FROM THE EDITORS

The Indigenous Knowledges, Encouragements, Engagements, and Experiences

('IKE) Alliance for Transforming STEM Education

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Abstract

Written by the SECEIJ Special Forum editorial team, this Project Report summarizes the interdisciplinary, collaborative, and inspiring research journey and theoretical background leading to the creation of a strategic plan for the ʻIKE Alliance for Transforming STEM Education. ʻIKE, which stands for Indigenous Knowledges, Encouragements, Engagements, and Experiences, means knowledge in the Native Hawaiian language. This article outlines the importance of honoring Indigenous epistemologies in STEM education and across institutions and communities as we work to increase the presence of Native American, Alaska Native, Native Hawaiian, and Pacific Islander students in STEM. Our goal is to build authentic and durable partnerships locally and nationally through respecting, honoring, engaging, cultivating, and consulting with Native Nations and communities.

Introduction

Indigenous science, knowledge, and traditions are essential for tackling some of today's most crucial and long-standing problems, yet Indigenous communities continue

to be widely under-represented in traditional ("Western") academic institutions, particularly in the fields of science, technology, engineering, and mathematics (STEM). In 2013, members of the Science Education for New Civic Engagements and Responsibilities (SENCER) community began a conversation about how to transform STEM education to honor Indigenous epistemologies. This led to a series of grant-funded initiatives aimed at identifying how to improve participation challenges for Native American, Alaska Native, Native Hawaiian, and Pacific Islander (NAAN-NHPI) STEM students.[1] The first was the "Transcending Barriers to Success: Connecting Indigenous and Western Knowledge Systems to Tackle Grand Challenges" (TBS) project which spanned three years starting in 2017 and was funded by the W. M. Keck Foundation. TBS included the University of Hawai'i at Mānoa and Kapi'olani Community College (both part of the University of Hawai'i system), the University of Alaska, Humboldt State University (now California State Polytechnic University, Humboldt), Northern Arizona University, and Salish Kootenai College (Montana). The lessons learned from the TBS work provided the foundation for an NSF INCLUDES Strategic Planning grant, which enabled faculty, staff, students, and Indigenous leaders to continue the work by focusing on developing a shared vision for an alliance: a collective of institutions, organizations, people, and programs committed to achieving a shared vision. The University of Hawai'i at Mānoa; Kapi'olani Community College; California State Polytechnic University, Humboldt; Texas Woman's University; the University of Arkansas; and George Mason University participated in the planning process.

From these efforts emerged the Indigenous Knowledges, Encouragements, Engagements, and Experiences ('IKE) Alliance to address STEM participation challenges faced by NAAN-NHPI students. 'IKE, the acronym for the Alliance, is the Hawaiian term for knowledge. It also means to know, understand, experience, and recognize. Its use grounds the 'IKE Alliance in the distinct Indigenous worldviews of the NAAN-NHPI students it supports. Our planning process was inspired by the importance of the number 4 in Native American belief systems: four worlds, seasons, directions, life stages, and personages. We devised four dialogic elements: 1) talking circles, 2) listening circles, 3) convenings, and 4) gatherings (Hultranz, 1980; Williamson, 1989; Mooney, 1982; Waters, 1977). Talking circles with faculty, administrators, staff, and students anchored the project at participating campuses. With NAAN-NHPI student experience and knowledge central to this work, listening circles were conducted with students, designed to understand their needs, desires, and insights (see for example Risling Baldy et al., "Listening to Learn: Using a Talking Circle Approach to Understand the Indigenous STEM Student Experience" in this issue).

