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Exploring Personal, Relational, and Collective Experiences and Mentorship Connections That Enhance or Inhibit Professional Development and Career Advancement of Native American Faculty in STEM Fields: A Qualitative Study

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Mentorship programs for Native American (NA) faculty in science, technology, engineering, and mathematics (STEM) fields hold significant promise toward developing, recruiting, and retaining NA members of the professoriate. In 2018, a qualitative study was conducted that explored experiences, and mentoring relationships that enhanced or inhibited professional development and career advancement of NA faculty and instructors in STEM fields. The study used Indigenous Research Methodologies to coconstruct a conversational moderator's guide aligning with Indigenous community ontology. Interview questions were developed from the existing literature and programs and the project teams' expertise. Twenty-three NA faculty and instructors and a postdoctoral trainee in STEM fields participated in the interviews. Transcripts were coded, organized, and interpreted. Themes and subthemes were generated, which were noted for relevance to the theoretical framework. Participants described their experience

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working in higher education as viewed through their academic, social and cultural values, relationships, and responsibilities. Common themes included the (a) importance of peer, senior and community mentors, (b) value of oral presentation to professional development, (c) need for social connectedness and work–life balance, and (d) importance of increasing institutional knowledge about Indigenous values and research methodologies. Several themes aligned with TribalCrit, allowing for a strong critique of NA faculty mentoring by NA's in higher education. The narratives underscore the need for institutions to deliver professional development and mentoring programs for NA faculty and for administrators to strengthen institutional supports to improve NA faculty achievement.

Keywords: Native American, faculty development and retention, mentoring, tribal critical race theory, STEM fields

Developing an Indigenous Mentoring Program for Native American Faculty in STEM Fields: A Qualitative Study

Native American (NA) faculty in science, technology, engineering, and mathematics (STEM) fields represent the resiliency of the greater NA community. More NA faculty in STEM (NAF-STEM) are needed to impart their scientific knowledge of the natural world and conduct, participate in, and drive relevant research on NA issues and within NA communities (Smith, 2013; Wilson, 2008) to improve health outcomes and the social, economic, and environmental conditions in NA peoples and communities.

Recruitment and retention of NAF-STEM is also critical to the development of the future professoriate and recruiting and retaining NA students (Ortiz-Walters & Gilson, 2005). Indigenous and graduate students of color value diverse faculty and are more satisfied when they have mentors of color (Jayakumar et al., 2009). Postsecondary NA enrollment is increasing and currently stands at 0.1 million (or 1%) according to the National Center for Education Statistics of total number enrolled (de Brey et al., 2019).

In 2017, the National Science Foundation Alliances for Graduate Education and the Professoriate Transformation (NSF AGEP-T) funded University of Montana (UM), Sitting Bull College (SBC), and Salish Kootenai College (SKC) to create a multicomponent model to enhance the retention and professional success of NAF-STEM. The three components developed for the model were a mentoring program; publication and grant writing preparation; and an institutional support program focused on faculty retention. The mentoring program component was developed using qualitative and Indigenous Research Methodologies (IRM) approaches. The focus of this paper is to describe the study that informed the mentoring program.

Contextualizing Native American Faculty Experiences

NA faculty are valuable professionals, often with strong ties to Indigenous communities, students, and cultural knowledge bases. Yet, limited opportunities persist for professional development (Mack & Winter, 2016). These include underrepresentation in leadership or administrative positions (Bischel & McChesney, 2017); inadequate and insufficient culturally relevant mentoring (Walters et al., 2016; Zambrana et al., 2015); discrimination and ethnic or racial bias (Hartlep & Ball, 2019; Turner et al., 1999; Victorino et al., 2013); increased administrative scrutiny; and an environment of cultural homogeneity (Hartlep & Ball, 2019; Menges & Exum, 1983; Nivet et al., 2008; Walters et al., 2019); differences in Indigenous and Western perspectives on knowledge (Brayboy et al., 2012), and exposure to chronic micro-aggressions (Clark et al., 2011; Smith, 2013).

Additional literature suggests that NA barriers to faculty career advancement is contextualized within settler colonialism (Tuck & Yang Wayne, 2012; Walters et al., 2019). For example, NA faculty typically experience distinctive diminishing settler colonial verbal and nonverbal messages from their students, colleagues, and administrators (Walters et al., 2019). Some scholars have suggested that “settler anxiety” (Tuck & Yang Wayne, 2012) is parallel to “White Fragility” (DiAngelo, 2011) and occurs among non-Indigenous peoples because the presence of NAs in the academy is a reminder that the settler colonial project is unfinished (Tuck & Yang Wayne, 2012; Walters et al., 2019). To reconcile settler anxiety, non-Indigenous peoples frequently use strategies to diminish NA identity, render them invisible (i.e., ignoring at meetings) or not credible (i.e., authenticity challenges), or “savable” (i.e., protecting the vanishing Indian; Walters et al., 2019). Identifying strength-based persistence narratives and strategies that reject the colonialist trappings of NA faculty powerlessness, invisibility and victimization would benefit all faculty (e.g., NA and non-NA), as well as the institution (Walters et al., 2019). An additional challenge of NA faculty career advancement often mentioned is cultural taxation, which is the extra, uncompensated, and institutionally unrewarded work that is disproportionately placed upon NA faculty members (Jaime & Rios, 2006; Walters et al., 2019). NA faculty are often asked to serve as liaisons between tribal communities and institutions—roles for which they are often uncompensated in terms of instructional load reduction, buyout, or institutional metrics for career advancement. Institutional supports need to recognize and mitigate the burden and stress of cultural taxation in NA faculty.

In 2016 a nine-module program was developed and implemented for faculty who mentor, or who are interested in mentoring, NA STEM undergraduate and graduate students (Brown & Komlos, 2019). The program provides training for faculty, administrators, and staff to learn about NA values, epistemologies, and IRM (Brown et al., 2020; Windchief et al., 2018). To date, 323 faculty, staff, and administrators at four Montana institutions have completed the program (Windchief, 2021). The structure and content of this program helped guide our initial discussions about what a mentoring program for NAF-STEM might look like, but more importantly, informed our approach in how to develop this kind of program for NA STEM faculty.

