



Indigenous Science Knowledge and Epistemologies in Practice: Living Everyday Research

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Abstract

This paper emerges from an understanding of Indigenous Science, Education, and research as being non-compartmentalized, interrelated, interconnected and wholistic. It focuses on Indigenous research and science epistemologies and worldviews, and it examines some of the ways in which Indigenous research and Indigenous Science are understood and carried out in everyday living practice. Numerous Indigenous scholars in Canada and elsewhere have pointed out that Indigenous peoples have always engaged in research. This paper draws on accounts of living Indigenous research and general knowledge practices in relation to salt pond harvesting to help to understand Indigenous Science methodologies as forms of living Indigenous knowledges. It reflects, and draws on, the works of Indigenous scholars and looks at the many ways in which research and science are conceptualized, practiced, and express Indigenous everyday education and inquiry.

Introduction

Indigenous Science, Research and Education are related. Indigenous Sciences are informed by numerous Indigenous perspectives. Anamuah-Mensah (2012, p. X) also notes that sciences share ethical principles and “key pedagogical and instructional strategies” which are contextualized teachings derived from the place and context in which the learner is situated. Corntassel and Scow (2017, p. 56) discuss how everyday aspects of life that may appear to be simple, routine actions or occurrences correspond to significant locations and actions of revitalizing and renewing family and community relationships. Meanwhile, for Cajete (2000), Indigenous philosophy reflects and embodies Indigenous science as a way of life which is lived within communities (p. 20). Like Anamuah-Mensah (2012), Cajete adds that Indigenous Science, both contemporary and historic, is “contextual and relational knowledge”. Cajete further notes that Indigenous science models ways of teaching, knowing, and understanding relationships which are based on the existing natural world in which they live (p. 20).

Through generations, Indigenous peoples’ relationship with their lands and waters, and an intimate understanding of their environment resulting from lived experiences with the land, have

developed into reliable knowledge of their ancestral territories, including the territories' processes and needs. This signifies the reciprocity that exemplifies these relationships. This is known as Indigenous Science (Black Elk, 2015). The history, ancestry and Indigeneity in the Caribbean context, and the connection to land, memory, and history, reinforce the valuable teachings and Indigenous Knowledge that are generated in different places by different groups which are from diverse contexts and frameworks. Little Bear (2009 p.10) states that Indigenous Epistemology speaks to "theories of knowledge," and suggests that Indigenous peoples' knowledge in science, education and research comes from their "actual experiences through stories, songs, ceremonies, dreams, and observation."

Cajete explains the importance of understanding what is meant by "Indigenous science", and why Indigenous science is significant to Indigenous communities and to building communities in contemporary times. The author asserts that Indigenous people acquire knowing and knowledge through Indigenous science which is "guided by spirituality, ethical relationship, mutualism, reciprocity, respect, restraint, a focus on harmony, and acknowledgment of interdependence" (Cajete, 2020, p. 2). Indigenous science is therefore relational. As Black Elk (2015) emphasises, "Indigenous science strives for holism in theory and in practice." Cajete reminds us that knowledge is structured with reference to a particular people and "place" toward the goal of sustainability and perpetuation of culturally distinct ways of life through generations (Cajete, 2020, p. 2).

This paper focuses on, and provides an overview of, Indigenous philosophies of Science which entails an understanding of Indigenous Science which is situated within its own everyday way of life. The paper provides a nuanced discussion of Indigenous Science. Indigenous Science stands on its own terms and does not need to be seen in relation to western science. Cajete (2020) points out that science is relative. There are many perspectives which western science can draw from Indigenous Science. Secondly, this paper discusses Salt Pond harvesting practices which are grounded in Indigenous ways that provide a framework for Indigenous life. Finally, Indigenous science epistemologies are examined and highlighted throughout this paper.

