

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 ‘IKE Alliance for Transforming STEM Education. ‘IKE, 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.<sup>1</sup> 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

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

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

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 'IKE 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 'IKE 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 'IKE 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 'IKE Alliance institutions; and
3. establish a durable 'IKE Alliance for institutional transformation with a sustainable collective infrastructure.

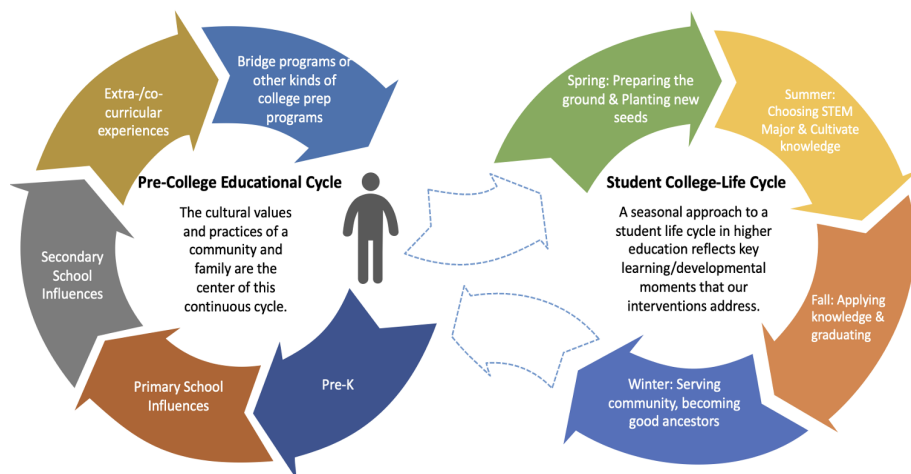
**The 'IKE objectives are to:**

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 'IKE 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

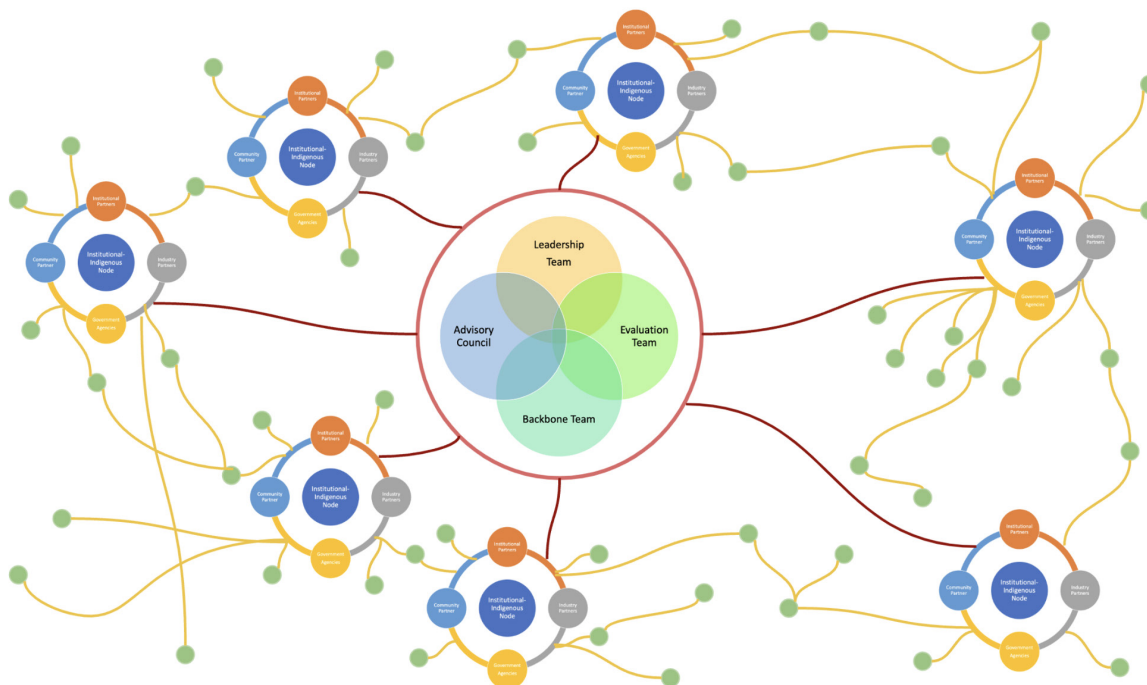
**FIGURE 2.** ‘IKE Alliance Four-Strand Model for Student Success (Aikau et al., 2024)





**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](http://ikealliance.org)) and to be part of this work.

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**Ulla Hasager** is Director of Civic Engagement for the University of Hawai'i at Mānoa's College of Social Sciences. She oversees academic community engagement for students and faculty and leads engaged curriculum creation, as well as professional and program development across communities, institutions,

and disciplines. At the university level, she serves as a leading engagement scholar. An anthropologist, Dr. Hasager teaches Ethnic Studies and general Social Sciences courses and combines her research with active engagement in human and environmental rights issues. As SENCER Ambassador, co-director of SENCER Center for Innovation West, and SENCER Hawai'i leader, she is involved in several joint research and educational reform projects with researchers and practitioners across the US. Dr. Hasager was raised in Denmark, has a large Native Hawaiian family, and lives on the Island of O'ahu.



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