The processes to de-colonize education are underway as more NAs earn advanced degrees and become faculty (Beech et al., 2013). Similar to our study, others are describing the lived experiences of NA faculty (Elliott et al., 2010; Walters et al., 2019) and graduate students (Windchief et al., 2018) to increase awareness for creating nondiscriminatory spaces and reducing barriers to NA educational and career advancement. However, our approach builds upon previous research by engaging faculty and instructors at Tribal

Table 1*Nine Tenets of Tribal Critical Race Theory (Brayboy, 2005; p. 429)*

Tenet 1: Recognition that colonization is endemic to society.
Tenet 2: U.S. policies toward Indigenous peoples are rooted in imperialism, White supremacy, and a desire for material gain.
Tenet 3: Indigenous peoples occupy a limited space that accounts for both the political and racialized natures of our identities.
Tenet 4: Indigenous peoples have a desire to obtain and forge tribal sovereignty, tribal autonomy, self-determination and self-identification.
Tenet 5: The concepts of culture, knowledge, and power take on new meaning when examined through an Indigenous lens.
Tenet 6: Government policies and education policies toward Indigenous peoples are intimately linked around the problematic goal of assimilation.
Tenet 7: Tribal philosophies, beliefs, customs, traditions, and visions for the future are central to understanding the lived realities of Indigenous peoples, but they also illustrate the differences and adaptability among individuals and groups.
Tenet 8: Stories are not separate from theories; they make up theory and are therefore, real and legitimate sources of data and ways of being.
Tenet 9: Theory and practice are connected in deep and explicit ways such that scholars must work toward social change.

Colleges and Universities (TCUs) and Predominantly White Institutions (PWIs) in conversations that expand the diversity of testimony and views on this topic.

Tribal Critical Race Theory

Our study incorporated Tribal Critical Race Theory (TribalCrit; Brayboy, 2005) to help us organize and assess data from the interviews conducted with NA faculty and instructors. Though TribalCrit has been used as an analytical tool, to our knowledge, this approach has not been used in previous studies specifically exploring the lived experience of NA STEM faculty. TribalCrit is designed to illuminate the issues of Indigenous peoples in relationship to the U.S. and its laws and policies (Brayboy, 2005). TribalCrit is characterized by nine tenets (see Table 1) and is a theoretical framework generating truths about colonization in larger social and structural contexts, facilitating change (Brayboy et al., 2012). TribalCrit also seeks to construct an interpretation of reality by helping individuals to name their reality through storytelling and counter-storytelling (Writer, 2008). This process provides a framework by which NAs may represent themselves in a self-determined manner (Dellinger et al., 2016).

Purpose of the Study

The purpose of this study is to explore personal, relational, and collective experiences, and mentoring involvement that enhance or inhibit professional development and career advancement of NA faculty and instructors in STEM fields. These data will help inform the content and configuration of a mentoring program for NA faculty and instructors in STEM.

Positionality of the Co-Authors

The 21-member co-authorship team includes NA and non-NA faculty, students, and researchers who are situated at TCUs or PWIs. Eighteen of the co-authors are NA. Of these, 13 are STEM faculty or

instructors who were interviewed for the study; five are faculty, program coordinator, or student researchers on the project team. Three of the co-authors are non-NA, of these, two are faculty members and one is a postdoctoral fellow on the project team. The diverse research team shared a common purpose of wanting to understand and convey the collective values and experiences of NAs working within the 2- and 4-year colleges and universities. Our varying perspectives and positionalities helped de-colonize traditional research processes and authorship protocols and created a replicable method that others can adopt.

Method

Project team and Advisory Board members used Indigenous Research Methodologies (IRM) to coconstruct a conversational moderator's guide to align with Indigenous community ontology. Indigenous Research Methodology acknowledges and validates the longstanding tradition among Indigenous communities of generating scientific knowledge through processes of observation and experimentation congruent with their cultural values (Mazzocchi, 2006; Snow et al., 2016). In contrast to the positivist notion that all science be completely objective and free from bias, IRM is both a precursor to and born out of methodological antipositivism—demanding flexibility on the part of researcher in responding to cultural norms, values, and practices (Starblanket, 2018). Thus, our open-ended conversational guide/method accommodated principles of NA oral traditions, including respect for each participant's story, and allowing each research participant greater control over what they wished to share with respect to the research questions (Kovach, 2009). To further de-colonize the NA—Western relationship and apply IRM, all participants were invited to provide critical feedback on the interpretation of findings, relevancy and relationality of the work (i.e., does the research assist the community and can the community make sense of the research?), dissemination of the results, and co-authorship on the paper. Advisory Board members reviewed and approved the paper before submission. Engaging the research participants and Advisory Board members helped create relationships throughout the entirety of the research.

The conversational moderator's guide was based on existing literature and career enhancement and/or mentoring programs (Kosoko-Lasaki et al., 2006) for women and minority faculty, and Fictive Kin (Tierney & Venegas, 2006) that considers tribal, institutional, and identity differentiation, embedded in the values of NA higher education. Based on existing literature, broad categories of personal, relational, and collective experiences, and mentoring relationships that enhanced or inhibited professional development and career advancement were developed as a framework by which to examine the research topic. The final guide included nine questions. Of these, five questions explored personal and relational values and experiences and mentoring relationships that enhanced or inhibited career advancement and professional development of NAF-STEM (see Table 2). This paper reports the outcomes for these questions. Four questions explored the configuration of a mentoring program for NAF-STEM. The outcomes for these questions and the initial implementation of an Indigenous Mentoring Program for NAF-STEM faculty will be reported elsewhere.

Recruitment efforts included snowball sampling and convenience sampling methods, flyers distributed at national science conferences

Table 2*Interview Questions*

How do Indigenous values play a role in your professional/academic life?
 How do you balance your values and the expectations of academia?
 How can mentoring activities support the balance of your values and the expectations or requirements of your profession?
 Please describe a positive mentoring relationship you've had in your life (this can be formal or informal).
 Who are your mentors?

and at TCUs and PWIs primarily in the Pacific-Northwest/Plains region. Inclusion criteria included being NA faculty, postdoctoral trainee, or TCU employee in STEM or related disciplines. One NA and two non-NA project team members conducted the interviews. Participants completed a demographic survey.

