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(Re)membering Indigenous Spirituality in Engineering Education: A Narrative Literature Review

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Austin Morgan Kainoa Peters was born and raised in Wailuku, Hawaii where he attended Kamehameha Schools Maui (KSM). This private, Christian K-12 institution gives admission preference to children with Hawaiian ancestry and attempts to incorporate Hawaiian culture, history, and values into a Western-based curricula. Although KSM has many colonial influences, it taught Peters to see the benefits of his ethnicities, especially Native Hawaiian, within academia. Peters obtained his bachelor's degree at the University of San Diego (USD) in Integrated Engineering. Assimilating to the culture of this predominantly white institution left Peters questioning if he could be an engineer and multiracial. Fortunately, the liberal arts emphasis of the school combined with research work in Engineering Education helped him to see his worth as a multiracial engineer. Peters' current goal is to obtain a doctoral degree in Engineering Education at Purdue University to bring his cultural knowledge and values into Engineering.

(Re)membering Indigenous Spirituality into STEM Education: A Narrative Literature Review

Abstract

Despite global and national calls and efforts to bring Indigenous knowledge and peoples into engineering and Science, Technology, Engineering, and Mathematics (STEM) education, these populations continue to struggle in these fields because their ways of knowing are not recognized or legitimized due to settler colonialism. Consequently, Indigenous peoples view Indigenous knowledge and STEM education as two separate entities. Decolonization research is in the beginning stages to develop culturally relevant STEM education for Indigenous populations to heal their identities and bring back their knowledge and its motivations. This narrative literature review focuses on analyzing these implementations of reconnecting STEM education and Indigenous knowledge in North America using the research question: **How has Indigenous knowledge of North America been (re)incorporated into culturally relevant STEM education?** Using review procedures including specified database search terms and inclusion and exclusion criteria, I identified 20 articles focused around incorporating Indigenous knowledge into STEM education as a form of culturally relevant pedagogy. Using inductive coding and thematic analysis, I identified three themes: centering Indigenous ways of knowing, ensuring Elder involvement, and recognizing all knowledge holders. By comparing exemplary implementations of Indigenous knowledge into STEM education for all three themes, I illustrated the meaning and benefits of each. Finding the common thread between the three themes provides one answer for the research question. I propose spiritual knowledge as the binding thread that connects the themes and (re)connects Indigenous knowledge and STEM education. Spirituality can become a theorizing space to help with the decolonizing of engineering education by challenging the dominant knowledge types and bringing in other ways of knowing.

Keywords: Culturally Relevant Education, Indigenous Knowledge, Spirituality

Introduction

The United Nation's (UN) Sustainable Development Goals (SDG) attempt to address the inequalities of our global society and tackle climate change, biodiversity, and nature restoration [1]. These complex issues affect our global community and require an approach that includes the arts, humanities, social sciences, natural sciences, applied sciences, and mathematics as we move forward [2]. The cultures of various Indigenous peoples have foundations in both interdisciplinarity and sustainability through their familial and spiritual relationship with the land [1], [2]. Consequently, the UN has stated how Indigenous populations must be included to play an integral role in achieving the SDG [1]. However, issues of accessibility and colonization are preventing many Indigenous students, both in the United States of America (USA) and globally, from entering and persisting in education, especially Science, Technology, Engineering, and Mathematics (STEM) education [3], [4], [5].

Although Indigenous representation in STEM education is important for all Indigenous peoples, this literature review will focus on Indigenous peoples of North America. My focus is on how researchers in this area are beginning to address bringing Indigenous peoples and knowledges back into STEM education in educational settings. I use a Literature (Re)membering to identify

the gap in literature by telling my version of the story of how Indigenous knowledge is in the process of being brought back into STEM education after the loss of land, culture, and knowledge that came with colonization. Colonization and settler colonialism attempted to remove and continues to erase and discredit Indigenous knowledge. However, this knowledge survives through the resiliency of Indigenous peoples and cultures. The play on words like (re)membering, (re)incorporating, and (re)connecting speak to this resiliency and how the knowledge has been known for millennia but not appreciated. The Literature (Re)membering illustrates how the research around Indigenous people in STEM began with issues of educational accessibility and retention, moved to the decolonization of Western STEM education, and currently sits in (re)introducing traditional Indigenous knowledge into STEM education.

