TEACHING CORE SUBJECTS AND TRADITIONAL FOOD KNOWLEDGE THROUGH FARM-TO-SCHOOL (F2S) CURRICULUM: THE USABILITY AND CULTURAL RELEVANCE OF GARDEN LESSONS SERVING DINÉ YOUTH AT AN OFF-GRID CHARTER SCHOOL IN LEUPP, ARIZONA

by

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Land Acknowledgement

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O’odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.
Dedication

To my friends and family who have supported me throughout the years. Thank you for always believing in my work to challenge and question the “status quo”. To my best friend and four-legged family member, Sassy, who has been a great support to me over the past 19 years. I love you all!
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Abstract

The urgency for culturally relevant, decolonizing, and Indigenizing farm-to-school (F2S) educational offerings is prevalent in a Western-dominated educational system in the United States. This participant-oriented curriculum evaluation case study aimed to determine how primary school teachers at a primarily Diné (Navajo) serving charter school may incorporate and utilize the Service to All Relations (STAR) School Garden Lessons (SSGL) into their existing core subject curriculum and in teaching Diné culture, language, and traditions. The purpose of this study was to determine how elementary teachers at a Diné serving charter school may utilize and incorporate the SSGL into their existing curricula offerings teaching core subjects (i.e. Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies) and Diné culture, traditions, and language around traditional foods. This qualitative case study aimed to gather teachers’ insights via an online survey instrument and optional follow-up interview(s) about the useability and cultural relevance of current F2S curriculum offerings via the SSGL. STAR school classroom teachers’ beliefs and perceptions of current F2S curriculum offerings at the STAR school were collected to provide community-centered support and recommendations to enhance the usability of pre-existing SSGL offerings. Furthermore, the goal of this curriculum evaluation case study was to identify ways to improve F2S curriculum useability in teaching core subjects and to improve cultural relevance of SSGLs for teachers’ use in the classroom. The findings of this study were significant in identifying six (6) classroom teacher’s ideas for integration of core subjects and Diné culture, tradition, and language into SSGL, need for continuing cultural-competency training among non-Diné educators, and further work needed in decolonizing and Indigenizing current SSGL curriculum offerings. Future participant-led qualitative studies are recommended to help provide school administrators with more diverse feedback and insights from teachers on delivering culturally relevant F2S curriculum.

Key Words: Farm-To-School (F2S) Education, Culturally-Relevant Education, Indigenizing, Decolonizing, Navajo, Diné.
Introduction

Background and Setting

The STAR School is a completely off-grid community-oriented, culturally inclusive charter school located in Leupp, Arizona, which is 25 miles Northeast of Flagstaff, Arizona and nearby the Southwest corner of the Navajo Nation. The STAR School primarily serves Diné youth in preschool through 8th grades. The school focuses on “The Four Rs: Relationships, Respect, Responsibility and Reasoning” as a part of the school’s core values and missions to serve primarily Diné students, families, and the community (Sorensen, 2018). The STAR school serves a maximum of 130 students each academic year, which allows for smaller class sizes and individualized attention for students (STAR School, 2021). The STAR school opened in August 2001 with the vision “… to create a joyful learning community in which members develop the character, skills and attitudes for understanding themselves, living in balance and serving all our relations.” (STAR School, 2021). The STAR School teaching methodologies focus primarily on place-based, experiential learning with a focus on applied problem-solving, teamwork, community-based learning in creative, service-learning projects that involve Science, Technology, Engineering, and Math (STEM) applications (Sorensen, 2018).

The STAR school’s Farm to Schools (F2S) programming titled, Healthy Foods For Navajo Schools (HFFNS), was established in Spring 2012 via the STAR School’s Navajo and Hopi Farm-to-School Project funded by the First Nations Development Institute. The STAR school’s HFFNS program aims to reduce incidence “…of severe poverty, social stresses, and health and nutrition problems including obesity and diabetes found in many Native communities, the largest regional group of whom are Diné or Navajo” (Newell, 2013).

The following case study will focus on the STAR School’s Garden Lessons (SSGL) curriculum, which is a part of the HFFNS programming at the STAR School. The SSGL described the lessons contained in the curriculum to be “…culturally-relevant, age-specific lessons designed to encourage food literacy for STAR School Students” (p. 2) and are designed to address the following essential questions (SSGL Introduction, 2015):

- Where does food come from?
- How do people grow healthy food?
- How does food tie to culture and community?
- How do you make healthy food choices?
- How do people prepare healthy food?

This participant-oriented, curriculum evaluation case study qualitatively explored the following question outlined above (i.e. how does food tie to culture and community?) by gathering STAR School teachers’ insights. The qualitative survey instrument was designed to collect teachers’ insights regarding the utilization of SSGL in the classroom while teaching core subjects (e.g., Math, Science, Social Studies, English Language Arts, etc.) and Diné

1 Diné means “The People” in Navajo Language.
culture, language, and traditions to build knowledge of traditional foodways among Diné youth.

**Brief Overview of STAR School’s Garden Lessons (SSGL)**

The SSGL contains “...culturally relevant, age-specific lessons designed to encourage food literacy for STAR School Students” and are described as hands-on lessons that teachers can utilize and customize with educational standards and within larger units (SSGL, 2015). According to the SSGL, the goal of the curriculum is to guide students through experiential learning about the food process via farm-to-“cafeteria trays” (2015). These lessons are designed to be delivered in-person via place-based and experiential learning methods with students primarily in Pre-Kindergarten through 5th grade. Currently, the SSGL can be accessed online via the STAR School’s Google Drive account by all active classroom teachers and staff members.

![STAR School Garden Lessons](image)

**Figure 1.** SSGL Description and Introduction

**Paradigm Statement**

How do STAR school teachers utilize the SSGL to teach core subjects and traditional food knowledge to primarily Diné students attending the STAR School?
**Purpose and Research Objectives**

The purpose of this study was to determine how elementary teachers at a Diné serving charter school may utilize and incorporate the SSGL into their existing curricula offerings teaching core subjects (i.e. Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies) and Diné culture, traditions, and language regarding traditional food knowledge.

The research objectives of this curriculum evaluation case study are as follows:

1. To identify teacher demographics, in particular, age, race, gender, of those teachers’ who served STAR school students during the 2021-2022 academic year.
2. To determine the usability of SSGL in teaching core subjects and Diné culture, traditions, and language by elementary teachers who serve primarily Diné students in grades Pre-K through 8th Grade.
3. To determine teacher’s perceptions and beliefs of SSGL in order to increase curriculum useability by teachers.
4. To identify potential barriers and/or motivations of teachers’ who may be delivering SSGL to primarily Diné youth enrolled at the STAR School.

**Phenomena of Interest**

This participant-oriented, curriculum evaluation case study aims to understand how Indigenizing and decolonizing F2S curriculum can be utilized by both, Indigenous and non-Indigenous teachers, to teach core subjects (e.g. Science, Math, English Language Arts) and Indigenous (Diné) culture, traditions, and language to primarily Indigenous (Diné) students. This case study also aims to review the literature to make future recommendations for Indigenizing and decolonizing F2S curriculum. This study will help describe how connecting core subjects and Indigenous (Diné) culture, traditions, and language to place- and land-based, experiential learning-focused farm and nutrition-related education may help increase the knowledge and desirability of traditionally grown foods and increase resilience and self-determination among Diné youth.

**Implications & Applications**

The implications of such phenomena of interest may help understand how facilitating decolonized and Indigenized F2S, culinary, and nutrition-related curriculum (i.e. STAR school’s HFFNS programming) with Indigenous (i.e. Diné) youth can ultimately lead to better health outcomes (e.g. decrease incidence of diet-related diseases) and increased participation in food-related activities promoting Indigenous (i.e. Diné) food sovereignty. Furthermore, the applications of such phenomena of interest may help predict how early exposure to healthy, traditional, Indigenous (i.e., Diné) foods within a Westernized educational structure (i.e. in-person primary school) may positively influence Indigenous (i.e. Diné) youth perceptions, understanding, connection, and relationship-building with Indigenous (i.e. Diné) culture, traditions, and customs surrounding the sacred gift of food (Morrison, 2020). It is noted that
Definition of Terms

Indigenous Food Systems:

“Indigenous food systems are a way of life for a given place-based community often shaped by diverse dietary practices, ecological features, geographical variations, and social-political as well as historical experiences (e.g. residential school systems). Indigenous food systems often consist of harvesting, foraging, hunting, fishing, and gathering of plants and wild foods and include teachings of ancestral food knowledges, adaptive practices, and social-cultural values that shape a complex and layered worldview that includes one’s sacred relationships with, and responsibility to the environment, other humans, animals, land, and water” (p. 4) (Pierotti, 2011; Settee, 2020; Shukla, 2020; Willows, 2005).

Indigenous Food Sovereignty:

“...is not focused only on rights to land, food, and the ability to control a production system, but also responsibilities to and culturally, ecologically, and spiritually appropriate relationships with elements of those systems. This concept entails emphasizing reciprocal relationships with aspects of the landscape and the entities on it, “rather than asserting rights over particular resources as a means of controlling production and access.” (Hoover & Mihesuah, 2017).

Food Justice:

“A process whereby communities most impacted and exploited by our current corporate controlled, extractive agricultural system shift power to re-shape, re-define and provide Indigenous, community-based solutions to accessing and controlling food that are humanizing, fair, healthy, accessible, racially equitable, environmentally sound and just.” (Cooper, 2017)

Food Apartheid:

“The systematic destruction of Black [Indigenous] self determination to control our food (including land, resource theft and discrimination), a hyper-saturation of destructive foods and predatory marketing, and a blatantly discriminatory corporate controlled food system that results in our communities suffering from some of the highest rates of heart disease and diabetes of all times. Many tend to use the term “food desert,” however food apartheid is a much more accurate representation of the structural racialized inequities perpetuated through our current system” (Cooper, 2017).

