



# **Examining Engineering Education Research with American Indian and Alaska Native Populations: A Systematic Review Utilizing Tribal Critical Race Theory**

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## Abstract

Despite their growing population, the number of American Indian and Alaska Native (AI/AN) students enrolling in engineering baccalaureate programs has remained static, and representation in the workforce has followed suit. This ongoing dilemma, cast alongside the continuing paucity of AI/AN success in academic engineering programs, prompts a review of engineering education research conducted with AI/AN populations. In this manuscript, papers dealing exclusively with AI/AN populations were systematically selected out of the body of work included in ASEE conference proceedings since 2005. These were then analyzed for the extent to which they accounted for the complexity of AI/AN lived experiences using a framework developed from Tribal Critical Race Theory. Results indicated that extant work does largely center Indigenous paradigms and do include outcomes tied to AI/AN communities, while not contextualizing the effects of colonization or accounting for the legal/political character of AI/AN identity. This manuscript therefore offers an analysis of recent work through a critical theoretical lens in an attempt to identify areas of focus where future work may have the most impact on engaging more AI/AN students to pursue engineering education and careers.

## Introduction & Background

The growth of the American Indian and Alaska Native population (commonly designated “AI/AN” by demographers<sup>1</sup>) over the past ten years alone should designate this demographic as a focus of education research. About 29% of AI/AN persons are under the age of 18, as compared to 21.9% of the total U.S. population [1]. It should therefore be no surprise that, collectively, the AI/AN population is amongst the fastest expanding demographics in the United States, with a combined population of 9.7 million identifying as AI/AN alone or in combination with another race<sup>2</sup> on the 2020 U.S. Census [2]; this accounts for 2.9% of the total U.S. population, and represents an 86.5% change from 2010. The magnitude of this latest count outstripped the internal estimates of the Census Bureau, which had previously estimated the AI/AN population would not reach 10 million until 2060 [3]. It should be noted, however, that the Census Bureau cautions against direct comparisons between the 2010 and 2020 enumerations due to changes in how race and ethnicity data were handled, as well as unanswered questions over the impact of new privacy measures on response rates [4]. Still, some observers argue that the decennial census continues to undercount AI/AN populations, particularly in rural settings, by up to 5% [5]. These uncertainties underscore the degree to which American Indians and Alaska Natives have been

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<sup>1</sup> This paper shall adhere to the AI/AN designation, though it should be noted that any associated statistics will exclude Native Hawaiians and Pacific Islanders, as they are generally tabulated separately. In instances where official designation is not relevant, the terms “Indigenous” or “Native American” may be used to refer to those peoples, historical or contemporary, who identify as descendants of a North American cultural group that predated the European colonial era.

<sup>2</sup> The U.S. Census Bureau does not define race biologically, anthropologically, or genetically, and collects data based on self-identification. The 2020 Census included 15 separate response categories which allowed respondents to report more than one race in order to indicate their racial mixture. The population count for those identifying as AI/AN alone was 3.7 million, or 1.1% of the total U.S. population.

inadequately described by previous tabulations, and serves to highlight the need for a sustained effort to better understand this often overlooked population.

And yet this growth in population has not been accompanied by a corresponding increase in representation within engineering fields, whether academic or professional. Over the past decade, the proportion of bachelor's degrees in engineering awarded to AI/AN students fell from 0.5% in 2011 to 0.3% in 2020 [6], [7]; in raw numbers this translates to a mere 397 such degrees awarded in 2020. This contraction in the educational sphere has led to static numbers in the professional world, with AI/AN persons filling just 0.2% of all jobs in the national science and engineering workforce [8]. These numbers not only expose the ineffectiveness of diversity, equity, and inclusion efforts within engineering, but also speak to a growing crisis confronting American Indian reservation communities. Tribal lands have been and will continue to be the site of large-scale public works projects of national importance (e.g., natural resource extraction), and yet the negative impacts of such projects continue to be borne disproportionately by local populations. Numerous examples exist within living memory, from the permanent inundation of Native towns and agricultural land following the construction of several dams along the Missouri River in the 1950s [9], to the bulldozing of Arikara burial sites during the construction of the Dakota Access Pipeline in 2016. It is likely that such destructive outcomes could have been avoided by the inclusion of a Native cohort of engineers involved in the planning and execution of such projects, and this imperative will continue to be a pressing need in the future, as tribal lands encompass up to 20 percent of the known natural gas and oil reserves within the United States [10].

