CIRCULATING CONVERSATIONS METHODOLOGY: CO-CONNECTING KNOWLEDGE TO DEVELOP RESEARCH QUESTIONS AT SITTING BULL COLLEGE

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ABSTRACT

How does one determine a research direction and research questions for research in undergraduate math education? Shawn Wilson (Opaskawayak Cree) articulates that “research is all about unanswered questions, but it also reveals our unquestioned answers” (2008, p.6). Circulating Conversations Methodology is one approach within an Indigenous research paradigm to determine the research direction and research questions. This methodological paper shares both the process of developing Circulating Conversations Methodology as an Indigenous Research Methodology and how the Circulating Conversations Methodology was specifically enacted at Sitting Bull College to develop research questions for undergraduate math education. Through collaborative connecting via conversation and story, relationships were strengthened and formed as we co-connected knowledge. This paper is a story intertwining the process of developing the research questions, the resulting research questions, and the relationships formed through the process. Circulating Conversations Methodology and this paper seek to follow an Indigenous principle “the process is the product.” (Wilson, 2008, p.103)

Keywords Indigenous research paradigm, Circulating Conversations Methodology, co-connecting knowledge, research in undergraduate math education

Introduction and Discussion

The purpose of this paper is to share how we applied a specific Indigenous research methodology within the community context at Sitting Bull College. Indigenous Research Methodologies literature lays the foundational principles for the process and outcomes of research with Indigenous Peoples while leaving room to uniquely reflect place and community (Archibald, 2008; Kovach, 2009; Wilson, 2008). Sitting Bull College is a tribal college/university chartered by Standing Rock Nation and guided by Dakota/Lakota culture, values, and language. This methodological paper articulates how we experienced conceptual ideas related to Indigenous research and methodologies such as relationality, responsibility, and reciprocity within specific place-based math education research. The methodology is titled Circulating Conversations Methodology and implements what we came to describe as co-connecting knowledge. As far as we are aware, Indigenous research methodologies have not yet been applied to research in undergraduate math education. Circulating Conversations Methodology demonstrates both the possibilities and value for using Indigenous research methodologies to strengthen undergraduate math education.

Formal Introductions

In following a Lakota/Nakota/Dakota model of communication, we will start with a formal introduction to begin establishing context and relationship (Long Feather, 2007).
Hau mitakuyepi. Ċhaŋte waśteya nape ċhiyuzapi. Danny Luecke emaċiyapi. Fargo, North Dakota el wathi na Fargo emataŋhaŋ. Ina Kathy Jo Dahlgren eċiyapi. Ate Lenny Luecke eċiyapi. In Lakhol'iyapi (the Lakota language) I said, hello my relatives. With a good heart I shake your hand. My name is Danny Luecke, and I am from and currently live in Fargo, North Dakota. I shared my parent's names as part of common protocol and in part to fulfill my desire to honor all my ancestors. My mother also grew up in Fargo and is of Danish, Norwegian, and Swedish ancestry. My father grew up on a farm in South Dakota and is of Irish, German, and Choctaw ancestry. I am enrolled in Choctaw Nation of Oklahoma and often reflect on the tension of embracing or neglecting my Choctaw heritage because of my predominantly white background and experiences. In hopes to neither romanticize nor demonize any of my/our/your ancestors, I am reminded that nobody chose their birth family, but Creator determined this for each one of us. Even though I am Choctaw, I introduced myself in Lakhol'iyapi to honor the Nation, people, and land that this research is from. My understanding of Indigenous Research Methodologies has come from books and not experience, which is an obvious limitation to my work. In response, I have sought to whole-heartedly live the teachings I have learned from the Indigenous research methodologies literature. Currently I live with my wife and two daughters in Fargo. This collaborative paper and research is part of my PhD in math and math education at NDSU.

Throughout this paper, the pronouns ‘I’ and ‘we’ are intentionally used. ‘I’ will specifically reflect Danny’s individual experiences and beliefs as the lead author. When another author writes in first person instead of Danny, it will be explicitly stated. ‘We’ will reflect collaboration and having a mutual experience or belief. The positionality of the co-authors will be shared throughout our paper as part of the story of Circulating Conversations Methodology.

Acknowledgements to Land, People, and Readers

The story begins with acknowledging Land and the place we are. We acknowledge that Land is alive, dynamic, and relational. Land was here long before we were and will be here far beyond all of us. We honor the Land and the Tribal Nations that have been in reciprocal, sustainable relationship with her for generations. We acknowledge the Oceti Sakowin, Anishinaabe, and any other Indigenous Peoples continuing their relationship with the Land despite settler colonialism seeking to divide them from one another.

Further, I specifically acknowledge and say thank you to the faculty and community at Sitting Bull College and Standing Rock Nation. Apart from you, this research would not exist, and I would not be the person I am today. Yakoke (thank you in Choctaw). I pray that everything I do can lead to strengthening our relationships with one another, the Land, our ancestors, and Creator.

Similarly, I pray for you, the reader/listener to this story. I pray that your connection with us could grow. I pray that you would also seek to honor all your relations. We, as co-authors, only share from our context/relations and cannot say how it will apply to your relations. Further, we desire your reading experience to be cyclical in nature. We purposefully communicate through story using a web of seven strands. Thank you for joining with us to unravel the journey of Circulating Conversations Methodology at Sitting Bull College to develop math education research questions.

Overview

Seven strands make up the web structure of this paper.

(1) Writing Style and Structure
(2) Indigenous Research Methodologies as Conceptual Framework
(3) Context of Colonialism in Research and Education
(4) The Story of Circulating Conversations Methodology
(5) The Research Questions
(6) Co-Connecting Knowledge
(7) Reflections on Circulating Conversations Methodology

This paper weaves together a story web that shares both the theory of Circulating Conversations Methodology (CCM) as well as shares my personal experience using this methodology to develop math education research questions.

I am continually learning from Shawn Wilson (Opaskwayak Cree) that “the process is the product” (2008, p. 103). Within my understanding of an Indigenous research paradigm, the process to arrive at our research questions is equally as significant as the answer to the research questions (Medin & Bang, 2014; Wilson, 2008). Similarly, the relationships developed through the process are equally as significant as the results. Or more in line with Shawn Wilson’s phrasing, the relationships are the results. Note that this is inclusive of not only human to human relationships, but also human to nature and human to knowledge relationships. In this way of being and thinking, we seek to write this paper in such a way that honors the process as product. How you read this paper (the process) will certainly impact how you learn from it (the product). In our attempt to strengthen relationship and process-oriented thinking, we will share Circulating Conversations Methodology and the four research questions stemming from it later in this paper after more context can be developed.

When entering graduate school interested in Indigenous math education, I intuitively knew from my previous life experiences in cross-cultural communication that I would need to build relationships through listening well. During the literature review phase of graduate school, I read Jo-ann Archibald’s (Stó:lō and St’at’imc) work titled “Indigenous Storywork: Educating the Heart, Mind, Body, and Soul”. She shares a powerful story leading to piercing questions that I have reflected upon since,

> Was I doing anything different from earlier ‘outsider’ academics who created a legacy of mistrust among First Nations concerning academic research? How was my research going to benefit the education and wellbeing of Indigenous peoples and their communities? How would I address ethical issues related to respect and ownership of Indigenous intellectual property? (Archibald, 2008, p. 36)

As I seek to do math education research with Indigenous Peoples, listening to potential answers to these reflection questions from Indigenous community leaders and friends has guided me.

Confronted with these reflection questions, and others like it from Indigenous scholars, I attempt to move forward in a good way in both doing the research and sharing it with others. The purpose of this paper is to respectfully share the methodology we used in developing the research questions in undergraduate math education. We specifically applied one form of an Indigenous research methodology to one specific context at Sitting Bull College. Through our example, we seek to demonstrate the value and

affordances of using Indigenous research methodologies within math education research.

Strand 1: Writing Style and Structure

The first strand is writing style and structure. In seeking to follow Indigenous ways of knowing and being throughout every aspect of this research, it is important to understand that how knowledge is transferred is equally significant with the knowledge itself (Kovach, 2009; Wilson, 2008). Lewis Cardinal (Cree) in 'Research is Ceremony' tells a story circling around the principle "the process is the product" (Wilson, 2008, p.103). This principle has become central to our work as well. Further, it connects with why we desire for the writing style (process) to align, or be in balance with, the content being shared (product). Specifically, for us, the research questions and the naming of Circulating Conversations Methodology were the product that came through our process. So, we will not share the research questions at this stage in the paper but will wait until more context is developed. Similarly, in a calculus course, or any math course for that matter, if all a student shows is '7' for their answer, this is vacuous without seeing the process. In contrast to 'the end justifies the means,' we see that the means is the end.