After developing how researchers are (re)incorporating Indigenous knowledge into STEM education, I analyze how outreach programs and classrooms have attempted to (re)integrate indigenous knowledge through the research question: **How has Indigenous knowledge of North America been (re)incorporated into culturally relevant STEM education?**

To address this question, I used systematic review procedures to obtain 20 relevant articles. I analyzed these articles to identify common themes the researchers used to integrate Indigenous knowledge into STEM education. All these themes begin to illustrate the significance that Indigenous spirituality has in (re)connecting Indigenous knowledge with STEM education. I argue that Indigenous spirituality should be used as a starting point and theorizing space to bring Indigenous peoples and knowledge back into the engineering field, as well as a place for other minoritized people to (re)introduce their own types of knowledge.

Literature (Re)membering

My use of the term (re)membering is adapted from Dr. Jamaica Heolimeleikalani Osorio's [6] use of it in *Remembering Our Intimacies.* Osorio explains that the only reason that Native Hawaiian scholars can begin to (re)member is due to the extensive work of previous scholars who dismembered the atrocities of colonization that continue to hold a grip on individuals, communities, and the land [6]. This entire paper and more specifically this section honors the people and Indigenous cultures who dismembered colonization within and outside of STEM education. Because of them, I, a Native Hawaiian scholar, have the privilege to attempt to help with (re)connecting Indigenous knowledge with STEM and engineering education.

My (re)membering will tell my version of the story of Indigenous knowledge in STEM education research while also identifying the gap in the literature. I emphasize "my version" here to show that this is my interpretation of the literature and others will (re)member Indigenous knowledge and stories in a different way [6]. There is power and spirit in all our stories coming together as a process of healing.

My version of the story frames settler colonialism as the driving force that removed Indigenous knowledge and spirituality in STEM. In their 2014 paper, Bang et al.[7] describe how settler colonialism was a deliberate act of colonizers taking land away from Indigenous people and claiming the land. Bang and colleagues [7] describe how "taking away" the land of Indigenous people was not just about ownership of land, but more importantly about taking away Indigenous people's source of knowledge, spirituality, and identity. Battiste and colleagues [8] describe how,

in the United States, settler colonialism still lives in education as it maintains a perception of land as a resource to be dominated and taken advantage of for economic growth. This theme is well established in the literature, with numerous scholars describing how settler colonialism stripped land, knowledge, and identity from Indigenous peoples [5], [9], [10].

As many Indigenous peoples and scholars began and continue to dismember and reclaim their cultural practices and relationship with the land, academic institutions also attempted and continue to attempt to increase their diversity of students and faculty. Thus, many organizations, programs, and scholarships have been founded and developed specifically to improve the representation Indigenous people of USA in higher education, such as American Indian Society and Engineering Society (AISES), Society for the Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS), National Action Council for Minorities in Engineering (NACME), and the American Indian College Fund. Although all these organizations and their programs have provided logistical assistance for Indigenous students in the USA, this population is still underrepresented throughout STEM education [3], [5], [9], [10].

Indigenous researchers and allies knew that issues of accessibility and participation will not work unless people begin to address the lasting effects of settler colonialism [4], [5], [9], [11], [12]. Because colonization led to the loss of language, land, and spirituality that replaced holistic STEM with Western STEM education, Indigenous students can consider their cultures and STEM as separate [4], [12].

However, researchers have shown how this separation is an illusion, as Indigenous peoples of the USA have long practiced STEM through their own spiritual values and practices. For example, Jordan et al. [10] demonstrated how the processes, practices, and thinking of Navajo making has similar attributes to the Western standardized engineering design process. Other research on this misconceived illusion looks at reconnecting culture and STEM through the identity of Indigenous students and scholars [4], [12], [13].

