Teacher "Thinking Circles" Reveal Protective and Risk Factors for Persistence of American Indian Students and Retention of Non-American Indian Teachers in Reservation Schools

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Thinking Circles Reveal Insight into Persistence of non-American Indian STEM Teachers and American Indian Youth in Primary and Secondary Schools on Native Nations

Abstract

This study engaged teachers in focus groups called Thinking Circles to gather valuable experiential data on perceived protective and risk factors for non-American Indian STEM teachers that potentially impact American Indian student and non-American Indian educator persistence in schools on Native Nations. Participants in this study were teachers (N=29) in a National Science Foundation funded Research Experience for Teachers (RET) program from 17 different tribes across the United States. All participants taught science or math in schools on or near Native Nations. Some participants were citizens of the Nations they taught on (n=9), while other teachers were non-American Indians contracted to teach (n=20) on indigenous lands. Three separate Thinking Circles were conducted each summer for three years during which participants were prompted to brainstorm protective and risk factors for: 1) non-American Indian STEM teachers' relatability to their American Indian students; 2) American Indian student persistence in school; and 3) retention of non-American Indian STEM educators in Nation schools. Once data were transcribed and reviewed, several patterns of insights emerged across prompts. Common protective factors for all three prompts emphasized the need for non-American Indian STEM teachers to: 1) gain the trust of students; 2) build relationships with students' families, 3) learn about and participate in the local culture and language; and 4) engage with community members to build rapport. Identified risk factors across prompts included: 1) student absences; 2) non-American Indian STEM teachers' lack of understanding of tribal community hierarchy and culture; 3) non-American Indian STEM teachers feeling unwelcome to or uncomfortable to participate in community ceremonies, and 4) non-American Indian STEM teachers not understanding how to apply STEM concepts within their students' cultural context and existing STEM knowledge. That these patterns of identified protective factors and risk factors appeared across prompts and across different tribal regions and grade levels suggests the potential benefit of a future larger study to further investigate the correlation between teacher training and improved American Indian student persistence in STEM. These results have the potential to transform precollege STEM classrooms in Nation schools, university recruitment programs, and university teacher preparation curriculum.

Introduction

Since 2009, The NSF funded Center for Integrated Access Networks (CIAN – NSF EEC#0812072) at the University of Arizona (UA) has been developing programs that address bottlenecks in the American Indian Science, Technology, Engineering, and Math (STEM)

pathways from precollege through graduate school. Over the years, CIAN has worked with American Indian communities to reach talented teachers in Indian Country across the United States for its Research Experience for Teachers (RET) program, entitled, Research in Optics for K-12 Educators and Teachers (ROKET – NSF EEC# 1300370), developing a strong infrastructure that has enriched American Indian precollege classroom curriculum, mentorship, and student engagement. This study investigated teacher perceptions of protective and risk factors impacting American Indian precollege students and non-American Indian STEM teachers teaching on Native Nations. Although literature demonstrates the challenges American Indians in their nations often face, such as poverty, health, and interfamilial relationships, there are few studies that focus on leveraging cultural strengths in the classroom and community by non-American Indian STEM educators in ways that are predicted to have great impact. This study offers recommendations for American Indian leaders, pre-service and in-service educational professionals, and education policy makers.

Motivation for Research

American Indian students perform equally, and at times outperform, other underrepresented minorities (URM) in all subjects until about 8th grade. Thereafter, math and science scores start to fall below that of other URMs [1]. According to a recent Race for Results study, by 8th grade only 21% of American Indian students were at or above the national average in Math proficiency, leaving 79% potentially weak in Math, which is foundational to science and engineering [2]. This achievement disparity continues for American Indians throughout high school, college, and into graduate school, ultimately impacting the diversity in engineering industry in the United States. Approximately 1.8% of the U.S workforce is made up of engineers; however, less than 0.5% of this engineering workforce is American Indians [3]. Teachers are critical to motivating children from their classrooms on the reservations toward the pursuit of engineering degrees in college and into engineering fields, but they must act early to keep American Indian children interested in math and science. While there was an overall upward trend in high school graduation rates for all students in the United States, American Indian students most recently saw a decline in graduation rates since 2008, and currently, American Indians make up only 0.5% of all undergraduates enrolled in engineering at U.S. institutions [3] [4]. Many variables factor into the low rate of participation in STEM higher education degrees by AI/AN students. Unfortunately, the reservation classroom can be a complicated web of misunderstandings, mistrust and missed opportunities. This paper provides an opportunity to gain insight into what teachers believe some of the challenges are that impact both their retention and that of their students.