With this idea in mind, we join with other Indigenous authors and researchers in grappling with how to best honor Indigenous knowledges in a university/academic setting and in printed literature (Kovach, 2009). Archibald clarifies that applying Western communication (literary and oratory) theory and thought onto the work and stories of Indigenous elders and scholars is a modern form of conquest and colonization (2008). Therefore, we chose to write this article in story. As Wilson says, this is "not just a matter of preference but a result of our relationality" (Wilson, 2008, p. 133). Wilson elaborates in sharing:

> As we Indigenous scholars have begun to assert our power, we are no longer allowing others to speak in our stead. We are beginning to articulate our own research paradigms and to demand that research conducted in our communities follows our codes of conduct and honors our systems of knowledge and worldviews. (Wilson, 2008, p. 8)

We are attempting to follow this demand in every possible way, which certainly includes writing style and structure.

Cheryl Long Feather (Lakota/Dakota) shares her perspective of an Indigenous theory of communication. She prefaces her "Native American Theory of Communication Conceptual Model" in saying that although it may generally represent an Indigenous perspective, it is her responsibility and obligation to acknowledge this is her perspective

based on her understanding and she cannot claim it extend to all Tribal Nations or Indigenous Peoples (Long Feather, 2007). Long Feather (2007) states the following:

"This illustration (see Figure 1) represents the 'world' of communication. A profound and quintessentially Native American adage states *what is above is also below*. In other words, everything in our human world consists of ever-expanding and ever-contracting circles that mimic the structure of the entire universe. This conception underscores the reason most uniquely Native American models – whether they be related to communication, social structure, mental health, mathematics, or any other subject – are circular." (p. 46-47)

Figure 1: Long Feather's "Native American Theory of Communication Conceptual Model" (Source: Long Feather, 2007, p. 46).

This paper is structured in a similar fashion. The abstract is a first and smallest circle. Then the Introduction and Discussion is the second pass at the same themes from the abstract but with more depth and connections. The rest of the paper focuses on seven themes/strands.

The writing style is specifically non-linear but rather circular. This paper attempts to follow the unique characteristics Long Feather noted including being centered, fluid, evolutionary, and relational (2007). Margaret Kovach (Plains Cree/Saulteaux) shares her understanding that "Tribal knowledge systems are holistic. They move beyond the cognitive to the kinetic, affective, and spiritual. They are fluid" (Kovach, 2009, p. 176). This paper seeks to follow this holistic way of knowing through every aspect, including the writing style. The organizational structure for this paper is a web (see Figure 2).

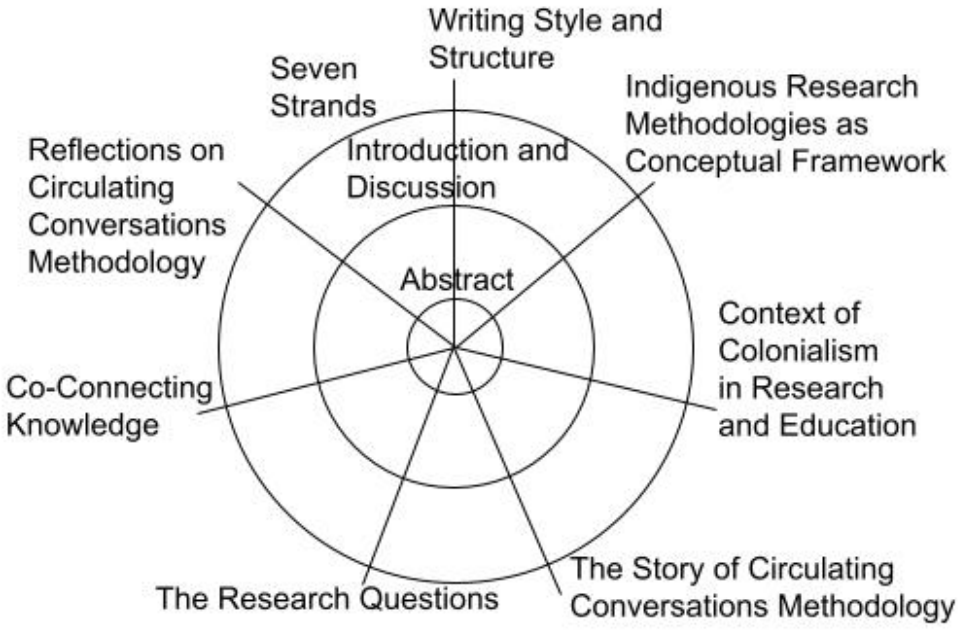

Figure 2: A web organizational structure for this paper

"For traditional Lakota/Nakota/Dakota people, as well as many other Tribes, a fundamental understanding of the universe is based on the concept of balance and perpetual movement. This is perhaps why so many of our symbols are predicated on circles." (Long Feather, 2007, p. 26). A circular writing structure and contextualized story give space to make as many connections as possible within the work itself and with you as the reader. Each strand and circle is a story within itself and is also interdependent and interrelated with every other strand and circle (Hampton, 1995; Kovach, 2009; Long Feather, 2007; Smith, 1999; Wilson, 2008). For me, it was a spiritual moment of connection as I read Long Feather's dissertation. When I saw her "Native American Theory of Communication Conceptual Model" (see Figure 1) and the examples she gave of circular communication structures (see Figure 3), the connection came to me for both the weblike structure of this paper as well as the weblike structure I experienced in developing Circulating Conversations Methodology (CCM). The paper's structure is *not like* a web, it *is a* web. Similarly, CCM is *not like* a web, it *is a* web. Both CCM and this paper's structure attempt to exemplify the process is the product. How you connect with these ideas in process is equally the product as much as what we have written (Wilson, 2008).

Figure 3: Circular Speech Structure (Source: Long Feather, 2007, p. 100).

To complete the circle, you could consider reading the Introduction and Discussion again after reading the body as you might read the Discussion section in another Western research paper. However, the thought of me telling you how to read is "personally and culturally repulsive" (Wilson, 2008, p. 134). There is no way that we can know all your relations and how you are accountable to them. The choice is yours on how to read and how you will connect with this article. We share this reading pattern only as an option. This pattern (Abstract, Introduction and Discussion, the Seven Strands, Introduction and Discussion, Abstract) also aligns with our writing pattern. I wrote the Abstract and the Introduction and Discussion first. Then we collaboratively discussed that portion. Then I wrote the Seven Strands, re-wrote the Introduction and Discussion, and finally re-wrote the abstract. We met again to edit the paper in its entirety. To me this writing process demonstrates the non-linear process that Cheryl Long Feather describes of increasing and decreasing circles. Further, the writing process was fluid and non-static like how a spider web moves and blows with the wind.

The person at the center of Long Feather's "Native American Theory of Communication Conceptual Model" (see Figure 1) can remind us that each person has their own set of relationships and connections. Indigenous knowledge systems view knowledge as relational and therefore without an individual owner (Grande, 2004; Kovach, 2009; Wilson, 2008). Instead, there is a joint responsibility with knowledge. You as the reader and we as the co-authors are all accountable to how we learn, embody, use, and share knowledge (Kovach, 2009; Wilson, 2008). As co-authors/storytellers, we are responsible for how we present Circulating Conversations Methodology (CMM), co-connecting knowledge, and the research questions. You as the reader are responsible for listening, learning, and being accountable to all your relations. Thus, we assume that each listener/reader will process and receive what their relationships have prepared them for (Archibald, 2008; Kovach, 2009; Wilson, 2008). Wilson describes the position of author/storyteller by saying,

> My role is not to draw conclusions for another or to make an argument. My role, based upon the guidelines of relationality and relational accountability… is to make as many connections or relationships available as possible and to respect the reader's ability to take in what they are ready to receive. (Wilson, 2008, p. 133)

There is no final or concluding point as relations continue to evolve, form, and flow. The web of this paper, Circulating Conversations Methodology, and our learning continue to be in motion just as a spider moves up, down, and around their web. Wilson expands in saying, "Carrying this one step further, it becomes unethical to reiterate or restate previous messages… [to do so] is to tell them what lessons they were supposed to pick up and this would be inappropriate." (Wilson, 2008, p. 133). Long Feather shares a similar idea in her conception of Lakota/Nakota/Dakota oratory that "by directly

responding to another point of view, an orator impedes another's ability to come to his or her own conclusions" (Long Feather, 2007, p. 138). Our role is not to tell you what an Indigenous research methodology is. Rather we will present some of the connections we have made with the Indigenous research methodology literature and share our experience of enacting Circulating Conversations Methodology.