Interviews were digitally recorded and ranged in length from 45 to 111 min (average 60 min). Audio files were transcribed and formed the units of analysis. Utilizing inductive methods, saturation was identified when, across interviews, no additional data were being found and the properties of emergent categories (or codes) could be developed (Glaser & Strauss, 1967; Saunders et al., 2018). Member checking took place in two forms. First, at the conclusion of each interview, where the moderator summarized and reviewed responses to confirm accuracy of data with each participant. Second, member checking occurred after analysis, where synthesized data from the entire sample was presented to participants to provide an opportunity for individuals to consider how and if their experiences fit with those of the group (Birt et al., 2016). Inductive methods for content analysis were applied by two researchers (first and second co-authors), described briefly as follows. First, open coding was performed to establish an initial coding frame; next, lists of codes were assembled under higher-order groupings to bring together data that were similar or related; finally, themes and subthemes were generated, labeled using content-derived words (Elo & Kyngäs, 2008). The content analysis was broadly guided by the framework of personal, relational, and collective experiences that enhanced or inhibited professional development, including additional emergent categories, and the researchers' cultural understanding and perspective. The draft was refined to develop a detailed coding frame, which was applied to the transcripts by the second co-author. To examine the trustworthiness of the coding frame and its application, an intercoder reliability (ICR) process was completed (O'Connor & Joffe, 2020). A third member of the research team (third co-author) applied the coding frame to a random 10% of total coded units. Agreement was evaluated, and disagreements across the two coders (second and third co-authors) were resolved through discussion and informed the refinement of the coding frame. The statistical package IBM SPSS Statistics for Windows, Version 25.0 was used to calculate Cohen's kappa statistic (Cohen, 1960). The resulting statistic was $\kappa = 0.820$, indicating strong agreement across coders (Landis & Koch, 1977). The research team also explored how themes and subthemes resulting from the interviews were relevant to the nine tenets of TribalCrit. The qualitative analysis software program NVivo 10 (QSR International Pty Ltd., 2010) was used to facilitate data organization and management. Institutional Review Board approval for the study was obtained from UM, SBC, and SKC.

Results**Description of Participants**

Twenty-three NA faculty in STEM participated in the interviews. See Table 3 for participant characteristics.

Description of Themes and Subthemes and Their Relevance to TribalCrit

Common themes and subthemes for understanding personal, relational, and collective experiences, and mentoring relationships that enhanced or inhibited career advancement and professional development were identified through the analysis of the interviews. Major themes included values, mentors and mentoring relationships, and general barriers to success. Several major themes and subthemes aligned with TribalCrit, allowing for a strong critique of NA faculty mentoring as viewed by NAs in higher education and supported by critical perspectives from this framework and theory. These results are described below with participant comments using pseudonyms to provide examples and to elevate the voices of NA faculty. Tables following each section provide summaries for the theme and subthemes and their relevance to TribalCrit.

Values

Participants discussed how their values impact academic life. Though values may differ between NA communities, the recurring themes included values related to the relevance of research for community; the importance of relationships inside and outside of academia; an emphasis on their responsibility to serve NA students; the tension of balance between academic and family or community identity; and respect for participating in cultural activities (see Table 4). The themes presented in this section illustrate how personal, relational, and collective experiences that are positioned within NA values, if recognized and supported by institutional supports and mentoring programs, can enhance professional development and career advancement of NA faculty and instructors in STEM fields.

Table 3*Participant Characteristics (n = 23)*

Demographics	Range or %, and (n)
Age range (years)	28–59
Female	64% (n = 14)
Professional title	
Instructor	22% (n = 5)
Assistant professor	35% (n = 8)
Associate professor	30% (n = 7)
Postdoctoral fellow	4% (n = 1)
Other	9% (n = 2)
Institutional affiliation	
Tribal college or university	30% (n = 7)
Predominantly White 4-year institution	65% (n = 15)
Other academic setting	4% (n = 1)
STEM area	
Science	52% (n = 12)
Engineering	17% (n = 4)
Mathematics	4% (n = 1)
STEM-related fields	26% (n = 6)

Note. STEM = science, technology, engineering, and mathematics.

Table 4*Theme Summaries: Values, Mentors and Mentoring Relationships, General Barriers to Success*

Theme	Subtheme	Examples	Relevance to TribalCrit tenets
Values important to NA faculty	Community work	Research relevance to community	Tenet 9—"Theory and practice are connected in deep and explicit ways such that scholars must work towards social change."
	Relationships	Academic peers	Tenet 4—"Indigenous peoples have a desire to obtain and forge tribal sovereignty, tribal autonomy, self-determination, and self-identification."
	Student success	Mentoring students outside of discipline and institution	Tenet 6—"Governmental policies and educational policies toward Indigenous peoples are intimately linked around the problematic goal of assimilation."
	Balance	With family With tribe With culture	Tenet 5—"The concepts of culture, knowledge, and power take on new meaning when examined through an Indigenous lens."
	Participation in cultural activities	Ceremonies Hunting/Gathering Funerals Celebrations	Tenet 7—"Tribal philosophies, beliefs, customs, traditions, and visions for the future are central to understanding the lived realities of Indigenous peoples, but they also illustrate the differences and adaptability among individuals and groups."
Forms of mentoring	Types of mentors	Peer mentors Senior faculty Cultural/Community	Tenet 9—"Theory and practice are connected in deep and explicit ways such that scholars must work towards social change."
General barriers to success	Institutional and Administrative Policies	Lack of administrative/institutional understanding of values and culture	Tenet 6—"Governmental policies and educational policies toward Indigenous peoples are intimately linked around the problematic goal of assimilation."
	Cultural Taxation	Over-burdened with mentoring, service on committees	Tenet 2—"U.S. policies toward Indigenous peoples are rooted in imperialism, White supremacy, and a desire for material gain."
	Value of Oral Presentation Versus Written Publication	Emphasis on written publication for tenure and promotion	

Note. NA = Native American.

Relevance of Research for Community. The drive for post-secondary education and chosen research area was frequently described as rooted in lessons learned from family and home community. Participants discussed the importance of attaining education so that they can "give back" to their tribes and/or communities (Page-Reeves et al., 2019), choosing a research path that directly supports NA people, water, plants, and the land, or selecting methodologies or strategies within a specific field that best align with their Indigenous values. L. P. described the importance of relevance and accessibility to her research,

I think that one of the things I also try to do, especially with my research and my writing and publishing is that I try to make sure that what I'm researching and publishing is useful to community. Not only is it useful, but that it's written in a way that people can read it . . .

