

Reimagining the Science Classroom: Building Indigenous and Non-Indigenous Partnerships

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Abstract

This article examines factors that are limiting the effectiveness of science education among Indigenous learners. The science classroom requires a fundamental change in its structure. There needs to be an increased focus on defining and examining Indigenous knowledge, on incorporating activities that meet relational needs by using traditional Indigenous ways of knowing, and on the appropriate synthesis of multiple cultural views within the Western science curriculum.

The scientific method can be an incredibly enjoyable endeavour, being hands-on while also providing structure. My six-year old son loves working with me on different science experiments. He enjoys experiencing how things work, classifying and quantifying, and the structure provided by the scientific method. However, the formal science classroom has not really changed much since I became involved in education in the mid-eighties. While in some urban areas this may be satisfactory, in the predominantly Métis school where I work, learning is hindered because science education needs to change. The curriculum should be less focused on formal classification systems and more focused on students' experiences and fostering a sense of belonging. To begin meeting the needs of Indigenous learners, one must understand their perspective and how to meet their needs within those experiences. Finally, the science classroom can be enhanced by embedding and balancing Indigenous practices with Western science knowledge. My son may be thriving in a very structured science environment, but I am no longer sure that it is the best way to learn or to teach science in all situations.

Problems in the Science Classroom

Imagine that within every effective school there is a community that fosters the diversity and well-being of each individual. Within these schools, the administrator invites partnerships with the community, parents support their children by helping them to reach their goal, educators welcome students while providing an environment free from discrimination, and all students arrive with an eagerness to learn and cooperate with each other. While I believe that many schools are attaining most, if not all, of these positive characteristics, there are schools that are having difficulty sustaining these characteristics. These schools are unable to provide diverse students with meaningful relationship because trust is hindered due to the lack of meeting the needs of Indigenous students, caused in part by cultural barriers and lack of knowledge of many educators. The current philosophies within the Western science classroom do not provide support or equal opportunities for every learner, because there is little to no connection with different cultural views. The school is not effective and fails its students.

I learned early in my career that building relationships and fostering students' sense of belonging is vital to be a successful teacher. However, it is becoming clear to me that there are characteristics that shape relationships into something deemed professional, and restricts conversations that focus more on curriculum than on the individual (Brendtro, Brokenleg, & Bockern, 2002). My way of thinking centres on my experiences, how I grew up, and what I was taught throughout my education. I had always felt safe in my environment, having been given many privileges that, on occasion, I take for granted. Safety, I now know, should be the foundation for building community and fostering relationships. The sense of belonging for many of my Indigenous students is not being fulfilled because safety is lacking in their home lives.

Safety is more than just being free of experiences that can harm a student physically; it emotionally connects them, implores them to trust another person, and is necessary for students to have positive relationships (Brokenleg, 2016). I will still value curriculum and incorporate it in diverse ways, but there is more to teaching that I need to learn and bring to the table. Although it will be difficult to make the shift from a curriculum- and percentage-based science classroom to one that is more focused on students' relational needs (Van Bockern, 2018), I know that it is becoming increasingly important to make this change.

Educators must be balanced, respect individuality, and accept differing cultural traditions. Canada's school system attempts to incorporate a shared belief system, it must eliminate all forms of discrimination and provide equivalent opportunities to all learners (Halstead, 2007). Perhaps inadvertently, Indigenous students' needs have been stifled in the Western science classroom. These individuals have not been able to learn within their traditional setting, and have often had their prior teachings subdued in order to maintain the Western characterization of what it means to be scientifically literate (Aikenhead & Elliott, 2010). In addition to these factors, Indigenous students value socialization with their peers in order to learn from one another and promote independence from adults (Rahman, 2013). Structuring education to include peer learning contradicts the idea that the curriculum provides all the structure needed for optimal learning. Teachers often focus on diversifying the curriculum in order to promote learning for all, but in turn are hindering the learning of their Indigenous students as they require more peer directed socialization. Teachers have been taught early in their career to provide differentiated instruction, but rarely have they developed skills necessary to give up their "power" and enable students to learn from their peers through cooperative and conversational partnerships (Brendtro et al., 2002). The notion that as a teacher I am promoting, perhaps inadvertently, the suppression of my Indigenous students is a scary thought and one that I am willing to reconsider moving forward.

Current philosophies in science attempt to provide goals that are attainable by all individuals, provide a framework that promote positive student engagement, and meet the needs of the scientifically literate. The science action plan focuses on three main goals: improving student's scientific literacy by providing meaningful activities, supporting schools with the motivation of students, and enabling teachers to enhance student engagement by making science relatable to the ongoing demand of jobs in science (Manitoba Education and Training, 2017). The problem with these goals is that educational opportunities do not incorporate meaningful Indigenous practices and strategies into the classroom, and there is no widespread acceptance of them. The curriculum encompasses many historical contributors to science, but has few ideas coming from the Indigenous community. Rarely is there recognition of Mother Earth as the teacher, of using all of their senses to explore nature, and of fostering learning of the world around them (Hatcher, Bartlett, Marshall, & Marshall, 2009). In order to move forward, the science curriculum needs to adapt and synthesize Western ways of knowing with the knowledge presented to us from Indigenous Worldviews.