This work in reconnecting culture and STEM through practices and identity is the beginning of the (re)membering, but there is still a long way to go to (re)connect these identities. (Re)membering requires knowledge on the spirituality behind these practices, knowledge which colonization has deliberately devalued and forced us to forget [5], [14]. To remember lost Indigenous ways of knowing in the USA, I suggest as valuable the research question, “What did STEM look like before colonization and who/where are the holders of this knowledge?”

Through different means, researchers described what Indigenous STEM practices looked like before contact [14], [15], [16]. One can see, for example, Indigenous STEM projects, such as the trap system for tidal pulse fishing of the Tlingit in Alaska and Canada, the *loko iʻa* (fishpond) system for Native Hawaiians, and the practice of wood bending of the Anishinaabe tribes in the Great Lakes [14], [16], [17].

Describing these practices is not sufficient to bring back Indigenous knowledge into STEM as it does not address settler colonialism and the spiritual aspects of knowledge [7], [11]. Work in decolonization should also bring with it the possibility to (re)member this spiritual aspect and combat settler colonialism. Decolonizing research begins to address settler colonialism and

reclaim spiritual knowledge by going to cultural practitioners and Indigenous ways of being as holders of knowledge [14].

Indigenous peoples in the USA have developed initiatives on how to properly integrate Indigenous knowledge and knowledge holders into education [18], [19]. Indigenous and non-Indigenous researchers and teachers alike have developed reviews and theories through literature and their experiences to synthesize how to develop culturally relevant pedagogy to reconnect Indigenous knowledge and STEM education through realizing the spiritual realm of knowledge [9], [12], [20], [21]. Many educational systems that are trying to help Indigenous students at various ages used culturally relevant pedagogy in teacher professional development to teach students native to North America [22], [23]. Similarly, instructors and outreach programs used such theories in the implementation of Indigenous-relevant education in classroom and other student learning settings.

However, little research exists to understand how the underlying efforts of culturally relevant eduation for Indigenous students help to heal our people and communities. This literature review begins at this point for further theoretical development and improved implementation of Indigenous-specific pedagogy in North American STEM education, exploring the research question, *"how has Indigenous knowledge of the USA been (re)incorporated into culturally relevant STEM education?"*

Positionality

Although it is unusual to include a positionality statement in literature reviews, I have done so here as I am trying to emphasize Indigenous spirituality to address major settler colonial ideologies in engineering education. My positionality helps to create an understanding of where I am coming from and how colonization controlled my ways of being, knowing, and doing.

As a part Native Hawaiian Ph.D. student in engineering education, I did not understand until recently how my upbringing and education had colonized me. I am white, Filipino, Korean, and Native Hawaiian, but settler colonialism erased the last three ethnicities for a long time. Assimilation is how I thrived in education, so I was never my full self.

Towards the end of my undergraduate years, I started to reclaim my identity as a Native Hawaiian student disconnected from his minoritized cultures. I became inspired to prevent other minoritized individuals from being assimilated and lose their ways of knowing, being, and doing. Spirituality, specifically Native Hawaiian spirituality, is what brought me back to myself. This personal (re)membering is what motivates me to help marginalized students negotiate their intersectional identities and to do my part in the decolonization of the engineering space through recognizing spirituality as a legitimate knowledge type.

Methods

I used systematic literature review procedures to craft an answer to my research question, "**How has Indigenous knowledge of the USA been incorporated into culturally relevant STEM education?"** While my goal is to understand the existing research literature in this space, much information of/by/from Indigenous people are kept through oral tradition and stories, focusing on published literature is a limitation of the study. However, because I am looking for specific

implementations that are more likely to be documented through the Western research process, this limitation may be small.