Indigenous Science in Context

Asabere-Ameyaw, Dei and Raheem (2012, p. 4) write that “as a form of epistemology, Indigenous science also signals a society, culture and nature nexus. Like other forms of knowledge, every body of knowledge, Indigenous science has its own ontological, conceptual/philosophical, methodological and axiological groundings.” Indigenous science is “multi-contextual” and comes from a system of thought, action, and orientation which is reciprocated by Indigenous people through which they interpret how nature works in “their place” (Suarmika et al., 2020, p. 3). This is what Cajete (2000) describes as coming to know. Indigenous Science is “a metaphor for a wide range of Indigenous community processes of perceiving, thinking, acting, and ‘coming to know’.” This happens based on our lived experiences in the natural world (see Cajete 2020; Cajete 2000). The concept of “coming to know” is used to describe the process of developing understanding in Indigenous Science (Williams and Snively, 2009, para. 1; Cajete 2000).

Learning and understanding Indigenous Science is not a quick project. Rather, it is knowledge that is transmitted through the generations and over time in connection with the Land, ancestors, and community. Developing an understanding of how to harvest a subsistence crop does not happen immediately, it takes years of having a deep relationship with the Land. Indigenous Science has never been about profit, exploitation, or commodification. Rather, it is about the wellbeing of the community and is rooted in reciprocity. Haliehana Alağum Ayagaa Stepetin describe subsistence living as more than a quantifiable event. Rather, suggesting that “Subsistence is a whole structure, it’s a way of life” (cited in Sullivan, 2021, para 22).

Understanding the seasons, when it’s a good time to plant, when to harvest, and how to harvest are all skills that are learned by observation, analyzing, understanding, and doing (see Suarmika et al., 2020). My Taino ancestors understood the art, skill and spirituality which were centered around fishing and agricultural science. Developing the skill of planting various foods such as cassava highlights not only survival, but also food sovereignty and governance systems and, as Sullivan (2021, para. 23) explains, “subsistence...also has greater cultural significance”.

Science involves spiritual practices and methods. This means that spirituality and Indigenous science are interlinked (see Cajete, 2000). Plus, Indigenous Science is based on Indigenous peoples’ worldviews and forms of knowledge (see Asabere-Ameyaw, Dei & Raheem, 2012, p. 219). Snively and Corsiglia (2001, p. 14) express how, before European contact, Indigenous worlds reflected balance and sustainability. The authors state that even in the

contemporary context, people continue to benefit from the work of Indigenous peoples and their skills and science knowledge of the natural world. Indigenous people have always practiced and lived science as living knowledge.

Ross (cited in Wongbusarakum, 2009, p. 93) states that “over 70% of all western drugs have come from isolating the active ingredients in plants and animals that the world’s Indigenous people had already been using for medicinal purposes for centuries” (prior to contact). Indigenous connection to plants and animals relates to their own beliefs of the world in which they live, with the notion that every living being has significance. This reflects Indigenous models of governance, ethics, relationships, and reciprocity in how Indigenous people see and understand their world. Indigenous science and knowledge are developed and understood through these principles, and Indigenous children learn their science and accumulate their knowledge through experience and doing (see Cajete, 2000, p. 24). Indigenous education methodologies, then, include role-playing, or learning relationships or roles that people play, as well as the ways of animals (see Cajete, 2000, p. 24).

Not only is Indigenous science knowledge research, but it is also a form of Indigenous education model systems. For example, in my family, salt pond harvesting is a form of science knowledge that has been passed down generationally and intergenerationally, for decades within the family. By engaging in salt pond harvesting and gathering practices and through storytelling I have learned how important salt pond harvesting was to our family and to members of the community. This is what Corntassel and Scow (2017) call Indigenous relationality in action through everyday living. The authors state that Indigenous communities are supported by, and their everyday living demonstrates, “their relationships to lands, waters, language, sacred living histories, and the natural world” (p. 58).

Salt Pond Harvesting Indigenous Theory and Practice

Science, too, is about stories. Stories told by Elders and Cultural Holders are passed down through several generations and continue to sustain Indigenous peoples. Ober (2017, p.8) writes that “stories are inspiring and enriching, with deep layers of cultural and historical knowledge that make up the social and cultural Indigenous identity.” That is why it is asserted that Indigenous Science not only existed in the past, but it continues to live in the everyday present (Snively and Corsiglia, 2009, p. 100). Indigenous Science involves many thoughts, observations, background

research, and experimentation, and an acknowledgement of the interconnectedness of science (see Black Elk, 2015, p. 3). It represents Indigenous sovereignty and self-determination.