Another writing style decision for this research paper is being written in first person. Since knowledge is relational and we each have our own set of relationships, then using first person point of view can easily follow. Further, since Wilson, Archibald, Kovach (key scholars in my understanding of Indigenous Research Methodologies) use first person point of view in their written work to some degree, then I seek to respect them as my academic 'elders' by following their pathway. Using a first person point of view does not diminish academic rigor. Rather, the academic rigor is demonstrated in the alignment of ontology (what is real?) epistemology (how do I know what is real?), methodology (how do I find out more and explore this reality?), and axiology (what moral beliefs will guide this search for reality?) (Wilson, 2001, 2008). Beyond simply writing in first person, Wilson, in "Research is Ceremony" (2008), shared his knowledge in such a way that allowed me to simmer in them, relate to him and the content, and then gave me the opportunity to strengthen relationships with myself, my spirituality, my research, and Indigenous communities. I desire to write in a similar way and have much to keep learning.

Further, I want to strongly dismiss any notions of being an 'expert' (Kovach, 2009; Wilson, 2008; Fast & Kovach, 2019). Since each of us are accountable to our own set of relations, we emphasize that this paper is my/our understanding of these ideas. In a relational way of knowing, any notion of 'expert' breaks down, because nobody can possibly know all of another's relations (Wilson, 2008). For me, when it comes to Indigenous knowledges and Indigenous research methodologies, I feel like a very young child! Through this process, I have come to believe that I may always feel this way. Despite over the past year greatly strengthening my relationship with Indigenous research methodologies, it has only continued to confirm how little I know about the methodology and Indigenous knowledges in general. However, I trust in the process. I am a learner to Indigenous ways of knowing and being. I did not grow up participating in ceremony but rather much of my learning has come from reading and connecting with Indigenous scholars. I have and continue to experience a central notion to Wilson and his co-researchers. They share that "If research doesn't change you as a person, then you haven't done it right" (Wilson, 2008, p. 135). At the start of this research project, I did not realize the change to me and my writing style that would unfold. This paper is both a personal story as well as a collaborative process simultaneously.

Strand 2: Indigenous Research Methodologies as Conceptual Framework

As Indigenous communities and nations are asserting their sovereignty, there is a growing demand for research by, for, and with the community towards an indigenizing or decolonizing outcome (Kovach, 2009; Smith, 1999; Tuck, 2009; Wilson, 2008; Windchief & Pedro, 2019). This is clear in the literature and fit my personal experiences as well. Linda Tuhiwai Smith (Ngāti Awa, Ngāti Porou) shared in her catalytic book, Decolonizing Methodologies (1999, 2012) that "it is surely difficult to discuss 'research methodology' and 'Indigenous peoples' together, in the same breath, without have an analysis of imperialism" (Smith, 1999, p. 1). The next strand of this paper will focus on just that, the "Context of Colonialism in Research and Education." However, this paper will first focus on Indigenous Research Methodologies to further emphasize an asset-based approach and to help demonstrate that Indigenous ways of research have been happening on this land for millennia, long before Western Imperialism came here. An Indigenous way of research is circling back to the forefront.

My journey with Indigenous Research Methodologies has been highly shaped by the book "Research is Ceremony: Indigenous Research Methods" by Shawn Wilson (2008). Many Indigenous scholars use the term 'Indigenous Research Methodologies', but Wilson uses the term 'Indigenous Research Paradigm'. I understand them to mean something similar and at times use them interchangeably. Paradigm can be helpful as well since it can help make a clear category for Indigenous Research Methodologies amongst other research paradigms such as positivist, critical/feminist, constructivist, etc. We will share more on that and forms of validity in the Co-Connecting Knowledge strand.

Indigenous research methodologies are as diverse as Western research methodologies. We believe that until we can articulate the vast array of Indigenous methodologies they may be inaccurately viewed as vague or fuzzy. Dr. Hollie Mackey (Northern Cheyenne) taught us this. Further, until Indigenous research methodologies can simply be described as research methodologies (as Western research methodologies are privileged), Indigenous research methodologies will continue to be seen as 'other' (Hollie Mackey, personal communication, February 2021).

Dr. Hollie Mackey and I met at NDSU in her first semester as a professor there in 2018. I often have joked with other people who know Hollie that she is a fount of wisdom and passion as it relates to navigating academia, Indigenous education, and Tribal Nation building. Hollie has continually helped guide me in using Indigenous research methodologies throughout the whole process. Further, she gave me great

encouragement to not discount my Indigenous ancestry but take on and learn about my Choctaw ancestors through my dad, grandmother, and aunties.

Our attempt with this strand is to share what we have learned about Indigenous research methodologies in a way that will honor our academic elders (that is, Indigenous scholars and community leaders that we have learned from). We hope this will bring further clarity about an Indigenous research paradigm to you as the reader. My greatest fear (that almost brought me to stop this work completely) is misrepresenting and/or disrespecting the Indigenous knowledges and Indigenous Peoples that I am connecting with and learning from.

While reading “Research is Ceremony” (2008) the first time, I wrote down in my notebook “Relationality is the sum of the whole Indigenous research paradigm.” Going through the book for a third time months later, the actual quote reads, “Relationality *seems to* sum up the whole Indigenous research paradigm *to me*” (Wilson, 2008, p. 70, emphasis added). This epiphany moment struck my heart and mind. In my first reading, I had removed ‘seems to’ and ‘to me.’ I had removed the subjectivity and personal connection, opting for a more definitive way of knowing. It was not until the third reading, and after a discussion with my mentor, Dr. Hollie Mackey, about my absolutist writing style at that time, did the revelation come that my reading and writing patterns were not matching the subjectivity inherent within relationality (H. Mackey, personal communication, September 21, 2020). I was reading the seminal pieces with an eye for the single precise definition for an Indigenous research paradigm so I could extract that out of context into my work (Smith et al., 2018). The single definition for an Indigenous research paradigm is *not* written in any of the seminal works, which fully aligns with the paradigm itself. There is no one way to apply an Indigenous research paradigm! There *cannot* be one way because it is dependent on all relations. This may include spirituality, a specific place, a specific language and culture, and certainly a dependence on the researcher, co-researchers, and participants themselves (Archibald, 2008; Kovach, 2009; Wilson, 2008).

Wilson shares that to him relationality is the idea that everything is in relationship (Wilson, 2008), that everything including knowledge is alive and connected (Meyer, 2014). Wilson taught me that it goes beyond the idea that I *have* a web of relationships to I *am* a web of relationships. “Rather than viewing ourselves as being *in* relationship with other people or things, we *are* the relationships that we hold and are part of” (Wilson, 2008, p. 80, emphasis in original). This is not for human relationships only. Knowledge as a living entity does not have relationships, but knowledge *is* relationships. Wilson says relationality to him is that “relationships form reality” (Wilson, 2008, p. 137). To help me remember I often think of the word relationality as an informal contraction of

the two words relationship and reality. Mathematically, it may be seen as emphasizing the study of the edges instead of the vertices. This reality of nature and knowledge is distinct from constructivism, and other Western research paradigms, that center individual human knowing, and not a web of all relations (Hatch, 2002; Kovach, 2009).

Language has an impact on reality (Smith et al., 2018). Lakota, as well as most Indigenous languages, have more verbs compared to nouns whereas English contains more nouns than verbs. The emphasis on nouns puts objects as the single reality. However, the emphasis on verbs centers dynamic relationships (Wilson, 2008). One example of relational knowledge is found in a short story. An English-only speaker asks a bilingual Cree-English speaker “How do you say grandma in Cree?” The Cree speaker responds, “You can’t.” Noticing a head tilt and perplexed facial expression, the Cree speaker continues. “You cannot be a grandmother without being attached to someone. You can either be ‘my grandmother’ or ‘your grandmother’” (Wilson, 2008). Language influences how we understand reality. This short story demonstrates the inherent bias of using English to learn about Indigenous knowledges.

This assumption about the nature of reality, that is ontology, impacts not only research but perspectives about science and math as living entities themselves (Kimmerer, 2013). Greg Cajete (Santa Clara Pueblo), a well-known Native scientist, is quoted by Manulani Aluli Meyer (‘Ōiwi Hawai’i) by saying “The perspective of Native science goes beyond objective measurement honoring the primacy of direct experience, interconnectedness, relationship, holism, quality and values, and they are specific to tribe, context, and cultural tradition” (Meyer, 2014, p. 98). Thus, both the views of science/math and how research is done is specific to place, nation, and local tradition.