Indigenizing Education:

“Indigenizing education means that every subject at every level is examined to consider how and to what extent current content and pedagogy reflect the presence of Indigenous/Aboriginal peoples and the valid contribution of Indigenous knowledge” (Castellano, 2014). Additionally, “Indigenizing education refers to the ways education can become more ideologically aligned with Indigenous thought, locally accountable to
Indigenous people and communities, as well as the ways it might be infused institutionally and in praxis” (Blimkie, Haig-Brown, & Styres, 2013).

**Epistemology:**
“...inquires into the nature of knowledge and truth” (p. 21) (Chilisa, 2012).

**Relational Epistemology:**
“...systems of knowledge built on relationships” (p. 74) (Wilson, 2008).

**Ontology:**
“...is the body of knowledge that deals with the essential characteristics of what it means to exist” (p. 20) (Chilisa, 2012).

**Relational Ontology:**
“...the social reality that is investigated can be understood in relation to the connections that human beings have with the living and nonliving” (p. 20) (Chilisa, 2012).

**Axiology:**
“...the analysis of values to better understand their meanings, characteristics, their origins, their purpose, their acceptance as true knowledge, and their influence on people’s daily experiences” (p. 21) (Chilisa, 2012).

**Relational Axiology:**
“...built on the concept of relational accountability. The four R’s – relational accountability, respectful representation, reciprocal appropriation, and rights and regulations during the research process” (p. 22) (Chilisa, 2012)

**Study Limitations**

1. Although the STAR school primarily serves Diné youth, not all teachers employed are Indigenous and/or tribal members of the Navajo Nation.
2. The data collected and analyzed from this study cannot be generalized to the entire Navajo Nation and/or other Indigenous Tribal Nations since a non probability purposive sampling technique was utilized.
3. The participant response rate (n=6) may have been affected by the timing of the questionnaire disbursement (i.e., end of the academic year) and how the questionnaire was dispersed (i.e. online via email).

**Basic Assumptions**

The basic assumptions regarding the subjects and population voluntarily participating in this study are as follows:

1. Teachers will be able to complete the questionnaire in its entirety.
2. Teachers will have the appropriate reading, writing and comprehensive skills to complete the questionnaire.
3. Teachers will answer the questions to the best of their abilities.
4. Teachers will answer questions via the questionnaire honestly and accurately.
Literature Review

Diné Food Sovereignty, Food Justice, and Autonomy

The tribal food sovereignty and food justice movements, in particular among the Diné peoples, are rooted in self-determination and resilience (Hoover, 2014). These movements focus on the reclamation with stolen lands and the traditional foodways in which foods were farmed before the arrival of White settlers. The historic and present-day food-related cultural erasure and assimilation of Indigenous peoples occurs at the hands of Western colonialistic systems, policies, and peoples (Diné Policy Institute, 2014). As a result, generations of Diné youth and adults alike are unfamiliar with traditional food knowledge due to decreased intergenerational knowledge transfer among Diné Elders and future generations (Diné Policy Institute, 2014).

Dawn Morrison describes the following Indigenous Food Sovereignty guiding principles outlined by Morrison are summarized below:

1. **Sacred Gift of Food**: The food sovereignty of Native peoples is a sacred gift from the Great Spirit/Creator and connects Indigenous peoples with nature provided the sacred responsibility and relationship to all life forms (land, plants, waterways, animals, etc.) in which food connects us through “transferring its regenerative life-giving energy” throughout Mother Nature.

2. **Participatory**: It is necessary for Indigenous peoples to actively-engage daily in Indigenous food-related activities, such as fishing, hunting, sharing, gathering, preparing, etc. in order for Indigenous food sovereignty to be realized.

3. **Self-determination**: All tribal members of the community need to be self-reliant and self-determined to meet their needs for food as an individual and community in order to “...be free from corporate control and oppressive land, water, and social policies and practices.” (Morrison, 2020)

4. **Policy**: The ability to continuously identify and respond, resiliently, to certain earth-based protocols, practices, and paradigms that undermine the worldviews, traditions and cultures of Native peoples in order to obtain Indigenous food sovereignty. This approach requires Native peoples to address the oppressive, colonial environmental and food-related policies that undercut Indigenous food sovereignty.


Systemic-Related Health Disparities & Food Apartheids on the Navajo Nation

The systemic-related health disparities faced by the Diné peoples can be directly connected to White settlers’ theft and pollution of natural resources, such as land, water, and energy (Diné Policy Institute, 2014). Due to colonialism and United States policies surrounding water and land resources, many Diné peoples and communities can no longer grow traditional Diné foods, such as squash, blue corn, melons, and beans (Diné Policy Institute, 2014). As a
result, Diné peoples have needed to rely on the United States Department of Agriculture (USDA) Commodity Foods. The USDA Commodity Foods have traditionally been highly processed, low nutrient-dense foods that have been documented being high in empty calories, sodium, and saturated fats (i.e. processed white flour, sugar, and fats such as lard) (Sundberg et. al., 2020). Additionally, community support (e.g. Chapter Houses, carpooling with friends, family, etc. to large chain supermarkets ≥3 hours away) proves essential for Diné peoples in helping to meet nutritional needs (Rajashekara, 2014).

The Navajo Nation can be viewed as a food apartheid (formally known as “food desert”) to acknowledge the “…structural racialized inequities perpetuated through our current [colonialist] system”, which has significantly impacted the Diné peoples access to affordable, healthy, culturally-appropriate foods within the Navajo Nation (Cooper, 2017). The lack of financial resources (e.g. to make essential transportation repairs, gas costs) and limited utilities within the Navajo Nation (e.g. electricity, clean water) directly impacts Diné people’s access to healthy, affordable foods (Rajashekara, 2014). As a result, the prevalence of diet-related health disparities among Diné peoples are higher than other non-Native populations (e.g. type-II diabetes, obesity, and cardiovascular disease) (Sundberg et. al., 2020). As a result of continued food- and agriculture-related systemic injustices and assimilation, it has become more difficult for Diné individuals, families and communities to farm traditional, healthy Diné foods on their lands and transfer intergenerational food knowledge (Ornelas et. al., 2017).

Decolonizing and Indigenizing Education Through Pedagogy

While reviewing literature on what decolonizing means within educational settings and pedagogy, Tuck and Yang make important observations of what decolonizing is and what it is not (2012). First, Tuck and Yang explain how “…decolonization specifically requires the repatriation of Indigenous land and life. Decolonization is not a metonym for social justice” (p. 21) (2012). Furthermore, their article discusses how decentering whiteness and Settler colonialism is critical in decolonizing [education] and further focuses on how, “…decolonization is accountable to Indigenous sovereignty and futurity” (p. 35) (Tuck & Yang, 2012). This distinction is important to make about what “decolonizing” is and the incommensurable relationships between Indigenous peoples and settler colonists in providing repatriation of Indigenous knowledge systems, traditions, language and culture into the educational setting (Tuck & Yang, 2012).

Additionally, Indigenizing Education is explained as follows, “Indigenizing education refers to the ways education can become more ideologically aligned with Indigenous thought, locally accountable to Indigenous people and communities, as well as the ways it might be infused institutionally and in praxis” (Blimkie, Haig-Brown, & Styres, 2013). Again, these are two pedagogical ways of promoting educational sovereignty and justice among Indigenous youth. It is important to center Indigenous values, goals, and knowledge systems while discussing land-based experiential learning curricula (i.e. SSGL) as it pertains to Indigenous food, energy, and water systems.
Theoretical Frameworks

The following theoretical frameworks were used simultaneously in this research study:

1. Transformative Learning Theory in Education (Freire, 1970)
2. Tribal Critical Race Theory (Brayboy, 2005).

Firstly, Transformative Learning Theory in Education is based on theorist Paulo Freire's critical pedagogy on transformative education. Freire’s critical pedagogy is described as an educational practice to promote civil engagement and self-determination among students by providing the educational tools necessary to become critical and participatory citizens within a future substantive democracy (Giroux, 2010). Furthermore, Freire’s critical pedagogy aims to educate students on how to diligently ask questions, critically analyze, and apply common sense logical reasoning in becoming revolutionary vehicles for social and learning change (p. 717) (Giroux, 2010). Freire’s critical pedagogy is further described by Henry A. Giroux as “...offering a way of thinking beyond the present, soaring beyond the immediate confines of one’s experiences, entering into a critical dialogue with history, and imagining a future that would not merely reproduce the present” (p.716) (Giroux, 2010).

Secondly, Brayboy’s Tribal Critical Race Theory (TribalCrit) complements Freire’s critical pedagogy via Transformative Learning Theory in Education. Brayboy’s TribalCrit Theory specifically details Critical Race Theory, developed by Kimberlé Williams Crenshaw, but through an Indigenous lens and experience with White colonial settlers. Brayboy’s TribalCrit theory distinctively recognizes and honors the differing experience and historical significance of Indigenous peoples’ violent encounters with White colonialists. The Nine Tenets of Tribal Critical Race Theory (see Figure 1) identify and describe the complexities and significances of White settler colonization on Indigenous lands in the United States. The TribalCrit Theory, specifically Tenet 4:

<table>
<thead>
<tr>
<th>Tenet 1</th>
<th>Colonization is endemic to society.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenet 2</td>
<td>U.S. policies toward Indigenous peoples are rooted in imperialism, White supremacy, and a desire</td>
</tr>
</tbody>
</table>

will be utilized in this study in unison with Freire’s critical pedagogy for Transformative Learning Theory in Education to frame surveying instruments that will be used in this study. Both theoretical frameworks described in this section will be used to explore the study’s paradigm statement regarding the influence of the STAR school’s HFNS F2S curriculum on its students in creating agents of social change regarding tribal food justice and sovereignty movements.
<table>
<thead>
<tr>
<th>Tenet 3</th>
<th>Indigenous peoples occupy a liminal space that accounts for both the political and racialized natures of our identities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenet 4</td>
<td>Indigenous peoples have a desire to obtain and forge tribal sovereignty, tribal autonomy, self-determination, and self-identification.</td>
</tr>
<tr>
<td>Tenet 5</td>
<td>The concepts of culture, knowledge, and power take on new meaning when examined through an Indigenous lens.</td>
</tr>
<tr>
<td>Tenet 6</td>
<td>Governmental policies and educational policies toward Indigenous peoples are intimately linked around the problematic goal of assimilation.</td>
</tr>
<tr>
<td>Tenet 7</td>
<td>Tribal philosophies, beliefs, customs, traditions, and visions for the future are central to understanding the lived realities of Indigenous peoples, but they also illustrate the differences and adaptability among individuals and groups.</td>
</tr>
<tr>
<td>Tenet 8</td>
<td>Stories are not separate from theory; they make up theory and are, therefore, real and legitimate sources of data and ways of being.</td>
</tr>
<tr>
<td>Tenet 9</td>
<td>Theory and practice are connected in deep and explicit ways such that scholars must work towards social change.</td>
</tr>
</tbody>
</table>


