

WIP: "This is What We Learned": Sharing the Stories of Experiences of Indigenous-Centered, Engineering & Community Practice Graduate Program at Cal Poly Humboldt

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Qualla Jo Ketchum (she/her/) is an Assistant Professor in the School of Engineering at Cal Poly Humboldt. She is a citizen of the Cherokee Nation and her Indigeneity impacts all she does from her technical research in water resources to her pedagogical practices and educational research around identity, indigenizing engineering practice and teaching, and the structural issues impacting Indigenous engineers. Dr. Qualla earned her PhD in Engineering Education at Virginia Tech in Blacksburg, Virginia. She received her Bachelors of Science and Masters of Science in Biosystems Engineering at Oklahoma State University in Stillwater, Oklahoma. She currently lives and works on the present and ancestral Homeland and unceded territory of the Wiyot Tribe in Humboldt County, California.

Title: WIP: *AD O'SGII* “This is What We Learned”: Sharing the Stories & Experiences of Indigenous-Centered, Engineering & Community Practice Graduate Program at Cal Poly Humboldt

Abstract: The purpose of this WIP research paper is to describe a new research project incorporating centering Indigenous ways of knowing and being within an engineering education context. Cal Poly Humboldt's new master's program in Engineering & Community Practice is among the first of its kind in the United States as an Indigenous-centered graduate engineering program. This program is a one-year, project-based degree where STEM students will work through the relationship-building process with an Indigenous Nation to develop and complete an engineering project. As such, the potential impact of the program could be significant as we start to engage with the decolonization process as a field. This research attempts to capture and communicate that impact in a way that centers Indigenous ways of being and storytelling. This will be done through incorporating collaborative autoethnographic and Indigenous research methods to share the story of the program through the experiences of all those involved. These methods position the participants as both coauthors and coresearchers in this work as we co-create this new program and new knowledge together. Participants will be asked to regularly reflect on their experiences within the program, their growth, and any conflicts or feelings that arise. These reflections will then be analyzed by the coauthors and coresearchers both for emerging themes and narrative structures to inform the story-building process. Stories will be created for both the individual participants and the program. One goal of this work is to develop the current pilot study into a larger, longitudinal study following the program's graduates to understand the long-term impact of the program, not just on the graduates themselves, but also the communities with which they work. For this work-in-progress, we will present the process of the pilot study including the open-ended prompt utilized, beginning themes in the responses, and the lessons learned in the first year of the program.

DLδhοΘE “In the Beginning”

በፋይናንስ ስራዎች ላይ ተመክሮ የሚያገለግል ነው። It is traditional practice among Indigenous people to introduce ourselves first by our community and in our language. This proposed work aims to center Indigenous ways of being, as well as knowing, and thus follows a similar approach in our communication about the project. We also note that language is an important concern among Indigenous and Native communities. Although we use the terms Indigenous and Native interchangeably, we will honor the language choices of the communities and individuals involved in this work. This practice of introducing ourselves first also mirrors calls for researchers and educators to be transparent in our positionalities and perspectives, especially when working with Indigenous communities [1]. It is in that spirit and tradition that before we discuss our proposed work, we begin with our own stories and positionalities as a team.

Qualla Ketchum ၵᄃᄂ, ᄃᄂᄂᄂᄂᄂ. ᄃᄂᄂᄂ ᄂᄂᄂᄂᄂᄂ. I am Qualla ᄃᄂ (qua-la) Ketchum, and I am a citizen of the Cherokee Nation. I grew up within the Nation's boundaries in what is currently occupied by the state of Oklahoma. I'm an Assistant Professor in the School of Engineering at Cal Poly Humboldt and my Indigeneity impacts all I do as a Cherokee woman from my technical research in water resources to my pedagogical practices and educational research around identity, Indigenizing engineering practice and teaching, and the structural issues impacting Indigenous engineers. I also recognize that my proximity to whiteness does come with the privileges associated with it in our society. I hold a B.S. and M.S. in Biosystems Engineering and a PhD in Engineering Education.