Wilson (2008) brought me to tears as he shared a metaphor describing relationality applied to knowledge, that knowledge has a time and space to be shared as well as not to be shared depending on one’s relationships. His analogy leads directly into the responsibility and relational accountability with knowledge that we all have as we learn and grow.

> So the way I see it, gaining knowledge is more like being married to someone – you don’t own your spouse or children but you do share a special relationship. It is a relationship that you are accountable to. And therefore it becomes cultural appropriation when someone comes and uses that knowledge out of its context, out of the special relationships that went into forming it... You know that sexual exploitation and total denigration of our humanity was a big part of colonialism. Now that is taking place with our ideas and knowledge. Our knowledge is being

> stripped of its relationships and being used without accountability. (Wilson, 2008, p. 114)

Through this metaphor I can feel the weight of knowledge and perhaps you may too. The metaphor not only helped me crystallize knowledge as relational (and therefore personal, subjective, experiential, and holistic) but also demonstrated the obligation of responsibility and accountability we have towards the Indigenous Knowledges and Indigenous Peoples we learn from. Through Circulating Conversations Methodology, we as co-authors have built and strengthened relationships that we are now accountable to. Further, as I read the Indigenous Research Methodologies literature, now I am accountable and responsible to the Indigenous scholars who I learned from. Figure 4 shows the pathway that led towards applying an Indigenous Research Methodology into education research. I am following this path to apply an Indigenous Research Methodology into undergraduate math education research.

Figure 4: Indigenous Research Methodologies Literature Pathway

"Decolonizing Methodologies: Research and Indigenous Peoples" (1999,2012) by Linda Tuhiwai Smith became a catalyst book for many Indigenous scholars (2012). Smith not only challenges the status quo of dehumanizing research by identifying research as a significant site of struggle between Western and Indigenous interests, but she also

illuminates 25 current research projects as a vision for the future of research with Indigenous Peoples across the globe. In 2004 and 2005, a book and an article came out respectively that also had a large impact on the development of Indigenous research methodologies through decolonizing efforts. “Red Pedagogy: Native American Social and Political Thought” (2004, 2014) by Sandy Grande (Quechua) and “Towards a Tribal Critical Race Theory in Education” (2005) by Bryan Brayboy (Lumbee) both emphasized decolonization through connecting with Western research frameworks. Red Pedagogy brilliantly intersects dominant modes of critical theory and feminist theory with decolonizing thought and gives a vision towards political, land, intellectual, and spiritual sovereignty (Grande, 2004). Tribal Critical Race Theory, as the name suggests, intersects the well-known Critical Race Theory with Native identity and beliefs (Brayboy, 2005).

Then in 2008 and 2009, three books came out with no reference to or connection amongst one another but all describing their understanding of Indigenous Research Methodologies (Archibald, 2008; Kovach, 2009; Wilson, 2008). This three-some of books seems to crystalize Indigenous Research Methodologies. Each share their own perspective, a place and relation specific understanding of Indigenous Research Methodologies. “Research is Ceremony” has had an immeasurable impact on this research. His stories drew us in. His humility drew us in. His strength to say that our Indigenous approach to research does not need to be compared to Western approaches changed me. He shared gently and firmly with laughter throughout. An Indigenous research paradigm based in relationality can stand on its own. It needs no outside validation from Western research or researchers (Wilson, 2008). I am forever grateful for what Wilson allowed me to learn from him.

“Indigenous Methodologies: Characteristics, Conversations, and Contexts” (2009) by Margaret Kovach highly influenced this research project as well. Kovach emphasizes that Indigenous research methodologies flow from tribal-specific knowledge, language, cultures, and communities. She helped me learn that not all research in Indigenous contexts requires an Indigenous methodology. The methodology is dependent on the context, researcher, and the research questions and therefore a Western research paradigm may be the best fit for a particular situation. To remind myself of the core of Indigenous research methodologies and what it can be, I often go back to Kovach’s work. She shares that “the sacredness of Indigenous research is bound in ceremony, spirit, land, place, nature, relationships, language, dreams, humor, purpose, and stories in an inexplicable, holistic, non-fragmented way, and it is this sacredness that defies the conventional” (Kovach, 2009, p140).

“Indigenous Storywork: Educating the Heart, Mind, Body, and Spirit” (2008) by Jo-ann Archibald Q’um Q’um Xiiem rounds out this powerful three-some on Indigenous Research Methodologies. Archibald shares a story, that we won’t repeat here, that spiritually and intellectually confirmed the use of an Indigenous research paradigm over a Western research paradigm for this project. The Elders taught Archibald about seven principles which she termed storywork. They are respect, responsibility, reciprocity, reverence, holism, interrelatedness, synergy. Writing this paper and looking back at all my conversation notes reminds me once again that respect is the foundation for all relationships (Archibald, 2008). I pray that my writing of this story and your reading may lead us towards growing respect for one another, Indigenous Knowledges, Indigenous Peoples, and Land.

Each of books in this three-some share their story of an Indigenous Research Methodology. Then in 2018 and 2019, three more books come out articulating how they applied an Indigenous research methodology into their unique context and set of relations. “Indigenous and Decolonizing Studies in Education: Mapping the Long View” (Smith et al., 2018), Applying Indigenous Research Methods: Storying with Peoples and Communities” (Windchief & Pedro, 2019), and “Reclaiming Indigenous Research in Higher Education” (Minthorn & Shotton, 2018) all emphasized their context of education. Before we share our story of applying an Indigenous Research Methodology in the context of undergraduate math education in Strand 4 and 5, we will further set the context of colonialism in research and education.

Strand 3: Context of Colonialism in Research and Education

This section begins by expanding on the most quoted line in “Decolonizing Methodologies” (2012). Linda Tuhiwai Smith shares about the dirtiness of research to Indigenous Peoples. The following is the first words of her book:

> From the vantage point of the colonized, a position which I write, and choose to privilege, the term ‘research’ is inextricably linked to European imperialism and colonialism. The word itself, ‘research’, is probably one of the dirtiest words in the Indigenous world’s vocabulary. When mentioned in many Indigenous contexts, it stirs up silence, it conjures up bad memories, it raises a smile that is knowing and distrustful… At a commonsense level research was talked about both in terms of its absolute worthlessness to us, the indigenous world, and its absolute usefulness to those who wielded it as an instrument. It told us things already

> known, suggested things that would not work, and made careers for people who already had jobs. (Smith, 1999, p.1-2)

When I first read the quote above, it brought an experience I had a couple months before reading back to the forefront. I was visiting a tribal college in North Dakota and a tribal college administrator strongly warned me of parasite research. With an adamant tone, the administrator declared 'We are stopping it here!' Not fully understanding what was meant by the declaration I sheepishly asked what was meant by parasite research. The administrator continued that parasite research and researchers take, take, take, and give nothing back. They show up for a short period of time to extract data solely for their own benefit and then disappear, giving nothing back to us or the community.

This conversation with a tribal college administrator pushed me again toward the piercing reflection questions shared by Archibald (2008). I share the questions again to fit the many times I have gone back to them myself. "Was I doing anything different from earlier 'outsider' academics who created a legacy of mistrust among First Nations concerning academic research? How was my research going to benefit the education and wellbeing of Indigenous peoples and their communities? How would I address ethical issues related to respect and ownership of Indigenous intellectual property?" (Archibald, 2008, p. 36). Reflecting on these questions alongside past and present colonialism within research and education nearly stopped me altogether. I see myself succumbing to valuing intent over impact. I see my personally biases inevitably having an impact on our collective work (Kovach, 2009; Wilson, 2008).

Particularly, my personal biases show up in one of the definitions for colonialism that brought me to even further prayer and self-reflection. Grande in "Red Pedagogy" describes colonialism as "a multidimensional force underwritten by Christianity, defined by racism, and fueled by global capitalism" (Grande, 2004, p. 8, 124). Personally, as a follower of Jesus, I was struck by the direct implication of Christianity. However, time after time I continue to learn more about how the Doctrine of Discovery, Manifest Destiny, and the whitewashing of Jesus undergirds colonialism. I lament and repent with and for my spiritual ancestors and current brothers and sisters in faith. Amy Parent (Nisga'a) gave my heart words when she said "I did not work with Jo-ann's principle of reverence [in Indigenous Storywork] for my master's or doctoral studies because I was uncomfortable writing about it due to the effects of Christianity, colonialism, and my exposure to a dominant modernist worldview (that values secularism, segmentation, polarization, fragmentation, and abstraction) … I can see now the contradictory ways that I was engaging Indigenous knowledge through my engagement with Indigenous storywork. At the time, I was in my infancy of understanding Indigenous knowledge" (Archibald & Parent, 2019, p. 11).