This ongoing dilemma, cast alongside the continuing paucity of AI/AN success in academic engineering programs, should prompt a review of engineering education research conducted with AI/AN populations. This paper offers an analysis of recent work through a critical theoretical lens in an attempt to identify areas of focus where future work may have the most impact.

## **Methods**

### *Scope*

As the premier forum of its kind, the American Society for Engineering Education's (ASEE) annual conferences serve to distill the overall research and programming activities of the engineering education community year after year. As such, its proceedings offer an optimal environment for an exploratory analysis of the content and focus of AI/AN engineering education research on a national level. Towards this end, a systematic search of the ASEE Papers on Engineering Education Repository (PEER) from 2005 to the present was conducted; this timeframe was chosen to coincide with the introduction of the theoretical framework used as the analytical lens for this literature review (see "Theoretical Lens" section below). Titles and tagged topics were searched for inclusion of the following phrases: indigenous, American Indian, Native American, Alaska Native, tribe, and tribal. An identical search was also conducted using the names of the largest ten tribal groupings by population, as recorded on the 2010 U.S. decennial census: Navajo, Cherokee, Chippewa, Sioux, Choctaw, Apache, Pueblo, Creek, Iroquois (several variations accounting for different spellings were also included). These searches resulted in 42 papers in aggregate, of which four were identified as duplicates and excluded. The remaining papers were then scanned for content and an additional 12 papers were excluded from further

analysis for the following reasons: 1) the study population was not exclusively AI/AN, 2) the paper was re-submitted in updated form in a subsequent conference, or 3) the paper did not include sufficient content for analysis. Thus, the final body of literature reviewed consisted of 26 papers archived in PEER since 2005. Each title was assigned an identification number for ease of reference; a full accounting of this list can be found in Appendix A.

### *Theoretical Lens*

The continuing underrepresentation of AI/AN peoples in engineering suggests that a systemic bias persists in engineering education pathways that has yet to be fully recognized and addressed in prior research. As such, critical theory provides not only a useful framework with which to understand social and educational structures from the perspectives of an oppressed group, but also to lay the foundations upon which to effect change in these underlying structures [11]. Prior efforts have described the imperative need to incorporate critical theoretical frameworks in engineering education research, and serve as a model for this study [12].

Tribal Critical Race Theory (TribalCrit) has been proposed as a framework to more completely evaluate the unique AI/AN paradigm that exists within the legal and social structures of the United States [13]. Its development was a response to the shortcomings of other frameworks, such as Critical Race Theory, to account for the liminality of AI/AN identity as both a racial and legal/political marker. Unlike other domestic socio-cultural groupings, the relationship between AI/AN peoples and the structures and institutions of the United States is mediated through independent and sovereign AI/AN governments. As of this writing, 574 federally-recognized sovereign AI/AN entities—which variously refer to themselves as nations, tribes, pueblos, villages, or communities—exist within external U.S. borders. The sovereignty of these entities refers to their inherent right to self-government, including the exercising of jurisdiction over territory and citizens. Thus, AI/AN identity contains an inherently political character that may be represented in a person’s status as a citizen of a Native nation within the external borders of the United States. The persistence of Native nations in the context of historical and ongoing forces that have sought to terminate the sovereign status of these nations and assimilate their populations is central to the AI/AN experience, and as such the foundational tenet of TribalCrit states that “colonization is endemic to society” [13].

From this starting point, TribalCrit outlines nine total tenets that comprise a framework for critically assessing the AI/AN lived experience within domestic structures, such as educational pathways. In his original formulation, Brayboy stressed the interconnected nature of each component and his delineation of nine tenets as “distinct ideas for heuristic purposes” only [13]. In that spirit, these original tenets were grouped into four novel analytical categories for the purpose of reviewing the 26 papers resulting from the systematic search described above. This created a less complicated analytical tool while still encompassing the breadth of the TribalCrit framework. To construct these categories, underlying themes were distilled from the original formulation of TribalCrit, and the initial tenets were grouped by commonality of these themes. The resultant categories, identified by name, are as follows: *Colonization*, *Centered Indigenous Paradigm*, *Liminality of AI/AN Identity*, and *Praxis in Tribal Communities*. Papers were reviewed for representation of each category. The description of these categories, their component tenets, and the criteria for inclusion in each category is listed in **Table 1**. As a result

of this analysis, papers could be included in 0 to 4 categories.