To begin, I separated “Indigenous knowledge of the United States” and “culturally relevant STEM education” into three search terms. For the term “Indigenous knowledge of the USA” I only used “Indigenous” rather than a specific geographical location; while I wanted to situate this work in Indigenous groups whose homelands were in what many now call North America, I wanted to also acknowledge that some relevant Indigenous lands sit partially outside of the North America. The inclusion and exclusion criteria accounts for this distinction of location.

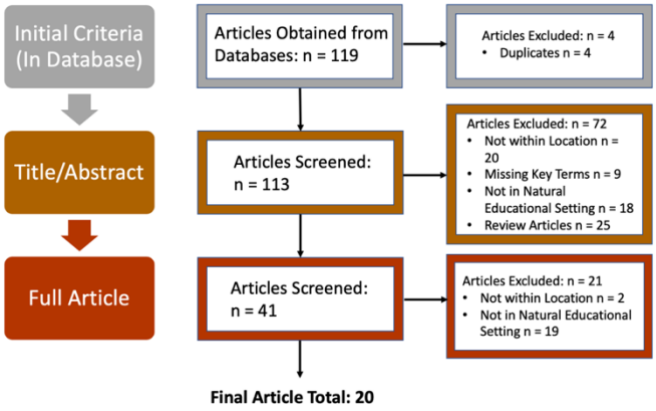
The exact search terms, their synonyms, and the final search string are in Table 1 below.

Table 1: Key Terms and Synonyms to Develop Search String

Search Term	Indigenous Knowledge	Culturally Relevant Education	STEM Education
Synonym	Traditional Knowledge	Culture Based Education	Engineering Education
Synonym	Local Knowledge		Science Education
Synonym	Native Knowledge		
Search String: (ALL ("indigenous knowledge" OR "traditional knowledge" OR "local knowledge" OR "native knowledge") AND ALL ("culture based education" OR "culturally relevant education") AND ALL ("engineering education" OR "stem education" OR "science education")) AND (LIMIT-TO (DOCTYPE , "ar"))			

I used the search string listed in Table 1 in ERIC, Education Source, and Scopus. To screen in articles to answer the research question, I developed exclusion and inclusion criteria. Figure 1 illustrates the screening process and the exclusion and inclusion criteria.

Figure 1: PRISMA Screening of Articles



Note: Each section is disaggregated by exclusion and inclusion criteria.

Applying these criteria to my initial 119 papers yielded a final body of 20 papers. To analyze the corpus of papers, I used inductive coding to analyze the portions of articles that explained the practices, successes, and challenges in integrating Indigenous knowledge into STEM education. I identified these three codes as themes that appeared in majority of the articles:

- Centering Indigenous ways of knowing in content
- Ensuring elder involvement in the planning of teaching
- Recognizing Indigenous knowledge as being beyond space and time for learning

In the following sections, I will describe each of these themes, how exemplar implementations of Indigenous knowledge accomplished these themes, and how these themes come together to address the research question.

Results

For each of the three themes, I will describe how the different researchers and instructors explained or demonstrated each theme. After that, I will compare different uses of the themes to illustrate the reasoning and benefits of implementing each theme when integrating Indigenous knowledge and STEM education. I want to emphasize that most of the researchers and instructors utilized a combination of or all three themes, so the themes work together. The way these themes come together will be in the Discussion to address the research question.

Centering Indigenous Ways of Knowing

Majority of the articles introduced Indigenous ways of knowing at various levels. Some of the researchers and instructors taught Indigenous knowledge and STEM knowledge as separate entities [24]-[28]. Other researchers and instructors centered STEM and used Indigenous knowledge to enhance the STEM curriculum [17], [29]. Most researchers and instructors centered Indigenous knowledge and used STEM knowledge to enhance the curriculum [31]-[40].