The historical intergenerational trauma that often manifests itself as mistrust between Native Nation citizens and mainstream educators and policy makers appears to be a contributing factor to challenges with Non-American Indian teachers teaching American Indian youth on Native Nations [5]. Non-American Indian educators and administrators may struggle to understand Indigenous Peoples' cultures and values and may even misinterpret them. This has, at times, led to American Indian students being excluded from URM student recruitment and retention efforts, projects, initiatives, and programs [6] [7]. There are far more Anglo teachers graduating universities as public education teachers than American Indians and other underrepresented minorities [8]. In fact, in academic year 2011-2012 of the 152,000 math teachers and 132,000

science teachers in the United States, only 600 and 400 respectively were American Indian, compared to 81,500 and 84,500 respectively for their Anglo peers [8]. This disparity often leaves Native Nations in need of qualified teachers, especially in math and science. The solution has historically been to hire teachers from outside the Native Nation, most of who are non-American Indians, to teach primary and secondary school children in Indian Country. While many of these teachers are well-educated and prepared to teach their respective subjects, evidence in the education sciences literature reveal that often they are unprepared to teach their American Indian students due to challenges in understanding the various indigenous cultures in which they are teaching. Often, even the most well intentioned non-American Indian teacher lacks a full comprehension of the deeply embedded cultural values and rituals that vary even within one tribe. Non-American Indian teachers often struggle to apply math and science concepts to the traditional ecological knowledge their students and their families are accustomed to, lack the ability to understand and interpret their curriculum and concepts in the language spoken in the homes and communities of their students, and miss opportunities to appreciate the family and community structures that American Indian students rely on in their everyday lives [7] [9]. When American Indian children are taught by a majority of non-American Indian teachers, the teachers and students may struggle to identify with one another, which research shows negatively impacts the ability of teachers to mentor and motivate children, particularly toward a love of math and science [10]. Sharing an understanding of one another's core beliefs and value systems is critical to implementing a culturally responsive curriculum and building the much needed teacher-student trust that improves URM retention, particularly for American Indians [10] [11]. Education does not take place void of outside forces and impacts, which makes these challenges potential risk-factors for higher than average attrition rates for both students and teachers. While the student-teacher relationship is imperative for student success, it's not the only education relationship that should be examined. The relationship between teachers and school leaders also plays a large role in retaining talented teachers [12]. When there is a high teacher turn-over rate, trust between teachers and students and teachers and community leaders becomes difficult to develop. As the pressure increases for education policies to align with national priorities to improve the inclusivity of the U.S. STEM workforce, it is imperative that American Indian and non-American Indian educators and administrators gain a deeper understanding of some of the challenges unique to teaching American Indian children on the "rez."

This paper provides insight into both barriers and strengths to improving teacher and student retention in K-12 schools on Native Nations. The issues investigated through the perspectives of educators include: 1) non-American Indian teacher relatability to American Indian students; 2) persistence of American Indian children in school; 3) and persistence of non-American Indian teachers in Native Nation schools.

Materials and Methods

Focus groups were the tool implemented to collect qualitative data to explore the topics of student and teacher persistence and relatability in American Indian schools. These topics are difficult to observe and do not lend themselves well to observational techniques. Further, these issues have a tendency to be sensitive and the researchers wanted participants to feel comfortable talking about their attitudes and beliefs with the ability to frame the context within the discussion. Twenty-nine K-12 STEM teachers participated in Thinking Circles over three

summers. Each of the teachers was teaching American Indian youth on American Indian nations, with 16 tribes represented. The teachers were participants in a National Science Foundation (NSF) funded Research Experience for Teachers (RET) within a NSF funded Engineering Research Center for Integrated Access Networks (CIAN) at the University of Arizona. Ten participants were American Indian teachers and 19 were non-American Indian teachers. Participation was voluntary and focus groups occurred on the final days of the RET experiences, ensuring no participant felt obligated to participate as part of their RET internship. Informed consents were completed and participants were briefed on the prompts to be discussed. Each focus group consisted of five to eight participants and two moderators and ran approximately 60 minutes. The assistant moderator took notes on responses and nonverbal body language. The primary moderator asked questions, facilitated the conversation flow, and ensured all participants had an equal opportunity to provide input. The groups were small enough that researchers did not feel it necessary to audio or video record the sessions. Once data was collected, it was analyzed for emergent themes, nonverbal behavior, and group dynamics. Each session began with engagement questions that established a baseline of comfort among the participants. Questions such as, "What is your favorite subject and age-group to teach?" were asked during this phase. Once participants were settled and talking easily, the three prompts were asked and discussed one at a time. The questions were: 1) What are tools/attributes/actions that assist teachers in *relating to* and *teaching* American Indian Students; 2) What are tools/attributes/actions that assist in the *persistence* of American Indian Students in school; 3) What are tools/attributes/actions that assist in *retaining and developing educators* for American Indian students. Responses were recorded on flip charts and hung around the room for discussion. Once ideas and insights were recorded, exit questions were asked to ensure participants had an opportunity to share what they felt was important. Upon closing the focus group, the lead moderator reviewed the notes and the responses and began analyzing the data for emergent themes.