It is abundantly clear that moving forward the education that I will be offering in my classrooms will extend beyond what I have learned in my own education. I will focus more on strengthening individual relationships in my classroom, by making meaningful connections with my Indigenous students. I must continue to learn more about the needs of my students and foster an environment that focuses on emotional safety. I will motivate myself to learn more about making meaningful connections between the perspective of Western science and Indigenous ways of knowing. This is impossible in our current conventional Western classrooms because not all are able to maintain their identities, but instead are forced to form new ones that are defined by the goals and experiences within the educational system (Rahman, 2013). Positive change requires incorporating effective and sustainable goals that protect cultural values and ensure well-being that extends beyond the curriculum.

Addressing Problems in the Science Classroom

Hope is not lost. Our education has a number of increasingly valuable and sustainable practices that can be done to ensure success for all. The partnerships between the school system and the community can be enhanced if we strive to understand our context of common goals, while enhancing our inner being through appropriate culture and spiritual developments (Halstead, 2007). These common goals start by creating trusting and respectful relationships that accept diverse backgrounds and cultures. In order to further these relational links, students should be encouraged to explore science by building on individual experiences and interacting with nature. Finally, it is important to respect diversity and integrate Western science curriculums with Indigenous Worldviews. Classroom goals should be balanced between multiple Indigenous and non-Indigenous teaching strategies. These changes in my science classroom will provide exciting experiences for all, ones that ensure positive growth with trusted relationships and create healthy environments.

Indigenous content in our school systems has been met with a myriad of positive and negative factors that have made it difficult for non-Indigenous participants to connect in a consistent and meaningful way. A main component that is lacking is the framework that intertwines the new culture within the context of the pre-existing one without damaging what makes each culture special. In order to form respectful relationships in the science classroom, we need to embed the “two-eyed seeing” notion. This notion promotes the positive values from each culture at the same time by viewing each perspective separately, then finds a common goal by using both lenses (Hatcher et al., 2009). If we truly respect ourselves and celebrate our differences by providing a safe space free from prejudice, we will harness genuine trust and form incredibly powerful partnerships with all students. Once teachers have established trust, we will be positioned to structure our classroom in such a way that meets the educational needs and learning styles of our students.

Once meaningful relationships are paramount in the classroom, the focus shifts to other essential needs that may be suffocated by a student’s experiences. Often, Indigenous students have had their needs overlooked, because they have been placed in a classroom that is different from their own cultural views. To prevent further isolation of Indigenous learners and to pursue being an effective science teacher, I must first recognize that we reside within the historical and current homelands of Indigenous peoples (Calderon, 2014). Through my acknowledgement, I may help to break down some cultural barriers that have been preventing my students from developing their needs. I also need to be aware that combining two cultures does not mean losing the parts of each culture that make meaningful connections for our students, but rather should focus on providing alternate outcomes that strive to excite conversation and promote diversity (Habib, Densmore-James, & Macfarlane, 2013). While the outcomes learned through using the scientific method are vital to Western science, experiential learning is vital to Indigenous learners. These two ideologies do not compete and can be used together by providing opportunities to learn from the land or within sharing circles. Incorporating multiple cultures at the same time will require educators to change how they fundamentally teach. They will need to attend professional development opportunities to learn about the values within each culture, while understanding the diverse learning styles within those cultures. Educators will then need to implement strategies focused on the diverse needs, instruct in a way that implores both independence and connectedness, and communicate effectively by being aware of the nonverbal cues that may be potentially harmful and disrespectful in some cultures. If I want to teach science effectively, I must refocus. I must continue learning about the needs of my Indigenous students, and provide them time to express their knowledge in a meaningful way. I must also incorporate ways that will blend my Western scientific knowledge within the context of Indigenous belief systems.

Science education has the capacity to change within the framework of inclusion by balancing educational perspectives from Western society with those found within Indigenous

communities. Restructuring my classroom to enhance the understanding of land in Western science classrooms as being empirical and calculated, while also providing discussions and sharing stories about the spiritual nature of the world, is one aspect of teaching that I can change immediately, thus meeting the needs of all learners. If I marry the ideas of Western science with the Indigenous idea that land is alive, connects everything, nurtures growth from within ourselves, and can teach and shape us (Datta, 2018), I can empower my Indigenous learners. The science classroom would also be enhanced if I enabled students to feel valued for their culture and to take ownership and pride in their community. I would also need to do this without implying that I am an expert on Indigenous culture or using Indigenous teachings without appropriate background knowledge (Freeman, McDonald, Morcom, 2018). If I were to incorporate traditional Indigenous practices, such as sharing circles focusing on Indigenous storytelling, I may reduce the learning disparity between Western and Indigenous students by providing valuable experiences for all learners (Datta et al., 2015).