**Methodology**

**Research Design**

This participant-oriented curriculum evaluation case study used a qualitative approach, which allows for surveying of STAR school teachers via online questionnaire instrument with an optional, individualized follow-up with teachers upon consent. STAR classroom teachers who consented and participated via online questionnaire were provided access to the SSGL via PDF for viewing and recollection purposes. Additionally, a brief description of SSGL was provided at the beginning of the questionnaire before curriculum-related questions were posed (see
Appendix A: Survey Instrument. This curriculum evaluation case study also includes analyses of current SSGL curricula offerings through outlined theoretical frameworks and literature review. The goal of this qualitative curriculum evaluation case study was to adopt a participant-oriented research approach by working directly with the community that this work will serve (i.e. STAR school teachers, administrators, students) to help increase the usability and cultural relevance of SSGLs to better serve a majority of their student population (i.e. Diné students). Additionally, the study aims to provide evidence-based future F2S programming recommendations based on teacher’s questionnaire insights and peer-reviewed literature recommendations on both Indigenizing and decolonizing F2S educational offerings.

Target Population & Purposeful Sampling Techniques

The target population for this study were all currently employed classroom teachers at the STAR school in Leupp, Arizona. The STAR School classroom teachers were selected to participate in this study at the researcher’s discretion (purposefully) via a non-probability purposive sampling method. For reference, a non-probability purposive sampling technique is designed to target a specific, limited population (i.e., STAR School classroom teachers) due to the specific student population the school serves (i.e. Diné youth). The sample size was determined by the total number of teachers educating at the STAR school during the 2021-2022 academic year. Non-formal classroom-setting teachers were also included in this sample size (i.e. wellness coordinator, culinary/Diné language teacher). The total sample size that was reached during the recruitment process via email was sixteen (16) teachers. The teachers who participated in the short questionnaire were required to provide informed consent (i.e. “I Agree”) after reading the informed consent online script provided at the beginning of the survey instrument.

Instrumentation

Description of Instrument

One (1) instrument was used to collect qualitative and minimal quantitative data in this study (see Appendix A: Survey Instrument). The University of Arizona IRB-approved survey instrument contained an online informed consent that provided the following: 1) general lay information about the study, 2) identification of any potential risks/harms to adult participants, 3) survey respondent confidentiality and security, and 4) the perceived benefits to collecting/analyzing such data to current/future STAR school students and teachers. The teacher questionnaire contained “Yes” and “No” questions and open-ended descriptive response components throughout the questionnaire. The questionnaire addressed certain external factors (i.e., COVID-19 pandemic) that may have hindered the usability and access to the SSGLs via fluctuation between virtual and in-person instruction modalities. The teacher questionnaire aimed to measure prior usage of the SSGL curriculum and to collect teacher’s insights and ideas to connect core subjects (e.g., Math, Science, English Language Arts, Social Studies, etc.) and Diné traditions, culture, and language within existing curriculum offerings (i.e., SSGL). Furthermore, the questions proposed via the teacher questionnaire directly related to the outlined research objectives to fully evaluate the current SSGL usability by teachers. The
questions proposed are a result of informal feedback gathered from school administrators on current teachers’ usage of the SSGL’s due to external factors, such as the COVID-19 pandemic beginning in March 2020. All instrument questions required a response from teachers except demographics (i.e., age, race, and gender) and optional follow-up request (i.e., preferred method for follow-up communication).

Additional follow-up questions were developed and administered to study participants who voluntarily consented to be contacted after the primary study questionnaire via their preferred communication methods (i.e., phone, email, Zoom).

Validity Procedures: Internal Validity

The face validity of the teacher questionnaire instrument was verified by a STAR school administrator (i.e., Principal Jeannie Gross), who is familiar with the SSGLs and the sample population (i.e. STAR school teachers). In addition, the internal validity of this study was verified by Indigenous scholars who serve on the researcher’s thesis committee for this project (i.e., Dr. Karletta Chief, Dr. Valerie Shirley). Both Dr. Chief and Dr. Shirley have expertise in mixed-methods, qualitative, community/participatory-led research methodologies in environmental sciences and education. Dr. Chief and Dr. Shirley both continue to conduct extensive community-oriented research with tribal members of the Navajo Nation. Dr. Shirley is an expert scholar on decolonizing and Indigenizing education for Indigenous youth through an Indigenous Social Justice Pedagogy framework. Dr. Chief’s environmental justice work (e.g., Gold King Mine Spill) identifies continued oppressive colonialist systems/policies that impact the traditional food, water, and energy systems (FEWS) of the Diné peoples. Dr. Edward Franklin is a non-Indigenous scholar who has worked extensively with Diné farmers and the STAR school directly on food, water, and energy outreach and education as an western-based agriculture expert. Dr. Edward Franklin also has expertise with quantitative surveying research methodologies, which helped to validate the surveying techniques utilized in this study via teacher questionnaire.

Validity Procedures: External Validity

The results of this case study may be generalizable to other public elementary schools on the Navajo Nation who directly serve Diné youth. This study may provide helpful information to public elementary schools on the Navajo Nation who desire adopting culturally relevant F2S curriculum and programming to increase student’s knowledge and desirability of traditional Diné foods. The results of this study may also inform other Native nations and peoples on ways to introduce decolonized, indigenized, and culturally relevant F2S educational programming to help increase traditional food knowledge among Indigenous youth.

Reliability Procedures

The reliability of the questionnaire instrument was verified via internal consistency measures provided by STAR school administrators (i.e., Jeannie Gross). Additionally, the study instrument questions were connected to the research objectives by ex post facto design via the primary researcher of the study (i.e., Jaclyn Rybin) and verified by additional researchers (i.e.,
Edward Franklin). Due to the rise in COVID-19 cases nationwide, the proposed pilot study was dismissed due to the researcher’s limited time frame to complete the outlined thesis research project. This research study commenced once the teacher questionnaire instrument, informed consent and recruitment scripts were approved by the University of Arizona IRB department, and a courtesy letter notice was emailed to Navajo Nation Human Research Review Board (NNHRRB) (i.e., Chairwoman Izzo Manymules and Coordinator Michael Winnie). STAR School is located off the Navajo Nation and because the study is not conducted within the boundaries of the Navajo Nation, the NNHRRB did not have oversight for approval of the study. The outcome of the NNHRRB courtesy notice is documented as follows:

“STAR School site is located outside the Navajo Nation reservation, as well as confirming with [current NNHRRB IRB Administrator] that research conducted outside the Navajo Nation reservation does not fall under the jurisdiction of the Navajo Nation Human Research Review Board (NNHRRB), no further action is required under NNHRRB policies. In addition, this project has received IRB-related approval from the University of Arizona Native Peoples Technical Assistance Office as compliant under the ABOR 1-118 Tribal Consultation Policy.”

However, any data ownership request(s) made by the NNHRRB will be discussed by both parties, if requested. In addition, the researcher’s thesis committee chairs provided formal approval of the study once all three (3) thesis project committee chairs confirmed the study’s internal validity. To confirm further study reliability, it is recommended that a second study with similar protocol and procedures be conducted with a primary school located on the Navajo Nation.

**Positionality**

**Personal Statement**

My positionality is as a white, cis-womxn who has grown up absorbing certain biases of Indigenous peoples in the academic and community setting alike. I grew up mainly in white-dominated communities in the Midwest United States. As a middle and high school student, I was exposed to new cultures and peers with diverse backgrounds. Throughout my college career, I continue to involve myself in spaces to do the “unlearning” needed to combat racism and white supremacy culture present in community nutrition, agriculture education, and dietetics, specifically in the United States. As a future health care professional, in the realm of dietetics and nutrition, my work heavily involves food justice and sovereignty initiatives and community-based projects. Hence, I am passionate about working in solidarity with the STAR school’s faculty, administrators, and student body by identifying key strengths and areas of improvements of the HFFNS programming by conducting this participant-oriented curriculum case study.

**COVID-19 Effects on Community Relationship Building Efforts**

It is important to note that the ongoing COVID-19 pandemic significantly impacted research efforts to build relationships and trust among STAR School classroom teachers. Although in-person educational instruction may have begun more frequently in
non-Indigenous, white-dominated communities in the region, the STAR School “proceeded with caution” as the Navajo Nation had disproportionately higher rates of COVID-19 infections and deaths. Additionally, the COVID-19 pandemic highlighted the lack of clean water infrastructure world-wide to non-Diné peoples who aimed to collaborate and support the Navajo Nation through philanthropic ventures (Peterson et. al., 2022). This significant external factor impacted my ability as the researcher to build relationships among STAR School classroom teachers. In mid-October 2021, I made a day trip to the STAR School with my advisor, Edward Franklin, to meet STAR School administrators to discuss F2S-related research projects that would directly serve students and teachers. During this site visit, I met very few classroom teachers as the visit was made during normal instructional hours on a school day.

An additional site and pilot study at a local high school (i.e., Kayenta) was proposed during Spring 2022, but was dismissed due to the rise of highly contagious COVID-19 variant cases nationwide. Throughout these waves of COVID-19 variants (i.e. Omicron) during the 2021-2022 academic year, the STAR School returned to virtual instruction to prevent further virus spread among student and teacher populations. The effects of COVID-19 on relationship building between the researcher (i.e., Jaclyn Rybin) and STAR School classroom teachers may have affected questionnaire response rates. This highlights the importance of in-person relationship and trust building efforts in the research process to increase the study’s target population involvement in this specific curriculum evaluation case study efforts.