An exemplar case study of Centering Indigenous Ways of Knowing in Content is the *Rekindling Traditions* project that centers a Canadian Aboriginal framework at the beginning of each unit and use Western science to enrich this framework [33], [34]. For example, one unit in the project studied the technologies related to snowshoes, trappings, and wild rice from a cultural perspective. After, students used Western science to understand pressure exerted by snowshoes, the interplay of potential and kinetic energy in trappings, and pH levels of wild rice lakes [33]. The focus shifted back to the Indigenous technologies and how these technologies change under specific conditions. Here, Aikenhead [33] demonstrates how students learn Western STEM principles in the context of their spiritual and cultural traditions of their homeland that encourages students to be border crossers.

Border crossing, in this case, is giving the students the ability to travel between their culture and Western science [40]. Promoting border crossing allows students to consciously code switch between the values, languages, conceptualizations, relationship with nature, and ways of knowing [34]. Empowering Indigenous students with the practice of border crossing allows students to learn STEM concepts in more meaningful ways [34], [39], [40]. By intentionally centering an Indigenous way of knowing, Western science becomes another world that students still can step into and build upon for both knowledges to coexist [39].

Another important benefit of border crossing that comes with centering Indigenous knowledge is addressing issues of settler colonialism. The *Rekindling Traditions* project describes that a teacher “identifies spirituality in Aboriginal knowledge and identifies its absence in Western science. Whenever possible, [the] units point out to students’ instances of Aboriginal science

being distorted by a Western worldview [34, p. 344].” In other words, teachers are trained to be explicit on tensions of the two cultures so that neither is seen as dominant over the other. Just because there is tension does not mean the two knowledge types cannot coexist despite efforts of settler colonialism to erase Indigenous science. *The Night Sky* unit of the project illustrates how to combat this erasure and to (re)connect Indigenous knowledge with Western knowledge. In this unit, students translate the Aboriginal 13 moon calendar to the Western 12-month calendar [34]. This process of identifying tensions and bridging them demonstrates a reconciliation of identity for students to see both sides of their way of knowing while decolonizing the larger settler colonial ideology of Western STEM education.

Ensuring Elder Involvement

One of the best ways to center Indigenous knowledge, promote border crossing, and addressing settler colonialism is bringing in the respected human holders of knowledge in Indigenous cultures or Elders. Every article has some form of Elder involvement; however, the benefits of Elder involvement comes through comparing two studies. Howard & Kern [28] utilizes the Elder for origin stories only while Miller & Roehrig [36] allows the Elder to be a part of every step of the process to restore a local tradition through the passing of knowledge.

Miller and Roehrig [36] discuss *The Reach for the Sky* Program focusing on the Snow Snake portion of the program. Students learn the history, the harvesting process, and carving a snow snake from an Elder. The Elder had a goal of restoring this cultural tradition of creating snow snakes nearly lost through colonization through a game where students can engage competitively in the creation and throwing of snow snakes [36]. The Elder taught every process of the tradition and was there to assist in the hands-on prototyping. Indigenous knowledge worked with STEM to help students to understand content related to friction, power, mass, and design. The biggest impact, though, was the community participation and support surrounding the snow snake competition day [36]. Parents wished they had this competition as a child or could even participate as an adult to reconnect to cultural traditions and do something fun. By centering the involvement of the Elder, Miller and Roehrig [36] helped to build more community by centering Indigenous knowledge and enhancing STEM education.

On the other hand, Howard [28] assisted with a STEM camp for Pacific Northwest Indigenous students that separated Western STEM education and Indigenous knowledge. An Elder told the stories of the surrounding area and its ecosystem, including Bigfoot. The final assignment of the camp was for the students to model Stream Restoration and almost every group included Bigfoot in their restoration alongside the system-level environmental engineering problems. Almost all the researchers looked past the creature in the restoration thinking that the students had a fictional fixation to the stories of one of the Elders [28]. However, if the Elder was involved more in the process, the researchers could have learned that the students saw Bigfoot as an inhabitant of the stream that equates to a healthy stream. Howard [28] realized after the camp that Bigfoot is not a fictional fixation but represents the past where the stream and tribe was flourishing, and it is only right for Bigfoot to come back when stream begins to flourish again. This was a missed educational opportunity for both the students and researchers because the researchers viewed the Indigenous knowledge of the students and Elder as illegitimate.