We also held regional convenings of groups with special knowledge and interests, as well as larger national gatherings. One of the convenings, for example, was focused on identifying population data, which has implications for funding and programming. The Cal Poly Humboldt team showed how they worked with the California State University Institutional Research teams to utilize both racial self-identification and tribal affiliation (e.g., Karuk, Maidu, Cahuilleno, Mojave, Yokuts, Pomo, and Paiute) on application data to provide a more accurate IPEDS (Integrated Postsecondary Education Data System) counting of Native students (National Center for Education Statistics, 2020). By recognizing "political status" they showed how they raised awareness state-wide of the need for honoring dual citizenship, which is a more accurate representation of Native enrollment. Likewise, the University of Hawai'i system team showed how it enables Native Hawaiian and Pacific Islander students to identify with their specific island affiliations (eg. Hawaiian, Samoan, Tongan, Chamorro, Marshallese, Chuukese, Palauan, etc.). The University of Hawai'i Community Colleges team also showed how allowing students to check one primary and one in-combination racial category resulted in total counts as much as four times larger for each islander group. When the University of Arkansas and Texas Woman's University teams adopted these strategies, the results were Native population counts four to five times larger than the IPEDS numbers. For example, in the fall 2021 semester, University of Arkansas' NAAN undergraduate student population was reported federally through the IPEDS system as 247 students comprising 0.8% of the total student population. When including NAAN students who selected "two or more races," the

1 Throughout this article we use the terms Native and Indigenous interchangeably to refer to this group as a whole.

population increased to 831 students, making them 2.9% of the student population. Such convenings shaped the shared visioning process.

As part of our strategic planning process, we identified the mission, shared vision and values of the Alliance. The ʻIKE Mission is to fully transform STEM by building reciprocal relationships with Native Nations and communities and with Indigenous knowledges, now and for future generations. The ʻIKE Alliance's Shared Vision is to increase the presence of NAAN-NHPI students in STEM by respecting, honoring, engaging, cultivating, and consulting in order to build durable relationships and partnerships with Native Nations and communities that honor Indigenous knowledges. Our values are built upon a shared understanding that Indigenous knowledges, practices, and visions for the future are held in an Indigenous sense of place, kinship networks, and languages. We value a sense of Belonging, a sense of Place, a sense of Reciprocity and Responsibility, a sense of Becoming, and durable relationships based on respect, humility, trust, and honesty.

The ʻIKE Alliance's overarching goals are to:

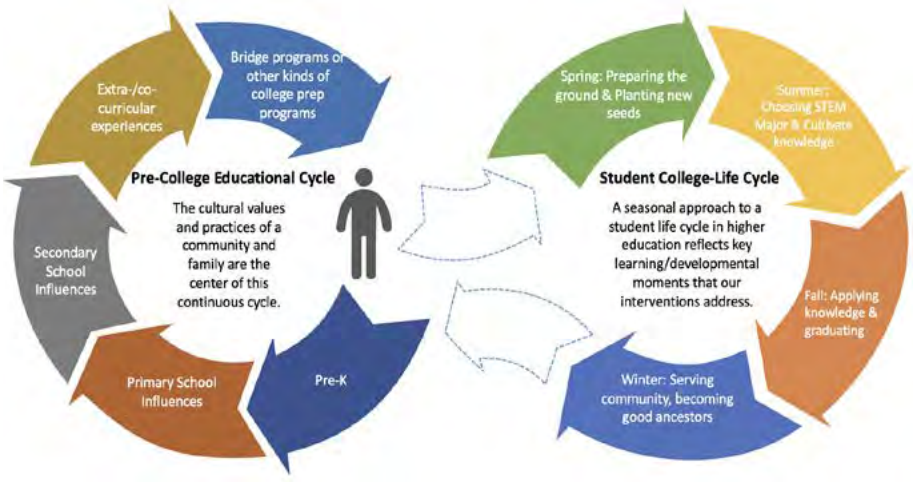
1. increase Native student representation in STEM to reflect the population of the nation;
2. achieve systemic change by Indigenizing STEM education in ʻIKE Alliance institutions; and
3. establish a durable ʻIKE Alliance for institutional transformation with a sustainable collective infrastructure.

The ʻIKE objectives are to:

1. take full advantage of both Indigenous and traditional academic knowledge systems to tackle grand challenges;
2. weave Indigenous science, culture, and community into best practices in STEM education;
3. support STEM NAAN-NHPI student leadership through the ʻIKE Alliance Student Corps;
4. create a collective infrastructure to support an Indigenized Networked Communities (INC) model; and
5. develop innovative and culturally appropriate assessment instruments.