This is exactly how I often feel. I am genuinely concerned that my Western training, spiritual subjectivity of faith in Jesus Christ, and infancy to Indigenous knowledges will continually lead me into contradictory places that put Indigenous knowledges in danger of appropriation. It has slowed me down and led me to think about the possibility of stopping multiple times. Yet, through the mentorship of Dr. Hollie Mackey and the encouragement of community members and friends I am gaining confidence in Creator leading me to this work, in my own Choctaw identity, and in storying with Indigenous Research Methodologies. For you, how does the connecting of Christianity, racism, and capitalism with colonialism impact your heart, mind, body, and spirit?

Brayboy in Tribal Critical Race Theory has a complimentary view of colonialism and emphasizes its current impact. “By colonization, I mean that European American thought, knowledge, and power structures dominate present-day society in the United States” (Brayboy, 2005, p. 430). Grande agrees and elaborates on how past efforts to civilize and Christianize the Indians easily seen in the boarding school era are now replaced with efforts to ‘make equal’ seen through deficit approaches to research and education and the achievement gap dialogue. She states that Indian Education in the U.S. sets out to continually “reinvent Native American people in the likeness of white people” (p. vii). Deloria and Wildcat (2001) agree and share that “the thing that has always been missing from Indian education, and is still missing today, is Indians” (p. 152). In response, Indigenous researchers and educators have recently begun using the term “Indigenous Education” which centers Indigenous Peoples, Land, and Indigenous visions for the future (Mackey, 2020).

Colonialism sets the context for all research and education with Indigenous Peoples (Archibald, 2008; Brayboy, 2005; Grande, 2004; Kovach, 2009; Minthorn & Shotton, 2018; Smith, 1999; Smith et al., 2018; Tuck, 2009; Wilson, 2008; Windchief & Pedro, 2019). Famous activist and scholar, Vine Deloria Jr. (Lakota) wrote the seminal piece responding to colonialism in the United States of America long before the term Indigenous Research Methodologies was seen in the literature. His provocative book title is “Custer Died For Your Sins: An Indian Manifesto” (Deloria, 1969, 1988).

Then and now, each educator and researcher enter their work with their own assumptions, biases, and beliefs (Archibald, 2008; Brayboy, 2005; Grande, 2004; Kovach, 2009; Minthorn & Shotton, 2018; Smith, 1999; Smith et al., 2018; Tuck, 2009; Wilson, 2008; Windchief & Pedro, 2019). Wilson shares one quote two times from Eber Hampton (Chickasaw) emphasizing the individual’s influence on research. We believe it can be extended to education as well. “We do what we do for reasons, emotional reasons… Feeling is connected to our intellect and we ignore, hide from, disguise, and

suppress that feeling at our peril and at the peril of those around us. Emotionless, passionless, abstract, intellectual research is a goddam lie, it does not exist. It is a lie to ourselves and a lie to other people. Humans – feeling, living, breathing, thinking humans – do research" (Hampton, 1995, p. 52 found twice in Wilson, 2008).

In all this, we hope we have set the context well for the story of Circulating Conversations Methodology that we used for this research project. The context of colonialism in research and education, the literature on Indigenous Research Methodologies, the writing style and structure, and our personal positionalities are all intertwined with each decision, conversation, and revelation within the Circulating Conversations Methodology.

Strand 4: The Story of Circulating Conversations Methodology

I began the research for my PhD with Sitting Bull College (SBC) with an understanding about the historical context of disrespectful research with Indigenous Peoples and the goal of advancing the core of an Indigenous research paradigm centered around relationality, respect, and accountability. Before the research began, I had a couple friendships with people from Standing Rock and a few strong professional connections through a pre-engineering educational collaborative that connected multiple tribal colleges in North Dakota together. I was confident that I could not come in with my research questions, framework, or agenda. I was confident that I wanted to do research that was beneficial and actionable for the SBC math instructors and that outside of directly talking with them I had no aspiration of thinking I could determine that on my own.

Dr. Joshua Mattes is the SBC faculty part of the pre-engineering educational collaborative in North Dakota. I got involved at NDSU and met Josh through this collaboration. Josh has been at SBC for almost a decade and is passionate for authenticity and will do whatever it takes to give the students he works with the absolute best learning opportunities. In our discussions, Josh shared both the desire to have authentic cultural connections within the math and engineering courses he taught at SBC and the scarcity of respectful, non-stereotyping resources available to him. Josh is someone I look up to as a self-reflective non-Native STEM faculty at a tribal college. He demonstrates the practice of "interrogating Western entitlement to knowledge" and trusted me to do similar in our work together (J. Mattes, co-authors meeting, October 20, 2021).

Within my literature review, I found precisely one article about collegiate math and Indigenous culture/languages. It was exciting to me showing a potential path forward but also warned of difficulties within the delicate relationship between math education research and fluent elders (Ruef et al., 2020). Due to the implications of the COVID-19 pandemic, my norm became a time of waiting, struggle, research roadblocks, prayer, and strengthening my Choctaw identity. I saw no clear path forward. Then in late January 2021, a spiritual moment of connection brought Sunshine and I together for our first meeting.

My name is Sunshine Woman Archambault Carlow. I am a Hunkpapa and Oglala Lakota and Northern Cheyenne woman. I first encountered Danny Luecke via an email introduction from a colleague, former teacher, friend, and mentor, Dr. Kathy Froelich (whose son I also went to elementary and high school with). Danny was a mathematician looking to do Math research with an Indigenous focus. Maybe a Lakota focus. Lakota Math. Math in Lakota. Lakota in Math. I admit, it keeps me up at night. I am a Lakota Immersion school teacher at “The Nest” – the Lakholiyapi Wahohpi and Wichakini Owayawa Lakota Immersion School at SBC. I am trained as an AMI Primary Montessori guide as well as in Project Based Learnings and prior to my time at the nest developed adult Lakota language curriculum for my tribe. I work with elders, Lakota Language 2nd Language Learners and am creating an education space that is healing and learning and reviving our Lakota language, history, and culture. Together we work to create a space that pilots a relevant education for all Lakota people, Indigenous people. And in creating that relevant space we have to constantly combat and push back on the imbalance colonization has created in overvaluing Western Math and devaluing Lakota Math.

Before going into the Circulating Conversations Methodology that we as the co-authors enacted together, let me (Danny) finish the introductions. Warren Christensen is currently a physics faculty at NDSU with dual appointment to the STEM Education PhD program. Warren and I first met when my freshman year taking his calculus-based physics course over a decade ago. His course prompted me towards a physics and physics education minor. Now Warren is my co-advisor in the STEM Education PhD program, and I am so thankful for his guidance in the PhD process. He has supported me in applying an Indigenous research paradigm in undergraduate math education from the start. He has continually used his privileges to fight for this inclusion and I am thankful to him for that.

Hollie, Sunshine, Josh, and Warren all agreed to be involved in my PhD process in varying ways. Relationships that begin with appropriate professional formality became more informal and friendly as trust grew through each conversation and interaction

together. Most recently they each have agreed to be a co-author and editor for this paper. The trust that we have built amongst ourselves is paramount and I have sought to keep that trust through self-reflecting often on my experiences, dispositions, and attitudes using a reflective journal. Since this work is for my PhD, I have been the main author for this paper. However, the ideas, connections, and entire process of Circulating Conversations Methodology was experienced altogether.

After initial introductions and first interviews with Hollie, Sunshine, Josh, and Warren, more focused conversations happened within the next week and a half about potential research directions at the intersection of undergraduate math and Dakota/Lakota language and culture. I took notes and recorded each conversation. With the notes from all four conversations in front of me and drawing upon what I remembered hearing, I sought to holistically (heart, mind, body, spirit) connect all the ideas together. This time of synthesis formed an initial one-pager with four first draft research topics including cultural math content, methodology of math education research at a tribal college, the affective domain for student learning in math, and faculty experiences. I circulated amongst Hollie, Sunshine, Josh, and Warren again to connect with each of them and listen to their feedback on the initial four topics. Through these four conversations and the time of synthesis after the four conversations, two topics revealed themselves as the place of connection amongst us all, that is cultural math content and the methodological approach we were using. I circulated again amongst Hollie, Sunshine, Josh, and Warren again to connect with each of them, listening to their feedback on the two topics. Those conversations and time of synthesis afterwards led to the initial four research questions with accompanying diagram. In this case, all these conversations happened through Zoom because of the COVID-19 pandemic.

