than the compartmentalised Western concept which puts maths here, English over there, etcetera.

“Having Elders participating in a day like this adds that level of legitimacy so what we are teaching is much more like true Aboriginal culture rather than the non-Indigenous representations of the culture that our history books are full of. Essentially it is the only way the culture continues because to me my Mum (Aunty Dot) is a direct connection to her grandmother, who was born in this area – we think – in the era when Coranderrk was operating. My great-grandmother learned how to live off the land and learned those traditional things, so the next generation – Elders like my mum (Aunty Dot) and Uncle Roddy – are the connection we have to the past.”

**Dr Chris Matthews**, a Noonuccal man, is the first Indigenous Australian to earn a PhD in Applied Mathematics. “Our kids are smart kids.” He said. “There’s no reason they should fail in maths. This suggests to me that it is a systemic problem, not a problem with the children. This country was founded on the idea of land belonging to nobody. Aboriginal people were irrelevant, and that feeling of not having something or being something that is valued continues. I have read papers in academic journals arguing that maths can not belong to Aboriginal people because it was not part of their way of thinking or culture.

“Countering that, firstly, is the idea that maths belongs to everyone and it is everywhere. Traditional Aboriginal people did not see maths in abstract terms, but it’s the thinking and the ideas behind it that is so important. It might not have been expressed as ‘x-squared’ or using ‘a’s or ‘b’s but those ideas sat in peoples thinking. There was a CSIRO scientist who wanted to find out about Indigenous ideas of astronomy. It is documented at [www.emudreaming.com](http://www.emudreaming.com). He writes about the maths involved in that understanding Elders have of the stars, knowledge of connections between moon phases and what happens on earth and so on. Now, that knowledge was handed down through song and dance which is the total opposite of looking at a textbook about angles and measurements etcetera. I have no understanding of that concept – what a song and dance must be like to teach moon phases – but my mind boggles at that stuff.

“For me to even think about making connections between maths and culture, you have to think about what culture is and what mathematics is.

“I don’t think many people talk about what mathematics is. I read a lot of education stuff and it is still stuck in the textbook mode. That is the epistemology of the Western world where they want to break things down into segments, but maths to me is about more than that. It is about connections and relationships, things that are more important, and that’s where culture comes in.

“All cultures create abstractions – that’s what song, dance, language is. When we see something, we create something to understand it. Maths comes from our reality of our world; when we see something of interest and create an abstraction, we might call that abstraction number, or scale – maths. We can call it what we want, but it is still connected to that reality. Maths can be about clouds colliding in the sky or pollution moving down a creek or animals in a hunting area. If you have an abstract reality you have to reflect back on it to make sure it makes sense, and when that happens you create a beautiful cycle.

“Most students only experience that abstraction phase. We talk about number as a separate entity, algebra as a separate entity, and there is no connection at all. How can we get students to start experiencing that whole cycle where they can be conventionalised into what we need to teach, in a language that people can understand? What journey of creativity is needed to arrive there?

“We don’t allow kids to go through that arc – to experience it, to think about it, to draw pictures about what they are understanding and seeing – and then connect that to maths. Then to go that further step and create that reflection process where we ask, Does it make sense for what I’m doing? Can we do something else? Can we do it better? Can we predict things? That is why people came up with maths, to help answer these questions.

“We make stories to explain the world, and that is where I came up with the idea of maths as storytelling. Allowing kids to understand the basis of it first and then connect with mathematics. That is where I see the connection of maths and culture. We all have a cultural propensity to do certain things and understand things in certain ways. We can use that to teach the conventionalised mathematics that we know about.

“One thing that annoys me in education is people saying you need to learn mathematical language – when what they mean is a bunch of English words in a list. So a lot of maths teaching becomes the idea of having to appropriate things that are foreign to you rather than using your own means to get there. There might be more imaginative ways to approach this that go outside the confines of those established English words. If you allow a child to talk it’s amazing what they can do. In education it is like we think children are empty vessels that are just there to be filled, but every human being wants to interact. We need to structure it as a two-way thing.

“Some of today (the Big Day Out) was about getting kids to think and create. Some activities were about representations. There were exercises in creative thinking. The Elders were here partly to see if by sitting down and weaving or by constructing the humpies we could do more with the maths. It was also a chance for kids to connect with local Elders, which they might not have a lot of opportunity for. It was a chance to hear a story while they did the weaving and a chance to give the kids information that their culture is alive. Exposing them to that is important.

“I think ‘community’ means a lot of different things, and of course it’s an abstract notion in itself. From my experience I think a lot of parents in general, not just Aboriginal parents, have to really acknowledge that they are the primary teachers of their children and not just hand it all over to the school. A lot of parents have a lot to offer but don’t understand that. For Aboriginal parents, it is especially important if they want culture to be taught. As a parent, whether it’s building a humpy, weaving, cooking, out in the bush, you can talk through a lot of ideas and processes that kids can take to the school.

“It is important to create a community around the school with those ideas. Most kids come from an extended family of uncles, aunts, grannies, cousins as well as the nuclear family. If teachers understand where the child comes from they will have a richer experience at school.

This idea of culturally responsive pedagogy is at least partly about a space where you come together and talk about children’s education and how we work together.

“I want to reinforce that we’ve gone through a history of devaluing Aboriginal kids and their families. Now it’s a time to start valuing what the kids bring to school and who they are.”

[ends]