We fine-tuned our intellectual approach during the planning process. Supporting NAAN-NHPI students along the path to degree and then to career will require cultural, community, and curricular innovations. One distinctive aspect of our approach is for campuses to collaborate with the Native and Indigenous communities of their service areas to tailor institutional practices such as student identification/data collection, recruitment, mentoring, advising, admissions, and financial aid, as well as systems to address basic needs like food, housing, and physical and mental health services. NAAN-NHPI students often are part of very close communities with extended family and deep relationships. Leaving home is hard, and the transition into higher education can be alienating and isolating. While our approach attends to activities identified in the college life cycle (right half of the student life cycle diagram, the undergraduate experience [Figure 1]), our shared vision acknowledges that students need a strong sense of Belonging and Becoming to succeed in their educational journey. "Belonging" means that students need to feel that they are legitimate members of the academic community, rather than strangers in a strange land (McClellan, 2018). "Becoming" means they need to have a clear vision of the path in front of them, so that they know where they are going and how they will get there (Ward et al., 2019). While the means of creating a culture supporting these needs will be

FIGURE 1. The 'IKE Alliance Student Life Cycle Model (Aikau et al., 2024)



dependent on individual institutional contexts, we start with a shared vision for integrating Indigenous knowledge, cultural practices, and cultural wealth with Western knowledge systems and frameworks to improve STEM success for NAAN-NHPI students.

Creating a sense of Belonging and Becoming can be envisioned as two strands of a four-strand braided rope that provides a net of support for NAAN-NHPI STEM students: a sense of Belonging, a sense of Place, a sense of Responsibility and Reciprocity, and a sense of Becoming. Indeed, a strong institutional net will provide a well-designed environment for success that more than meets the basic needs of NAAN-NHPI STEM students.

To achieve the four strands of an institutional rope of support, our "Belonging to Becoming" model (Figure 2) brings community and higher education together in ways proven to produce positive results (Tuck & Guishard, 2013). The values of Responsibility and Reciprocity have deep cultural meaning for Indigenous communities and can be translated into the Native vernacular providing even deeper meaning, specificity, and resonance for everyone. This strand of the braid acknowledges that Indigenous students do not necessarily pursue higher education for their own individual advancement. Rather, they see higher education as a means by which they can meet their familial, community, and cultural responsibilities (Whyte, 2018). An Indigenous worldview also recognizes that one's sense of responsibility extends beyond human relations and is imbued with a sense of reciprocity to the other-than-human world in the present moment and into the future. Our model for institutional transformation attends to these complex webs of responsibility and reciprocity.

Sense of Place is the final strand of the institutional rope. Being Indigenous today is to be in constant struggle to protect one's "own internal capacity to cultivate, transmit, remember, and exercise Indigenous knowledges despite what persons and organizations of other heritages and nations do" (Whyte, 2018, p. 76). Indigeneity as an analytic requires at least two analytical lenses, one reflecting settler colonialism and another seeing Indigenous views of land and nature as kin (Gilio-Whitaker, 2019). Speaking to a sense of Place means recognizing that being Indigenous is a political identity formed by colonization and its ongoing effects as well as the unique relationship autochthonous peoples have to specific places and the complex, interdependent societies that emerged from this original relation. A sense of Place fundamentally acknowledges the sovereignty and self-determination inherent in the relationship between place and peoples, and each institutional rope must attend to that specificity. Further, equity, inclusion, and diversity require truth-telling. Thus, a sense of Place must also attend to the history of settler colonialism and to how structures of removal, dispossession, assimilation, racism, and sexism continue to impact all Indigenous communities in the United States, albeit differentially (Gilio-Whitaker, 2019). Ultimately, a strong institutional net of Belonging to Becoming is reliant on the strength of all other strands as it leads to life success, revitalization of culture, durability in the continuum of flow, and respect between institutions of higher education and Native communities.