Unique Experiences as a National Science Foundation (NSF-NRT) Indigenous Food, Energy, and Water Security and Sovereignty (Indige-FEWSS) Trainee (NSF-NRT IndigeFEWSS Grant #DGE1735173)

During my Master’s thesis research project efforts with the STAR School, I was heavily involved in various cultural-competency trainings, conferences, story work, and seminar lectures by Diné academics (e.g. Valerie Shirley); Indigenous research ethics coursework, decolonization and Indigenizing readings and self-study; and immersion trips on the Navajo Nation with FEWS-focused grassroots organizations (e.g. Sixth World Solutions) to meet Diné farmers (i.e. Tyrone Thompson, Ch’ishie Farms), and various Diné community members and families. As a funded Indige-FEWSS trainee with an open mind and with alleviated pressures to “perform” via normalized Western-centered research methodologies, I was allowed to design this participant-oriented research project that centered the voices of community partner leaders (i.e., STAR School) through Indigenous-centered, appropriate, and just research methodologies. These opportunities provided by Indige-FEWSS trainings, coursework, seminars, and relationship building spaces with community members allowed me to do the work needed to un/relearning the historical and present-day significance of settler colonialism on FEWS-related problems faced by the resilient and self-determined Diné peoples. The NSF Indige-FEWSS traineeship provided me with the various opportunity to network and develop genuine relationships with community partners and organizations (i.e. STAR School, Sixth World Solutions).
Summer 2022 Indige-FEWSS Internship with STAR School (NSF-NRT IndigeFEWSS Grant #DGE1735173)

During Summer 2022, I was afforded the opportunity to complete a full-time 10-week, community-oriented in-person internship with my thesis project site (i.e. STAR School). During this hands-on internship, I developed their ongoing F2S infrastructure projects by building additional raised garden beds by requesting funding (i.e., Coca Cola Foundation Grant, PI Kimberly Ogden) from my mentor and Indige-FEWSS PI Dr. Karletta Chief for building supplies and materials. This community-oriented internship experience allowed me to be of service to the school by “doing the work” needed to have essential F2S infrastructure in place to deliver culturally relevant, Indigenizing, and decolonizing F2S curriculum for years to come. During this time, I notably developed meaningful relationships with STAR staff and classroom teachers that would have been beneficial at the beginning of this research project endeavor. In hindsight, the completion of the internship before survey implementation may have increased teacher response rate and the overall outcomes of this study.

Data Collection

Procedures

This study was conducted ethically and by accordance with the research instruments, methodologies, and procedures approved by all stakeholders in this study. These stakeholders include the STAR School principal(s), the University of Arizona IRB (STUDY00000994) (see Appendix B: IRB Approval Letter), and the Navajo Nation Human Research Review Board (NNHRRB) Two (2) courtesy letters (see Appendix C: NNHRRB Courtesy Letter) were sent to NNHRRB Chairwoman Izzo Manymules and Coordinator Michael Winnie to notify of this proposed research project. The online questionnaire was administered to teachers via informed consent process. The researcher followed up with consenting teachers via preferred method of communication (i.e., phone, Zoom, email, in-person). Before teachers can access the online questionnaire, each teacher was asked to read and provide informed consent (i.e., “I Agree”) before beginning the questionnaire. If any participant (i.e., STAR teachers) did not want to participate, they would be automatically excluded from the Qualtrics questionnaire (i.e., I Disagree). At any point during the questionnaire, teachers may exit out of the form. In the case of a participant not wanting their insights used for the final study analysis, the researcher requested teachers email to withdraw their provided data.

Non-Response Error

Non-response error was accounted for due to the timing of implementation (i.e., final weeks of the academic year) and assumption that the online questionnaire was “spam”. The incompleteness and/or lack of clarity of the questionnaire questions answered by teachers was also accounted for via non-response error. A total of sixteen (16) teachers were contacted via their school email accounts. Out of the sixteen classroom (16) teachers reached, six (6) teachers completed the questionnaire in its entirety with a final response rate of 38%. After the initial email invitation, six (6) teachers completed the survey. Additionally, two (2) email reminders
were sent out to the ten (10) teachers who did not respond to the initial email invitation. These two (2) reminder emails did not provide additional survey responses from the target population (0%). According to Yun & Trumbo (2000), online questionnaires sent via email typically only see a 25-30% response rate without follow-up reminders (Kittleson, 1997). Since follow-up reminders did not affect the final survey response rate, it can be assumed that the initial response rate of 38% is acceptable for the size of the population.

Findings

The purpose of this research project was to determine how elementary teachers at a Diné serving charter school may utilize and incorporate the SSGL into their existing curricula offerings teaching core subjects (i.e., Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies) and Diné culture, traditions, and language around traditional foods.

Objective 1: Demographics

The demographics of the 2021-2022 STAR School’s classroom teacher survey participants included age, race, and gender. Of the eight (8) teacher responses, six (6) participant responses produced complete and usable data. Of the two (2) respondent’s data that was not utilized in the study, one (1) participant requested their data be omitted via email and the other participant exited out of the questionnaire immediately after providing informed consent. Out of the six (6) study participants, two (2) participants were between the ages of 24-30 years-old (33%), one (1) participant was 31-40 years-old (16.7%), one (1) participant was 40-50 years-old (16.7%), and two (2) participants identified as “Other” (33%), which can be assumed these participants are over the age of fifty (50) years-old (Figure 1). Additionally, the identified race of the six (6) study participants were White/Non-Hispanic (100%). The identified gender of the study participants were five (5) participants identified as female (83.3%) and one (1) participant identified as male (16.7%) (Figure 3).

The average representation of the six (6) teachers who participated in the survey were on average 31 years of age and identified as white/non-Hispanic and female. The overall race demographics of STAR School classroom teachers are reported as 67% white/non-Hispanic and 33% American Indian (i.e. Navajo) via STAR School administration data. The race demographic of the entire STAR School teacher population can be noted as a limitation when discussing the integration of Diné culture, language, and food traditions into the SSGL.
Figure 3. Teacher Demographics (Age)

Figure 4. Teacher Demographics (Gender)
Objective 2: Usability of SSGL in teaching

Objective 2 aimed to determine the usability of the SSGL in teaching core subjects as well as Diné culture, traditions, and language by classroom teachers who primarily serve Diné youth in Preschool (Pre-K) through 8th Grades. The following instrument questions sought to measure what was outlined in Objective 2 via one (1) “Yes or No” question (Question 4) and two (2) open-ended response questions (Question 5 and 6):

1. **Question 4**: Have you used the following STAR school Garden Lessons with your students in the classroom?

2. **Question 5**: How would you integrate the following core subjects (i.e., Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies) into STAR School’s Garden Lessons curriculum?

3. **Question 6**: What Diné food traditions, culture and language would you like to see incorporated and/or offered within the STAR School Garden Lessons curriculum?

All six (6) classroom teachers responded “No” to Question 4 (100%) in regard to the utilization of the SSGL in the classroom. The following open-ended questions (Questions 5 and 6) provided the following responses from teachers, respectively via Tables 1 and 2. Notably, there was an equal distribution for use of SSGL into English; Math; and Core Subjects either as a theme or arithmetic in planting. One teacher suggested teaching it with Diné (Navajo) culture and language.

<table>
<thead>
<tr>
<th>Quote</th>
<th>Subject</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>“English Language Arts.”</td>
<td>Language (English)</td>
<td>Unknown</td>
</tr>
<tr>
<td>“Math would be integrated by calculating how many plants we could put in each bed and then how many seeds we would need.”</td>
<td>Math</td>
<td>Arithmetic in planting</td>
</tr>
<tr>
<td>“Math would be integrated by calculating how many plants we could put in each bed and then how many seeds we would need.”</td>
<td>Math</td>
<td>Arithmetic in planting</td>
</tr>
</tbody>
</table>
“Run the lesson as a theme for the week, integrating the other core subjects as we go along.”

<table>
<thead>
<tr>
<th>All (Core Subjects)</th>
<th>As a theme</th>
</tr>
</thead>
</table>

“Create a learning experience where the same language is used in all classes and subjects. Gardening is a combination of all core subjects. Having students read a Diné story about a plant, measure the spacing of seeds when planting, and discussing photosynthesis and the health benefits of the plant is all a part of gardening.”

<table>
<thead>
<tr>
<th>All (Core &amp; Navajo)</th>
<th>As a theme and integrating Navajo culture and language; Arithmetic and science in planting.</th>
</tr>
</thead>
</table>

“ELA (English Language Arts) incorporates reading, writing, speaking, and listening. This would be fairly easy to do by having students research and write about the Garden lessons.”

<table>
<thead>
<tr>
<th>Language (English)</th>
<th>As a theme</th>
</tr>
</thead>
</table>

**Table 1.** Teacher Responses for Question 5 (How would you integrate the following core subjects (i.e., Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies) into STAR School’s Garden Lessons curriculum?) and connection to core subjects and curriculum integration approach.
**Figure 5A:** Word Cloud Responses to Question 5 *(How would you integrate the following core subjects (i.e., Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies) into STAR School’s Garden Lessons curriculum?)*.