Daniel (Bubba) Lipe I am a member of the Cherokee Nation. I currently work as an assistant professor in Environmental Science and Management Department at Cal Poly Humboldt. My research explores the intersections between Indigenous and Western science, identifying ways to reconnect with our environmental systems through relational accountability and holistic perspectives through inclusion of diverse understandings of resource management. I have worked for over 25 years in higher education, teaching Indigenous courses and Indigenizing STEM and University programs through hands on experiential programs and research.

Pakuni Martin Nek-new Pakunihanich. Mey'-wo-me-chookw' Ah-pee-ue-wey es-ee Chaw-kwee. Ne-chek wew Maggie Peters es-ee neyp-sech wew Steve Martin Jr.. Ne-kue-chos wew Sue Burcell es-ee Charlene Neff. Ne-peech-ue-was wew Chris Peters es-ee Steve Martin. *My name is Pakunihanich. I come from the villages of Ah-pee-ue-wey and Chaw-kwee. My mother is Maggie Peters and my father is Steve Martin Jr. My grandmothers are Sue Burcell and Charlene Neff. My grandfathers are Chris Peters and Steve Martin.* The Yurok villages of my ancestors are now commonly known as Big Lagoon and Stone Lagoon, respectively. I am a member of the Yurok Tribe and of Karuk descent. My name, Pakunihanich, means "little singer" in the Karuk language. Throughout my life, I have been immersed in Yurok and Karuk cultural traditions including preparation and participation in ceremonial dances, which I reflect upon as sources of strength and gratitude for my family, our community, and our homelands. I received a B.S. in Environmental Science and Management with an emphasis in Energy and Climate from Cal Poly Humboldt in 2023. As a graduate student in the Engineering and Community Practice Program I am preparing for a career in service to our local tribal communities, in particular supporting their autonomy in the face of numerous climate change impacts.

Natalie Mendez My name is Natalie, and I am a first-generation American whose family immigrated to the United States from Sahuayo Michoacán. My hometown, Sahuayo (Nahuatl: Tzacuātlayotl), resides on P'urhépecha land, and its name translates to "turtle-shaped pot" in the Nahuatl language. I do not claim tribal affiliations, nor can I trace back my Indigenous roots, if any, to any particular people, but for as long as my family has known, we have lived in this region of Mexico for many generations and have Japanese roots from the 19th-century treaties that forced immigration of Japanese people for plantation labor and railroad construction in Michoacán. Regardless, I was raised immersed in a culture that centered conversations on indigenous knowledge, language, and colonization at any given moment. I graduated with a B.S. in Environmental Resources Engineering from Cal Poly Humboldt in 2023, and completed my M.S. in Engineering and Community Practice in 2024. My desire to pursue engineering stems from my determination to support indigenous and underserved communities in their land, language, and cultural restoration efforts by centering their values and traditions in every project, while also avoiding methods of extractive engineering.

Filip Amborski I am Filip Amborski and I was born in Ontario, Canada on the ancestral lands of the Anishinaabek. I was also raised across different areas of California, namely Pacifica, California which is the ancestral homeland of the Ohlone. My parents, Thomazs and Krystyna, were Polish immigrants and are respectively Sarmatian and Ashkenazi Jewish. My formative years were in the backdrop of San Francisco, where early on I engaged with philosophies from beatniks, the Free Speech movement, and acceptance activism around AIDS and Queer Identity. I have an Associate's in Electrical Engineering, and an Associates of Liberal Arts and Science with a focus on Anthropology from Skyline Community College, also located on Ohlone Land. My B.S. degree from Cal Poly Humboldt was in Environmental Resource Engineering with a minor in Native American studies of Culture and Community. Currently I am finishing a Master's in Engineering and Community practices from the same institution. My passion and focus lies around collaborating and supporting communities' capacity towards energy autonomy, climate resilience, and health and habitat restoration.

Our positionalities and who we are is an integral part of this work as the purpose of this WIP paper is to explore centering Indigenous knowledge and ways of being in a collaborative autoethnographic research project. This mirrors the spirit of the program which is among the first of its kind in the United States as an Indigenous-centered graduate engineering program.