H. L. described Indigenous values as the foundation and driver of his career path,

I do like to use (*the term*) Indigenous values because that is one of the ways that I think about my professional and academic life. I mean, the root . . . I tell people all the time that the reason that I got into academia is because the culture that I was brought up in exercised multiple [*values*], but among those were the value of education. It was stressed for me from my parents, all of my relatives, and the Urban Indian community that I grew up in that one of the best things I could do with my life was get as much education as possible. And then, to go along with that, the second thing was, so that you can help your community. So that you could help your tribe.

This response is reflective of TribalCrit by articulating a desire to work toward social change (Tenet 9) particularly in contemporary (and urban) Indigenous philosophies, which has its roots in place-based community values.

Relationships. Building and maintaining relationships with peers or students and their families at the academic institution was described as positive and important. A. T. described the value of department-wide, informal gatherings to his professional experience,

. . . I think one of the ways that are my values, which I think also because of my background, is more family and prioritizing relationships with people. I think that's why I enjoy some of these get-togethers, because you get to know the people on a personal level as opposed to on a professional level, get to learn about their families and what it is that they're doing and the trips that they take.

A. T. also described the importance of relationships with NA students,

I've noticed this also when I work with students. I've gotten to know them and their families quite well, and just being involved in their lives in some way with my own family, I think, is how I see infusing Indigenous values into some of the professional roles that I'm in with students and even academic in some ways. Just, I enjoy talking to students and having them tell stories even if it's in the middle of class and just getting to know them a little bit better and their families too. I'm fortunate because my classes are usually smaller, so I can do that.

One common issue voiced on this topic was the emphasis on faculty-to-student relationships rather than faculty-to-faculty

relationships, representing a missed opportunity to build connections between NA faculty. This additionally reflects the small number of NAF-STEM in higher education settings, leaving a void, which is representative of Tenet 3 of TribalCrit; stating that Indigenous Peoples occupy a limited space. Informal gatherings, such as social events hosted by a department where faculty, students, and their families could gather for meals and engage were described as valuable for learning more about peers and building a sense of connection.

Some participants described having regular, informal gatherings of NA faculty from across disciplines, which could be one component of a mentoring program. These gatherings could occur in an Indigenous-only space (such as a building designated for NA students) or meeting-up at a broader campus event—to share meals and talk about personal topics rather than professional topics. B. E. described an informal group in this way,

One thing that we used to do every month, was we would have what we called family dinner . . . It can be very isolating, and just knowing that there's other Native American [*field of study*], staff, faculty, etc., who are there, is a big deal. We started getting together once a month to cook a dinner together. We called it family dinner, someone would bring a salad . . . like a meal. It was something that was highly attended, and if somebody missed, they felt bad. Because this is almost a real community, it was a real family. I think envisioning that people have a very . . . I don't know, we just understand family differently.

When viewed through a TribalCrit lens, respondents articulate concepts of culture that reflect a connection to family and the cocreation of space that affords relationship development (Tenets 4, 7). These are the spaces that establish the foundation for the reciprocal sharing of knowledge, and reconceptualizing power in a collective sense, versus power as typically understood in a predominantly non-NA Western academic paradigm.

Harley (2008) states “The literature documents a pervasive theme that the qualifications and contributions of faculty of color are devalued or undervalued and that this racial bias carries over to the tenure and promotion process” (p. 25). This phenomenon forces faculty of color, particularly women of color to make adjustments and develop coping strategies, adding to an already strenuous workload. Problematically, the workload mentioned here is one that is not the same as majoritarian faculty (Villapando & Bernal, 2002) where community labor (the family dinner mentioned above is a labor of love) is not seen as viable in academic circles and is unlikely to make into one's tenure dossier. In short, the conceptualization of power at PWIs is understood in the context of rugged individualism, exclusion, and prejudice. In this environment, academic standards are pervasive in terms of racial and gender oppression.

Responsibility to Serve Native American Students. The topic of student success and supporting NA students within their academic institution was overwhelmingly present across interviews. In fact, the wish to support NA students and spend time talking with and mentoring students was described as a central factor for choices in career direction or for impact of scholarly productivity. A. T. described a choice to change institutions for increased opportunity to work with NA students.

It was always a struggle because I felt as a Native professor that I had the obligation to help other Native students. Even though my service component was probably 5% of my overall position description, I spent a lot of time on service and helping students and just being a part

of their degree programs and their struggles. That was difficult for me, and I think that's one of the reasons that drew me over here to [*academic institution*] is I could spend more time working with Native students and it'd still be part of my position description, because that was sort of the direction I was heading anyway. I enjoyed being able to do that.

A. T. described a transition in the area of research that would enable a focus on mentoring students,

I'm more concerned about the success of other people and just seeing them do well, which is also part of the reason why I'm switching away from hard science and [*field of study*] research to more education research, I think. To me, right now it just has a little bit more value than writing another journal paper, just to see students actually do a little bit better in education or schooling and going into STEM disciplines.

Here, H. L. brings in the concept of cultural taxation to describe the excess burden placed on NA faculty due to the limited faculty and high commitment to supporting NA students on-campus,

I think that goes under the category of cultural tax. So, a lot of that kind of weighs on me and it is hard to say no to my Native students. It's hard to say no to any of the tribes in this region when they come to me and ask questions, even if it's kind of outside of what I'm doing or it's not part of my current plan of action. I still want to point them in the right direction or do everything that I can to help them get answers to their questions. And, really what happens is I probably don't do as much visible scholarship as other people in my faculty rank, or my level [of] experience, or whatever. That's okay, I'm not sad about that. But, that's just kind of how it is.

These statements articulate that institutional policies do not reflect NA community values. Rather, they reflect a subtle commodification of identity. This happens in practice by disincentivizing relationship (NA community construction and mentoring) toward intellectual imperialism and material gain by valuing scholarly production and neoliberal notions of working from a capitalist ethic of filling classrooms that have popular/performative instructors (Tenet 6). In short, the commitment to community is in conflict with what is valued by the institution and not part of mentoring practices that support NA faculty success.

Balance. The tension between academic expectations and personal values such as time with family or participation in nonacademic activities was often surmised as; “it's hard” and “I'm pretty terrible at it to be honest with you” and “one of the things I struggle with most.” This challenge was most often referred to in relation to family and home life, as N. M. reflected,

The balance has not been great though. I don't get to spend nearly enough time with family. One of our values is strength of family, love of family. And I can't spend enough time with my family. I feel like my kids are growing up knowing a little bit about our traditional values because we go to dance practices once in a great while and I speak a little bit of [*Indigenous language*] at home, sometimes my cousins come over, but I don't have that connection that I wanted to have when I came here. I wanted to be able to have dinners at least once a month with my family, or some sort of something with my family at least once a month and it doesn't happen because I'm so busy with work. Work just consumes most of my time.