**Table 1**  
*Analytic Framework for Literature Analysis*

Analytic Category	Original Tenet	Description of Category
Colonization	1) Colonization is endemic to society	This category accounts for any recognition of the central role settler-colonial ideology takes in U.S.-Indian relations. This ideology has as its central aim the displacement of Indigenous ways of life, either through removal or assimilation. For inclusion in this category, a paper must examine the effects of colonization in the context of the phenomenon being studied
	2) U.S. policies toward Indigenous peoples are riddled in imperialism, White supremacy, and a desire for material gain	
	6) Governmental policies and educational policies toward Indigenous peoples are intimately linked around the problematic goal of assimilation	
Centered Indigenous Paradigm	5) The concepts of culture, knowledge, and power take on new meaning when examined through an Indigenous lens.	This category recognizes Indigenous worldviews as legitimate ways of thinking and doing, even within an engineering context. For inclusion in this category, a study must make explicit use of Indigenous (or tribal) beliefs, customs, or traditions as vehicles for understanding phenomenon within engineering education research; alternatively, they may draw upon Indigenous oral tradition or narratives to inform their understanding of such phenomena.
	7) Tribal philosophies, beliefs, customs, traditions, and visions for the future are central to understanding the lived realities of Indigenous peoples, but they also	
	8) Stories are not separate from theory; they make up theory and are, therefore, real and legitimate sources of data and ways of being.	
Liminality of AI/AN Identity	3) Indigenous peoples occupy a liminal space that accounts for both the political and racialized natures of our identities.	This category accounts for the recognition that AI/AN personal identity may be derived from both ethnic/cultural sources and political/legal sources. From Brayboy: “the racialized status of American Indians appears to be the main emphasis of most members of U.S. society; this status ignores the legal/political one, and is directly tied to notions of colonialism” [13, p. 433] For inclusion in this category, the paper must account for the legal/political framing of AI/AN identity
	4) Indigenous peoples have a desire to obtain and forge tribal sovereignty, tribal autonomy, self-determination, and self-identification.	
Praxis in Tribal Communities	9) Theory and practice are connected in deep and explicit ways such that scholars must work towards social change.	From Brayboy: “Utilizing a TribalCrit lens, I would argue that no research should be conducted with Indigenous Peoples that is not in some way directed by a community and aimed toward improving the life chances and situations of specific communities and American Indians writ large” [13, p. 440]. For inclusion in this category, the project must include AI/AN institutions or organizations in decision-making processes or be tied to outcomes with direct bearing within AI/AN communities.

## *Author Positionality*

This literature review represents a beginning step in a larger project with a long-term goal of broadening pathways into engineering for AI/AN students, particularly those who are residents of AI/AN communities (such as reservations). As neither author identifies as AI/AN, nor are we residents of an AI/AN community, our motivation is informed by the expressions of need for greater numbers of AI/AN engineers as articulated by relevant stakeholders, including tribal governments and AI/AN scholars, educators, and practicing engineers. By aligning our project goals with the communicated views of such stakeholders, we strive to de-center our own standpoints from this work in an attempt to limit the unintentional effects of deficit-oriented or colonial mindsets on our analysis. The project focus represents a continuation of the first author's work within American Indian reservations in the Midwest, first as an educator at a tribally-chartered school, then as a researcher at a Native-led educational non-profit. Both of these roles imparted an understanding of tribal sovereignty as an organizing concept central to the daily lives of those residing in such communities. Thus, we have adopted tribal sovereignty, its associated concept of AI/AN identity as legal/political in addition to racial/ethnic, and the overarching framework of TribalCrit to guide our analysis.

## **Results**

The outcomes of this literature review are presented below. **Table 2** displays the frequency with which each analytical category was represented across the 26 papers reviewed. The cumulative frequency totals to more than 26, as each paper could include multiple categories. **Table 3** thus groups the papers by number of categories represented, from 0 to 4, with the resulting paper count totaling to 26.

**Table 2**

*Representation of Analytic Category by Frequency Across All Papers*

Category	<i>n</i>	%
Colonization	2	8
Centered Indigenous Paradigm	15	58
Liminality of AI/AN Identity	6	23
Praxis in Tribal Communities	15	58

**Table 3**

*Papers Organized by Number of Analytic Categories Represented*

Categories represented	<i>n</i>	%
4	1	4
3	2	8
2	12	46
1	4	15
0	7	27

A preliminary review found that it was possible for our pre-defined TribalCrit analytic categories to be identified in any of the standardized subsections of a given paper, from the formulation of a

research question, the crafting of research methods, the making and handling of data, to the discussion of results. Therefore, each paper was read in its entirety and thematically coded using the analytical categories in **Table 1** as *a priori* codes. The following sections provide example passages extracted from the body of papers that illustrate ways in which each analytic category was explicitly represented in this literature review.