Looking forward a few years, my classroom will be changed at its roots, and I will be a more effective teacher. I will communicate better in the lessons that I share. I will no longer focus solely on the empirical and measurable aspects of the science classroom, but also include Indigenous storytelling and ways of learning that involve the care and fostering of how students view themselves, how they interact with their peers, and whether they are making mature and healthy decisions that will better the community as a whole (Whitaker, 2004). The relationships in the classroom are based on trust and respect for diversity. All students' needs are being met through a combination of appropriate teaching practices that focus on individual learning styles and acknowledge that our differences are what makes each one of us special. The classroom will be further enhanced by exploring the world around us through multiple cultural perspectives, enabling individuals to share their unique stories. Attainable goal-setting is paramount in education and, if there are to be positive partnerships between the Indigenous and non-Indigenous communities, the science classroom needs to adhere to a two-eyed seeing notion. Each culture has merit, and applying strategies from each culture is important for sustainable growth and harmony among these cultures.

Conclusion

When I imagine a science classroom, I envision students with a curiosity that extends beyond the work that is in front of them. I see students who ask thought-provoking and insightful questions, then develop strategies to solve those problems. It never occurred to me that I was not emotionally connecting with all of my students, thus not enabling all learners to generate those insightful questions. I was unaware of how decolonization has impacted our Western school system, the implications that it has in my science classroom, or how my students' learning has been negatively affected. I am relieved to find that there are Indigenous teachings and concepts that can be incorporated into the current science curricula, which may help to reduce the negative effects and stifling nature of Western science among Indigenous students. My son and I shall embark on a new adventure: one that provides an enhanced way of learning science that will free us from prejudices, while gaining valuable insights into the world around us.

References

- Aikenhead, G. S., & Elliott, D. (2010). An emerging decolonizing science education in Canada. *Canadian Journal of Science, Mathematics & Technology Education*, 10(4), 321-338. doi:10.1080/14926156.2010.524967
- Brendtro, L. K., Brokenleg, M., & Bockern, S. V. (2002). *Reclaiming youth at risk: Our hope for the future*. Bloomington, IN: National Educational Service.
- Brokenleg, M. (2016). How Indigenous people see the world. *Thriving*, 1(1), 1-3. Retrieved from

- http://cflearning.org/wp-content/uploads/2016/08/How-Indigenous-People-See-the-World_Thriving_vol_1-1.pdf
- Calderon, D. (2014). Speaking back to manifest destinies: A land education-based approach to critical curriculum inquiry. *Environmental Education Research*, 20(1), 24-36. doi:10.1080/13504622.2013.865114
- Datta, R. K. (2018). Rethinking environmental science education from Indigenous knowledge perspectives: An experience with a Dene First Nation community. *Environmental Education Research*, 24(1), 50-66. doi:10.1080/13504622.2016.1219980
- Datta, R. K., Khyang, N. U., Prue Khyang, H. K., Prue Kheyang, H. A., Ching Khyang, M., & Chapola, J. (2015). Participatory action research and researcher's responsibilities: An experience with an Indigenous community. *International Journal of Social Research Methodology*, 18(6), 581-599. doi:10.1080/13645579.2014.927492
- Freeman, K., McDonald, S., Morcom, L. (2018, April 24). Truth and reconciliation in your classroom: How to get started, and who can help. *EdCan Network*. Retrieved from <https://www.edcan.ca/articles/truth-reconciliation-classroom/>
- Habib, A., Densmore-James, S., & Macfarlane, S. (2013). A culture of care: The role of culture in today's mainstream classrooms. *Preventing School Failure*, 57(3), 171-180. doi:10.1080/1045988X.2013.798777
- Halstead, J. M. (2007). In place of a conclusion: The common school and the melting pot. *Journal of Philosophy of Education*, 41(4), 829-842. doi:10.1111/j.1467-9752.2007.00597.x
- Hatcher, A., Bartlett, C., Marshall, A., & Marshall, M. (2009). Two-eyed seeing in the classroom environment: Concepts, approaches, and challenges. *Canadian Journal of Science, Mathematics & Technology Education*, 9(3), 141-153. doi:10.1080/14926150903118342
- Manitoba Education and Training. (2017). *An action plan for science education in Manitoba*. Retrieved November 10, 2018, from https://www.edu.gov.mb.ca/k12/cur/science/action_plan/student.html
- Rahman, K. (2013). Belonging and learning to belong in school: The implications of the hidden curriculum for indigenous students. *Discourse: Studies in the Cultural Politics of Education*, 34(5), 660-672. doi:10.1080/01596306.2013.728362
- Van Bockern, S. (2018). *Schools that matter: Teaching the mind, reaching the heart*. Winnipeg, MB: University of Winnipeg Faculty of Education.
- Whitaker, T. (2004). *What great teachers do differently: 14 things that matter most*. Larchmont, NY: Eye on Education.

About the Author

Shane Buck chose to focus his master's program within the educational administration stream. He is a teacher in St. Laurent and desires to continue his career in a leadership role. He has a beautiful wife and two incredible children who support him and provide motivation to complete his course work.