As the field of engineering and engineering education continues to strive towards inclusive practices and broadening participation, the call for decolonizing research and curriculum that pushes back on the traditional Eurocentric nature of our field and academia increases [2]. However, research and publications within engineering that centers Indigenous knowledges and experiences remains limited [3]. The limited work that has been published mostly comes from Canada and not the United States [4]. Cal Poly Humboldt's new master's program in Engineering & Community Practice is among the first of its kind in the United States as an Indigenous-centered graduate engineering program [4]. This program is a one-year, project-based degree where STEM students will work through the relationship-building process with an Indigenous Nation to develop and complete an engineering project. Researching the impact of such a program on students (Indigenous and non-Indigenous), faculty, and the communities served would increase our understanding as a field of what it means to Indigenize and decolonize engineering work, academic structures, and curricula in practice.

Cal Poly Humboldt (CPH) is located on the traditional homelands and unceded territory of the Wiyot people, where they have resided from time immemorial. The Wiyot, which includes the Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria, and Wiyot Tribe, named this place Goudi'ni roughly translating to "among the redwoods". It is also known as Arcata, California in Humboldt County. Cal Poly Humboldt is uniquely positioned to become a true leader in incorporating Indigenous ways of knowing and being across university curricula and programming. The university indicated this goal in their Polytechnic Prospectus, describing how the inclusion of Indigenous ways of knowing and being and Indigenous communities must be key elements in CPH's polytechnic development [5]. (Risling Baldy et al., 2023). This goal is also echoed in the university's vision of addressing the legacy of colonialism and nurturing spaces for Indigenous knowledges, communities, and pedagogies [6]. In this paper, we define colonialism/settler colonialism as the ways Eurocentric thought, beliefs, and perspectives are accepted as the norm and standard in the U.S. while others, particularly those of Indigenous cultures, are dismissed as "savage," "uncivilized," and "unsystematic," without making any effort towards understanding [7]. Colonialism is an ongoing process that we all participate in as part of modern society [8] including as engineering educators and professionals.

It is with an understanding and acknowledgement of who we are, where we are both physically and societally, and what we bring to this work that we can begin to tell our stories within this specific context.

SGAŋ TJP SCL4PŋŋSŋŋJ "Direct each other in the right way; without pushing or confining"

Stories are at the heart of many Indigenous cultures around the world. They are how we present ourselves, understand our world, and leave a legacy for the next generations. As described in Tribal Critical Race Theory, an established education theory developed to meet the specific needs of U.S. Indigenous populations, "stories are not separate from theory" and are "real and legitimate sources of data and ways of being" [7 p 430]. We often use stories to pass on lessons learned to others in a way that aligns with our community values "without pushing or confining." For Cherokees, it is considered rude to tell someone directly what they need to do. As such, stories are used to lead the listener towards the idea without explicitly stating the specific lesson or moral of the story. The listener is instead expected to make meaning from the story and apply it in their own way [9]. In this same way, we as researchers and scholars look to the work of others who came before to glean meaning in our own work and research

design. This work primarily pulls from two methodologies: Indigenous Storywork developed by Stó:lō scholar Jo Ann Archibald [10] and collaborative autoethnographic methods.

Indigenous Storywork is a methodology developed to honor stories and storytelling as a valuable and legitimate source of data in education research [4]. There are seven primary principles of Indigenous Storywork - respect, reciprocity, responsibility, reverence, holism, interrelatedness, and synergy. The first four are key tenets in most Indigenous research practices [11], while the last three work to describe the tenet of relationality to different degrees. Holism recognizes the many different facets of our whole person in Indigenous communities and cultures [10]. Interrelatedness addresses how everything is connected and related to each other, and synergy describes working together with the community, participants, and researchers [10].

Collaborative autoethnography is an established “western” qualitative research method in engineering education research and has been utilized as a method to explore faculty engagement in course development [12], engineering graduate student experiences integrating social justice into engineering education and practice [13] and the experiences of transgender and gender nonconforming engineering undergraduates [14]. Several of the aspects of collaborative autoethnography align with Indigenous research practices, including Indigenous Storywork, particularly relationality and reflexivity. A common theme in Indigenous research practices is the interconnectedness of all things and our accountability to all our relations during research [11]. It is important to recognize that collaborative autoethnography does not legitimize the use of Indigenous Storywork or other Indigenous research practices. It is instead used as a support for centering Indigenous methods and beliefs in practice within the context of our program and research.

