

# **Little Singer Community School Spring 2019 STREAM Family Literacy Night at Birdsprings Chapter House**



This school year Little Singer Community School students, kindergarten through sixth grade, as well as the Family and Child Education (F.A.C.E.) program, learned about and presented on the life of the Navajo loom.



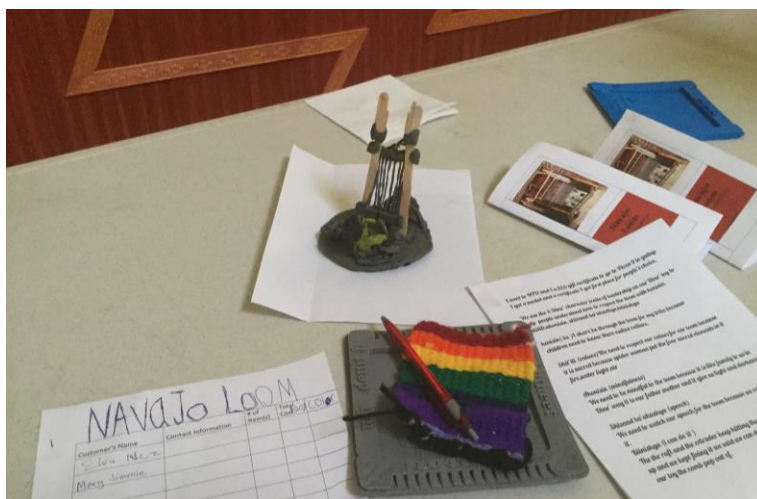
The significance and deep meaning of symbolism within the loom were taught through Navajo and English language instruction. One major message is that not only do we communicate with the loom, but it speaks to us as well. Through informed instructional conversations, our students built literacies necessary to hear the messages taught by the loom.



By design, our instructional design brought forth Navajo rug weaving, and respective history in ways that informed what has been and is Navajo Makerspace and pedagogy thereof. Student presentations over the past two years at our local Birdsprings Chapter House during evening Science + Technology+ Reading, writing, listening and speaking + Engineering + Arts + Mathematics (STREAM) Family Literacy Nights are helping our community build conversations, and strengthen our instruction at LSCS. Intergenerational transferences of knowledge are kindled and cultivated, enhancing the meaning and content being learned.

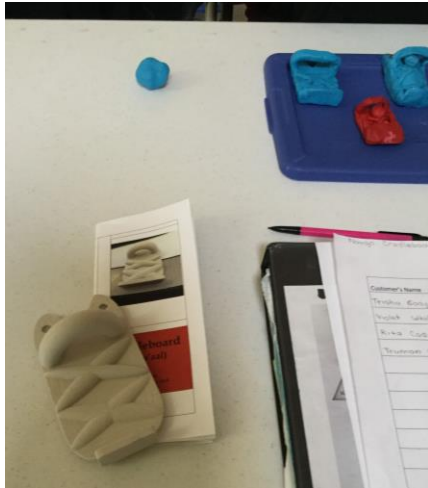


Presenting on the life of the loom and rug weaving occurred at our Birdsprings Chapter House on Thursday, April 18, 2019. The fifth grade student on the left presented his 3D printed Dine' educational toy loom, shuttle, and comb. He superimposed Dine' terminology on the perimeter of his functional toy loom. Plus, he used his small loom to weave a rug about four by five inches with sequential bands of color representational of the rainbow. The fourth grade student on the right presented her completed rug and another in-progress. She also shared background knowledge about weaving processes, pronunciations of related Dine' terminology, and insights gleaned from her multi-generational family history of rug weavers.



During our LSCS STREAM Family Literacy Night, students advertised and sought customers for their Dine' educational toy products. Not only did the product include a student-designed, 3D printed Dine' toy, but also a brochure which outlined what a 3-5 year old child may learn while playing specifically with that toy. Each team of students published a brochure containing the following information:

1. Five Dine' Character Traits of Leadership,
2. Additional related information to be learned,
3. Images of cultural constructs that informed genesis of the Dine' toy.
4. Images of the Dine' educational toy. Perhaps being played with by young children.
5. Company (student team) information,
6. Contact information,
7. Image of Dine' Engineering Design Process and explanation about how it was applied.