### *Colonization*

This category accounts for any recognition of the central role settler-colonial ideology takes in U.S.-Indian relations. Such ideology has as its central aim the displacement of Indigenous ways of life, either through removal or assimilation. For inclusion in this category, a paper must explicitly examine the effects of colonization in the context of the phenomenon being studied. Paper 23, which offers a working definition of decolonization in engineering education pathways, describes in detail the origins of U.S public education of Native American students as an assimilative process designed to strip pupils of their cultural identity [14]. Likewise, Paper 18, in discussing the results of several “Thinking Circle” focus group conversations with educators from schools on or near Native nations, identified the latent colonial mindset still existing within these schools, exhorting teachers “to abandon the mentality that views Indigenous Peoples as needing rescuing through western methods” [15, p. 5].

### *Centered Indigenous Paradigm*

This category recognizes Indigenous worldviews as legitimate ways of thinking and doing, even within an engineering context. For inclusion in this category, a study must make explicit use of Indigenous (or tribal) beliefs, customs, or traditions as vehicles for understanding phenomenon within engineering education research; alternatively, they may draw upon Indigenous oral tradition or narratives to inform their understanding of such phenomena. Paper 13, which asks as its central research question “How does a philosophy of learning engineering design fit within the traditional Navajo worldview?” [16], is an exemplar of this category. It is important to note the directionality of this question; the authors do not ask how a Navajo worldview might fit within a philosophy of learning engineering design, but rather ask the opposite, and in doing so give primacy to an Indigenous way of knowing even within the domain of engineering activities. This approach reflects the language of the fifth tenet of TribalCrit, a constituent tenet of the “Centered Indigenous Paradigm” category, which states that “the concepts of culture, knowledge, and power take on new meaning when examined through an Indigenous lens” [13, p. 429]. In practice, this requires one to recognize the authority of tribal philosophies when conducting research within a Native setting. The authors of Paper 21 make this necessity explicit, writing “in situations where traditional knowledge conflicts with aspects I want to investigate or in the framing of my research questions and data analysis ... I must always concede to traditional knowledge” [17, p. 4].

### *Liminality of AI/AN Identity*

This category accounts for the recognition that AI/AN personal identity may be derived from both ethnic/cultural sources and political/legal sources. From Brayboy: “the racialized status of American Indians appears to be the main emphasis of most members of U.S. society; this status

ignores the legal/political one, and is directly tied to notions of colonialism” [13, p. 433] For inclusion in this category, the paper must account for the legal/political framing of AI/AN identity. In practice, this distinction is rarely made, and is a reality that is only made explicit in 23% of the papers included in this review. Paper 25, in describing the deficiency of research which aggregates all AI/AN students into a single category, comments that “socio-culture [sic] context is unique to each Nation, reservation, and tribal college” [18, p. 5]. One simple approach that several papers utilized included identifying the tribal enrollment of each participant. However, for studies particularly interested with the “socio-cultural” context of their AI/AN participants, this strategy may not be sufficient to describe the totality of one’s tribal affiliations. The authors of Paper 10 observe of their Creek-identifying participants:

[they] may in fact have ancestry from two or three different tribes in addition to multiple races. In their parents’ home or at clan gatherings they consider themselves Creek. However, if enrollment in the Creek Nation was closed to their blood quantum, they may have enrolled in another tribe in which they qualified to secure access to resources that make college attendance possible [19, pp. 4-5].

Here, “blood quantum” refers to the fractional measure of one’s degree of “Indian” or “tribal” blood as calculated through lineal family descent, which is used to identify who is eligible to be “enrolled” as a citizen of a particular Native nation. This is a static characteristic wholly dependent on the blood quantum of one’s parents only, and does not account for affiliation with tribes engendered by other forms of kinship practiced in Indigenous culture, or by location and duration of residence in another Native nation. Therefore, researchers who wish to include in their analysis an understanding of how AI/AN peoples formulate their identities should allow participants to not only indicate tribal enrollment, but also to describe other forms of tribal affiliation as well.