The 'IKE strategic planning process led to an Indigenous Networked Community (INC) and to a theory of change for the Alliance (Figure 3), building on the Networked Improvement Community (NIC) model developed by the Carnegie Foundation, which has been a model

FIGURE 2. 'IKE Alliance Four-Strand Model for Student Success (Aikau et al., 2024)

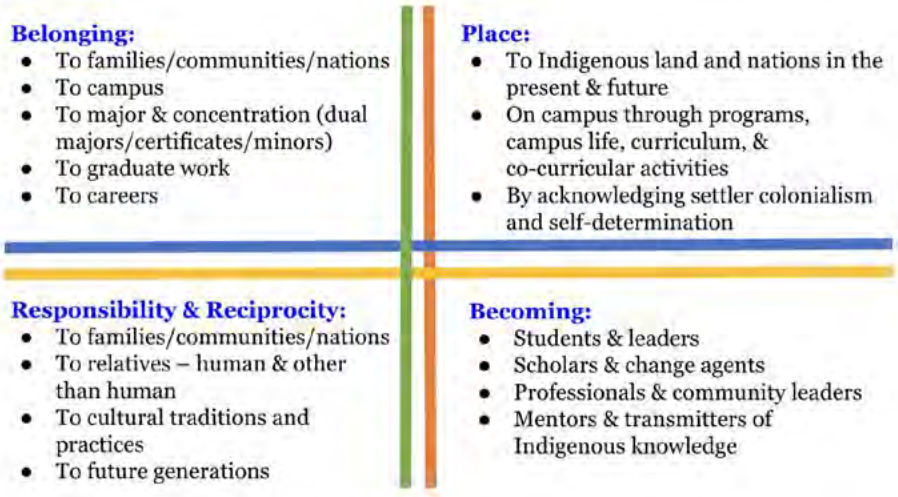
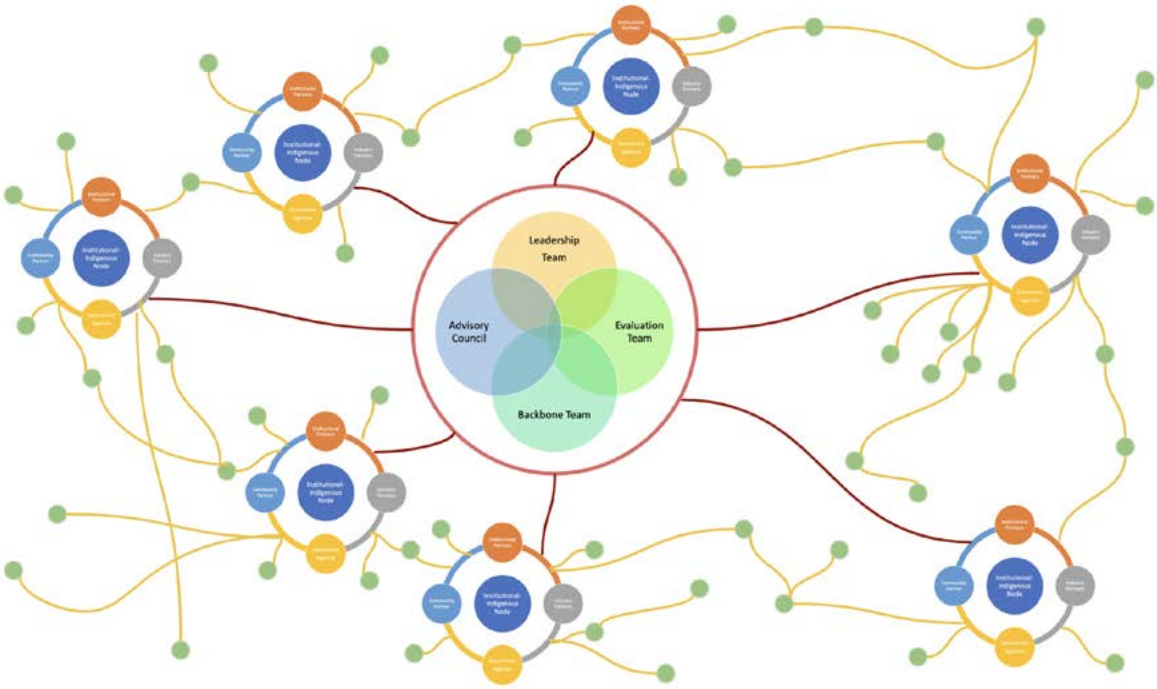


