

# The Alberta Science Teacher



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# Editor's Message

**I**t's my pleasure to take on the role of newsletter editor for the ATA science council. I completed a degree in zoology in 1995, and worked in the field and in labs at the University of Alberta as a research assistant for years after graduating, learning how data is generated and collected. When I came to the fork in the road that gave me a choice between a graduate degree and "other," I had a hard choice to make. The intellectual challenge of a path into academia appealed to me. But at the time, I had worked on enough studies on carbon cycling to understand that our world was being changed at a rate that was unsustainable. And I also saw that further data generated to support concern for global warming wasn't needed to prove something was changing in a way that put us at risk as a species. What was needed was the average person to understand the risks and consequences of travelling further down a path of unlimited consumption of fossil fuels, and an economic system that was based on rapid growth and consumption-based lifestyles.

Therefore, I chose to go into education. I figured it was the best way to change the future. I've done my very best to introduce my past and present Grade 7, 8 and 9 students to their curriculum over the past ten years, and to spark their curiosity and analytical thought processes. I've asked them to question and keep questioning and be critical thinkers. I've made flamethrowers for flame tests, and I've immolated gummy bears. At least a couple of my former students have gone into the sciences at university. That was my *why* for getting into the profession of teaching the next generation.

I've been privileged to work with Knowledge Keepers and Elders from a variety of First Nations over the past few years. My *why* has now changed. I see clearly the need for a decolonized curriculum—not only to support our First Nations, Métis and Inuit students, but also to support all students learning about the ways our world works from multiple perspectives and cultural backgrounds. We all know that using the scientific method with the best of intentions produces truths that are often fleeting. The first step toward making a new platform for teaching curriculum, at least in my mind, has to be opening ourselves to different perspectives and facing our own biases. I have attended sweats. I have taken part in full moon ceremonies. I have listened intently to people talking about how they see the natural world while examining the biases that I have held while seeing the same systems. All of it has helped me see my profession in a new and inspiring light, and I encourage you to take part in as many First Nations, Métis and Inuit ceremonies as you can to connect even deeper to the natural world we all love.

Let's keep sharing resources and experiences. Let's keep inspiring and supporting one another. We've got this. We have one of the coolest jobs in the schools. Wear those lab coats proudly. Keep those nerdy memes refreshing as your computer background. Thanks for reading this newsletter. I'm looking forward to seeing your future contributions!

**Rachel Mount**

# My First Steps: Indigenous Education and My Classroom

Over the 2019 winter semester I have begun a journey to integrate Indigenous knowledge into my science classrooms. Initially I was fearful, worrying about tokenizing a culture that I respect and apprehensive about my own knowledge of the topic. Nevertheless, I ventured on. I am fortunate to work in a large Edmonton school that focuses on community building; and community is key when discussing the incorporation of Indigenous knowledge in our classrooms. With this in mind, a few of my colleagues attended a session held by the University of Alberta's Centre for Math and Science Technology Education (CMASTE) and came back to our staff to share what they had learned. They discussed the need for a strong foundation, but most important, that the integration of Indigenous knowledge must be authentic. And for me, authenticity is key. I am still reflecting on the past school year, but nonetheless wish to share how I have thus far attended to Indigenous knowledge in my classrooms in case any other science teachers are as anxious as I am.

In my Science 20 classes, during the biology unit (see program connections below), after teaching about the flow of energy in our environment, I discussed not only the impact of the bison but how bison were so relevant for the plains people of Alberta. I then began a discussion on colonization and why the bison were killed. The conversation then flowed to discussing spirit, the importance of bison to all aspects of life according to the seventh generation principle and what the removal of the bison meant to our landscape and our spirit.<sup>1</sup> The next day I checked in with my students, asking why the bison were so important; I am proud to say that the first

response my students had was in connection to Indigenous peoples. During this unit, we also discussed biomagnification,<sup>2</sup> so naturally we discussed birds of prey. I also brought in speakers from the Beaverhill Bird Observatory; during these discussions, one important bird that always comes up is the eagle. Discussing the eagle leads to a natural, genuine conversation about eagle feathers. During these many conversations, students have shared their personal stories with their peers. What I have learned from my colleagues is that these stories and the ability to share their thoughts and learnings via stories is very important in Indigenous knowledge. Their stories have ranged from discussions about their experiences with medicine men and why the eagle feather is important to what spirit animal they are and why spirit is important. These conversations generated a class discussion that connected all of my students, as many have come from countries that have also experienced colonization. It is my belief that these conversations stemmed from the community created in my classroom as well as the school at large and the respectful discussions we have within these places that are both safe and inviting.

In my Science 30 classes, I took a different approach: after their first unit exam, I asked them to set a goal about what they would like to attain for their next unit. I then introduced a version of the medicine wheel that addressed not only mental, but also spiritual, physical and emotional aspects of self. We then discussed how important it is to be balanced, and I gave them examples from my own life and goal-setting experience, using the wheel. Next, I asked them to create their own wheel and place their own goals in each part



of said wheel. They handed in their wheels, and I photocopied them and placed them in my classroom as a reference (with no names) for the rest of the term for all to see. I was so impressed with what my students wished to prioritize—for example, make sure I sleep, go for a walk, the need for a stress ball, stand up and walk before I sit for a test, eat healthily, meditate and deep breathing. For me, my students' well-thought-out responses highlighted how quick and ready they are to think beyond their grades and strive for an understanding on how to become a well-rounded individual. So many of my students suffer from anxiety and many other mental health disorders, and the wheel provided the opportunity to shift the focus away from grades and instead emphasize the whole. What is important to me is that this discussion helped my students to understand the need for balance among the many aspects of their selves in their future lives.