However, some participants addressed the tension in balance between being a NA community member while also representing an “outside” academic institution. K. W. described it in this way,

And I'm not like a White [*field of study*] researcher going to these communities. I'm going back to my own community who have expectations for me as well. Balancing that is a point of contention in my life. I've gone back and talked to people. They often say to me, "We don't want you guys . . ." And I forget that, I don't think of myself as representing [*academic institution*]. But when I'm there, I've had community members talk to me about, "Well, we don't want [*academic institution*] coming in and saying we're doing all this great stuff and we're saving the people here." Which is definitely the value I have. I definitely don't want to be seen that way, but I was glad that they were able to share that with me straight up. It was on the table and I could realize what they needed, even though I'm [*tribal affiliation*] they don't necessarily know me. And I do represent [*academic institution*].

These statements reflect the collective experiences of colonization as well as contemporary community reactions to the problematic assimilation of Indigenous peoples (Tenet 5). To share these experiences (stories) the respondents are participating in the development of theory that adds to the theory. Rarely are NA faculty educated to what tensions are awaiting them, primarily because the credential comes from a PWI.

Participation in Cultural Activities. Cultural activities such as hunting, gathering plants, attending celebrations, and attending funerals were described by some participants as valued activities, while others described a distinct disconnection from cultural activities since beginning academia, or did not describe such activities as part of their value system. Among those that described such participation as central to their values, a desire was expressed for improved access to participate (e.g., time off, policies) and/or approval or acknowledgment of participation by department chair or administration. D. H. described it as a "challenge" in this way,

. . . I go down on my reservation every fall, and I elk hunt. If I get an elk, it's like three weeks of work after that to process it correctly and to do it in a way that is good and the right way. I can't just go back to work the next Monday. So, I don't know. There's definitely challenges, like time is a challenge and trying to stay connected to your community while also being away and working and traveling. It's not easy, and I think that that's probably a common thread that you'll see, and I'm sure it's identified in other papers, where it's really hard to walk in those two worlds for Native people. You're either giving one up and focusing on the other or trying to balance them both, but it's definitely a challenge.

A few participants described institutional policies such as "cultural leave" to provide limited paid time for such activities; this allowance was described among a few participants representing TCUs and was not mentioned by participants representing PWIs. These statements reflect that tribal beliefs and customs, traditions, and visions for the future are central to understanding the lived realities of Indigenous peoples, but they also illustrate the differences and adaptability among individuals and groups (Tenet 7; see Table 4).

Mentors and Mentoring Relationships

One component of our research question/purpose was to explore the mentoring experiences of NA faculty and instructors. Participants described mentors and mentoring relationships along the academic pathway including peer mentors, senior faculty mentors, formalized teams of mentors, and cultural or community mentors (see Table 4). The themes presented in this section suggest that a mentoring program for NAF-STEM should provide opportunities

for faculty to develop and strengthen a variety of mentorship relationships to assemble an "academic family" that best supports their professional development and success. HeavyRunner & DeCelles (2002) state, "Establishing and maintaining a sense of "family," both at home and at college, fortifies American Indian students' academic persistence" (pp. 3–4), and we extend this idea to NA faculty and instructors.

Peer Mentors. Whether at the same or a different institution, participants described the valued role of peer mentors. These types of mentors functioned as role models, confidants about academic and personal issues, and friends able to share experiences and tips for navigating the tenure and promotion process. K. W. described the value of having STEM peers hired at the same time at the same institution,

At [*institution name*] there were four of us that came in (at the same time), and that was important . . . We could talk about what we needed to do, what needed to get done. How are you dealing with that? Talk about students. Talk about class. Talk about your research. Talk about what grants you're going to apply for.

This statement reflects the desire of NA faculty to build tribal sovereignty, tribal autonomy, self-determination, and self-identification (Tenet 4) while navigating PWI environments through informal, peer-to-peer conversations and meetings.

Senior Faculty Relationships. Participants described senior faculty mentoring relationships as essential for guidance toward career goals, modeling balance or supporting values, and encouragement and direct feedback on grants, publications, and presentations. Senior mentors were often described as a "champion" within the department or institution—someone who will provide opportunities and advocate for the best interest of the NA faculty. Some participants, however, described a lack of such mentoring relationships due to the size of institution or minimal options within their field—the terms "professional isolation," "disconnected" and "lone" were used to describe this feeling within respective areas. M. O. described her situation in this way,

I was at a previous institution where there was very little related to Native Americans. There was a small NA student population, I think there were maybe only one or two other NA faculty. And there, I felt completely isolated. I really was not happy there at all. But coming to a different institution where I do have that, and they've recognized it's important, and I'm starting to realize that that's probably what was missing in my success.

If culture, knowledge, and power take on new meaning when examined through an Indigenous lens, we see in this excerpt, that meaning is found in community. This speaks to the comprehensive effects of becoming a faculty member, the policies that they abide, and the racialized nature of identity. If community is present, resilience tends to come with it.

Cultural or Community Mentors. One pervasive theme across participants was the existence of cultural or community mentors, often family members, or elders. These mentors were described as necessary; promoting concepts such as work-life balance, taking care of oneself, and providing guidance on how to navigate the Western institution while acknowledging and honoring cultural values. Cultural or community mentors may or may not have had experience within academia and was often a family member or from the same tribe as the participant. This dynamic was described by B. E. as,

I was gonna say non-traditional mentors, but in a way they're actually very traditional mentors. One of my close mentors right now is an elder in my tribe . . . She's probably worked for 30 years in community advocacy and community activism. P. B. described it in this way,

I think most of my guides in life are my in-laws, or my own family. They really provide a sounding board. I didn't even have to say anything to them about it. Just interacting with them, understanding their own life stories provides that inspiration and guidance. More so, it's more directly related to the ceremonial things we do that we don't really like to talk about too much. Those activities are the real guides.