FIGURE 3. Draft 'IKE Alliance Indigenous Networked Communities Model
Concentric center circles: leadership, backbone, and evaluation teams plus advisory council; institutional-indigenous node (dark blue) with community (light blue), institutional (orange), industry (gray), and governmental (orange)



for change in STEM education for over a decade. The essential characteristics of NICs include

1. a focus on a common aim,
2. "deep understanding of the problem, the system that produces it, and a shared working theory of how to improve it," and
3. a network structure "to accelerate the development, testing, and refinement of interventions, their rapid diffusion out into the field, and their effective integration into varied educational contexts" (McKay, 2017).

The 'IKE Alliance network structure serves as network nodes or hubs that we must address to accelerate Indigenization within higher education. The Alliance is focused now on the further development and implementation of the INC model.

The strategic planning process outlined in this brief overview coupled with our expertise, experiences, and the scholarship of others (see Suggested Readings below) provides a deep understanding and foundation for this work. We invite you to join the 'IKE Alliance (ikealliance.org) and to be part of this work.

References

Gilio-Whitaker, D. (2019). *As long as grass grows: The indigenous fight for environmental justice from colonization to Standing Rock*. Beacon Press. https://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=1844249

Hultrantz, A. (1980). *The religions of the American Indians*. University of California Press.

McClellan, G. S. (2018). *Beyond access: Indigenizing programs for Native American student success*. Stylus Publishing.

McKay, S. (2017, February 23). *Quality improvement approaches: The Networked Improvement Model*. The Carnegie Foundation for the Advancement of Teaching. https://www.carnegiefoundation.org/blog/quality-improvement-approaches-the-networked-improvement-model/

Mooney, J. (1982). *Myths of the Cherokee and sacred formulas of the Cherokee*. Charles and Randy Elder.

National Center for Education Statistics. (2020). *Integrated Postsecondary Education Data System* (IPEDS). US Department of Education. https://nces.ed.gov/ipeds/

Tuck, E., & Guishard, M. (2013). Uncollapsing ethics: Racialized scientism, settler coloniality, and ethical framework of decolonial participatory action research. In T. M. Kress, C. Malott, & B. J. Porfilio (Eds.) *Challenging status quo retrenchment* (pp. 3–27). Information Age Publishing.

Ward, C., Demetropoulos, J., Horan, H., Rainock, M., Tatham, L., & Wixom, J. (2019). Native college student STEM experiences. In M. M. Jacob & S. RunningHawk Johnson (Eds.), *On Indian Ground: The Northwest*, pp. 179–206). Information Age Publishing.

Waters, F. (1977). *Book of the Hopi*. Penguin Books.

Whyte, K. (2018). What do Indigenous knowledges do for Indigenous peoples? In M. K. Nelson & D. Shilling (Eds.), *Traditional ecological knowledge: Learning from Indigenous practices for environmental sustainability* (pp. 57–81). Cambridge University Press.

Williamson, R. A. (1989). *Living the sky. The cosmos of the American Indian*. University of Oklahoma Press.

Suggested Readings

Aikau, H. 2016. *Interview on the relationship with Science Education for New Civic Engagements and Responsibilities (SENCER) and Indigenous ways of learning and knowing* (Film). https://www.youtube.com/watch?v=lLWI4Aqjz70

Alkholy, S. O., Gendron, F., McKenna, B., Dahms, T., & Pontes Ferreira, M. (2017). Convergence of Indigenous science and Western science impacts students' interest in STEM and identity as a scientist." *Ubiquitous Learning: An International Journal*, 10(1), 1–13. http://digitalcommons.wayne.edu/nfsfrp/16