Keeping the knowledge of an Elder strictly for origin stories and not intertwining the Elder more into the camp, reinforces that their knowledge and community is separated from Western STEM education. Miller and Roehrig [36] illustrated not just the learning opportunities from bridging the two knowledge types but the community impact that bridging the knowledge types can bring.

Recognizing All Knowledge Holders

In the previous section, we described the importance of an Elder as a human holder of knowledge and the community building it can provide. An Elder is not the only holder of knowledge and community builder. There are multiple living and nonliving knowledge holders in Indigenous cultures. Recognizing and viewing the non-human knowledge holders as legitimate is another important theme found throughout the different implementations of Indigenous knowledge and STEM education. An important aspect of Indigenous ways of being is that everything including the land, all its inhabitants, and technology have a spirit and knowledge attached to them [29], [39]. Majority of the articles address this understanding through illustrations or demonstrations [17], [28]-[32], [35]-[39], [41].

One example of living knowledge ties back to Howard [28] and Bigfoot. The students in this case were unconscious holders of Indigenous knowledge teaching Howard [28] the cultural understanding of Bigfoot. An example of an "inanimate" object being a knowledge holder is Barajas-López and Bang [37] designing a clay-working STEAM project for Indigenous students to understand the storytelling and interrelatedness of clay. Their qualitative research study describes the experiences of one of the scientists who participated with the students in clay making [37]. While making clay, this scientist saw time as a picture where he could zoom in and out of time and felt his ancestors in the water contained in the clay. This experience illustrates the connections to ancestors, which includes all living and nonliving inhabitants of the Earth, that Indigenous peoples have. The scientist felt a rush of a positive spirit that impacted his physical outlook towards a better future for himself emulating the long-term impacts a design has on others and his community when he takes his piece home [37]. This can be translated to engineering design or technology as designs and inventions continue to affect people and have the spirit of their designers kept within them.

Another example that builds upon how technology and designs can be holder of knowledge is Bang et al. [39] demonstrating how fire technology is living. Bang et al. [39] used community-based design research to teach Urban Indigenous youth and their families about fire as technology that was used by Native Americans as a conservation practice. By planning to have students create fire using plant fibers, learn its indigenous histories, and connect it to contemporary uses, students see fire technology and technology in general as a living practice with cultural and spiritual connections [39]. This understanding of technology challenges the Western view of technology not having living knowledge or spirit and how this knowledge and spirit connects to the past, present, and future. Technology, inanimate objects, the land, and all its inhabitants should be seen with a spirit and a connection to the past with positive future impacts from an Indigenous perspective [17].

Discussion: Spirituality as the Binding Thread

Let us go back to the research question: **How has Indigenous knowledge of the USA been incorporated into culturally relevant STEM education?** One answer I propose is through finding the binding thread of all three themes. I argue that this thread is recognizing spirituality as a legitimate knowledge in STEM education.

Each of the themes attempt to accomplish this recognition of spiritual knowledge as legitimate to different groups of people. Centering Indigenous knowledge legitimizes spirituality in the minds of Indigenous students by showing that their cultural and spiritual practices are STEM despite settler colonialism trying to erase their spiritual knowledge. Teaching students to recognize their spiritual knowledge as legitimate empowers them to find the places to practice spirituality in Western STEM education [10, 33].

Ensuring Elder Involvement, when done throughout the entirety of a program or course, legitimizes spirituality as STEM in Indigenous communities. Elders are well-respected carriers and protectors of spiritual knowledge in their communitites [31]. Many Elders also recognize the impacts of colonization in that STEM and engineering work favor Western practices and ignores cultural and spiritual practices [10]. This mindset makes it more imperative to bring in Elders and other cultural knowledge keepers through the entirety of the work to truly center spiritual ways of knowing and bring together Indigenous communities. As *The Reach for the Sky Project* illustrated, Elder involvement can lead to participation and acceptance of spiritual knowledge in today's STEM curriculum at the community level [36].