The concepts of culture, knowledge, and positionality take on new meaning when examined through an Indigenous lens and are reified in ceremonies that are often undisclosed to outsiders. These community philosophies and beliefs are central to understanding the lived realities. It is important to note that we cannot essentialize these but understand that they are different for different communities. This is an excellent example of "illustrating the difference and adaptability among individuals and groups."

How Mentoring Relationships Start. Participants described several individuals, whether they had been formally assigned as mentors or informally served as mentors. Mentoring relationships often began during the undergraduate or predoctoral stage, during field research, as a dissertation committee member, or at conferences. Mentoring relationships that began during the faculty stage were formally assigned or informally initiated. Formal assignments were through institutional programs—such as a department or program-based mentoring committee to provide guidance on tenure and promotion. One participant described being assigned a tenured NA faculty member as a "cultural mentor." These formal mentoring dynamics provided accountability for progress, orientation to the culture of the department, and future collaborators or long-term mentors. Other participants described unsuccessful formal mentoring teams that did not maintain contact, meeting once or twice and then dwindling or discontinuing contact.

Informal mentoring relationships were initiated by senior faculty inviting new NA faculty to meet, often connecting over common activities, research interests, or through social media outlets. Finally, mentoring relationships were catalyzed through national entities, such as the American Indian Science and Engineering Society (AISES). AISES activities initiated long-term relationships with mentors that NAF-STEM faculty felt connected to, with one participant describing the AISES network as "family."

Several participants recounted feeling isolated and alone in their academic departments. This was described as having a mentor who does not share a similar Indigenous worldview, not having NA peers in their professional field who understand their research, or not having access to a sense of community with other NA people at their institution. E. A. said,

I'm still very isolated. I mean I have friends and colleagues and stuff like that. But there's not a deep pool of . . . And then there are staff who are Native that I'm friends with . . . So that helps. But they don't get what I do really. So that's an issue sometimes. People don't often understand what I'm doing, you know?

When viewed through a TribalCrit lens, respondents convey mentoring relationships in ways that confound the way these relationships are understood in academia. NA communities are operating with a different understanding based on their

community-supported norms, customary interactions, and relational protocols. The lived realities of NA faculty experiences demonstrate both differences in a way mentoring is experienced and the compliance that is expected in their professional development.

Characteristics of Positive Mentoring. Characteristics across mentoring relationships designated as positive included an "open door" policy, where questions or guidance could be accessed informally; providing career guidance on faculty responsibilities, time management, and strategic planning for advancement; navigating the funding world and guidance on grant writing; sharing encouragement for writing and publishing; consistently checking-in or listening to concerns; providing a platform for presenting research on a national scale; providing guidance on navigating bureaucracy within an academic institution; and encouragement to stay focused amidst adversity.

Participants identified common gaps across mentoring relationships. Some participants wished their mentors would acknowledge and support time off from work to participate in cultural activities or ceremonies. Others described how some of their non-NA mentors were not willing to—or expressed not feeling capable of—learning about the unique challenges faced by NAF-STEM, such as tokenism and imposter syndrome. Participants shared the importance of the mentor standing as a champion to express support and promote the mentee in academic settings; it was described that NAF-STEM are less likely to self-promote due to a "cultural code" of humility (i.e., reluctance to self-promote or seem boastful). This was described as a tension, where self-promotion is encouraged and considered necessary for career advancement in a PWI, yet it may be uncomfortable or considered inappropriate by some NAF-STEM. These common gaps and assimilation models represent areas where improved mentoring strategies could better support NAF-STEM (see Table 4).

General Barriers to Success

Participants identified common barriers to success in academia as we explored collective experiences that enhanced or inhibited their professional development and career advancement. One barrier described as "administrative roadblocks," another relating to cultural taxation. Several participants described a dynamic within the academic system where emphasis is placed on written publication rather than oral presentation, whereas oral forms of sharing information were described as more closely linked to cultural history and preference (see Table 4).

Institutional and Administrative Policies. Participants expressed frustration with administrative policies; some described a need for an institution-wide mandatory orientation to NA values and culture, others on guidelines for research with NA communities, while one participant described their relationship with administration as "adversarial." Many participants suggested the need to "mentor administrations," J. P. L. described it in this way,

. . . I think mentoring activities for faculty, but we also need to mentor the institutions. I don't think we can just tell people, "Start talking about your values," or "be an advocate for the thing that you wanna see." We need to be at the same table with people who could help us make those changes. So I think we can be mentors for the people above us, in terms of, if we have a unified voice and say, you know, faculty do want the same time off that they need, or go to activities, or bring the culture to

the campus, I think is a big one. So yeah, I think we can . . . I think we mentor faculty, but we should mentor administrations.

Another perspective described an approach where the participant (NA STEM faculty member) moved forward with their agenda rooted in their values, and was content as long as the administration did not block their efforts. A. T. described it in this way,

I feel like I have a pretty good vision of where it is I want to go both with me, my program and with my students. As long as they're [administration] not putting up roadblocks to get that way, it doesn't bother me too much that they're not necessarily supporting or getting on board or things like that as long as they're just not getting in the way . . .

While it may seem problematic that NA faculty shared stories that call for the development of inclusive professional development for administrators, colleagues, and mentors, the very act of sharing these perspectives is in alignment with TribalCrit. Specifically, the praxis of working toward social change is exemplified by interacting with adversaries and continuing the work. This can come with frustration, which is sometimes eased when operating from one's own agenda.

Cultural Taxation. Participating on diversity and search committees, boards, and other campus groups was described as an honor and as a cause for burn-out among participants. Many described the challenge being one of two or three NA STEM faculty at their institution, and the multitude of opportunities presented to them for representing Indigenous voice at their institution. When combined with a commitment to participating in community work which may compete with other scholarly activities, and supporting NA student success, these circumstances create challenging conditions for NA faculty to succeed. H. L. described it in this way,

["Cultural taxation"] is the often self-imposed, but sometimes externally imposed duties and responsibilities that I take on as one of two Indigenous faculty members at this institution. So, I know that if I say "no" to something, that our voice will not be represented on a committee, or organizing for a particular function, or planning for something. So, I . . . Before I say no to any of these opportunities, I carefully think through the implications of not having Indigenous representation at whatever that thing is. So, as a result of thinking through the possibilities, I'd probably say "yes" a lot more than I should. And so, that ends up tipping my . . . I'd say it tips my service responsibilities maybe more towards 25% than 10%. And, again, these are things that you don't really get evaluated on for promotion and tenure and things like that.