Amaral Buskirk, P. 2016. *Science education & civic engagement in Hawai'i* [Film]. https://www.youtube.com/watch?v=RSPF2c0OQ0Y&t=2s

Biden, J. (2021, January 26). *Memorandum on tribal consultation and strengthening nation-to-nation relationships*. White House Presidential Actions. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/26/memorandum-on-tribal-consultation-and-strengthening-nation-to-nation-relationships/

Bowman, N. R. (2018). Looking backward but moving forward: Honoring the sacred and asserting the sovereign in Indigenous evaluation. *American Journal of Evaluation*, 39(159). https://doi.org/10.1177/1098214018790412

Bowman, N. R. (2020). Nation-to-nation in evaluation: Utilizing an Indigenous evaluation model to frame systems and government evaluation. *New Directions for Evaluation*, 2020(166), 101–118.

Bowman, N. R., & Dodge-Francis, C. (2018). Culturally responsive Indigenous evaluation and tribal governments: Understanding the relationship. *Indigenous Evaluation, New Directions for Evaluation*, 2018(159), 17–31.

Bowman, N. R., C. Dodge-Francis, & M. Tyndall. (2015). Culturally responsive Indigenous evaluation: A practical approach for evaluating Indigenous projects in tribal reservation contexts." In S. Hood, R. Hopson, & H. Frierson (Eds.), *Continuing the journey to reposition culture and cultural content in evaluation theory* (pp. 335–360). Information Age Publishing.

Cajete, G. A. (1999). The Native American learner and bicultural science education. In K. G. Swisher & J. W. Tippeconnic (Eds.), *Next steps: Research and practice to advance Indian education, ERIC Clearinghouse on Rural Education and Small Schools.*

Community-Campus Partnerships in Health (CCPH). (2013). Position statement on authentic partnerships. *CCPH* Board of Directors. https://ccphealth.org/partnering/principles-of-partnering

Confederated Salish and Kootenai Tribes of the Flathead Reservation. (2016). *Climate Change Strategic Plan*. https://www.adaptationclearinghouse.org/resources/confederated-salish-and-kootenai-tribes-of-the-flathead-reservation-climate-change-strategic-plan.html#:~:text=The%20CSKT%20Climate%20Change%20Strategic,and%20funding%20mechanisms%20for%20each.

Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95(2), 256–273.

Education Northwest. (2015, June). *Indigenous culture-based education rubrics*. https://educationnorthwest.org/resources/indigenous-culture-based-education-rubrics

Education Northwest. (2020, May). *Scaling out-of-school time STEM programming: A national scan*. https://educationnorthwest.org/sites/default/files/overdeck-ost-stem-report.pdf

Estrada, M. (2014). Ingredients for improving the culture of STEM degree attainment with co-curricular supports for underrepresented minority students. *National Academies of Sciences White Paper.*

Gewin, V. (2021, January 12). How to include Indigenous researchers and their knowledge. *Nature*, 589(7841), 315–317. doi:10.1038/d41586-021-00022-1

Gilio-Whitaker, D. (2019). *As long as grass grows: The Indigenous fight for environmental justice from colonization to Standing Rock*. Beacon Press.

Hanleybrown, F., Kania, J., & Kramer, M. (2012, January 26). Channeling change: Making collective impact work. *Stanford Social Innovation Review*. https://doi.org./10.48558/2t4m-zr69

Hultrantz, A. 1980. *The religions of the American Indians*. Universitiy of California Press.

Johnson, M. D., Sprowles A. E., Goldenberg, K., Margell, S., & Castillino, L. (2020). *Effect of a place-based learning community on belonging, persistence, and equity gaps for first-year STEM students. Innovative Higher Education*, 45, 509–531. https://doi.org/10.1007/s10755-020-09519-5

Johnson, M. J., Johnson, M., Goldenberg, P., & Sprowles A. E. (n.d.). *Impact of a first-year place-based learning community on STEM students' academic achievement in their second, third, and fourth years* [Manuscript submitted for publication].

