ANCESTRAL Science PODCAST

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Ancestral Science Podcast

The Ancestral Science Podcast explores scientific topics through conversations between Knowledge Keepers and Scientists, while *experiencing* the origins and depth of science on and with "the Land". Join us as science COMES ALIVE when knowledges are shared alongside ancestor plants, rocks, animals, and rivers, creating connections between personal, Indigenous, and global science.
The Ancestral Science podcast is a place for *everyone* to see themselves in science, to be inspired by the SCIENCE that is all around them and expand the definitions of both *ancestor* and *science*.

SEASON 2: Episode 20 (audio/video)
with **PHILIP STEVENS**
"Hunting Mathematics"

We were grateful to speak with **PHILIP STEVENS**, San Carlos Apache, Director of American Indian Studies at the University of Idaho, about (global/Western) mathematics being like pornography or taxidermy, non-Euclidian tessellations in mesquite wood stacking, patterns of the Land, Apache ontologies, academic camouflage, and focusing on how to take care of our own garden/sphere of influence to broaden mathematical perspectives.

Upon Philip's request, honoraria was gifted to someone we know that is in need. They were grateful, thank you.

Remember, you can support the pod and rock some unique Indigenous Science merch at www.relationalsciencecircle.com/shop, all proceeds go towards Knowledge Keeper honoraria, following protocols, and keeping the pod going.

Please like, share, follow, and rate the pod, it goes a long way to share this knowledge.

Hand to Heart to Indigenous Screen Office and Bespoke Productions Hub.

SHOWNOTES:

-**What is science to you**?
- -Science is how we interact with the world and create non-human meaning making
  - -like how water acts in different places
  - -but what are "acceptable" ways of acting for water… animals?
    - -this is behaviour
  - -think about, how does light act?
    - -refraction, angle, filters…
    - -since all is in flux, what is "normal" light behaviour?
  - -when it's cold, snow "acts" differently
    - -the snow is *squeaky* when its colder because of ice crystals (listen to video here).

-these knowledges are based on our experiences and relationship we have through the lands we are in relationship with.

-Which prompts the question…

"If a tree falls in the forest, does it make a sound?"

-YES!!

-Dr. Philip Stevens

-Director of American Indian Studies at the University of Idaho

-Philip came into this position with "a chip on his shoulder" but knew the needs of community, that the curriculum didn't work, and therefore used his gift/skills to develop processes to help Indigenous people better connect with the depth of scientific and mathematical knowledges within the land and community.

-Philip said he was *good at school*, but wanted to be *good "on the land,"* of which included hunting or cowboy-ing.

-**Aha Moment** that was a catalyst for his work:

-realizing there were PATTERNS everywhere:

-bows, trajectory, probability

-then understanding these patterns lead to a deeper understanding of meaning-making

-but the curriculum doesn't connect people to their culture or land.

Eg. learning about regattas and speed doesn't build meaning or relationship with Indigenous students, but learning about spirit runs or hunting would!

-Kori's add-on: think about the common "problem solving" examples you teach or have learned in school. Do they relate to your students' lived experiences, their culture, their history? Do they reinforce a narrative based within a capitalist, hierarchical, human-centered system? I always ask, give me an example of a problem-solving question you remember in school. . . . . and the answers are often about "trains travelling towards each other…." or "hundreds of watermelons or coins." Think critically for a moment about what narratives these examples are reinforcing: trains (rail as vehicle of colonization and expropriation, see here. Or how they have helped eliminate the buffalo and plant non-native harmful trees/plants,
see Ancestral Science Podcast Episode with Tessa Wolfleg), speed (race, colonial time), watermelons (connection to the land you are on? Also, why do you need that many watermelons?), coins (reinforce capitalism, wealth over value/relationships).

-**Wood Cutter Mathematics**

"A Woodcutter's Story: Perceptions and Uses of Mathematics on San Carlos Apache Reservation" (article) by Philip Stevens

-there is a righteous indignation towards mathematics

-imposter syndrome of doing/understanding mathematics

"I'm not that smart."

-Philip's experience with assimilation-style schooling, not being supported in bringing in cultural, land-based, Indigenous mathematics that has depth, history, and relationality.

- "I hunted mathematics" (P. Stevens)

-Philip has always been "making wood" and had to "do it good"

-fires are a significant part of his community, it keeps it going (heat, cooking, ect..), therefore having chopped wood available is important.

-"making wood" meant cutting down trees, cutting them into pieces, stacking them, then bringing them back to the community. Doing this *good* meant stacking the wood "well."