Indigenous Lands are central to the lives of Indigenous peoples. The reliability developed and generated by Indigenous people has provided them the skills and gift to understand the needs of the Land, including how to look after it and how to take care of it just as an individual would care for a relative. This understanding is developed and transmitted orally (see Black Elk, 2015; Cajete, 2000). Science Education and research come from the Land and are related and intertwined in Indigenous peoples' experiences and practices of salt pond harvesting. Hughes (2020) explains salt harvesting tradition and its importance to many Indigenous peoples globally. In the same way with the history of salt, many Indigenous people see salt pond harvesting as gathering practices for building relations. Gonzales (2020) speaks about engaging in salt gathering and harvesting with a grandfather, then sharing with the community, as being about relationship building. As Gonzales states, the importance of salt is connection and relationship between stories. Connection binds people to Land and to each other. Potts & Brown (2005, p. 272) discuss the crucial necessity to pay attention and to listening. In doing so they write that “we become increasingly aware of contexts, histories, and social dynamics... Through paying attention and listening, research is reconceptualized and becomes an emergent, unfolding process rather than a trip to a predetermined destination.”

Similarly, Hughes (2020) writes about the value of the salt tradition. The salt from ponds and lakes is valuable. This knowledge is not necessarily systematically structured within formal school curricula. Instead, it occurs within the messages that are transmitted from generation to generation within communities (Hidayah et al., n.d.). Indigenous people have always practiced and lived science, and they continue to do so. For example, some Indigenous coastal communities globally practice fish conservation, and have had rich understanding of natural medicines. Science is also structured in Indigenous cultures as Indigenous people observe their natural environment, adapt and problem solve. These aspects are woven into Indigenous models of education and research methodologies and approaches.

Science is commonly practiced and lived in everyday Indigenous “agriculture, astronomy, navigation, mathematics, medical practices, engineering, military science, architecture, and ecology” (Snively & Corsiglia, 2001, p. 10). Snively & Corsiglia (2001), cited in Baker et al. (p. 3, n.d.), observe that “after centuries of living on the land, observations of natural phenomena

accumulate, and knowledge is refined to near precision.” Living off the land, for me, was part of the research process. It was a search for knowledge, understanding and learning through planting crops and getting food from the Land, which is a key part of rural Caribbean life. Furthermore, Indigenous Science is related to research. This includes observing the sky at night and looking at the stars and the moon which provide light to enable us to continue working even at night when it starts to get dark. The clouds help us to understand when the rain will come (or not), and what that means. It includes understanding the different seasons, even though living in a hot, wet tropical climate. There are seasons during which there is time for certain plants to grow, to prepare for the dry and rainy season, or for trees to grow fruits. Having a grasp of the ways in which fruits, vegetables and trees grow is part of the Indigenous knowledge systems and Indigenous science ways. Knowing when to pick various tropical fruits, and when they will be ready, requires examination, careful observation and understanding of the environment. (see Absolon 2011; Absolon & Willett 2005)

This constitutes Indigenous epistemology which speaks to “theories of knowledge—how we come to know. How we come to know, in essence, is a methodology or a validation process” (see Little Bear, p. 10). This is connected to generational knowledges and is a form of Indigenous science. Absolon & Willett (2005) discuss growing up immersed in the bush. I can relate to the bush. I reflect on the opportunity that I had to walk into the hills and into the bush to help my parents plant their peanuts, digging into that dirt and sowing these seeds in the earth, and watching them grow. Going into the steep hills filled with sharp rocks, I witnessed many life forms in my surroundings. Going out on the land and finding grass for the sheep, picking Spanish needle grass for the rabbits, even looking for firewood to cook dinner grounded me with an understanding of the Land, the People, and the Community. The profound feeling of deep and inner respect for the Land, the sky, and the ancestors is a feeling that cannot be understood from a text. It is the process of what I call living science and research (see Absolon, 2011; Absolon & Willett, 2005).