Justice Institute of British Columbia. (n.d.) *Indigenization Plan 2015-2020*. https://www.jibc.ca/sites/default/files/main/pdf/Indigenization_Report.pdf

Kezar, A., & Gehrke, S. 2015. *Communities of transformation and their work scaling STEM reform*. Pullias Center for Higher Education. https://eric.ed.gov/?id=ED574632

LaValle, F. F., Camvel, D. A. K., Thomas, F. I. M., Aikau, H. K., & Lemus, J. D. (2019). Interdisciplinary research through a shared lexicon: Merging 'Ike kupuna and Western science to examine characteristics of water. *Hulili: Multidisciplinary Research on Hawaiian Well-Being,* 11(8), 167–185.

Lowe, J., Liang H., Riggs, C., Henson, J., & Elder, T. (2012). Community partnership to affect substance abuse among Native American adolescents. *American Journal of Drug and Alcohol Abuse*, 38(5), 450–455. https://doi.org/10.3109/00952990.2012.694534

Malcom-Piqueux, L. (2020). Transformation in the U.S. higher education system: Implications for racial equity. Commissioned paper for Symposium on Imagining the Future of Undergraduate STEM Education, convened virtually by the Board on Science Education, November 12, 13, and 19 with support from the National Science Foundation.

McClellan, G. S. (2018). *Beyond access: Indigenizing programs for Native American student success*. Stylus Publishing.

McGee, E., & Bentley, L. (2017). The equity ethic: Black and Latinx college students reengineering their STEM careers toward justice. *American Journal of Education*, 124(1), 1–36.

McKay, S. (2017, February 23). Quality improvement approaches: The networked improvement model. *Carnegie Commons Blog*. The Carnegie Foundation for the Advancement of Teaching. https://www.carnegiefoundation.org/blog/quality-improvement-approaches-the-networked-improvement-model/

Meador, A. (2018). Examining recruitment and retention factors for minority STEM majors through a stereotype threat lens. *School Science and Mathematics*, 118(1-2), 61–69.

Mooney, J. (1982). *Myths of the Cherokee and sacred formulas of the Cherokee*. Charles and Randy Elder.

National Center for Education Statistics. (2020). *Integrated Postsecondary Education Data System (IPEDS)*. US Department of Education. https://nces.ed.gov/ipeds/

National Science Foundation (NSF). (2003). *Culturally responsive educational evaluation workshop*. https://www.nsf.gov/pubs/2003/nsf03032/nsf03032.pdf

National Science Foundation-National Center for Science and Engineering Statistics (NSF-NCSES). (2021, April 29). *Women, minorities, and persons with disabilities in science and engineering.* https://ncses.nsf.gov/pubs/nsf21321

Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, 91(3), 328–346. https://doi.org/10.1037/0033-295X.91.3.328

Postsecondary National Policy Institute (PNPI). (2020). *Factsheets: Communities of students and types of institutions*. https://pnpi.org/category/factsheets/

Raymond, S. (2020). Best practices for participatory leadership in higher education. The Indian Tribal Educational & Personnel Program (ITEPP). [Master's thesis, California State Polytechnic University]. https://itepp.humboldt.edu/sites/default/files/participatory_leadership-itepp.pdf

Russo Carroll, S. R., Garba, I., Figueroa-Rodríguez, O. L., Holbrook, J., Lovett, R., Materechera, S., Parsons, M., Raseroka, K., Rodriguez-Lonebear, D., Rowe, R., Sara, R., Walker, J. D., Anderson, J., & Hudson, M. (2020). The CARE Principles for Indigenous data governance. *Data Science Journal*. https://datascience.codata.org/articles/10.5334/dsj-2020-043/

Russo Carroll, S. R., Herczog, E., Hudson, M., Russell, K., & Stall, S. (2021). Operationalizing the CARE and FAIR Principles for Indigenous data futures." *Sci Data*, 8, 108. https://doi.org/10.1038/s41597-021-00892-0

SENCER Hawai'i. (2016–). [YouTube channel]. https://www.youtube.com/channel/UCgwYMedNuabJ8a0beEOJTNw/videos

Snyder, T. D., &. Dillow, S. A. (2015). *Digest of education statistics 2013*. National Center for Education Statistics. NCES 2015-011. https://eric.ed.gov/?id=ED556349

Sprowles, A. E., Johnson, M. D., Margell, S., Malloy, K. J., Hillman, L., & Hillman, L. (n.d.) *Integrating culture and social-justice issues of the Native American people of our place preferentially improves academic achievements of racially minoritized first-year STEM students*. [Unpublished manuscript].