In a spiritual moment of epiphany as we were finalizing the research questions, I came to realize the pattern of relationships we were enacting was a web. My experiential journey of conversations with each key person was my theoretical framework! I named it Circulating Conversations Methodology (CCM). Another round of circulating conversations took place to discuss the CCM web and prepare to write this methodological paper. Although time moved forward as CCM happened, the connecting of themes and ideas was anything but linear as shown in Figure 5. Each circle represents a stage in the process and each line represents a key person I connected with. Each intersection point on the web is a particular conversation. Upon reflection afterwards, each conversation followed Margaret Kovach's conversational interview protocol, where sharing through both giving and receiving are essential to the conversation (Kovach, 2010). The research questions are the central component and end goal of this CCM that brought together multiple people, ideas, value systems, and institutions.

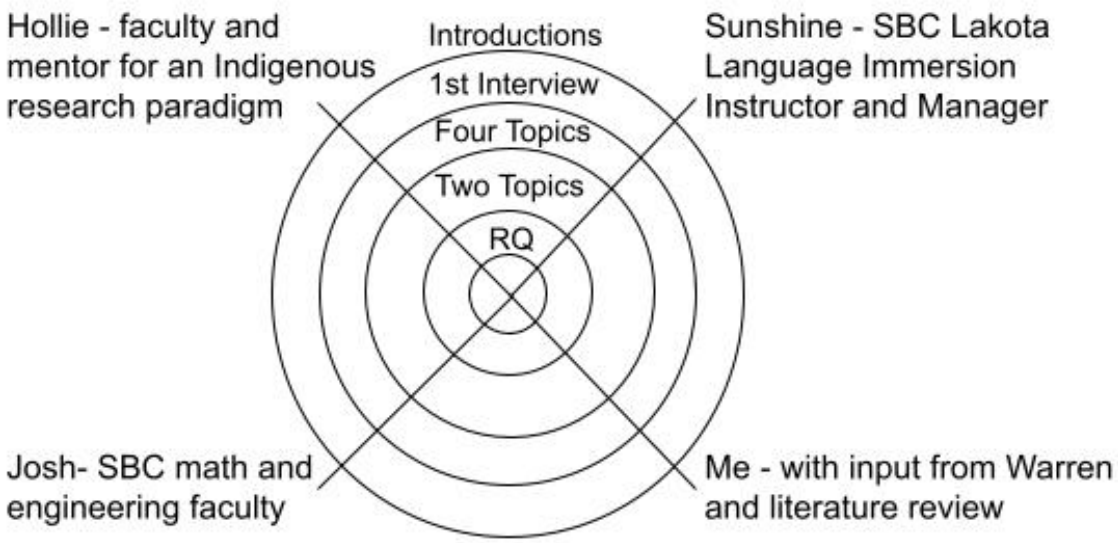

Figure 5: A diagram showing Circulating Conversations Methodology is a web

Like a spider web that waves with the wind, the circulating conversations web is non-static. Each conversation connects to another in a unique way. Like a spider web that glistens as the sun hits it, each intersection point between circles and strands is unique, that is each conversation is unique. The following Research Questions strand will share the research questions and specific conversations that brought about specific wording and emphasis of each research question. Each person brings in an essential component to the CCM web. Hollie, Warren, and I represent the North Dakota State University line, where I am earning my PhD. Sunshine and Josh represent the Sitting Bull College line. Hollie connected her knowledge of an Indigenous research paradigm and Indigenous Knowledges. Sunshine connected her knowledge of Dakota/Lakota language and culture. Josh connected his knowledge of teaching math and pre-engineering courses at Sitting Bull College (SBC). Warren and I connected with an impetus for my PhD research in STEM education and my PhD level understanding of mathematics. Through CCM, the research questions developed through an iterative, circular, and collaborative process.

Strand 5: The Research Questions

I did not come up with these research questions myself. I did not choose a topic or gap in the literature. Rather I chose a set of values and a process, that is an Indigenous research paradigm, and it guided me throughout. Through conversation, connections, and strengthening relationships, the questions iteratively became known to us. I did not come into Sitting Bull College with my agenda for research to be done on an Indigenous community. Instead, every word of the research questions has a specific moment of co-

connecting knowledge through Circulating Conversations Methodology that brought that idea and specific wording to bear.

The research questions developed through Circulating Conversations Methodology (CCM) are:

A. In what ways can Western higher order math concepts be identified within Dakota/Lakota space, place, and language, to inform possible Sitting Bull College math curricular/pedagogical adjustments [for Josh]?
B. In what ways can Dakota/Lakota culture and language be identified within Western higher order math concepts, to inform possible Lakota Language Immersion Nest curricular adjustments [for Sunshine]?
C. In what ways can Dakota/Lakota space, place, and language represent non-Western higher order math concepts?
D. In what ways can Indigenous Research Methodologies lead an individual researcher towards more ethical and impactful (beneficial and actionable) research in undergraduate math education at tribal colleges and universities?

The following definitions and stories share only part of what we experienced together. These examples illustrate the iterative process of development through relationships. First, ‘higher order math concepts’ as a term has a multi-faceted definition. Through the circulating conversations I noticed that multiple people were using the term differently. One of my co-advisors, Dr. Bill Martin, saw it as specifically relating to higher order thinking as previously written about in undergraduate math education research literature. Sunshine, who teaches pre-kindergarten students viewed higher order math concepts to mean simply not elementary math, but math that was at the collegiate level. The wording originally came from the desire to build from David W. Sanders’ dissertation titled “Mathematical Views within a Lakota Community: Towards a Mathematics for Tribal Self-Determination” (Sanders, 2011). Sanders looks at Bishop’s framework of six universal mathematical activities, counting, measuring, locating, designing, playing, and explaining, in the Oglala Lakota context (Bishop, 1991). My desire to build on Sanders’ work, to go beyond vocab lists and direct translation of math concepts, and to do research in math education at the tribal college were combined to form the initial phrasing ‘higher order math concepts’.

None of these views on higher order math concepts are wrong. At this stage in the research, to be accountable to all my relations, we are not ready to claim or declare a single definition. Further, we are not convinced the term needs a single, precise definition within an Indigenous research methodology. In one conversation, technically outside of the Circulating Conversations Methodology formally but not in spirit, Dr. Hollie Mackey and my PhD committee were discussing the definition for higher order math

concepts. She shared that it could be possible to not define the term at this point, or at least not have it defined by outside literature to the Standing Rock Nation and Sitting Bull College community. She offered the possibility of waiting to see how the community may come to understand the term ‘higher order math concept’ through the process of answering the research questions, and that is what we decided upon (Mackey, PhD Committee Meeting, March 2021).

The term ‘space and place’ in the research questions has a story that begin with Sunshine and again finished with Hollie. In my first and second conversations with Sunshine, she shared her interest in specifically articulating the mathematical connections to Lakota star knowledge and its mirrored patterns in the Land. Sunshine had often heard people in her community say “there’s math in that, math is connected to everything” but then when probed for any specifics only a dumbfounded look is given in return. So, within the initial four research questions it seemed fully fitting to ask about mathematical connections to ‘culture, land, and language’ through question A and B. However, discussing the ‘culture, land, and language’ phrasing with Hollie, it came up that within academia using the terminology ‘space and place’ has more specific clarity and might be better understood within Academe while using the terms culture, land, and language might be more appropriate when communicating outside an academic audience. This story is an example of how multiple conversations in the Circulating Conversation Methodology web went into forming the specific ideas and phrasing found within each research question.

We are choosing not to share every story about every word in the research questions in hopes to not lose your attention if we haven’t already. However, we will share about non-Western higher order math concepts. Non-Western math concepts are something I certainly would have missed on my own, that is apart from engaging in Circulating Conversations Methodology (CCM). As the focus of four topics was set on cultural math content and the connections between collegiate level mathematics and Dakota/Lakota language and culture, both Josh and Sunshine brought up the same idea in separate conversations. Both Josh and Sunshine exclaimed that there is more than Western (universal) math, or at least we must not assume that Western math already covers all higher order math concepts that could be embedded within Lakota language and culture. An existence proof for a non-Western higher order math concept was discussed with Sunshine. In Lakota language and thought, numbers can be considered as verbs, depending on context. That is numbers are not objects or abstract quantities but rather can be seen as the action of being three for example. I have been pondering the implications of this view of numbers since I learned it myself. Still today I am not sure what implications this may have in the field of math and/or the teaching mathematics but

it certainly is an example of a non-Western higher order math concept that became known to us all through Sunshine as part of CCM.