**Figure 5B:** Word Cloud Responses of how teachers would approach teaching SSGL.
<table>
<thead>
<tr>
<th>Quote</th>
<th>Navajo subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Gardening, wellness, and culinary classes should be combined with an emphasis on Diné traditions and language. Each month, there is one fruit or vegetable that is focused on in these classes, and it would be grown on site and served in the cafeteria for a total farm to table experience.”</td>
<td>Navajo wellness; Navajo cooking; Navajo planting; Navajo language.</td>
</tr>
<tr>
<td>“Not having looked at it (SSGL), I would say vocabulary, recipes, and stories to accompany.”</td>
<td>Navajo language; Navajo cooking.</td>
</tr>
<tr>
<td>“I would like the students to try and grow from the beginning some traditional Native American veggies. Plant them, water them, harvest them, eat them, etc.”</td>
<td>Navajo planting</td>
</tr>
<tr>
<td>“Navajo Language”</td>
<td>Navajo language</td>
</tr>
<tr>
<td>“Learning the names of the different foods and plants in Diné.”</td>
<td>Navajo language</td>
</tr>
<tr>
<td>“Learning about traditional foods to grow and times of year of growing and then incorporating literature that uses these growing traditions/information.”</td>
<td>Navajo planting</td>
</tr>
</tbody>
</table>

Table 2. Teacher Responses for Question 6 (What Diné food traditions, culture and language would you like to see incorporated and/or offered within the STAR School Garden Lessons curriculum?) and connection to Diné (Navajo) subjects.
Figure 6A: Word Cloud Responses to Question 6 (What Diné food traditions, culture and language would you like to see incorporated and/or offered within the STAR School Garden Lessons curriculum?).

Figure 6B: Word Cloud Responses of how STAR classroom teachers would approach teaching Diné (Navajo) subjects via SSGL.
Only one (1) teacher initially said the SSGL could be integrated into Diné (Navajo) language classes but when prompted further, almost all teachers said that Diné language and Diné planting seasons could be a way to incorporate Diné language, tradition and culture into SSGL.

**Objective 3: Teachers’ perceptions and beliefs of SSGL**

Objective 3 sought to determine classroom teachers’ perceptions and beliefs of SSGL in order to increase curriculum useability by teachers. Due to external factors (i.e. COVID-19 pandemic), the survey instrument aimed to measure the environmental impact of the external factor in the utilization of the SSGLs by classroom teachers (e.g. virtual and in-person learning environments). The following questions (Questions 7, 7.1, and 7.2) were formatted as follows: “Yes, No, and Unsure” (Question 7: *Did you utilize this curriculum BEFORE the COVID-19 pandemic?*) and open-ended questions (Questions 7.1 and 7.2). Out of the six (6) respondents, five (5) reported not utilizing the SSGLs before the COVID-19 pandemic (83.3%) (where 3 of the 5 where not using it because they had not been at STAR school prior; 1 was unaware of the curriculum and 1 always wanted to create a program like this) and one (1) respondent was unsure (16.7%). Since none of the respondents report utilizing the SSGLs before the COVID-19 pandemic, there are no results to report for Question 7.1 (*If YES, how did you utilize it?*). Out of the five (5) respondents that reported not utilizing the SSGLs before the COVID-19 pandemic, Question 7.2 gathered the following insights from classroom teachers’ (see Table 3):

<table>
<thead>
<tr>
<th>Teacher Responses for Question 7.2 (If NO, please explain your reasoning below):</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I was not teaching here at that time.”</td>
</tr>
<tr>
<td>“Didn’t know it was a thing.”</td>
</tr>
<tr>
<td>“It’s always been a dream of mine to help create a program like this at STAR, but it has not yet come into fruition.”</td>
</tr>
<tr>
<td>“I was not here before the pandemic.”</td>
</tr>
<tr>
<td>“Not working at this school.”</td>
</tr>
</tbody>
</table>

**Table 3. Teacher Responses for Question 7.2 (If NO, please explain your reasoning below):**

**Objective 4: Potential barriers and motivations in SSGL deliverability**

Objective 4 aimed to identify potential barriers and/or motivations in delivering SSGL’s with primarily Diné youth enrolled at the STAR school. The following questions (Questions 4.1, 4.2) were designed to be multi-select, multiple choice questions with an “Other” open-ended response option available. Since all six (6) of the respondents (100%) reported they have not utilized the SSGLs (Question 4), Questions 4.1 was not provided to the respondents (*If YES, what are some motivations to utilizing the STAR School Garden Lessons (select all that apply)?*). Furthermore, Question 4.2 provided the following perceived barriers in
the classroom to utilizing the SSGLs (If NO, what are some barriers to utilizing the STAR School Garden Lessons (select all that apply)?). Out of the six (6) respondents, five (5) teachers reported that they “Did not know this curriculum existed” two (2) teachers reported the “Lack of appropriate resources/materials to deliver lessons”, and one (1) teacher reported “Difficulties integrating into existing curriculum”.

**Follow-Up Interview(s)**

In addition to teachers’ insights via questionnaire, five (5) respondents consented to a follow-up interview via the participants preferred method of communication (e.g. phone, email, Zoom). Out of the five (5) consenting respondents, one (1) teacher was able to follow-up with the researcher at their convenience. The researcher (i.e. Jaclyn Rybin) sent out a total of two (2) emails per consenting respondent (e.g. initial request and one (1) reminder) to schedule a follow-up meeting. The following responses were provided by a teacher via a semi-structured pre-approved IRB follow-up question script (see Appendix D: Follow-Up Question Script). Any identifying information has been redacted for confidentiality purposes.

The teacher was asked to elaborate on their response to Question 5 (How would you integrate the following core subjects (i.e. Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies) into STAR School’s Garden Lessons curriculum?) as well as how they envision themselves utilizing the SSGLs with their [grade level taught] students. They stated,

“I would utilize it with science...we would be talking about plant life cycle, planting from seeds to sprout to mature plants. We could incorporate it with social studies talking about farm to table, you know feeding communities, feeding families. We could make a writing lesson out of it...umm you know give me directions on how you go about planting your favorite food choice from seed all those different ideas. That's why I was kind of thinking of making it into a weekly scene so we could try to incorporate it into all different subject areas somehow. Now as far as Diné language, I wouldn't touch that, because I don't know...I wouldn't even begin to attempt to teach it. I would do a big disservice. But I would hope that our Diné specialists would jump in with us on this theme.”

The researcher then posed an impromptu follow-up question based on the teacher’s response by asking, “So who would you identify at the STAR school to be the Diné language and culture specialists here?” The teacher responded as follows:

“Well, there's several for different grades. I think it's Ms. [Teacher's Name] for the older kids. I know Ms. [Teacher's Name] has done it for many of the younger classes and I know Mr. [Teacher's Name] is now jumping in and going to be teaching some of the lower-level grade levels as well...so that's at least my knowledge.”

Again, the researcher posed an additional follow-up question “Yeah, so like with those kinds of areas [Diné language, culture, traditions]...would you be comfortable teaching items within the
culture [Diné] if that was provided through their expertise?” They stated,

“Oh yes, yeah, I would love to but ummm, for as far as I guess history, I would probably want them to teach that part, but I would certainly incorporate anything that I could.”

Lastly, the researcher posed one more impromptu follow-up question by asking the teacher, “Would you mind elaborating on that little bit about the history part?” They explained that,

“Well, the history and the culture being that it’s all new to me, I don’t want to do again [do a disservice] and teach something or don’t feel that I would be able to answer questions appropriately. But if I was given a lesson by someone, who was understanding of the culture and then they asked me to teach it, I don’t mind teaching it but I would definitely want their approval [their stamp of approval on it].”

The researcher then proceeded to return to the follow-up questions by asking “…how often would you like to utilize [SSGL] if you had the resources, supplies, lesson plans, etc.? and “…what seasons do you envision utilizing the SSGL here?” They replied by stating,

“I think it would be fun to do maybe every season whatever we could grow in a particular season.” and regarding the seasons, “Any that we could. I don’t know very much about planting and agriculture so I don’t know if it’s warm enough here for the winter months or not. If there’s any time we could yeah, you know, fit it in, that would be great. I just see it seasonally, maybe doing a week for each season being that we’ve got so much else to accomplish but I think that’s important and we certainly can tie it in.”

When asked what would allow you [the teacher] to utilize the SSGLs more often while teaching core subjects and/or Diné traditions, culture and language to your students?, they provided the following insights:

“Well I just think if you guys had a little bit of a curriculum to offer maybe, you know, it’s not too hard to incorporate it…you know just thinking we’ve got to get to our grammar and all of that and we can incorporate all of that. So obviously we can’t do full-on agriculture school but we certainly can incorporate as we go along so maybe more often than just seasonally, one time a season, but maybe more often.”

Lastly, the researcher asked the teacher what [Diné] food traditions, culture and language would they like to see incorporated and/or offered within the SSGL curriculum and to help [the researcher] better understand why this may be important to you and/or the students who serve and how do you envision them benefiting from culturally-relevant garden lessons and curricula. The teacher stated,

“Well maybe this isn’t the answer, the right answer that you’re looking for, maybe not answering it correctly, but if I understand what you’re asking for in my opinion it just helps seal in the knowledge of their culture. I know that’s one of our goals here, is for them not to lose, you know because culture is lost you know depending on where you live and you know it just breaks my heart and I know that that was one of our schools goals.
We’re trying to help decrease the loss. So I think you know it’s important to understand your culture, where you’re from, who you are and maybe just help cement it in...because you know how family life is, you’re busy, you’re working and things, you know, sometimes before you know it you’re like, I never taught my kids that.”

**Discussion**

It is important to note the findings of this study (n=6) cannot be generalized among the entire STAR School classroom teacher population (N=16). The average respondent was a white female young teacher who previously didn’t work at STAR school and did not use the curriculum before. STAR School does have a third of their teachers who are Native American. The findings of this study only represent 38% (i.e., six classroom teachers) and are exclusive to most STAR School classroom teacher’s demographics and SSGL insights. Moreover, these findings will help provide a foundational baseline of SSGL past and current utilization and incorporation by classroom teachers to help guide STAR School administrators in providing teacher support, resources, etc. to assist teachers with integrating revised SSGL lessons into teaching core subjects and Diné language, culture, and traditions in the classroom with students.

Regarding Objective 1, this study found that the majority of teachers are White/Non-Hispanic females with an average age of 31. The demographics of classroom teachers’ is very important to note while facilitating SSGLs with Indigenous (Diné) youth. It is important to note that it is the educator’s responsibility to unlearn certain implicit biases towards Indigenous peoples and begin the practice of being critically conscious when relearning accurate historical details of colonialist violence, genocide, and erasure towards Indigenous peoples the Diné peoples (Freire, 1974; Shirley, 2017; Smith, 1999). Furthermore, STAR School classroom teachers can be viewed as critical change agents (Freire, 1974) that are needed to facilitate careful, truth-telling, and empowering F2S lessons. It is the educator’s duty to prioritize and center Indigenous knowledge systems, language, culture, and traditions (Shirley, 2017) when facilitating learning about traditional Diné foodways.