This work in particular centers around the experiences of those involved and associated with the Engineering and Community Practice graduate program at Cal Poly Humboldt. The program coordinator, students, instructors, and community partner were all given the opportunity to participate in this research as co-authors, co-researchers, and participants in the study. At the time of this draft, those who chose to contribute for this pilot study in the very first year of the program include two instructors, one of which also serves as the program coordinator, as well as two students. Participants can choose their level of involvement at any point in the program and research.

Participants have been asked to regularly journal and reflect on their experiences within the program, their growth, and any conflicts or feelings that arise throughout the year-long program and corresponding project. For this first-year, we will be given an open-ended prompt at the end of the year asking us to look back at our reflections and describe our experiences and growth through the program. The draft prompt for this pilot first-year is “Describe your experience throughout the past year in the Engineering & Community Practice program. How have you grown or changed through these experiences? What conflict, if any, arose for you during the course of the program? Please feel free to share stories of specific instances, thoughts from your regularly journaling, and feelings throughout your reflection.” Future prompts will be developed utilizing lessons learned as well as themes from the pilot study.

We will be given autonomy and sovereignty over our own data, meaning we can determine if there are pieces of our reflections we do not want utilized as part of the research. These reflections will then be analyzed by the group both as a team and as individuals for emerging themes and narrative structures to inform the story-building process. Stories will be created for both the individual participants and the program as a whole as done in previous Indigenous Storywork engineering education research [4]. This will all be done in an iterative and collaborative way, in which the participants are engaged as researchers throughout the work. Quality and trustworthiness will be established first in terms aligned with

Indigenous research methods, particularly responsibility, reciprocity, and respect. Through the collaborative autoethnography practices of this study, we can ensure that the stories being shared are truly those of the program and not another's perception of the program's stories. It also demonstrates that the knowledge and results are being co-created by all of us together. Notes, memos, and/or recordings of verbal conversations of analysis will also be completed to ensure validity of the analysis.

AD O'SGI "This is What We Learned"

Already through the process of developing this program and research surrounding the program, we have learned a lot, particularly the challenges that we are facing. This program was set up as a one-year program with new faculty at the university both teaching and leading the program. As stated previously, relationship-building and relationality is the basis of most Indigenous work. Previous research has demonstrated how when engineering academic structures are void of this relationality, they are implicitly connected to systemic oppression and colonialism [4]. A program like this must situate itself differently and ensure that they are holding relationships and community at the center of how they function. However, relationships can take longer than a year to build and strengthen to the point of doing this type of work, particularly in and with Indigenous communities and there was very little time in this instance to complete this work before the program's launch. We were luckily able to build a relationship with our community partner relatively quickly due to existing relationships at the university as well as a shared cultural background. We are hopeful that through our work building relationships, not only as individuals but as organizations and programs, this partnership can continue to blossom and make following years of the program run smoother. Because we are still early in this process, both as a program and in conducting this research, our goal is that this pilot study will serve as the starting point for a larger, longitudinal study including not only future students in the program, but also following the program's graduates to understand the long-term impact of the program, not just on the graduates themselves, but also the communities with which they work.

Indigenous communities and governments are often under-resourced but over-burdened with requests to participate in research, projects, and more by other organizations including universities. Historically, this has been a very extractive process that has created distrust and a need for Tribal Nations to protect themselves with their own protocols. This distrust also makes communities' protective of their sovereignty in all forms including intellectual property and data. Each Nations' government and community is different, so each protocol and process are different. Our Tribal partner is currently in the process of developing and finalizing their protocol. We have not been able to see the proposed protocol itself but have been working with one of the authors to do our best to make sure we are following it as closely as possible. We also honor and recognize that the Nation has the final say and sovereignty on all aspects of the project and relationship. This is an important part of the decolonizing process, particularly in academia, engineering, and research.