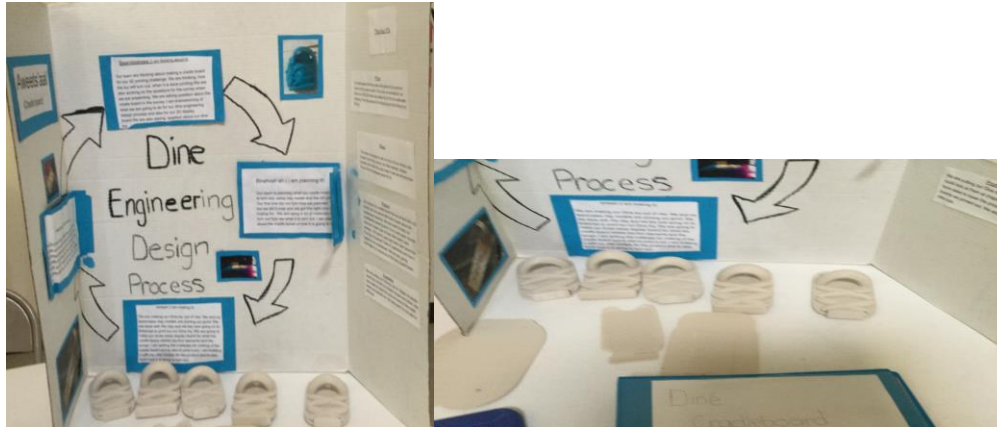
The product to the left tied for First Place All Around in the 2019 KARMA Product Challenge hosted by Navajo Technical University. It shows clay sculptures of cradleboards which is the Engineering Design Process stage preceding the creation of a digital prototype. However, the very first step is that of drawing thumbnail sketches and proportional sketches from different perspectives. The second step was to sculpt the Dine' educational toy using oil-based clay. Students then proceeded to use TinkerCad to generate the digital prototype. This is where they ramped up their efforts in revising their designs before printing a 3D prototype using our LSCS MakerBot printers. Once printed, each team assessed the prototype to determine whether or not they needed to revisit the respective digital prototype on

TinkerCad to revise their product yet again. All printed prototypes were kept regardless of quality to demonstrate how and to help explain why they may have reapplied the engineering design process to improve upon the product.

Student teams also applied a culturally contextualized version of the writing process when drafting and publishing their brochures. The publication reflects research conducted by each team, and occurred online, as well as reading printed resources, and via structured interviews with family, community and school staff. The results of such research informed the substance within the brochure. The digital content of each brochure may later serve useful when teams design websites promoting their product(s).

(Note: One MakerBot Replicator Plus was provided by Indigenous Education Institute and their partnership with NASA's Goddard Space and Flight Innovations Lab along with the Magnetosphere Multiscale Mission (MMS) education department. Our second MakerBot Replicator Plus was provided by the Navajo Technical University KARMA Productions Kellogg grant which supports local creativity, product challenges and entrepreneurship.)

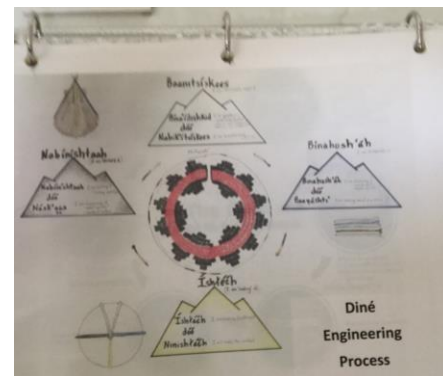




Each student-formed company (aka a cooperative learning group) which needed to not only generate a product, but also a three-panel display board containing information about how they applied the Dine' Engineering Design Process (DEDP) as well as the 4P's of marketing: Price,

Product, Position, and Promotion.

Included along with the display were students' initial sketches, clay sculpted preliminary prototypes, 3D printed Dine' educational toys demonstrating mistakes, revisions, and full application of the DEDP shown below.