The teachers can viewed as cultural brokers (Aikenhead, 2001) as a way of bridging Western knowledge systems with Indigenous (i.e. Diné) knowledge systems to extend ideas and create new perspectives and values that enhances learning and connectedness for Indigenous (i.e. Diné) students (Brayboy & Maughan, 2009; Mack et. al., 2012 ). According to Aikenhead, students are more successful if they receive help [from educators] with navigating their “cultural border crossings” and be the person(s) who identify such cultural borders with students (2001). Furthermore, cultural brokers (i.e. STAR School teachers) can act as guides for Indigenous (i.e., Diné) students while navigating informal science education (ISE) (i.e. F2S experiential learning via SSGL) and Indigenous knowledge systems (i.e. Diné traditions, language, culture) (Aikenhead, 2001; Mack et. al., 2012).
The findings regarding Objective 2 via teacher questionnaire showed underutilization (0%) of SSGL in teaching core subjects as well as Diné culture, traditions, and language by classroom teachers who primarily serve Diné youth at the STAR School. There was an equal distribution for use of SSGL into English; Math; and Core Subjects either as a theme or arithmetic in planting. One teacher suggested teaching it with Navajo culture and language. External factors, such as environmental constraints (i.e. COVID-19 pandemic), should be considered while discussing this specific finding. From the sample of classroom teachers' that responded, common SSGL curriculum integration suggestions of core subject content included the following: Math, Social Studies, English Language Arts, and Diné Language. Additionally, Question 6 helped to provide teachers' insights on what Diné food traditions, culture and language they would like to see incorporated into the SSGLs. Common themes from Question 6 included the incorporation of Diné language, identification and naming of traditional Diné foods and plants, Diné storytelling, and full-circle planting to consumption of traditional Diné foods. Only one (1) teacher initially said the SSGL could be integrated into Navajo language classes but when prompted further, almost all teachers said that Navajo language and Navajo planting seasons could be a way to incorporate Navajo language, tradition and culture into SSGL.

Lastly, it is important to note that the six (6) respondents reported being White/Caucasian, which may limit their knowledge and understanding of Diné culture and traditions regarding Native foods and foodways. By gathering teachers' insights regarding SSGL are critical to future academic-related engagement and genuine relationship-building to increase the usability and incorporation of culturally-relevant, decolonizing, and Indigenizing F2S curricula for Diné youth.

Objective 3 sought to determine the teachers’ beliefs and perceptions of the SSGL in order to increase usability among classroom teachers’ serving Diné youth at the STAR School. The findings showed that once again, external (i.e. environmental) factors such as the COVID-19 pandemic, hindered the usability of the SSGLs. The majority of teacher respondents (60%) reported not being employed at the STAR School before the COVID-19 pandemic (i.e. prior to March 2020). Additionally, one (1) teacher was unsure they utilized the SSGLs before the COVID-19 pandemic and one (1) teacher explained that they “didn't know it [SSGL] was a thing”. As the coronavirus becomes increasingly endemic in the world (Tenet 1, TribalCrit Theory, Brayboy, 2005), there is hope and optimism surrounding more stable, in-person educational offerings and opportunities for experiential land-based education (Datta, 2016) for students and teachers. It is important to also note that colonization continues to be endemic in Indigenous (Diné) communities. Diné-centered knowledge, traditions, storytelling, language, and culture surrounding traditional Diné foodways needs to be centered by critical change agents (i.e. teachers) when facilitating revised SSGLs with Diné students (Brayboy, 2005; Shirley, 2017). Finally, the findings within Objective 3 persist to acknowledge the external factors that have made it difficult to engage in SSGLs over the course of the COVID-19 pandemic and limited awareness of such curricula being available at
the school.

In regards to Objective 4, which sought to identify perceived barriers and/or motivations by teachers in utilizing the SSGLs. Out of all respondents of this sample population (n=6), the majority of respondents (83.3%) said that they “did not know this curriculum existed”. Furthermore, a minority of teachers reported that they “lack appropriate resources/materials to deliver lessons” and “difficulties integrating into existing curriculum”. Again, these findings are important to note while considering future recommendations for SSGL curriculum exploration via teacher training, workshops, etc. Further participant-oriented, curriculum case studies may help measure progress made post-pandemic (i.e. SSGL utilization, adoption of culturally-relevant, decolonizing, and Indigenizing F2S curricula) by the STAR School classroom teachers, school administrators, and community-centered, participant-led academics directly serving the STAR School to help promote Indigenizing and decolonizing F2S curricula by prioritizing Diné goals in these endeavors (Lee, 2006; Shirley, 2017).

Lastly, the one (1) teacher follow-up interview provided valuable insights on the need for cultural competency teacher training rooted in critical consciousness (Freire, 1974), Tribal Critical Race Theory (Brayboy, 2005), and Indigenous Social Justice Pedagogy to better serve the primary student population (i.e. Diné) attending STAR School. These findings display teachers’ genuine desire for learning about Diné history, language, and traditions, although implicated significant avoidance mentalities when asked about perceived encounters among Diné students’ inquiring about Diné culture, traditions, and language. It is essential for White/Causasian teachers, who are non-Diné, to engage in the un/relearning and decolonization of current knowledge systems necessary to appropriately serve the STAR School’s primary student population, Diné youth.

Inclusion of U.S. Government Violence, Policies, and Actions in SSGL Curriculum

It is critical to acknowledge the historical significance of scorched earth tactics that were carried out by U.S. military personnel (i.e. General James Carleton, Colonel “Kit” Carson) as an act of genocide via the Long Walk in 1863-1864 (Bailey, 1970). These acts of violence at the hands of White settlers and the U.S. government removed the Diné peoples from their traditional homelands, which namely ensued forced starvation, malnutrition, cultural genocide, and thousands of deaths (Bailey, 1970). The destruction of traditional Diné foodways and homelands via the Long Walk in turn forced the Diné peoples to depend heavily on foreign, U.S. governmental foods (e.g. bacon, coffee, flour), which caused additional illnesses and deaths due to unfamiliarity with these foods and how to prepare them for consumption (Bailey, 1970; Lake Valley Navajo School, 1991; Mihesuah & Hoover, 2019). These are only a few examples of how U.S. settler colonialism has caused generational trauma for the Diné peoples as it relates to traditional Diné foodways, food security, and food sovereignty.

Such historical and present-day truth-telling and storywork are critical in promoting Indigenizing and decolonized educational frameworks via F2S curricula. Diné students, such as those attending the STAR School, deserve to be presented with unwhitewashed historical
facts of centuries of food-related systemic injustices that have occurred at the hands of U.S. white settler colonialism and governmental systems in order to promote resiliency, self-determination, cultural pride, and Nation-building efforts among youth for generations to come. As described eloquently by Garcia & Shirley (2012), schools are "...sacred landscapes where educators promote and privilege Indigenous knowledge in their classrooms and guide Indigenous students in the critical process of promoting, protecting and preserving Indigenous languages, cultures, land and people...". In the Oral history stories of the Long Walk = Hwéeldi Baa Hané, a story is told by an Elder Jane Begay of her great-great grandmother’s story told to her great grandmother as follows:

“My mother gave birth to several girls, but only one son. They were fleeing from the enemy when the son was born, and they had very little food. The baby was fed plant seeds, but he did not survive. He died from lack of mutton. They never had enough mutton to eat because they were always on the move, fleeing from the enemies” (Lake Valley Navajo School, 1991, p. 17).

For example, cornmeal and corn pollen was mostly used before the Long Walk in sacred medicine bundles (jish) for medicinal ceremonial purposes, such as for medical treatments, by the Diné medicine man (Frisbie, 1987). It wasn’t until during and after the Long Walk that the Diné peoples needed to heavily rely on various forms of corn for nutritional support to combat malnutrition and endemic starvation (Frisbie, 1993; Lake Valley Navajo School, 1991). This storywork is invaluable when teaching culturally-relevant F2S curriculum (i.e. SSGL) with Diné students and acknowledging the historical significance and intentionality behind the replanting of certain crops, plants and trees on the land that the STAR School campus resides (i.e. apple, peach, and juniper trees).

**Contemporary Lens of decolonizing and Indigenizing F2S curriculum**

These engagements are an extremely critical part of disrupting colonization within Indigenous-serving (i.e. Diné) educational institution (i.e. STAR School) and should not be overlooked. It is important to un-center whiteness and white comfort while engaging in such cultural-competence teacher training among non-Diné educators. In order to prevent further systemic harm, these un-learning spaces should primarily involve non-Diné educators in such discussion spaces. According to Madden & McGregor (2013), certain decolonizing storywork activities, such as “...personal decolonizing story of coming to understand their historical, political, social, and cultural relationships to Indigenous peoples, land, and/or Indigenous education” may provide helpful in these (un)learning spaces (p. 372). Without continual teacher training(s) and self-educating opportunities for non-Diné educators, it can be assumed that continued erasure of Diné culture, traditions, language, and stories surrounding traditional food knowledge will continue to occur.

**Online Diné Farming Curriculum Resources Available for Teachers**

Here are some examples of Diné-centered F2S curriculum resource(s) that are currently available for educators, anywhere:
San Juan District Navajo Language Resources
Salina Bookshelves (Multicultural Publishing): Free Teacher Resources
Dine Bizaad: Speak, Read, Write Navajo*
Navajo Ethno-Agriculture: Diné Agriculture and Learning Opportunities
Examples of Culturally Relevant Navajo Farming and Food Children’s Books:
  ○ The Navajo Year, Walk Through Many Seasons
  ○ The Water Lady: How Darlene Arviso Helps a Thirsty Navajo Nation
  ○ Fry Bread: A Native American Story

*It is recommended that all teachers who facilitate Diné-centered lessons should have this book on hand as a reference.