As previously discussed, in Cherokee storytelling, it is the responsibility of the reader to make meaning from the stories they've heard, incorporate it into their lives, and to continue the story's life through sharing it [4]. We hope that the stories shared from this work live on through the impact they make on you, the listener, and beyond. We hope to share the beginnings of this storybuilding process and emerging themes in our presentation associated with this WIP as well as future publications. We believe that these stories will demonstrate the impact of decolonizing and Indigenizing engineering curricula and practice for all those involved, Indigenous and non-Indigenous. We hope we can demonstrate what that often-daunting work looks like in practice and build a model that inspires other programs to learn from our stories and begin their own.

References

- [1] Haynes Writer, J. (2008). Unmasking, exposing, and confronting: Critical race theory, tribal critical race theory and multicultural education. *International Journal of Multicultural Education*, 10(2), 1–15.
- [2] Seniuk Cicek, J., Herrmann, R., Forrest, R., & Monkman, K. (2022). *Decolonizing and Indigenizing Engineering: The Design & Implementation of a New Course*. Proceedings of the Canadian Engineering Education Association (CEEA). <https://doi.org/10.24908/pceea.vi.15886>
- [3] Mueller-Alexander, J. M., & Soto, A., & Leonardi, B. M. (2023, June), *Research in Progress: Engineering Research for Indigenous Engineering Techniques* Paper presented at 2023 ASEE Annual Conference & Exposition, Baltimore , Maryland. 10.18260/1-2—44115
- [4] Ketchum, Q.J. 2023. *Walking Between Two Worlds: Indigenous Student Stories of Navigating the Structures & Policies of Engineering at Public, Non-Native Institutions*. Dissertation. Virginia Tech, Blacksburg, VA, USA
- [5] Risling Baldy, Cutcha, Kaitlin Reed, and Kayla Begay. 2023. "Polytech to PolyTEK: Traditional Ecological Knowledge, Indigenous Science, and the Future Forward Polytechnic University." *Humboldt Journal of Social Relations* 1 (45): 34-51. DOI: <https://doi.org/10.55671/0160-4341.1219>
- [6] Cal Poly Humboldt. *Vision*. Strategic Plan. 2023. <https://strategicplan.humboldt.edu/>
- [7] Brayboy, B. M. K. J. (2005). Toward a Tribal Critical Race Theory in education. *Urban Review*, 37(5), 425–446. <https://doi.org/10.1007/s11256-005-0018-y>
- [8] Laurier Students' Public Interest Research Group (LSPiRG). (2015). *Know the Land Territories Campaign*. Retrieved from <http://www.lspirg.org/knowtheland>
- [9] Personal communication, Mark Parman, 2022
- [10] Archibald, J.A. (2008). *Indigenous storywork: Educating the heart, mind, body, and spirit*. Vancouver: UBC Press.
- [11] Wilson, S. (2008). What Is an Indigenous Research Methodology? *Canadian Journal of Native Education*, 25(2), 175–179.
- [12] H. M. Matusovich, H. Murzi, D. Gray, B. D. Chambers, and M. B. James. (June 2020). A autoethnography: Outcomes from faculty engagement in course development in a large first year engineering program. Presented at the 2020 ASEE Annu. Conf. [Online]. Available: <https://peer.asee.org/34109>
- [13] Carroll, T., Gordon, B., Hancock, P. I., Stenger, K., & Turner, S. S. (2022). Cultivating solidarity for action on social justice in engineering: A collaborative autoethnography. *International Journal of Engineering, Social Justice and Peace*, 9(1), 62-91. <https://doi.org/10.24908/ijesjp.v9i1.15216>.
- [14] Haverkamp, A., & Butler, A., & Pelzl, N. S., & Bothwell, M. K., & Montfort, D., & Driskill, Q. (2019, April), *Exploring Transgender and Gender Nonconforming Engineering Undergraduate Experiences through Autoethnography* Paper presented at 2019 CoNECD - The Collaborative Network for Engineering and Computing Diversity , Crystal City, Virginia. <https://peer.asee.org/31764>