

Building Australia through Citizen Science

What place does citizen science have in our schools?

I pinched the title of this article from a paper published this year by the Office of the Chief Scientist. Professor Ian Chubb, Australia's Chief Scientist, alerted the delegates at the inaugural Australian Citizen Science Association conference held in Canberra this year – *Maximising the Capacity of Citizen Science for Science and Society* – to the fundamental importance of building citizen science in the community. We all listened very closely and no delegate could disagree with the assertion that:

"New technologies are enabling people in the community to collect data with more accuracy and precision than ever before. Smartphones can equip untrained citizens with the capacity for a high degree of accuracy in observations, allowing automated data collection and creating rigour through the potential of post-processing."

My only issue with the paper was that at no stage are schools, teachers or students mentioned. It seems obvious that the next generation of citizens could participate very easily in citizen science when a school empowers the teachers to focus students on *doing* something practical which is not just for the classroom but genuinely useful for the whole community. It gives everyone a sense of purpose.

Allowing students to take on an identity or role is an effective way of genuinely engaging them in learning, for many students have no idea what a scientist really does and cannot really imagine how to be a scientist. Citizen science has the potential to help students make the link.

However, school leaders, students and science teachers need guidance and tools. The Australian Citizen Science Association is keen to assist young people and schools, as are a plethora of government agencies in the fast-growing citizen science community. Engaging students makes sense to everyone keen to grow the community's understanding of science and ability to understand and work on solutions.

School leaders and teachers have an excellent opportunity to create the "Goldilocks conditions" where students can grow their scientific literacy while contributing to their communities as citizen scientists.



What is citizen science?

A Google search reveals the following definition:

"...the collection and analysis of data relating to the natural world by members of the general public, typically as part of a collaborative project with professional scientists"

However, I liked the definition given by the keynote speaker who took to the podium after Professor Chubb. Rick Bonney, of Cornell University, posited the following:

"Members of the public engaging in authentic scientific investigations: asking questions, collecting or processing data, and/or interpreting results."

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This sounds exactly what our students should be *doing* at school.

What sort of citizen science could be happening in classrooms?

Many would be inclined to say the kind of science that has students outdoors, wherever possible, collecting data to contribute and analyse back in the classroom. My 12-year-old daughter loves working in the school's garden and when she proofread this article passionately agreed that 'kids want to do something real, not just fill-in worksheets'. Most have a powerful, connected tool called a smartphone in their pocket that can be very gainfully employed to do something very real if the teacher has the right approach and uses the citizen science apps.

There are many resources perfect for nurturing young citizen scientists. These are often to do with wildlife or our environment and involve using smartphones to collect and submit data. One amazing project, theSkyNet, conducted by the International Centre for Radio Astronomy Research, will really engage students who are obsessive about technology and our cosmos.

After attending the conference mentioned in the opening paragraph, I curated a list of inspirational resources that teachers and students could easily use at school. They can be accessed here: <http://www.darcymoore.net/2015/07/24/citizen-science/>

How else could citizen science be nurtured?

We have a science club at our school who have been briefed by a representative of Birdlife Australia about collecting data. Holly Parsons is the program manager for Birds in Backyards and introduced the students to the "Aussie Backyard Bird Count" and discussed the latest research into urban birds. She showed them how to set up a monitoring regime and discussed potential project ideas.

Maybe some of the students in this thriving science club will go on to make a genuine difference in our community. At the very least, they are participating at school in a useful citizen science initiative led by their enthusiastic teacher, Troy Koglin, as bird atlassers.

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Should citizen science just happen in science?

National Geographic encourages student citizen scientists to participate in their Genographic Project, which employs cutting-edge genetic and computational technologies to analyse historical patterns in DNA from participants in an effort to better understand our human genetic roots. They have an emerging education focus that encourages schools to participate.

My Year 9 Big History class has been funded by the Centre for Archaeological Science, at the University of Wollongong, to participate using the Geno 2.0 kits. They have sent DNA samples off to National Geographic for analysis.

It will take two months for their DNA to be analysed and the data to appear at their personalised page at the Genographic site. This will not only tell them the migratory paths ancient ancestors followed thousands of years ago and what percentage of their genome is affiliated with specific regions of the world but also if they have Neanderthal or Denisovan ancestry. They

will also be assisting, as citizen scientists, to build on our total knowledge of the human journey by contributing the story from their DNA.

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The students will be receiving their results around about the time they commence Threshold 6 of their Big History course which explores early humans and collective learning. This seems symbolically significant as the nature of citizen science is yet another example of the human urge to share and cooperate. The students will have a very personal connection with our earliest origins as they will be able to see their own genetic route out of Africa.

Conclusion

Schools must engage young people in authentic, purposeful learning for a raft of very practical reasons, not least being to improve our stewardship of a fragile environment.

Citizen science is a good model to encourage student participation in processes that involve the collection of data and rational, evidence-based decision-making. The education systems of a properly functioning democratic state must encourage truth-seeking to maintain and extend civil society. This is more important than ever.

School leaders should be supporting and encouraging teachers to get their students *doing* science, or geography or maths rather than just learning about it. Australians need to be powerfully scientifically literate to participate in democratic decision-making processes.

Schools also have an opportunity to generate a great deal of very useful data for the professional science community in the process of helping students become citizen scientists but good educational leadership is needed if our youngest citizens are to be authentically involved in their own education and society.

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