Implications and Future Recommendations

Firstly, when considering the following 1) external factors (i.e. COVID-19 pandemic) 2) limited timeframe and methods to conduct study and 3) low response rate from the study’s population, it is recommended that additional follow-up studies be conducted. By conducting additional participant-oriented research projects with this particular study population, there are opportunities for further relationship building among teachers, staff, faculty, students, and the community and ultimately gathering invaluable teacher insights to better serve Diné students in F2S curriculum offerings. The implications of this study include the need for cultural competence training and workshops for non-Diné educators in order to better serve the school’s primary student population while facilitating culturally relevant F2S curricula. Additionally, there is a need for supplying classroom teachers with the appropriate resources, lessons, and curricula to integrate and to facilitate such F2S learning with students on a more frequent basis. Although there is a need for cultural competency training and workshops among non-Diné educators, it is recommended that current SSGLs be revised to further decolonizing and Indigenizing existing curricula offerings to better serve and represent Diné culture, language, and traditions around food. Further SSGL topic suggestions are as follows, which is based on the current SSGL topic focus(es):

1. Where does [traditional Diné] food[s] come from?
2. How do [Diné] people[s] grow healthy food?
3. How does [traditional Diné] food[s] tie [in]to culture, [language] and community?
4. How [can] [do] you make health[ier] food choices?**

**These specific SSGLs should be framed through a food-access lens and be considerate of students’ lived experiences within non-school environments.

It is recommended that a contemporary lens of decolonizing and Indigenizing F2S curriculum via SSGL occur by following frameworks: 1) critical Indigenous pedagogy (Darder, Baltodano & Torres, 2003; Freire, 2002; Garcia & Shirley, 2012; Kincheloe, 2008) and 2) Indigenous social justice pedagogy (ISJP) (Shirley, 2017, p. 165). Shirley describes ISJP as helping educators’ process and facilitate Indigenize and decolonize educational offerings as
Deconstructing and disrupting the cycle of colonization in Indigenous communities

2. Promoting, revitalizing, and protecting Indigenous languages and knowledge systems

3. Envisioning ways to inspire youth to employ transformative possibilities that contribute to nation-building.


Further recommendations include reintroducing F2S curriculum that is foundational in Brayboy’s Tribal Critical Race Theory (i.e., Tenet 7: Tribal philosophies, beliefs, customs, traditions, and visions for the future are central to understanding the lived realities of Indigenous peoples, but they also illustrate the differences and adaptability among individuals and groups) (2005) and Freire’s Transformative Learning Theory in Education (1974). It can be assumed that future participant-led research projects may provide helpful decolonizing and Indigenizing education frameworks for utilization by other Diné-serving schools, in particular near and/or on the Navajo Nation. Additionally, it is recommended that the STAR School create a transparent, easily accessible process (e.g. curriculum resource library) that allows teachers access to SSGL and other F2S-related Navajo curriculum.

Lastly, It is the institution(s) (i.e. STAR School) and the individual educator’s duty to prioritize and center Indigenous knowledge systems, language, culture, and traditions (Shirley, 2017) when facilitating learning about traditional Diné foodways. It is recommended that STAR School classroom teachers’, administrators, faculty, and staff alike engage in such practices (e.g. cultural-competence trainings, workshops, self-education) to promote resilience, activism, and self-determination among their Diné students, who are the future protectors and knowledge holders of traditional Diné food(ways) for generations to come (Diné Policy Institute, 2014; Shirley, 2017).

Conclusion

As the COVID-19 becomes endemic around the world, there is optimism surrounding more stable, in-person educational opportunities for land-based, experiential F2S education (Datta, 2016) in the classroom. It is also important to note that colonization continues to be endemic in Indigenous (i.e. Diné) communities, therefore Diné-centered knowledge, traditions, storytelling, language, and culture surrounding traditional foodways should be prioritized when facilitating culturally relevant SSGLs with Diné students (Brayboy, 2005; Shirley, 2017). These findings will provide a foundational baseline for STAR School administrators for the past and current utilization and incorporation of SSGLs and future recommendations for cultural-competence training and workshops for non-Diné educators, faculty, and staff. These insights will help provide better teacher support, resources, etc. to further revise and integrate culturally relevant garden lessons while teaching core subjects
Diné language, culture, and traditions with students.
Appendices

Appendix A: Survey Instrument

University of Arizona
Consent to Participate in Research

Study Title: Teaching Core Subjects and Traditional Food Knowledge through Farm-to-School (F2S) Curriculum: The Useability and Cultural-Relevance of Garden Lessons serving Diné youth at an Off-Grid Charter School in Leupp, Arizona.

Principal Investigator: Jaclyn Rybin

This study involves research, and your participation is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. As a study participant, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled. The procedures for orderly withdrawal of participation by you, the study participant, is by declining consent below (i.e., I Disagree), which will immediately exit yourself from the questionnaire and participation in the study. At any time during the questionnaire you decide to withdraw consent, please exit the questionnaire and email Jaclyn Rybin at jrybin@email.arizona.edu to request your responses to be omitted from the study. The information you provide in the following questionnaire may be used for future research. The approximate number of study participants involved in the study is fourteen (14) STAR School teachers.

Brief explanation summary of the project:

This mixed-methods curriculum evaluation case study aims to determine how elementary teachers at a primarily Diné-serving charter school may discern and incorporate their school’s garden lessons into their existing core subject content curriculum (e.g. Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies). The study aims to measure, quantitatively and qualitatively, the useability of current farm-to-schools (F2S) curriculum and teachers’ beliefs and perceptions of current F2S curriculum at the STAR school in Leupp, Arizona. Furthermore, the goal of this case study is to identify ways to improve F2S curriculum useability in teaching core subjects by teachers and to improve culturally-relevancy of current F2S lessons available for teachers’ use in the classroom. Teachers at the STAR School will be surveyed via online questionnaire (i.e., Qualtrics) upon receiving their voluntary informed consent before proceeding with the IRB-approved online questionnaire.

Perceived risks and benefits: There are minimal expected risks to you, including the risk of loss of confidentiality, with participating in this study. The benefits of collecting your feedback and responses include the continued development, improvement, and increased useability of farm-to-school curriculum, lessons, programming, etc. within your existing curriculum offerings in the classroom.
If you are Native American and agree to participate in this study, there may be minimal risk(s) associated with the research that impacts your community. The information and study findings may conflict with your communities' culture, traditions, creation stories, or spiritual beliefs.

**Time commitment:** This questionnaire should take no longer than 10-15 minutes of your time.

**Confidentiality of information:** Your name will not be used in any report. Identifiable research data will be encrypted, and password protected. Your responses will be assigned a code number. The list connecting your name to this code will be kept in an encrypted and password protected file. Only the research team will have access to the file. When the study is completed and the data have been analyzed, the list will be destroyed.

The information that you give in the study will be anonymous. Your name will not be collected or linked to your answers. Because of the nature of the data, it may be possible to deduce your identity; however, there will be no attempt to do so, and your data will be reported in a way that will not identify you.

The information that you provide in the study will be handled confidentially. However, there may be circumstances where this information must be released or shared as required by law. The University of Arizona Institutional Review Board may review the research records for monitoring purposes. For questions, concerns, or complaints about this case study, you may contact Jackie Rybin (PI) at jrybin@email.arizona.edu and/or Edward Franklin (Co-PI) at (520) 940-3718 or uafranklin0@arizona.edu.

For questions about your rights as a participant in this study or to discuss other study-related concerns or complaints with someone who is not part of the research team, you may contact the Human Subjects Protection Program Director at (520) 626-8630 or online at https://research.arizona.edu/compliance/human-subjects-protection-program.

**Statement of Informed Consent:** By taking part in this questionnaire-style interview, you are allowing your responses to be used for research purposes.

I Agree. I Disagree
3. Grade of students you teach/serve:
   a. Pre-Kindergarten
   b. Kindergarten
   c. 1st Grade
   d. 2nd Grade
   e. 3rd Grade
   f. 4th Grade
   g. 5th Grade
   h. 6th Grade
   i. 7th Grade
   j. 8th Grade

The following questionnaire will ask your input about the STAR School Garden Lessons (PDF may be downloaded HERE). Your input is invaluable in making improvements to the STAR School Garden Lessons curriculum usability when teaching the following core subjects: Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies. Your time and feedback are greatly appreciated to better serve you, as instructors, as well as your students.

STAR School Garden Lessons Introduction:
4. Have you used the following STAR School Garden Lessons with your students in the classroom?
   i. Yes
   ii. No.

4.1. If YES, what are some motivations to utilizing the STAR School Garden Lessons?
   i. To help improve student’s eating habits.
   ii. The lessons are easy to integrate into existing curriculum and/or classroom instruction.
   iii. Relevant to the existing curriculum being taught in my classroom/grade level.
   iv. To help connect students to Diné culture, language, and traditions.
   v. Other:

4.2. If NO, what are some barriers to utilizing the STAR School Garden Lessons?
   i. Difficult to adapt to the virtual classroom.
   ii. Difficulties integrating into existing curriculum.
   iii. Lack of appropriate resources/materials to deliver lesson(s).
   iv. Irrelevant to existing curriculum being taught.
   v. Did not know this curriculum existed.
   vi. Other:

5. How would you integrate the following core subjects (i.e. Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies) into STAR School’s Garden Lessons curriculum?
   i. Open-ended response.

6. What Diné food traditions, culture and language would you like to see incorporated and/or offered within the STAR School Garden Lessons curriculum?
   i. Open-ended response.

7. Did you utilize this curriculum BEFORE the COVID-19 pandemic?
   i. Yes
   ii. No

7.2. If YES, how did you utilize it?
   i. Open-ended response option.

7.3. If NO, please explain your reasoning below:
   i. Open-ended response option.

8. Would you be open to being contacted after the completion of this questionnaire for follow up questions by the researcher (i.e. Jackie Rybin)?
   i. Yes
   ii. No
8.2. If YES, what is your preferred method of communication for follow-up?
   i. Open-ended response option.