In my community where I grew up there were seasonal ponds and water springs which existed for generations (see Tuberville et al., 2005). Harvesting salt was a long tradition in my family. I heard many stories of my mother, grandmother and great grandmother harvesting salt at the pond. They developed the skills of harvesting the salt from the pond. When the water from the pond dried up, they harvested the salt by raking and scraping it from the dry ground, doing so with skill and an ethic of care. For decades there was no need to purchase salt since the pond gave to

the community every year during the dry season. Similarly, in traditional Hawaiian salt harvesting, sea salt was used to season and preserve food, for religious and ceremonial purposes, and as medicine (Ku‘ulei Gaisoa, 2020)

Hidayah et al. (n.d.) explains that this form of local knowledge of traditional salt production is a concept of Indigenous science (p. 180). Indigenous science, according to Snively & Williams (2016, p. xvii), is immersed in the “local...the timeless, and the emotional” within the community. These forms of salt pond science are still preserved and practised today (Hidayah et al., n.d., p.180).

According to Williams and Snively (2009, para. 20), everyday examination of life on the land would reveal if an area was harvested too much, leading to an understanding that the land needed to heal. Similarly, overflowing or drought which impacts the Land, plants, or environment would lead to an understanding that the Land needs time to rest or to heal to regenerate and restore itself. Within Indigenous Science there is care of the land.

In a recent study about salt farming in Indonesian communities, Hidayah et al. (n.d., p. 183) discuss how salt farmers in the community studied and learned the science of salt making which was transmitted down from their own parents. This study demonstrates that the understanding of salt farming by the community members “is related to the daily life of hereditary community or inheritance from parents. This original science is part of the life or culture of society that is still maintained and believed to be true” (Hidayah et al., n.d., p. 188). This is like the situation of my own family and community. The understanding of science is gained through their lived experiences and lived knowledges, and through interaction with the environment. As Absolon (2011, p. 47) states “if the methods are Indigenous, within an Indigenous context and for Indigenous purposes, then it is normal and the mainstay of knowledge collection.” Although I have never participated in salt harvesting or learned the skills, I am still able to carry those stories with me.

In their demonstration of their sovereignty, Indigenous peoples continue to experience challenges from governments which continue to operate from systems of *terra nullius*. For example, Hughes (2020) describes how the Zuni people had to fight for decades to secure control of a sacred natural Salt Lake in New Mexico. Then they had to fight to protect it from a coal mine plan that could have drawn water from it. Fortunately, the Zuni successfully fought off the mining company’s plans that could have harmed the sacred natural Salt Lake. Many Indigenous peoples

globally continue to encounter these challenges. For Emeagwali and Shizha (2016, p. 8), technical knowledge or science is flexible, and knowledge develops and adapts to the changing situations and environments in which members of the communities find themselves. Yet many communities have remained connected to their land, even in cases in which they have been consistently threatened by outsiders who have been persistent.

Indigenous Science Epistemologies

Moreton-Robinson (2020, para. 17) writes about the ontological connection between ancestral knowledge, land, and community as “a form of *embodiment*”. Williams and Snively (2009, para. 13) state that, for Indigenous peoples, there is spirit in Science, and “This spirit is conscious and has awareness—the wind, water, stars, frogs, rocks, smoke, people, cedar trees, salmon, and killer whales possess a spirit”. For example, it is common in the Andes to hear people say, ‘rivers walk’ or ‘the Apus or mountain deities nurture us’ or ‘seeds walk’. As every aspect of the environment is alive, including the rocks, they are all involved in, and subject to, processes of regeneration and growth (see Ishizawa & Rengifo, 2009, p. 63). Moreton-Robinson (2020, para. 36), reflecting on the relationship of spirit and the love that Indigenous people have for their lands, notes that Indigenous bodies “signifies our title to land and our death reintegrates our body with that of our mother the earth.” There are communities around the globe which still practice communal living and embody the principles of sharing, giving and reciprocity. For Barnhardt & Kawagley (2005, p.11), Indigenous people engage in a form of “science” when they are involved in the annual cycle of subsistence activities. “They have studied and know a great deal about flora and fauna, and they have their own classification systems and versions of meteorology, physics, chemistry, earth science, astronomy, botany, pharmacology, psychology, and the sacred.” This science is structured in the processes of relationships.

Many Indigenous people learn from Elders and Knowledge Holders, and many people globally in Indigenous communities look to Elders and Knowledge Holders for guidance on how to live and how to treat illness, whether it is physical, emotional, mental, or spiritual. Further, “Many, if not most, indigenous cultures revere Elder epistemology and include the metaphysical integral to their ontological beliefs” (Peters, 2016, p. 29). Throughout Canada and around the globe, Elders continue to be key to the survival and sustaining of Indigenous communities. This became very apparent during the COVID-19 pandemic when Indigenous communities in Canada

and across the globe demonstrated their understanding of the significance of Elders, and many Indigenous communities established systems to protect Elders in their community (see Ka'nhehsí:io Deer, 2020).