### *Praxis in Tribal Communities*

Brayboy argues that “no research should be conducted with Indigenous Peoples that is not in some way directed by a community and aimed toward improving the life chances and situations of specific communities and American Indians writ large” [13, p. 440]. For inclusion in this category, the project must include AI/AN institutions or organizations in decision-making processes or be tied to outcomes with direct bearing within AI/AN communities. Recognizing the indirect manner in which research may be transmitted into practice, the latter connection may also be indirect in nature. Paper 14 exemplified this relationship; though its direct outcomes were theoretical, this paper was explicitly situated within a larger project which aimed to “create and pilot tools to evaluate Navajo students’ experience of engineering design in the context of Navajo culture” [20, p. 4]. In this manner, researchers can construct multi-stage projects that have the ultimate outcome of bridging the research-to-practice gap in AI/AN communities.

## **Discussion**

Examining the representation of each category, we found that *Centered Indigenous Paradigm* and *Praxis in Tribal Communities* were the most frequently included among the papers reviewed, with each appearing in over half of all studies. This result is indicative of ongoing trends in engineering education research. Culturally responsive paradigms have long been incorporated in education research in general [21], and have been adopted by engineering education researchers



as a means to address diversity and inclusion issues in the field. The inclusion of Indigenous paradigms in the papers reviewed for this study took on a number of forms, from vaguely-described AI/AN “values” incorporated into a research or project design to extended descriptions of tribal philosophies drawn from extensive oral narratives. In several papers, a citizen of the Native nation of focus served as a primary author, thus bringing their perspectives to every stage of the study. Many of the papers with explicit outcomes tied to Native communities were in fact a product of a collaboration between a Predominately White Institution (PWI) and one or more Tribal Colleges and Universities (TCUs). Seven such papers were in some way related to NSF-funded programs aimed at building TCU capacity through partnerships with PWIs. One such example is the Pre-Engineering Education Collaborative (PEEC), which is currently in its second phase of funding. Collaboration with TCUs can serve as an excellent vehicle to incorporate all four of the analytical frameworks of this study into a project design, as they are located within AI/AN communities, exist as chartered entities of a sovereign tribal government, and have as part of their institutional mandate the mission to preserve Indigenous knowledge as a mechanism of resisting the assimilative forces of settler-colonialism.

The least represented categories in the literature reviewed were *Colonization* and *Liminality of AI/AN Identity*. As TribalCrit was developed in response to the need for a framework that acknowledged both the pervasiveness of the effects of colonization in the daily lived experiences of AI/AN peoples, and the persistent mischaracterization of tribal peoples as inhabiting cultures without sovereign nations, this outcome illustrates the need for increased use of critical theory in designing engineering education research involving AI/AN populations. Of particular relevance to ongoing equity and inclusion initiatives, researchers should recognize that, for AI/AN peoples, equity is not always built upon inclusion. Rather, project outcomes should align with an end goal of tribal sovereignty, autonomy, and self-determination. Again, collaborations with TCUs that include a component of capacity-building for these institutions offer an optimal way forward.

It should be noted that the inclusion, or lack thereof, of each of the four analytical categories employed in this study should not be construed as a measure of the “quality” of a paper, nor was it conceived by the authors to serve such a purpose. The purpose of this study was to examine recent engineering education efforts involving AI/AN communities through a critical theoretical lens in an attempt to identify areas of focus where future work may have the most impact. Such future work can and should build upon the foundations laid by these efforts, which offer promising avenues to engage with AI/AN students.

## **Conclusion and Future Work**

Papers dealing exclusively with AI/AN populations were systematically selected out of the body of work included in ASEE conference proceedings since 2005. These were then analyzed for the extent to which they accounted for the entirety of AI/AN lived experiences using a framework developed from Tribal Critical Race Theory. Results indicated that extant work does largely center Indigenous paradigms and do include outcomes tied to AI/AN communities, while not contextualizing the effects of colonization or accounting for the legal/political character of AI/AN identity. It is important to note that this literature review was somewhat limited in its scope by only searching the ASEE PEER depository; it is our intent to expand upon this initial effort by reviewing publications in other engineering education peer-reviewed outlets.

Future work can benefit from the inclusion of AI/AN researchers, whether through the faculty or student body of PWIs or through collaboration with TCUs. Of particular interest is the role of tribal sovereignty in shaping the daily experiences of AI/AN students and engineers. This offers a topic for future research, such as in exploring how tribal citizens may perceive engineering in the context of national self-determination. Such a study can draw upon the ongoing public dialogue surrounding large-scale public works projects occurring on or near tribal land bases. Development of a framework of engineers as nation-builders in a tribal context may prove useful to researchers studying AI/AN student motivation and persistence in engineering education pathways.