9. Teacher Demographic
   i. Age (ranges)
      a. 18-23
      b. 24-30
      c. 31-40
      d. 40-50
      e. Other:
   ii. Race
      a. American Indian or Alaska Native.
         i. Tribal affiliation/membership (if applicable)
      b. Asian American.
      c. Black or African American.
      d. Native Hawaiian or Other Pacific Islander.
      e. White.
      f. Other:
      g. Prefer not to answer.
   iii. Gender
      a. Woman
      b. Man
      c. Transgender
      d. Non-Binary/Two-Spirit
      e. Other:
      f. Prefer not to answer.
Appendix B: University of Arizona IRB Approval Letter
MINIMAL RISK APPROVAL

April 18, 2022

Jaclyn Rybin

Dear Jaclyn Rybin:

On 4/18/2022, the IRB reviewed the following submission:

<table>
<thead>
<tr>
<th>Type of Review:</th>
<th>Initial Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td>Teaching Core Subjects and Traditional Food Knowledge through Farm-to-School (F2S) Curriculum: The Useability and Cultural-Relevance of Garden Lessons serving Diné youth at an Off-Grid Charter School in Leupp, Arizona.</td>
</tr>
<tr>
<td>Investigator:</td>
<td>Jaclyn Rybin</td>
</tr>
<tr>
<td>IRB Submission ID:</td>
<td>STUDY00000994</td>
</tr>
<tr>
<td>Sponsor:</td>
<td>None</td>
</tr>
<tr>
<td>Prime Sponsor:</td>
<td>None</td>
</tr>
<tr>
<td>Documents Reviewed:</td>
<td>Advisor_Co-PI Attestation Form_Edward_Franklin (1).pdf, Category: Institutional Approval; Appendix for Native Americans and Indigenous Populations (Complete_1.7.22).docx, Category: HSPP Form; Appendix for Waiver or Alteration of Consent_Section B1.docx, Category: HSPP Form; Co-PI Biosketch_KarlettaChief, Category: CV; Co-PI CV_ValerieShirley, Category: CV; Courtesy Letter_Navajo Nation.docx, Category: Other; Department_Center_Section Review Attestation Form.pdf, Category: Institutional Approval; Edward Franklin_BioSketch, Category: CV;</td>
</tr>
</tbody>
</table>

Page 1 of 3
The IRB approved the protocol from 4/15/2022 to 4/14/2023 inclusive. Before 4/14/2023 or within 30 days of study close, whichever is earlier, you are to submit a completed continuing review and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 4/14/2023, approval of this protocol expires on that date.

Regulatory determinations:
- **Risk Level:** No greater than minimal risk
- **Pediatric Risk Level:** None
- **Review Level:** Exempt; Minimal Risk 2018: The project is not federally funded or supported and has been deemed to be no more than minimal risk.
- **Special Determinations:** None

To document consent, use the consent documents that were approved and stamped by the IRB. Go to the Documents tab to download them.

This project has been reviewed and approved by the IRB or designee. All documents referenced in this submission have been reviewed and approved. The University of Arizona maintains a Federalwide Assurance (FWA) with the Office for Human Research Protections (OHRP) (FWA #00004218). This Institution assures that all of its activities
related to human subjects research, regardless of the source of support, will be guided by the Belmont Report and applicable regulations according to 45 CFR 46.111 and/or 21 CFR Part 50. Modifications may be needed for Minimal Risk research. Please refer to the Guidance Exempt/Minimal Risk Research for a list of changes that would require a Modification submission. All research procedures should be conducted according to the approved protocol and the policies and guidance of the IRB. The Principal Investigator should notify the IRB immediately of any proposed changes that affect the protocol and report any unanticipated problems involving risks to participants or others. Please refer to Guidance Investigators Responsibility after IRB Approval, Reporting New Information, and Exempt/Minimal Risk Research.

The University of Arizona has chosen to require yearly renewals on projects that involve Native American populations. This is to ensure proper tribal approval is maintained throughout the life of the protocol and the research is being conducted ethically and properly. Please submit a continuing review 30 days from your project’s expiration.

Clearance from official authorities for sites where research is to be conducted must be obtained prior to performance of this study at those sites. Evidence of this may need to be submitted to the HSPP office depending on your project’s risk level. Please review the applicable guidance document to confirm.

We value your feedback and would appreciate you taking the time to complete our survey about your experience with the IRB staff.
https://unizarzona.co1.qualtrics.com/jfe/form/SV_dgQSVxqePHuiUd.

If questions arise at any time during your study, please email the general IRB inbox at VPR-IRB@arizona.edu.
Appendix C: NNHRRB Courtesy Letter(s)
19 April 2022

Dr. Rebecca Izzo Manymules, PhD, MPH
Chairwoman, Navajo Nation Human Research Review Board
Navajo Division of Health
Window Rock Boulevard, Administration Building #2
PO Box 1390
Window Rock, AZ 86515

Re: Notice of Proposed Research

Dear Chairwoman, Izzo Manymules:

I would like to inform you of my proposed thesis project as a graduate student researcher from the University of Arizona. This mixed-methods curriculum evaluation case study aims to determine how elementary teachers at a primarily Diné-serving charter school may discern and incorporate their school’s garden lessons into their existing core subject content curriculum (e.g. Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies). The study aims to measure, quantitatively and qualitatively, the useability of current farm-to-schools (F2S) curriculum and teachers’ beliefs and perceptions of current F2S curriculum at the STAR school in Leupp, Arizona. Furthermore, the goal of this case study is to identify ways to improve F2S curriculum useability in teaching core subjects by teachers and to improve culturally-relevancy of current F2S lessons available for teachers’ use in the classroom. Teachers at the STAR School will be surveyed via online questionnaire (i.e. Qualtrics) upon receiving their voluntary informed consent before proceeding with the IRB-approved online questionnaire. The project aims to gather qualitative information from teachers to better understand both their needs and students in teaching core subject content and traditional food knowledge through F2S curricula in the classroom. This project is being overseen by my thesis committee members composed of experts in community-led, participatory research, indigenization/decolonization educational curricula development, and agriculture curricula development, respectively. Those serving on my thesis committee include:

- Dr. Karletta Chief, PhD (Diné)
- Dr. Valerie Shirley, PhD (Diné)
- Dr. Edward Franklin, PhD

Our current activities involve engagement with the STAR school founder (Mark Sorenson), principals (Jeannie Gross, Andy LaFrante), teachers, and staff regarding the project to promote long-term collaboration and reciprocal working relationships and ensure the research benefits and serves STAR school teachers and students.
We hope to administer online questionnaires to teachers in late April 2022, and the project is scheduled to continue through July 2022. We anticipate the main research activities to be gathering qualitative information and feedback from teachers via online questionnaires. All data collection and research activities will occur off the Navajo Nation reservation; some tribal affiliation information may be collected during this study. However, due to the proximity of the STAR School to the Navajo Nation, and the high potential of including its members in this study, we are following the University of Arizona HSPP protocol to inform the Navajo Nation Human Research Board of our proposed activities. Once our study is completed, we look forward to sharing this information with your Board.

This study has received approval from the University of Arizona IRB # 00000994 for current activities. If you would like additional information about the project, or if you have any questions regarding the study, please contact the study Co-Principal Investigators Ms. Jaclyn Rybin @ jrybin@email.arizona.edu, or Dr. Edward Franklin @ uafrank0@arizona.edu.

Sincerely,

Jackie Rybin
19 April 2022

Mike Winney, IRB Coordinator
Navajo Research Program - NDOH
P.O. Box 1390
Window Rock, AZ 86515

Re: Notice of Proposed Research

Dear Mr. Winney:

I would like to inform you of my proposed thesis project as a graduate student researcher from the University of Arizona. This mixed-methods curriculum evaluation case study aims to determine how elementary teachers at a primarily Diné-serving charter school may discern and incorporate their school’s garden lessons into their existing core subject content curriculum (e.g., Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies). The study aims to measure, quantitatively and qualitatively, the useability of current farm-to-schools (F2S) curriculum and teachers’ beliefs and perceptions of current F2S curriculum at the STAR school in Leupp, Arizona. Furthermore, the goal of this case study is to identify ways to improve F2S curriculum useability in teaching core subjects by teachers and to improve culturally-relevancy of current F2S lessons available for teachers’ use in the classroom. Teachers at the STAR School will be surveyed via online questionnaire (i.e. Qualtrics) upon receiving their voluntary informed consent before proceeding with the IRB-approved online questionnaire. The project aims to gather qualitative information from teachers to better understand both their needs and students in teaching core subject content and traditional food knowledge through F2S curricula in the classroom. This project is being overseen by my thesis committee members composed of experts in community-led, participatory research, indigenization/decolonization educational curricula development, and agriculture curricula development, respectively. Those serving on my thesis committee include:

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Sincerely,

Jackie Rybin
Appendix D: Follow-Up Question Script

1. Can you tell me more about the information you provided in Question 5 (How would you integrate the following core subjects (i.e. Mathematics, Science, Diné/English Language, English Language Arts, and/or Social Studies) into STAR School’s Garden Lessons curriculum?), where you provided the following response: “[Insert Response]”?
   a. How do you envision yourself utilizing the STAR school’s Garden Lessons with your [specified] grade students during the academic year?
   b. How often would you like to utilize it?
   c. Which seasons do you envision utilizing the Garden Lessons?

2. You mentioned [Insert Response] within the STAR school’s Garden Lessons in Question 6 (What Diné food traditions, culture and language would you like to see incorporated and/or offered within the STAR School Garden Lessons curriculum?).
   a. Can you help me better understand why this is important to you and/or the students you serve?
   b. In addition to [Insert Subjects], which additional core subjects would you like to connect to the Garden Lessons throughout the academic year?

3. What would allow you to utilize the STAR School’s Garden Lessons more often while teaching core subjects and/or Diné food traditions, culture, and language to your students?

4. How do you see your current students benefiting from culturally relevant garden lessons?

5. Is there anything else you would like to add?

Thank you so much for your time and feedback. Your responses will be valued greatly in helping to develop connections between core subjects taught with students and increase overall cultural relevance in STAR School’s farm-to-school (F2S) lessons and curricula.
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