Other participants called for increased awareness among non-NA faculty and administration about NA STEM faculty needing to "say no" to such opportunities in order to protect time for professional development and to maintain competitive scholarly productivity; J. P. L. summed this up by saying, "you can't burden the burdened." Other participants called for academic positions that incorporate the mentoring as a larger portion of the workload, or for institutions to aid with student mentoring for NA STEM faculty. N. M. described the need in this way,

. . . My service load is way too heavy and a big part of that is because I'm reaching out to students who are interested in [field of study] and who are [tribal affiliation] and who are female and who have kids and who . . . you know there are all these groups but I feel like I need to support because I'm the only the person whose . . . because I'm the only person for a lot of those little check marks. And that becomes extremely hard. It's just an overload on my service.

These statements illustrate how government and education policies toward Indigenous people are intimately linked around the problematic goal of assimilation (Tenet 5).

Value of Oral Presentation Versus Written Publication. Some participants referred to the Indigenous tradition of storytelling or "narrative voice" and expressed frustration with the lack of value placed on oral presentation compared with written publication. B. E. described it in this way,

Some of the currency of promotion in academia are not things that I inherently am really good at. One thing that I do enjoy, is I enjoy stories, and I enjoy listening to stories, I enjoy sharing stories. So, speaking and accepting speaking invitations, and going out to share about what we're doing in more of an oral tradition, that is exciting to me. I have so much more fun doing that. Whereas the currency, especially in the older model, well what value is writing something on a paper, even if you don't tell anybody about it ever. If you write it on a paper, it's valuable, pushed in a closet and it'll stay there forever, but you did that so it's value . . . I value the story telling and dissemination through in-person communication as much as possible, and that is very different.

It is important for PWIs to acknowledge and value forms of dissemination besides peer-reviewed journals, formal presentations, etc., that are typically valued for tenure and promotion. Sometimes, the best way to publicize information about research that impacts NA communities is through local PSAs, and presentations to community members, tribal government, and cultural committees. These types of dissemination products should have same value as the traditional forms of dissemination typically rated for tenure and promotion.

Discussion

Very few studies have explored the lived experiences of NA faculty at research universities (Walters et al., 2019) and medical schools (Elliott et al., 2010). Our study adds to the literature by providing insights into NA STEM faculty reflecting upon their experiences and ideas that support the retention and promotion of NA STEM faculty. While many of the themes emerging from the interviews were similar to issues that have been documented in the literature for faculty of color, some were unique. Several themes and subthemes are relevant to tenets of TribalCrit on recognizing how NA STEM faculty think and behave in ways unique to their worldviews, experiences and culture, and positioning of NA peoples in contemporary societies and institutions of higher education. How the themes compare and contrast with the literature and relevancy to the tenets of TribalCrit is further discussed below.

Values

Relevance of research for NA communities, importance of relationships internal and external to the institution, responsibility to serve NA students, staying connected to cultural activities, and the challenges of balancing academic and family/community life were identified as values impacting the lives of NA faculty in this study. Faculty have acknowledged that their research puts them at risk of losing their ability to belong or give back to their home communities in other studies (Elliott et al., 2010; Guillory & Wolverton, 2008); findings which mirror ours. Further, the emergent theme in our study of choosing a research path that is relevant to the community and directly supports NA people is similar to others (Barnhardt &

Kawagley, 2005; Guillory & Wolverton, 2008). Indeed, one of our participants described Indigenous values as the foundation of their career path. These findings show training faculty and administrators about Indigenous values and methodology should include how these elements enhance the success of NA faculty, and their NA mentees.

Our study showed a main factor for choosing a professional and scholarly direction was anchored in the opportunity to mentor and work with NA students. However, participants also described the excess burden, or cultural taxation placed on NA faculty to support NA students due to a paucity of NA [sic] faculty. Cultural taxation is described as the “... extra, uncompensated and institutionally unrewarded work that is disproportionately placed upon Underrepresented Minority (URM) and NA faculty members” (Jaime & Rios, 2006; Walters et al., 2019). For example, NA “... faculty are often asked to serve as liaisons between the institution and tribal communities—roles for which they are often uncompensated in terms of reduction in other responsibilities” (Walters et al., 2019). Cultural taxation (Padilla, 1994) also emerged in a study conducted by Walters and colleagues exploring the lived experiences of NA faculty at research universities (Walters et al., 2019). These data emphasize that mentoring programs for NA faculty and institutional supports need to recognize and mitigate the burden and stress of cultural taxation in NA faculty.

Participants agreed that peer support and networking played an important role in decreasing their sense of isolation and enhancing their professional success and social connectedness with NA STEM faculty. These findings are similar to a study that assessed the experiences of 12 URM faculty participating in a structured faculty development program at an academic medical center (Daley et al., 2011).

Participants described tensions between prioritizing academic expectations over personal life; findings that echo others (Eagan & Garvey, 2015; Walters et al., 2019). Participants also described feeling tension between being an NA community member while also being an academic external to the community. Similarly, a study conducted with NA faculty women showed their studies put them at risk of losing their ability to belong or to give back to their home communities (Elliott et al., 2010). Community members commonly question the level of commitment of anyone who leaves the community and spends years in educational settings (Elliott et al., 2010). Our participants described the importance of being able to create opportunities to use skills obtained in their professions to give back to NA communities in ways that honor cultural values and traditions.

Previous studies suggest that participation in cultural activities can help maintain a healthy work–life balance in NA faculty (Walters et al., 2019). Participants in the present study described hunting, fishing, gathering plants, attending celebrations, and funerals as cultural activities that were most important to them, and suggested that institutions create “cultural leave” that allows paid time for these activities. Institutionalizing paid leave for faculty who engage in cultural activities might help institutions attract, retain, and improve work–life balance for diverse faculty of color.

The idea of cultural taxation and the concept of bicultural accountability speak directly to educational policies and practices being linked to assimilation. Indigenous resistance to assimilation can be found in the forementioned enactments of Indigenous “philosophies, beliefs, customs, traditions, and visions for the future” (Brayboy, 2005; p. 429). These practices demonstrate adaptability among NA students and mentors alike. These experiences

have the potential to inform mentoring for other students and mentors who come from historically underserved communities in higher education.