-Philip thought about how ***making wood*** could allow for connections between math and community.

-the **mesquite wood** (commonly used/found in Philip's community of San Carlos Apache) is irregular and asymmetrical, making stacking/nesting it more difficult.

-looking at the techniques he used growing up to stack this wood *good* made him think about the tessellation activities (think repeating regular shapes interconnected like a puzzle) he did in math class. (here is a simple tessellation activity that may look familiar to many). But…these classroom tessellation activities were 2-D, created on paper on a single plane, his real-life tessellation example with the mesquite wood, is a 3-D example of non-Euclidian tessellations!

-**non-Euclidean tessellation** fun video explained through MC Escher

-remember doing these 2-D tessellation activities in school? How deep of an understanding did you have after that puzzle activity?

-Philip stated: with these classroom mathematical examples, we didn't allow them to *do good*, there wasn't a deep/relational understanding of the knowledge, there wasn't a personal connection with the puzzle. BUT, Philip had a deep understanding of 3-D tessellations through *making wood*, because he was supported to *do good*, therefore learning how to nest these irregular shapes. Yet, all the while, was being told "that's not math!"

-**Apache Ontologies**

-here, children are treated like they are intelligent FIRST. Where everyone has knowledge and a gift to be discovered and used for good.

-unlike in western societies where children are to be "filled with knowledge"

-how does *this* make sense to you?

-leaving space for topics to be relational and relative

-allow for students/children to show **innovation** and **creativity** instead of focusing on replication and memorization

"'A space for you to be who you are': an ethnographic portrait of reterritorializing Indigenous student identities" (article) by Vanessa Anthony-Stevens, Philip Stevens

-**Apache Language**

-there is a looseness of this language

-is co-constructed through an understanding of the world between the listener and the speaker

-the verb-based language allows it to be both relational and descriptive

"Enacting Hope through Narratives of Indigenous Language and Culture Reclamation" (article) by Kari Chew, Vanessa Anthony-Stevens, Sheilah Nicholas, Angel Sobotta.

-**Math as**…

…**arithmetic**

-in school math was a place to count

-it was about memorization and abstract ideas, disconnect from self, culture, land, spirit

…pornography

-Philip mentioned that the processes he was required to go through to understand global/western mathematics made him feel like a pornographer, because it removed all emotion and love.

…taxidermy

-similarly, it was like being a taxidermist. . . learning global/western mathematics was like hunting then killing mathematics, taking its life, its spirit, its energy, then stuffing it with inanimate, unfamiliar, unrelated. . . .materials. It is no longer a relative, no longer connected to culture, Land, ceremony, community, or spirit.

-**Philip's "Rosetta Stone's"**

"The New Dictionary of Cultural Literacy" (book) by E.D. Hirsch

"The Archaeology of Knowledge" (book) by Michel Foucault

"Wisdom Sits in Places" (book) by Keith Basso

-describing these books as all the things that "describe white people." It was a way for Philip to better understand and work alongside these methodologies and ontologies; to work in both worlds.

-these worldviews are not shy, they are written down so to be preserved and shared widely.

-Indigenous knowledges are not often shared through the written word, but orally, in community, to allow for relationships to be created and knowledge shared that is appropriate and through protocols.

-how can you reconnect with these "home-team" ontologies?

-Hope for the **future of Apache Mathematics**:

-remember to take of your own garden first, think about "your sphere of influence"

-strengthening your community and culture vibrates outwards

-embrace the difference and uniqueness

-Philip's hope is to broaden the view of mathematics and pedagogy to include watching and listening, and to include "making sense."

"Indigenous Mexican Teachers and Decolonial Thinking: Enacting Pedagogies of Reclamation" (article) by Vanessa Anthony-Stevens, Eulalia Gallegoas Buitron

-Philip is the conduit, and I agree!

-**Additional Links:**

“Native teaching seeks to redefine education” (article)
“Tribal Nation Building and the Role of Faculty: Paying the Debt on Indigenous Well-Being in Higher Education” (article) by Philip Stevens, Vanessa Anthony-Stevens, Dylan R Hedden-Nicely.
“Raiding and Alliances: Indigenous Educational Sovereignty as Social Justice” (article) by Vanessa Anthony-Stevens, Philip Stevens, Sheilah Nicholas

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Want more Indigenous Science Resources? Check out Relational Science Circle.

Want to learn more about Indigenous Science, Indigenous Science/Mathematics Teacher PD sessions, or have an idea for a guest or topic for the Ancestral Science Podcast, email relational.science@gmail.com

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