Elders are sources of knowledge, and Indigenous peoples' self-determination features key aspects of learning from Elders. Indigenous Elders and Knowledge Holders are scientists. Wongbusarakam (2009) states, this knowledge is not abstract but is knowledge in the context and situated experiences of Indigenous peoples. The author adds, "It is knowledge generated, demonstrated and primarily transmitted in a context of active use (pp. 74-75)." This knowledge is expressed through Indigenous peoples' viewpoints.

Ishizawa and Rengifo (2009, p. 65) suggest that "What is most characteristic of such knowledge is its relational and holistic qualities rather than its analytical quality." Indigenous people continue to practice their various ways of expressing and implementing science in their lives.

Indigenous people are innovators who have been enacting creativity in varied forms both historically and in these contemporary contexts. Today, Indigenous peoples globally are living and engaging in science research and education. This is both spiritual and emotional, and centers around the community. It has been passed down through Elders, family, community, Lands, territories, and ancestors who share their knowledge of science.

Conclusion

In the present context, Indigenous people are centering Indigenous Science practices in Canada and globally by drawing on their Land knowledges. Indigenous science continues to be central to Indigenous cultures and people. Through time, Indigenous Science has supported Indigenous peoples who have been living and learning off their lands. These knowledges should be honoured at all levels of teaching and learning in schools. Respect embedded in reciprocity is a key principle of Indigenous Science and, as expressed by Black Elk (2015, p. 3), "reflects respect for the people, their protocols, ceremonies, histories, stories, and ecological knowledge." Indigenous Science, although broadly speaking is often unrecognized, is crucial not only to Indigenous peoples, but also to the broader global society (see Snively & Williams, 2016, p. xv).

For centuries, Indigenous people have practiced science and lived collaboratively with their environment. They have been learning from the land and learning from each other and from all

that nature itself offers. Many still do. There is an ethic of interdependence, and Indigenous people, young and old, have acquired skills and knowledges which express their governance systems. This is despite the epistemic challenges which they face from outsiders. As a result, Corntassel and Hardbarger (2019, p. 87) affirm that the perpetuation of Indigenous knowledge and nationhood occurs daily, often in the shape of unnoticed or unacknowledged actions carried out within intimate settings including homes, ceremonies, and communities. Indigenous science, according to Emeagwali and Shizha (2016, p. 8) is practical, personal, and contextual, and it is not detached from the individual, their community or their environment. It is “physical and spiritual”.

Indigenous Science varies according to geography, location, and context, and it carries centuries of knowledges. It continues to build on these knowledges in the present, while looking toward Indigenous futures.

References

- Absolon, K. (2011). *Kaandossiwin: How we come to know*. Fernwood.
- Absolon, K. & Willett, C. (2005). Putting ourselves forward: Location in Aboriginal research. In L. Brown & S. Strega (Eds.), *Research as resistance: Critical, Indigenous, and anti-oppressive approaches* (pp. 97-126). Canadian Scholar's Press.
- Anamuah-Mensah Jophus (2012) Foreword. In Akwasi Asabere-Ameyaw, George Dei & Kolawole Raheem, *Contemporary Issues in African Sciences and Science Education*, p. ix. Boston. MA. Sense Publishers.
- Asabere-Ameyaw, A., Dei, G., & Raheem, K. (2012) Introduction. In Jophus in Akwasi Asabere-Ameyaw, George Dei & Kolawole Raheem, *Contemporary Issues in African Sciences and Science Education*, pp. 1–14. Boston. MA. Sense Publishers.
- Asabere-Ameyaw, A., Dei, G., & Raheem, K. (2012) Conclusion. In Akwasi Asabere-Ameyaw, George Dei & Kolawole Raheem, *Contemporary Issues in African Sciences and Science Education*, pp. 217-219. Boston. MA. Sense Publishers.
- Baker, J & Rayner A, & Wolowic J. (n.d). Native Science. Retrieved from <https://ctabobandung.files.wordpress.com/2011/11/ns-primer.pdf>
- Barnhardt, R., & Kawagley, A. O. (2005). Indigenous Knowledge Systems and Alaska Native Ways of Knowing. *Anthropology & Education Quarterly*, 36(1), 8–23.
<http://www.jstor.org/stable/3651306>