The following diagram (see Figure 6) was used in the final phases of CCM as we moved from two research topics to four research questions. I called it the Higher Order Math Concepts Authentic Cultural Connections Model Version One. But since everyone kind of laughed at me and my long title during CCM, now we call it the “Research Questions Diagram”. Note research questions A, B, C rotate around three ideas to inform Sitting Bull College math curriculum and Immersion Nest math curriculum. Those three ideas are Western Higher Order Math Concepts, Lakota Language and Culture, and Non-Western Higher Order Math Concepts. Notice research question A and B are paired together on the bi-directional arrow on the left side of the diagram. This was intentional to keep balance and maintain relational accountability with both Josh and Sunshine. As Sunshine shared her knowledge and relational connections with us about Lakota language and culture to teach Western higher order math concepts, to stay clear from parasite research, a balance of reciprocal giving needed to be kept. To maintain balance the giving and receiving had to go both ways, that is, be reciprocal. Reciprocity is one of Archibald’s seven principles for Indigenous Storywork. Thus, research question A and B are partners, balancing one another, and going both directions between Western higher order math concepts and Lakota language and culture.

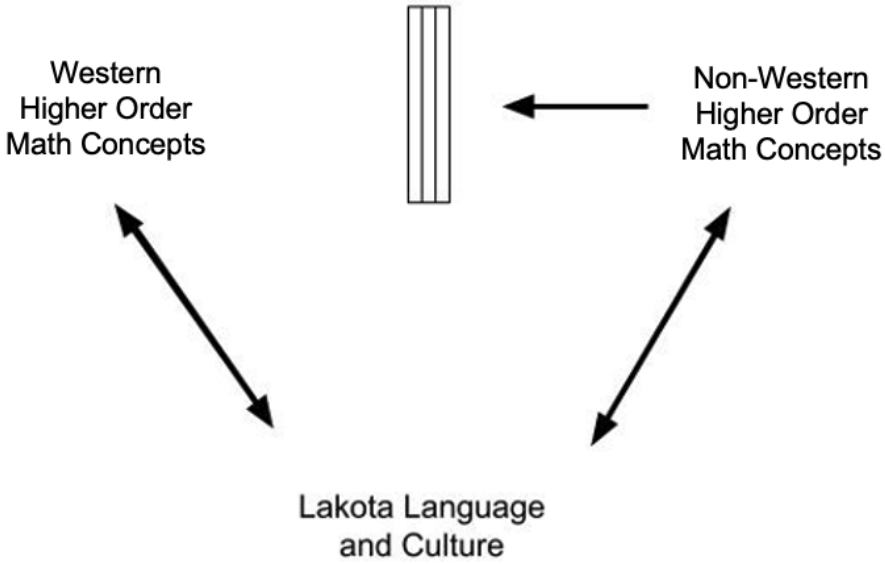

Figure 6: Research Questions Diagram

Research question C specifically relates to the bi-directional arrow on the right. This arrow and research question attempts a balance with Western higher order math concepts on the left. However, the three vertical lines and stunted arrow on the top of the diagram represent a wall between Western and Non-Western higher order math

concepts. In final conversations about the research questions and this diagram, we laughed at the many analogies we came up with to break down, go around, go through, or go over this wall. The wall represents two different ideas. First, we had a consensus that we were not sure if Non-Western higher order math concepts would be allowed 'into' Western math. We suspected that Western math might put up a wall to keep anything that does not abide by its Western beliefs out. Secondly, in the example of numbers as verbs as an existence proof for Non-Western higher order math concepts, we were unsure what implications would entail when translated into Western math.

Lastly, research question D looks at the intersection of Indigenous Research Methodologies, research in undergraduate math education, and tribal colleges and universities. In part it stems from Wilson's powerful phrase "the process is the product." The question includes the words 'beneficial and actionable' because these were the two words that I began this journey with when asking the engineering instructors part of the tribal college pre-engineering educational collaborative about potential research directions to go. This paper and the next paper on data collection and data synthesis are the answer to research question D.

In closing, we explicitly share that these four research questions are inseparable from our enactment of Circulating Conversations Methodology (CCM). The process of developing the research questions and the connections formed in the process are just as significant as the questions (and answers) themselves. The process is the product. This contrasts with me searching the literature for a gap in undergraduate math education research and individually developing research questions from the literature. CCM is a web of relationships and seeks to be accountable to all of them all the time. The research questions as the product of CCM are inter-connected to the process and cannot be taken out of context from the specific place, people, and Nation that co-developed them. As an outsider academic researcher, I am reminded that I now have ethical, moral, spiritual, and legal responsibilities to the Sitting Bull College (SBC) and Standing Rock community because of the relationships built through this process.

Strand 6: Co-Connecting Knowledge

One key aspect of Circulating Conversations Methodology is the use of co-connecting knowledge. Co-connecting knowledge was certainly not the term we used at the start of the process. This term, along with the term Circulating Conversations Methodology and higher order math concepts, came about *through* the process. The terminology 'co-connecting knowledge' began in conversation with Hollie about the four research topics. Within our conversation, Hollie recognized that our word choice of 'co-constructing knowledge' was a Western term that was distinct from the activity we were doing. We

found ourselves stuck in Western terminology “to describe something that’s far more nuanced” and desired to “come up with something that actually catches what it is” (H. Mackey, personal communication, February 19, 2021). Later that week, in a time of prayer, the revelation was given to me to name it ‘co-connecting knowledge’. Please note that my role is only writing/sharing the terminology given to me. The experiential practice of knowledge making itself known through collaborative connecting and strengthening relationships has been happening within Indigenous ceremony, lifeways, and research methodologies for millennia.

During the conversation with Hollie and in multiple other conversations, both Hollie and I have referenced, learned from, and connected with Manulani Aluli Meyer. Her work titled “Holographic Epistemology: Native Common Sense” (2014) shares her understanding of an Indigenous worldview from Elder Willis Harman that “everything in the universe is alive… [and] we are relatives” (Meyer, 2014, p. 99). This includes knowledge. Knowledge is alive and is our relative, just like Wilson’s metaphor of knowledge as a marriage. Thus, as Hollie easily noted, knowledge is not something we construct. None of the conversations within Circulating Conversations Methodology constructed, created, found, or discovered new knowledge. Rather it was the collaborative connecting via conversation and story that new relationships were formed and knowledge became known to us. Wilson said, “knowledge is shared with all creation… [and] the idea belongs to the cosmos, to all of the relations that it has formed, not to the individual who happens to be the first to write about it.” (Wilson, 2009, p. 56, 113-114).

Circulating Conversations Methodology is not haphazardly talking to a few different people. It is specifically based in the ontology (nature of reality) and epistemology (nature of thinking and knowing) of relationality. Similarly, co-connecting knowledge is specifically based in relationality. It cannot be separated from the belief that knowledge is alive and reveals itself to us in emotional, spiritual, physical, and intellectual ways. An Indigenous research methodology is distinct from Western methodologies in its decolonizing aim, tribal-specific knowledges, and knowledge being bound to place through ancestors, language, and land (Grande, 2004; Kovach, 2009; Windchief & Pedro, 2019). Similarly, co-connecting knowledge is not constructing meaning with other humans but is based in the core beliefs of an Indigenous research methodology that everything is alive and we are all related.

Additionally, we understand co-connecting knowledge to describe the space where theory from the literature connects with personal experiential knowledge in practice. It describes the space where intellectual knowledge connects with spiritual knowledge (Meyer, 2014). Before my work with Indigenous research methodologies, a spiritual

mentor of mine told me that “life on earth following Jesus is all about relationship, relationship, relationship” (personal communication, Pastor James Brooks, June 2017). This is my spirituality, and it certainly influences my understanding of co-connecting knowledge and Indigenous research methodologies in general. My spirituality influences how I experience Indigenous scholars describing a relational, spiritual, and verb/movement-oriented worldview. My spirituality is part of how I experience and enact co-connecting knowledge in every conversation, prayer, and epiphany moment. Each person’s spirituality will influence their work, their relationships, and who they are. It is part of co-connecting knowledge.