Results

After recording thoughts and ideas from 29 teachers over 3 summers and 3 separate focus groups, several strong patterns emerged in the topics and themes of their responses. Table 1 depicts the emergent themes. Regarding the first prompt, "Tools/attributes/actions that assist in teachers relating to and teaching American Indian students," community involvement, language and cultural training, and relationships of trust were the primary themes in teacher responses. Several individuals across all three years commented on the need for teachers of American Indian students to gain the *trust* of students and families by building relationships and getting to know them. Similarly, a strong theme in responses suggested that *engaging with the local community* would be beneficial for relating to American Indian students; examples included going to after-school sporting events and clubs, participating in cultural events, and learning the language. Teachers from each year of data collection also proposed that more rigorous formal training and *immersion in the culture* was crucial to relating to their students. Another noteworthy response, though iterated by only one cohort of respondents, suggested that non-American Indian educators should seek to abandon the mentality that views Indigenous Peoples as needing rescuing through western methods, as opposed to an attitude of genuine caring and a desire to help in ways dictated by the people themselves.

The second focus group prompt was, "Tools/attributes/actions that assist in the persistence of American Indian students in school," and genuine caring, motivation/incentives, pedagogical methods, and family relationships were the principal trends in discussions. Once again the importance of the *family* in a student's education was emphasized; several individuals stressed the importance of gaining rapport with families and developing relationships with students and their families, and others mentioned the general impact that home life can have on learning and school, cautioning that teachers must be prepared to intervene appropriately on the student's behalf. Furthermore, several responses suggested that a *genuine caring* (i.e. the teacher truly wants to be there) is what often makes a difference in building relationships with students and families. Each of the three cohorts also agreed that it was necessary to discover what *motivated* their American Indian students in order to incentivize and reward hard working students. This concept certainly applies to education systems everywhere, but the unique cultural context requires a more thoughtful approach, taking care not to make assumptions based on past experiences with non-American Indian students. Another pattern revolved around *pedagogical methods;* some proposed that teachers must take extra care to teach to various learning styles and make curriculum content relatable to students' lives, and others suggested that instructional methods should reflect a natural, traditionally-rooted learning style. A final common thread that was mentioned in two of the three groups was the importance of integrating technology into learning in order to help American Indian students stay connected to the 21st century. This, however, can be tempered by poor connectivity in some rural nations.

The final prompt asked participants to discuss Tools/attributes/actions that assist in developing and retaining educators for the American Indian student, and four main trends emerged. First, all cohorts repeated the importance of *cultural immersion* to improving teachers' abilities to bridge the cultural gap that is often described in this teaching population; one person suggested that new hires should be required to go through a cultural immersion program. Next, *professional development* opportunities and trainings on teaching and culture were suggested as being an important part of teacher development and retention. In conjunction with teacher development, each year's respondents proposed that *peer mentorship* programs among teachers should be established in order to support weak or struggling educators rather than penalize them. Finally, two cohorts mentioned the potential of generous *monetary incentives* to attract new educators to American Indian schools; however the 2015 cohort felt that one negative consequence of this method may be the recruitment of teachers who are less devoted to the community and more interested in the salary. An insightful comment from one participant also noted that there is opportunity to stimulate interest in the teaching field among indigenous populations by promoting careers in teaching to their own students.

Table 1: Summary of Focus Group Consensus

Tools/attributes/actions that assist teachers in *relating to* and *teaching* American Indian Students	Number of Respondent groups that agreed
Build relationship of trust with students and families	3 of 3
Learn the tribe's language	3 of 3
Get immersed in the culture	3 of 3
Integrate into local community (attend sports events, cultural events, etc)	3 of 3