- Black Elk, L. (2016). Native Science: Understanding and Respecting Other Ways of Thinking. *Rangelands*, 38(1), 3–4. <https://doi.org/10.1016/j.rala.2015.11.003>
- Cajete, G. A. (2020). Indigenous Science, Climate Change, and Indigenous Community Building: A Framework of Foundational Perspectives for Indigenous Community Resilience and Revitalization. *Sustainability*, 12(22), 9569. <https://doi.org/10.3390/su12229569>
- Cajete, G. (1999). Igniting the sparkle: An Indigenous science education model. Skyland, NC: Kivaki Press.
- Cajete, G. (2000). Native science: Natural laws of interdependence. Santa Fe, NM: Clear Light Publishers
- Corntassel, J., & Scow, M. (2017). Everyday Acts of Resurgence: Indigenous Approaches to Everydayness in Fatherhood. *New Diversities*, 19(2), 55-68. Retrieved from https://newdiversities.mmg.mpg.de/?page_id=3194
- Corntassel, J. (2012). “Re-envisioning resurgence: Indigenous pathways to decolonization and sustainable self-determination.” *Decolonization: Indigeneity, Education & Society* 1(1): 86-101.
- Corntassel, J., & Hardbarger, T. (2019). Educate to perpetuate: Land-based pedagogies and community resurgence. *International Review of Education*, 65(1), 87–116. <https://doi.org/10.1007/s11159-018-9759-1>
- Emeagwali, G. and Shizha, E. (2016) Interconnecting History, African Indigenous Knowledge Systems and Science 3 in G. Emeagwali & E. Shizha (Eds.), *African Indigenous Knowledge and the Sciences*, 3–11. Boston. MA. Sense Publishers.
- Gonzales (Genízaro), M. (2020). *Salt for flavor and tradition» Native America Calling*. Native America Calling. <https://nativeamericacalling.com/monday-july-27-2020-salt-for-flavor-and-tradition/>
- Hidayah, F., Si, S., Pd, M., Yuliyanto, E., Pd, S., Pd, S., & Imaduddin, M. (n.d.). Exploration of Original Science (Indigenous Science) Indigenous Science Salt Farmers in the Traditional Salt Production as a Reliable effect of Chemical Large Based Materials; Retrieved October 25, 2021, from <https://jurnal.unimus.ac.id/index.php/psn12012010/article/viewFile/2777/2692>

- Hughes, A. (2020) *Salt for flavor and tradition» Native America Calling*. Native America Calling. <https://nativeamericacalling.com/monday-july-27-2020-salt-for-flavor-and-tradition/>
- Ishizawa, J., & Rengifo, G. (2009). Biodiversity regeneration and intercultural knowledge transmission in the Peruvian Andes. In P. Bates, M. Chiba, S. Kube, & D. Nakashima (Eds.), *Learning and knowing in Indigenous societies today* (pp. 59-71). Paris, France: UNESCO. Retrieved from <http://unesdoc.unesco.org/images/0018/001807/180754e.pdf>
- Deer, ` K. (2020, March 20). *#ItsNotAboutYou: First Nations coming together for their elders amid COVID-19 pandemic*. CBC. <https://www.cbc.ca/news/indigenous/first-nation-elders-covid-19-1.5504159>
- Ku‘ulei Gaisoa (Native Hawaiian) (2020) *Salt for flavor and tradition» Native America Calling*. Native America Calling. <https://nativeamericacalling.com/monday-july-27-2020-salt-for-flavor-and-tradition/>
- Little Bear, L. (2009). *Naturalizing Indigenous Knowledge: Synthesis Paper*. Saskatoon, SK: University of Saskatchewan Aboriginal Education Research Centre and First Nations and Adult Higher Education Consortium. Retrieved from https://www.afn.ca/uploads/files/education/21._2009_july_ccl-alkc_leroy_littlebear_naturalizing_indigenous_knowledge-report.pdf
- Moreton-Robinson, A. (2020). “*Our story is in the land.*” ABC Religion & Ethics. <https://www.abc.net.au/religion/our-story-is-in-the-land-indigenous-sense-of-elonging/11159992>
- Ober, R. (2017). Kapatí Time: Storytelling as a Data Collection Method in Indigenous Research. *Learning Communities: International Journal of Learning in Social Contexts*, 22, 8–15. <https://doi.org/10.18793/lcj2017.22.02>
- Peters, W. (2016). The Embodied Library: The Culmination of All Who Came Before. In C. Callison, L. Roy & G. LeCheminant (Ed.), *Indigenous Notions of Ownership and Libraries, Archives and Museums* (pp. 25-39). Berlin, Boston: De Gruyter Saur. <https://doi.org/10.1515/9783110363234-005>
- Potts, K. & Brown, L. (2005) Becoming an anti-oppressive Researcher. In L. Brown & S. Strega (Eds.), *Research as resistance: Critical, Indigenous, and anti-oppressive approaches* (pp. 255-286). Canadian Scholar’s Press.