As mentioned, this is a journey that I have just begun. I know I will continue to grow and explore, but what I have learned thus far is that if I am open, so are my students. Like many of my colleagues I am anxious, but less so than I was last year. What I learned last year from my students is that not only are they excited to discover more about Indigenous knowledge in their science classroom, but also that it is my responsibility to continue to infuse Indigeneity when there is an authentic moment. I plan to continue to use the medicine wheel as a reflection tool. I am excited to see what the next year brings.

## Program of Studies Connection

Biology 20, Unit D: Changes in Living Systems  
General Outcome 1

20–D1.4k—describe the potential impact of habitat destruction on an ecosystem

20–D1.5k—describe the effects of introducing a new species into, or largely removing an established species from, an environment; eg, zebra mussel, carp and the Eurasian milfoil in Canada's lakes, purple loosestrife in Alberta, the horse or the buffalo in the plains region of Alberta.

## Notes

1. Today, the *seventh generation principle* generally refers to decisions being made about our energy, water and natural resources, and ensuring that those decisions are sustainable for seven generations into the future. In my classroom, I use this as a discussion prompt about our natural resources. For example, if people had considered the seventh generation principle then, would they have hunted the bison to extinction? Then I ask, "Looking forward seven generations, what do you think our land will look like? What should we do now?"

2. *Biomagnification*, also known as *bioamplification*, is the increasing concentration of a substance, such as a toxic chemical, in the tissues of organisms at successively higher levels in a food chain.

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**Monica M Chahal**

# Preteaching Vocabulary in Science

As science teachers, we know that comprehension of scientific vocabulary is important for understanding content and for communication. Preteaching vocabulary is an important strategy in helping students improve their understanding of course material. However, in the context of Biology 20 and 30, I have found that preteaching vocabulary without the associated context does not work.

One strategy I have used to overcome this challenge has been to use short videos that students preview before coming to class. To use a specific example, in Biology 30 during the nervous system unit, I use a number of *2-Minute Neuroscience* videos from *Neuroscientifically Challenged* ([www.neuroscientificallychallenged.com/2-minute-neuroscience-videos](http://www.neuroscientificallychallenged.com/2-minute-neuroscience-videos)).

Each video is less than two minutes and teaches many different concepts that we cover in the nervous and endocrine systems unit of Biology 30. To help with preteaching vocabulary, I have my students watch the video and highlight on their vocabulary list the words used in the video. Often there are one or two questions posted on my classroom learning management system for them to check their understanding, and I then decide if they need to rewatch the video. Once they have identified the key words, they begin to write out their flashcards as an example before class. Because they have the accompanying explanation, students come to class having some exposure to the terminology and can now focus on the science that surrounds the words, and not just the words themselves.

Tracy Onuczko

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## STEAM Meets Design Thinking

Using design thinking, students were given a task challenge. Design thinking is a process for problem solving in a creative way. Prototypes are created, tested and re-created until a goal is achieved. The goal for this project was “To create a machine that will draw with *no* human touch.” Materials to be used were electric toothbrush,

tape, markers, paper, pool noodle and student imagination. This STEAM (ie, science, technology, engineering, art and math) project can be viewed at <http://perehak201819.edublogs.org/2019/05/06/s-t-e-a-m-art-bots/>.

Peter Rehak

# Book Review

## *The Immortal Life of Henrietta Lacks*, by Rebecca Skloot

Broadway Paperbacks, New York 2011

I was admittedly far more familiar with Henrietta Lacks as the HeLa cells I learned about in university than with the woman the cells came from. Like the author, I was intrigued by the story of a woman who was rarely cited by name despite having a significant role in the earliest years of cell culture. *The Immortal Life of Henrietta Lacks* explores in impressive detail the life of a woman who suffered both from a culture of institutional racism and through an era where the rights of research subjects were nonexistent. Rebecca Skloot explores not just the life of Henrietta herself and the life of her family, but also the significant developments of ethical concerns in medical and scientific research. Written following extensive interviews with the remaining Lacks family members, medical and research files, and even the journals of Lacks's daughter, the book paints a vivid picture of the woman's life and her death from cervical cancer.

Exploring the intersection of class and race in the United States in the 1930s and 40s as a part of the larger development of ethical medical research contrasts greatly with what we think today of research ethics. The book touches on the Tuskegee syphilis experiment, and the lasting

effect it had on African-Americans' view of the health care system and the broken trust between these communities and those sworn to first do no harm. Starting from an era of research on cells and tissue samples obtained from biopsies without consent, questionable explanations of the procedure being done and misleading claims of why blood samples were being taken, we see the development of the rigorous consent processes of today and modern concerns about medical privacy.

The book does a fantastic job exploring not just the story of source of HeLa cells, but also the resistance of the research community when confronted with the uncomfortable truths of their work. Development of early immortal cells lines like HeLa were the basis of expansive amounts of research in the areas of vaccination, cancer research, HIV/AIDS research and gene mapping. Work with HeLa was also critical to the discovery of the link between HPV and cervical cancer, work that led to a Nobel Prize. Overall, a great read that balances science literature and human interest for all of us science nerds.

**James Slattery**  
Vice-President ATASC





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