Set high but realistic expectations for students	2 of 3
Formulate new perspective of purpose as teacher of Indigenous Peoples: American Indians do not need "rescuing."	1 of 3
Tools/attributes/actions that assist in the *persistence* of American Indian Students	**Number of Respondent groups that agreed**
Family: rapport with students' families, family involvement in education	3 of 3
Find out what motivates students and use it	3 of 3
Teachers motivated by sense of "calling"/genuine caring for students	3 of 3
Culturally sensitive pedagogical methods (make content relatable)	2 of 3
Integrate technology into teaching	2 of 3
Create vocational tracks and alternate programs for students with extenuating circumstances	2 of 3
Tools/attributes/actions that assist in *developing and retaining educators* for American Indian students	**Number of Respondent groups that agreed**
Quality trainings and professional development related to teaching in the cultural context.	3 of 3
Peer mentorship programs rather than penalize weak teachers	3 of 3
Bridge the cultural gap; provide a cultural immersion programs for new hires	3 of 3
Monetary incentives (e.g. higher salaries)	2 of 3
Quality housing on the reservation	2 of 3
Incorporate various learning styles in teaching	1 of 3
Create opportunities for teachers to develop relationships with students and families	1 of 3

Conclusions

Non-American Indian teachers working in Indian Country face obstacles that have the potential to directly impact their students' persistence in high school and into STEM careers. Addressing these challenges to teacher and student persistence increases the probability for teachers to positively impact their students' decisions to pursue higher education and majors and career aspirations in STEM. Conclusions from this study provide direction for education policy-makers and funders, educators in the classroom, program developers creating teacher development opportunities, and Native Nation education leaders. The responses from American Indian and non-American Indian educators in this study provide solutions to obstacles in American Indian education, such as American Indian student persistence in school and retention and development of teachers of American Indian students. Responses revolved around gaining the trust of students, building relationships with students and their families, the importance of learning about the local culture and language, and engaging with the community to build rapport. Other insights called for personalized and culturally relevant pedagogical methods and teacher training and development. Although many of the ideas and solutions discussed here may seem intuitive, this

input comes directly from teachers of American Indian students across several tribes and regions; thus, reinforces their validity. It also paves the way for future discussions of more specific solutions and programmatic changes that could lead to significant improvement in student outcomes among indigenous populations.

The following recommendations are made: Native Nation education leaders and citizens of Native Nations might consider clarifying appropriate ways for non-American Indian teachers to become engaged and participate in the Nation's culture and activities outside the classroom. It might be helpful to find ways to encourage non-American Indian teachers to feel welcomed at appropriate activities and ceremonies, as often times, non-American Indian teachers shared that they are unsure whether they should attend certain events. Further, it may be beneficial for Nation leaders and school administrators to find non-monetary ways to motivate non-American Indian teachers to increase their connection with and motivation for teaching on the Nation. Ways this may occur include: requesting teacher involvement in community events, encouraging them to coach or lead a student club, or to ask them to sit on an educator advisory board. Recommendations for non-American Indian educators and mainstream education policy-makers to improve teacher-student connections are to focus pre-service teacher training and in-service teacher development curriculum on pedagogical techniques that facilitate teaching STEM concepts in culturally appropriate ways, including teaching some lessons in the traditional language of the students they will be teaching, encouraging teachers to work with others in the Nation community to learn ways to apply STEM concepts to the students' daily lives on the nation. Further, teachers should be provided training on their potential impact as mentors and career counselors, making it important for teachers to stay in-tuned to career and education pathways beyond high school for their students. Ultimately, Non-American Indian educators should take the initiative to learn about the cultures in which they are teaching and familiarize themselves with the language and the family structures within that community. They should take a strengths-based approach to teaching and hold the belief that American Indian students and communities have much to teach the teacher. Demonstrating genuine interest in the students' lives outside the classroom will go far to build much needed trust inside the classroom. These conclusions for policy makers are summarized in Table 2.

Table 2: Summary of Suggested Changes for Policy Makers

For Native Nation Leaders
Determine opportunities for non-American Indian teachers to engage the Nation's culture and activities outside the classroom
Create methods to help non-American Indian teachers to feel welcome and invited to activities and ceremonies
Seek non-monetary ways to motivate non-American Indian teachers to increase their connection with and motivation for teaching on the Nation
For Non-American Indian Educators and Policy Makers
Increase & Improve pre-service teacher training and in-service teacher development curriculum on pedagogical techniques for culturally appropriate STEM-teaching methods
Encourage teachers to work with the reservation community to apply STEM concepts to daily lives on the Nation
Train teachers on their potential impact as mentors and career counselors

Initiate Non-American Indian educators to learn about the cultures in which they are teaching and familiarize themselves with the language and the family structures within that community
Adopt a humble, strengths-based approach and be open to learning valuable insight and knowledge from the students and their families

Further Discussion

This paper sheds light on protective factors, as well as risk factors that may impact the academic success in STEM for American Indian youth. It also provides insight into some complicated, yet critical, relationships that impact both teacher and student persistence in schools in Indian country. Further research on pre-service and in-service teacher development that highlights and leverages the strengths of the American Indian culture in an effort to engage youth and their families in academic endeavors should be conducted.

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