Lastly and the most difficult group to try to prove spirituality as a legitimate knowledge is Western cultures, which includes STEM education. The theme of recognizing all knowledge holders becomes a call to action to Western STEM try to think outside the perspective of settler colonialism and towards an openness to different knowledge types. Kwapisz et al. describes how the experiences of Indigenous students inform that engineering knowledge, specifically, is "both incomplete and limited in its delegitimating of other forms of knowledge [4, p. 12]." Indigenous students, leaders, and scholars recognize how spiritual knowledge is discredited but continue to see the possibilities of growth that comes from (re)membering spiritual knowledge. As a group, we will fight our battles to legitimize spiritual knowledge and my battle sits within engineering education.

I argue that engineering education is currently in its early stages of recognizing spiritual knowledge as legitimate. Kwapisz et al. [4] recognized that Indigenous engineering students saw leadership as stewardship to uplift and support sovereignty in their communities. Jordan et al. [10] uses the experiences of Navajo engineers to describe the compatibilities of Navajo tradition and engineering design to promote border crossing and enculturation for Navajo engineers. These studies illuminate how Indigenous spirituality lives through Indigenous engineering students and engineers. One engineering education study explicitly identifies the importance of spirituality as an overarching theme to how Navajo engineers understand making [42].

Because engineering education is already exhibiting being in its early stages of recognizing spiritual knowledge as legitimate, I hope to move the process one step further by posing spirituality as a theorizing space. Bang et al. [35] used the spirit of fire technology to carry on Indigenous stories and values. What if we took the same viewpoint on our designs and

technologies in engineering and engineering education? How does our work carry on our own personal or cultural stories and values?

I argue that we leave a piece of our spirit in our work that goes beyond time and connects us to the land and all its inhabitants. In other words, what seems to be inanimate engineering objects and technologies carry spiritual knowledge. As a starting point, I challenge you to look at your work and how you attach a piece of your spirit and then come back to see how spirituality is a legitimate knowledge and a theorizing space for the future.

Conclusion

Spirituality, specifically Indigenous and Native Hawaiian spirituality, in engineering education as a theorizing space is a topic that I am excited to explore and expand on. I hope that this paper begins to illustrate what spirituality can look like as a way of knowing. I do not expect non-Indigenous researchers, instructors, and engineers to practice Indigenous spirituality as a way of knowing, but I ask them to appreciate and recognize spirituality as a legitimate knowledge type in our field. Let us keep our minds and hearts open to different knowledges as different cultures go through their process of (re)membering.

I do want to heed one warning related to (re)membering so that we do not suffer from a similar pitfall to my story of incorporating Indigenous knowledge into STEM education. Bringing back spiritual knowledge and practices may not be sufficient unless researchers address settler colonialism at a systemic and institutional level. Therefore, decolonization research plays an important role. Thus, (re)membering is not only about knowledge and practices to solve complex sociotechnical issues, but (re)membering and healing together from the consequences of settler colonialism through supporting decolonization, a practice that can help all marginalized communities.

For the future, I want to push others to recognize their own definitions of spirituality and how their spirit lives in their work, research, and teaching. Although unusual to the engineering field, spirituality can and should be a theorizing space for all. Similarly, I urge more marginalized communities to bring in their own knowledge types to further the decolonization process as we move forward together to challenge the dominant ways of knowing in engineering education.

Acknowledgements

Again, I would like to honor all the Indigenous peoples and scholars that came before me both those cited here, those I did not include, and those who work continues to go unseen. I thank you for your resilience and for giving me the opportunity to try to propel our vastly different ways of knowing forward to help heal our communities. I hope that I was able to represent a piece of your spirit in this paper. Also, thank you to Drs. Pawley and Purzer for their support and encouragement to tell my version of this story.

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Note: The 20 articles obtained from the systematic literature review procedure are marked with an asterisk (*).

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