Further, we see co-connecting knowledge as a clear link to neuroscience that claims “Instead [of making new brain cells], learning appears to occur primarily because of changes in the strength and number of connections between existing neurons” (Owens & Tanner, 2017, p. 16). Although neuroscience is at the microscopic level, it mirrors an Indigenous research paradigm, that instead of new knowledge coming from research, knowledge becomes known to us through making connections and strengthening existing relationships.

Co-connecting knowledge also connects with Meyer’s description about an Indigenous worldview. Meyer’s shares that “An Indigenous worldview thus begins with the idea that relationships are not nouns, *they are verbs*” (Meyer, 2014, p. 98, emphasis in original). Knowledge is not a static object but made up of fluid relationships. Relationships are dynamic and a lived experience, not an intellectual idea. Cora Weber-Pillwax (Cree) warns of intellectualizing Indigenous research methodologies and shares that “until we live them [Indigenous knowledges]… it’s like writing ‘bread’ on a piece of paper and eating the paper instead of having the bread” (Wilson, 2008, p. 103). Co-connecting knowledge gives the space for holistically connecting neuroscience, spirituality, lived experiences, and an Indigenous worldview that everything is alive and related altogether.

Co-connecting knowledge instead of co-constructing knowledge is one example of how an ontology (nature of reality) and epistemology (nature of thinking and knowing) based in relationality is distinct from Western research paradigms (Grande, 2004; Kovach, 2009; Wilson, 2008; Windchief & Pedro, 2019). Some Western frameworks/methods are popular in Indigenous communities such as participatory action research, critical/feminist paradigms, and a constructivist paradigm because the expansive intersection in seeing knowledge as personal, subjective, and political (Grande, 2004; Gutiérrez, 2012; Kovach, 2009; Sfard, 1998). By no means does research with Indigenous Peoples require an Indigenous research methodology. Each community and research should make their own decision based on their relationships. Co-constructing

meaning within a research framework can be the right fit for a particular place and context. However, these Western frameworks are distinct from an Indigenous research methodology since they are still based in Western constructs such as human-centrism and progressivism (Grande, 2004; Kovach, 2009). For example, Gutiérrez's work (2012) in equity recognizes math education as going well beyond individual intellectual capacity to include the critical dimensions of student identity and power dynamics at multiple levels. However, math is still viewed through a human-centric lens. Similar can be said for Sfard's work on using an acquisition metaphor or participation metaphor for learning (1998), that learning and knowledge are still human-centric. The ontology and epistemology of these frameworks are not based in relationality and Indigenous knowledges. They can work well in many Indigenous contexts but are not specifically based in Indigenous knowledges. Co-connecting knowledge is in no way an improvement to the term co-constructing knowledge. It is simply based in a different view of reality, a different set of relationships. Co-connecting knowledge describes how the cosmos reveals itself through strengthening relationships.

Co-connecting knowledge is about strengthening relationships between people, land, knowledge, and the cosmos. Some of Wilson's final words in "Research Is Ceremony" will close the Co-Connecting Knowledge strand.

> Many things in our modern world try to force us to be separated, isolated individuals. We separate the secular from the spiritual, research and academia from everyday life. It is my dream that we may turn away from this isolation to rebuild the connections and relationships that are us, our world, our existence. We need to recognize the inherent spirituality, as well as the everyday applicability, in our research. Indigenous research needs to reconnect these relationships.
>
> Research is ceremony. It bears repeating, as I think this statement ties up and holds together all of the relationships that have gone into the formation of this book. The purpose of any ceremony is to build stronger relationships or bridge the distance between our cosmos and us. The research that we do as Indigenous people is a ceremony that allows us a raised level of consciousness and insight into our world. Through going forward together with open minds and good hearts we have uncovered the nature of this ceremony (Wilson, 2008, p. 137).

Strand 7: Reflections on Circulating Conversations Methodology

During the writing phase, we had much time to reflect on the process of enacting Circulating Conversations Methodology before the term existed, on the spiritual moment of epiphany that revealed the web and the name, and on the process of sharing the term and experience with others. A handful of additional connections have emerged in this time of reflection and writing. They are shared in no particular order.

Knowledge is power. We believe this adage and see its impact in many ways. Graduating from high school or college gives students greater opportunities in our current society. Further, we believe Indigenous Peoples have been educating the next generation for millennia without accepting the Western beliefs and implications for schooling that Grande articulated (Grande, 2004, p. 69-71). This gives us even greater power to fight back against colonialism. Knowing the strategies and impacts of colonization gives us greater power to resist. If knowledge is power, then we also believe that the process of gaining knowledge (research methodologies) is powerful also. Our experience in applying Indigenous Research Methodologies has taught us that how we go about gaining knowledge, what questions are asked, how those questions are determined are all related to power, and therefore political. Who has the authority to determine what is an appropriate methodology for a particular context? Who has the authority to determine which questions get asked? Who has the authority to determine if the work is done well?

There are many socio-political answers to these questions. Wilson emphasizes axiology in “Research is Ceremony” and his previous journal article in 2001. Axiology is about the worth of knowledge, what types of knowledge and products will be privileged, and what moral beliefs will guide the research (Wilson 2001, 2008). From his perspective, the core Indigenous research paradigm and its axiology is relationality and relational accountability, respectively. Wilson further explains his stance of relational accountability through the lens of research validity.

> So even though we don’t need externally imposed measures or tests of whether or not something is ‘true,’ we have our own ways of ensuring this. We have our own ways or questions to ask, so that we know that what we are saying is strong enough to say, ‘Yes, we can go ahead and design a program for our children, or our community, based on what we have learned from this research.” And we have trust or faith enough so that we are willing to use this in our communities, for our own people. (p. 102)

If Sunshine Carlow, financial manager and instructor at the Lakota Language Immersion Nest, uses the results of this research, that is our strongest validation. If Josh Mattes, Sitting Bull College math instructor, and other tribal college math instructors, use the results of this research in their undergraduate math courses, that is our strongest validation.

Further, through Circulating Conversations Methodology, we came to see research validity and rigor in a more generalizable way. Our journey has helped us see our working definition for academic/scientific/research rigor. In 2002, Hatch published the well-known “Doing Qualitative Research in Education Settings”. He shared five research paradigms, each with their own ontology, epistemology, methodology, and expected products. Building from that, our understanding of scientific/academic rigor is the *alignment* of all four of these categories. It is the agreement of ontology, epistemology, methodology, and products. For example, lack of rigor would be mixing positivist ontology, feminist epistemology, and constructivist methodology.

An Indigenous Research Paradigm has its own form of validity, distinct from any other paradigm based on its distinct ontology. Research validity for an Indigenous Research Methodology/Paradigm does not come from a high ‘n’ value or statistical significance. It comes from the community’s test of you personally and the work you are doing. Will the community use it for their children at the pre-K to tribal college level? Even if a research project meets the Western standards of rigor but does not show respect to the relationships between researcher, participants, topic, Land, and community it would be considered inauthentic or non-credible within Indigenous Research Methodologies (Archibald, 2008; Kovach, 2009; Wilson, 2008).

I have been conditioned and trained into Western beliefs throughout my Western education. Although this research journey has certainly changed me, I apologize to the reader and those I am working with for where my embodiments of Western thinking have certainly influenced my relationship with Indigenous Knowledges. Specifically, I apologize for when my impact has been negative, even when my intent was positive. I am a common man full of mistakes. I pray continually that my work will be beneficial and actionable to Sitting Bull College and Standing Rock Nation. For anyone considering research with Indigenous Peoples, I pray that our story/article may urge self-reflection and a willingness to slow the pace, or stop altogether, if that is what the Nation and/or community leaders are suggesting.

Circulating Conversations Methodology and co-connecting knowledge as an Indigenous research methodology are not secluded to only research in undergraduate math education as we have applied them. For anyone seeking to show deep respect to the community and knowledge through research, center an Indigenous worldview of

relationality, and be changed through the process of research, then Circulating Conversations Methodology and co-connecting knowledge may be beneficial for you. You have the responsibility to all your relations and can make the decision if Circulating Conversations Methodology and/or co-connecting knowledge is valuable to you and any research you do. We attempted to follow a spiritual, holistic, respectful, reciprocal, relationship-oriented approach in every aspect of this process from developing the research questions to writing this article. Thank you for joining us in unraveling this journey. I pray that you were able to connect holistically with some of this writing and it can be beneficial to you and your work. In Choctaw, Yakoke. In Lakota, Pilamayapilo. In English, Thank you.

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