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## Appendix A

### *Papers included in systematic review<sup>1</sup>*

Paper #	Year	Title	Authors
1	2005	Out of the mix: Native Americans in information technology	R. Varma
2	2005	A middle school program to attract Native American students to STEM higher education	W. Lin and G. Padmanabhan
3	2006	Designing our community: Evaluating the success of a program to recruit and retain American Indian students to engineering	S. Watson, H. Sherick, and C. Plumb
4	2006	A weekend STEM enrichment program for tribal high school teachers and students	G. Padmanabhan, W. Lin, R. Pieri, F. Patterson, and E. Khan
5	2007	Using a service learning project to make progress on both recruitment and retention objectives for American Indian engineering students	S. Watson, H. Sherick, and C. Plumb
6	2007	Introducing Native American community college students to engineering through hands on exploratory projects	W. Lin, G. Padmanabhan, S. Pryor, and D. Wiesenborn
7	2007	Experience with and lessons learned in a STEM summer camp for tribal college students	W. Lin, G. Padmanabhan, R. Pieri, and F. Patterson
8	2009	Bridge design on the reservation: A study of curriculum implementation with American Indian youth	S. Guzey, T. Moore, and G. Roehrig
9	2009	Using Community Advisory Panels (CAPS) for the development of a STEM professional development model for teachers of American Indian students	K. Becker, J. Barta, and R. Monhardt
10	2009	I feel like Forest Gump: Mixed race Native American students find community in a college of engineering	C. Foor and R. Shehab
11	2011	A unique university-tribal college collaboration to strengthen Native American pathways to STEM education	G. Padmanabhan, R. V. Pieri, and C. Davis
12	2013 <sup>2</sup>	Impact of a research experience program on North Dakota tribal college STEM retention	A. LaVallie, E. Khan, and G. Padmanabhan
13	2014	A philosophy of learning engineering and a Native American philosophy of learning; An analysis for congruency	C. H. Foster and S. S. Jordan
14	2015	CAREER: Engineering design across Navajo culture, community, and society	S. S. Jordan
15	2016	Native American mentorships: Industry's next step to assist Native Americans' transition into STEM careers?	J. V. Berrett, C. S. Armstrong, and C. G. Frazier
16	2016	How to develop Alaska Native STEM students in middle school and high school	M. Yatchmeneff, H. P. Schroeder, and M. E. Calhoun
17	2016	Learning about design from the Lakota Nation	G. D. Catalano
18	2017	Teacher "thinking circles" reveal protective and	A. J. Huff-Lohmeier,

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		risk factors for persistence of American Indian students and retention of non-American Indian teachers in reservation schools	A. Hennig, and D. Lamoreaux
19	2017	Research experience for undergraduates: Integrated optics for undergraduate Native Americans (IOU-NA)	A. J. Huff-Lohmeier, A. J. Hennig, and D. Lamoreaux
20	2017	Research in optics for K-14 teachers (ROKET): A research experience for teachers in Native American schools	A. J. Huff-Lohmeier, A. J. Hennig, and D. Lamoreaux
21	2018	Engineering connections in a Native American community and culture	I. Anderson and S. S. Jordan
22	2019	Exploring the career thinking of Native American engineering students (research)	N. M. Colston, S. L. Turner, G. M. Chagil, S. C. Jacobs, and S. Johnson
23	2020	Pre-engineering collaboration as a tool to facilitate decolonization of Native American students	R. V. Pieri et al.
24	2020	Piloting an innovative bridge camp at a tribal college to improve the transition from high school to college	S. M. Hanson et al.
25	2020 <sup>3</sup>	Efforts to improve mathematical preparation for a pre-engineering program at tribal colleges in North Dakota	D. Luecke et al.
26	2021	Culturally-based ethical barriers for American Indian/Alaska Native students and professionals in engineering	J. C. Ingram, A. E. Castagno, R. Camplain, and D. D. Blackhorse

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<sup>1</sup>All papers published in the annual conference proceedings unless otherwise noted.

<sup>2</sup>Published in the proceedings of the North Midwest Section Meeting.

<sup>3</sup>Published in the proceedings of the First-Year Engineering Experience