- Snively G. & Corsiglia, J. (2009) Indigenous Science: Proven, Practical and Timeless in I. Bates, M. Chiba, S. Kube, & D. Nakashima (Eds.), *Learning and knowing in Indigenous societies today* (pp.89-104). Paris, France: UNESCO. Retrieved from <http://unesdoc.unesco.org/images/0018/001807/180754e.pdf>
- Snively, G., & Corsiglia, J. (2001). Discovering Indigenous science: Implications for science education. *Science Education*, 85(1), 6-34. Retrieved from [http://dx.doi.org/10.1002/1098-237X\(200101\)85:1<6:AID-SCE3>3.0.CO;2-R](http://dx.doi.org/10.1002/1098-237X(200101)85:1<6:AID-SCE3>3.0.CO;2-R)
- Snively, G., & Williams, L. (2016) Preface. In (Eds.) Snively, G., & Williams, L., *Knowing Home: Braiding Indigenous Science with Western Science.*, Pp. xv-xvii. Victoria, BC: University of Victoria.
- Snively, G., & Williams, L. (2008). Coming to know: Weaving Aboriginal and Western Science knowledge, language, and literacy into the science classroom. *L1—Educational Studies in Language and Literature*, 8(1), 109-133.
- Suarmika, P. E., Arnyana, I. B. P., Suarni, N. K., & Marhaeni, A. A. I. N. (2020). Indigenous science: what we can learn? (the exploration of balinese local wisdom for science learning). *Journal of Physics: Conference Series*, 1567, 042016. <https://doi.org/10.1088/1742-6596/1567/4/042016>
- Sullivan, M. (2021, October 14). *Can Indigenous subsistence rights still be protected in Alaska?* Indian Country Today. Alaska Public Media. <https://www.alaskapublic.org/2021/10/14/subsistence-is-absolutely-critical-to-our-survival-can-indigenous-subistence-rights-still-be-protected-in-alaska/>
- Tuberville, T., A Buhlmann, K., Kerr Bjorkland, R., & Booher, D. (2005). Ecology of the Jamaican Slider Turtle (*Trachemysterrapen*), with Implications for Conservation and Management [Review of *Ecology of the Jamaican Slider Turtle (Trachemysterrapen), with Implications for Conservation and Management*. *International Journal of Turtle and Tortoise Research*, 4(4), 908–915.
- William. L. Wanosts' a7 and Snively, G. (2009) “Coming to Know”: A Framework for Indigenous Science Education. Retrieved from <https://pressbooks.bccampus.ca/knowinghome/chapter/chapter-3/> <http://unesdoc.unesco.org/images/0018/001807/180754e.pdf>

Wongbusarakum, S. (2009) Loss of traditional practices, loss of knowledge, and the sustainability of cultural and natural resources: a case of Urak Lawoi people in the Adang Archipelago, Southwest Thailand in In P. Bates, M. Chiba, S. Kube, & D. Nakashima (Eds.), *Learning and knowing in Indigenous societies today* (pp. 73-85). Paris, France: UNESCO. Retrieved from <https://unesdoc.unesco.org/ark:/48223/pf0000180754>