Mentors and Mentoring Relationships

Having peer and senior faculty mentors was described as vital to NA faculty’s professional and social development as scholars. This finding is similar to others who have conceptualized, designed, and implemented a mutual mentoring model for URM faculty (Yun et al., 2016), a postdoctoral program for junior NA investigators (Buchwald & Dick, 2011; Manson et al., 2006), and minority faculty programs at medical schools (Beech et al., 2013; Brodt et al., 2019; Daley et al., 2011; Johnson et al., 1998). Additionally, some of the NA faculty in the present study expressed a sense of isolation regarding their departments and STEM field areas, findings which mirror other studies (Viets et al., 2009; Walters et al., 2019). Whereas other studies report that mentees of color (Viets et al., 2009) often feel isolated because of ignoring issues involving ethnicity (Ponjuan et al., 2011), participants in the present study felt isolated because there are very few NA students and faculty, or minimal interactions specific to STEM fields at their institution. Participants in our study did not voice concern about supervisory mentors, regardless of gender or race/ethnicity, internalizing settler colonial messages and perpetuating settler colonial processes; these findings contrast others (Jayakumar et al., 2009; Walters et al., 2019). However, that NA faculty and faculty of color in other studies (Jayakumar et al., 2009; Stanley, 2006; Walters et al., 2019) have voiced concerns underscores the importance of decolonizing university environments and promoting healthy mentoring relationships.

Participants described family members or elders as important cultural mentors who could provide necessary guidance on work–life balance and navigation of a PWI while honoring cultural values; findings similar to others (Guillory & Wolverton, 2008). In contrast, others have described culturally based mentorship as providing faculty of color access to role models and mentors of the same race/ethnicity or gender who are successful in academia (Viets et al., 2009). Perhaps future mentoring programs can engage family members, elders, and NA role models and mentors in culturally focused mentorship activities for NA STEM faculty.

Respondents’ stories illuminated the reality that they are engaged in communities that make them feel more complete, and as a result, are successfully navigating their respective disciplines in resistance to the endemic nature of colonization (Tenet 1). Even in spaces away from home, the respondents are working toward sovereignty, autonomy, self-determination, and self-identification (Tenet 4), but it is distinctive outside of the contemporary political/tribal context speaking directly to “philosophies, beliefs, customs, traditions, and visions for the future are central to understanding the lived realities of Indigenous peoples, but they also illustrate the differences and adaptability among individuals and groups” (Brayboy, 2005, p. 429; Tenet 7).

General Barriers to Success

Themes relating to NA faculty academic success emerged in the present study. One theme was to institutionalize mandatory trainings for administrators and faculty about NA values and culture, decolonization and indigenization—particularly in the STEM fields

(Cull et al., 2018), and guidelines for research with NA communities. This view is similar to suggestions by Walters and colleagues to “require administrators to be educated on NA epistemologies and incorporating diverse worldviews, while actively addressing settler colonial privileges” (Walters et al., 2019). Resisting colonization comes in multiple forms and is context specific. Sometimes that context includes policies and procedures that call everyone into action as opposed to just the NA students and mentors. Certainly, policy changes and shifts in practice are easier said than done. Nonetheless, there are opportunities to make changes that reflect a praxis that moves toward social change (Tenet 9), one which includes NA faculty, staff, and students to participate in policy and procedure creation and implementation.

To our knowledge, only one program has been developed for non-NA faculty who mentor NA STEM graduate students that provides training for faculty, administrators, and staff to learn about NA values, research methods, and epistemologies (Windchief et al., 2018). Another theme was the lack of value given to oral presentation compared to a written publication. This finding speaks to qualities associated with Indigenous knowledge systems such as qualitative oral record, and communication of story-based research in transferring what is intended to be oral instead of written text (Kovach, 2010). In NA oral culture, story lives, develops, and is imbued with the energy of the dynamic relationship between teller and listener. The story can only exist within an interdependent relationship between teller and listener. Writing story (e.g., written publication) becomes a concession of the Indigenous researcher (Kovach, 2010). Thus, department unit standards and other institutional policies that evaluate the performance activities of NA faculty should place equal (or more) value on oral presentations than on written publications.

Strengths and Limitations

These data are limited by the voluntary nature of the participants, potential selection bias, and inclusion criteria that included a postdoctoral researcher. With only one of the 23 participants being a postdoctoral researcher, potential to skew the results is minimized. The data are also limited due to the low number of NA faculty in STEM in institutions across the U.S. Native American populations are not homogenous; worldview, beliefs, and customs may vary by tribe, geography, and rural or urban identity, limiting broad generalizability of findings. Nonetheless, the authors employed recommended strategies to recruit an appropriate number of participants, including a substantial number of female NA faculty in STEM, and to identify saturation (Glaser & Strauss, 1967) and establish trustworthiness of findings (Birt et al., 2016; O'Connor & Joffe, 2020). We applied TribalCrit to help us organize and assess the qualitative data that were collected to understand the lived experience of NA faculty and instructors in STEM. To our knowledge, applying TribalCrit for this particular context has not been reported in the literature. We encourage qualitative researchers to gauge the strength of our analysis and research findings in using TribalCrit in this way and in their own work.

Implications for Future Research, Practice, and Policy

This study provides powerful and persuasive testimony from NA scholars in STEM to help understand the human damage that

perpetrators of social injustices in the twenty-first century academy have wrought—in the 2- and 4-year colleges and research universities, in PhD programs, in the academic publishing industry, and in the independent disciplinary organizations. It also offers a path forward by prompting discussions among faculty and administrator colleagues and deepening our understanding of what concrete practices and policies universities should adopt in the names of social justice and indigenizing the academy. If adopted, the lessons learned from these research participants can pave the way for other NA scholars to follow in their footsteps.

Conclusions

The findings of this study have implications for the successful retention and promotion of NA STEM faculty and increasing representation of NA people in meaningful decision-making leadership positions to enhance tribal self-determination and self-governance. From the participants' stories, we learned there is a need to recognize that peer, senior and community mentors, cultural identity, and values increased institutional knowledge about Indigenous values and research methods and placing value on legitimizing oral presentation is essential to NA faculty professional development, social and professional connectedness, and work-life balance. The narratives underscore the need for institutions to support and deliver career advancement, professional development, and mentoring programs for NA faculty and for non-NA administrators and faculty to strengthen institutional supports to improve NA faculty in STEM achievement. The potential result is a diverse and inclusive institution which is resilient and rich with varied and valued Indigenous and NA worldviews.

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