Sprowles, A. E., & Malloy, K. J. (2017, October 26). Klamath connection and critical histories/activist futures: The role of interdisciplinary discourse in addressing racism and inequity in STEM education. *Somatosphere*. https://somatosphere.com/2017/klamath-connection.html/

Sul, D. A. (2021). Indigenous assessment developers on elements of the disjuncture-response dialectic: A critical comparative case study (Publication No. 571) [EdD dissertation, University of San Francisco]. University of San Francisco Scholarship Repository. https://repository.usfca.edu/diss/571

Thoman, D. B., Arizaga, J. A., Smith, J. L., Story, T. S., & Soncuya, G. (2014). The grass is greener in non-science, technology, engineering, and math classes: Examining the role of competing belonging to undergraduate women's vulnerability to being pulled away from science. *Psychology of Women Quarterly*, 38(2), 246–258.

Tuck, E., & Guishard, M. (2013). Uncollapsing ethics: Racialized sciencism, settler coloniality, and ethical framework of decolonial participatory action research." In T. M. Kress, C. Malott, & B. J. Porfilio (Eds.), *Challenging Status Quo Retrenchment* (pp. 3–27). Information Age Publishing.

United States Census Bureau. (2021, August 12). 2020 Census illuminates racial and ethnic composition of the country. https://www.census.gov/library/stories/2021/08/improved-race-ethnicity-measures-reveal-united-states-population-much-more-multiracial.html

Voyageur, C. J., Calliou, B., & Brearley, L. (Eds.). (2015). *Restorying Indigenous leadership: Wise practices in community development*. Banff Centre Press.

Ward, C., Demetropoulos, J., Horan, H., Rainock, M., Tatham, L., & Wixom, J. (2019). Native college student STEM experiences. In M. M. Jacob & S. RunningHawk Johnson (Eds.), *On Indian Ground: The Northwest* (pp. 179-206). Information Age Publishing.

Waters, F. (1977). *Book of the Hopi*. Penguin Books.

Wehipeihana, N. (2019). Increasing cultural competence in support of Indigenous-led evaluation: A necessary step toward indigenous-led evaluation. *The Canadian Journal of Program Evaluation*, 34(2). https://doi.org/10.3138/cjpe.68444

Whyte, K. (2018). "What do Indigenous knowledges do for Indigenous peoples?" In M. K. Nelson & D. Shilling (Eds.), *Traditional ecological knowledge: Learning from Indigenous practices for environmental sustainability* (pp. 57–81). Cambridge University Press.

Wilbur, J. R., Wilbur, M., Garrett, M. T., & Yuhas, M. (2001). Talking circles: Listen, or your tongue will make you deaf. *Journal for Specialists in Group Work*, 26(4), 368–384.

Wilkie, S. R., Lenentine, M. M., & Hiser, K. (2022). *Final Report: Weaving Indigenous and Western knowledge systems.* Center for Resilient Neighborhoods. https://cerenehawaii.org/weaving-indigenous-and-western-knowledge-systems/

Williamson, R. A. (1989). *Living the sky. The cosmos of the American Indian*. University of Oklahoma Press.

Windchief, S., & Brown, B. (2017). *Conceptualizing a mentoring program for American Indian/Alaska Native Students in the STEM fields: A review of the literature. Mentoring & Tutoring: Partnership in Learning*, 25(3), 329–345.

Wolf, P. R., & Rickard, J. A. (2003). Talking circles: A Native American approach to experiential learning." *Journal of Multicultural Counseling and Development*, 31(1), 39–43.

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