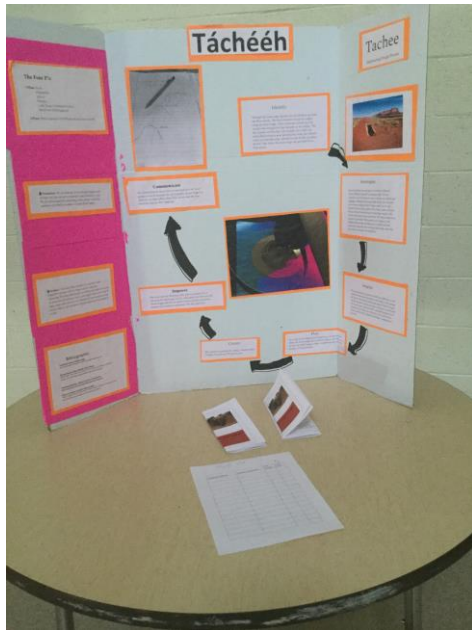




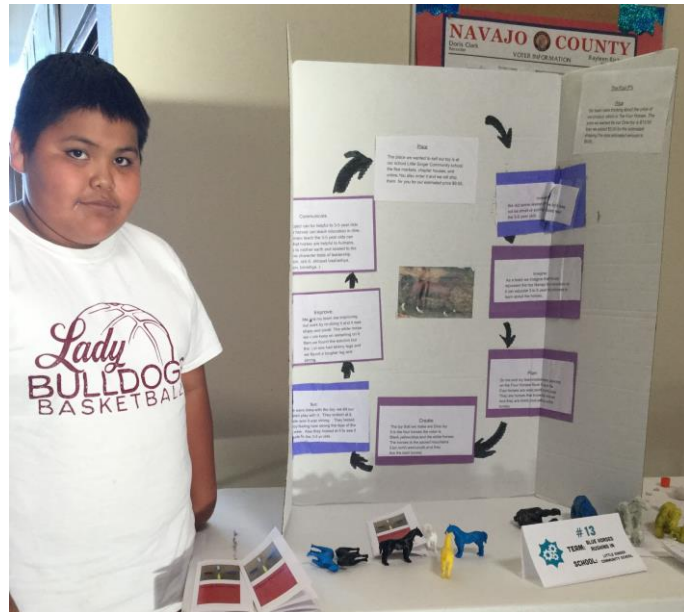
Above, the student-run company, Dinetah, has provided multiple sets of the six sacred mountains, each with the Dine' name of the respective mountain. This Dine' toy earned first place last year for Best Prototype at the 2018 KARMA Product Challenge hosted by Navajo Technical University in Crownpoint, NM.



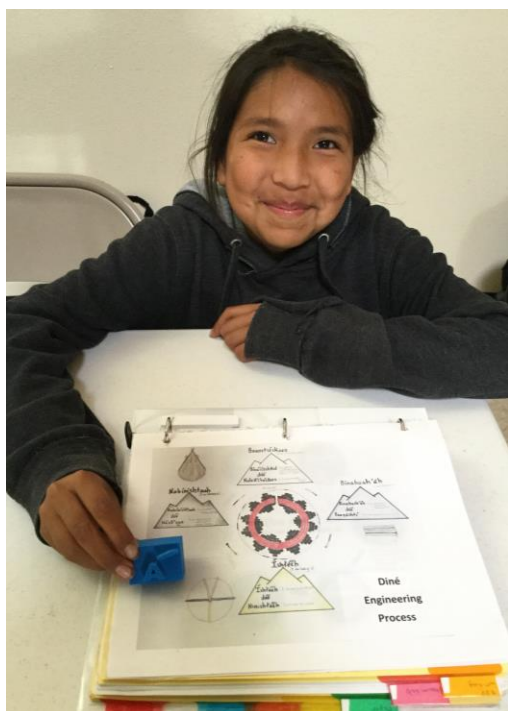
This student is representing her company's livestock corral containing a sheep and a horse. The blue fence panels represent an earlier prototype which didn't meet their expectations so they revised their digital prototype. One idea they have is to apply the DEDP to provide a gate that opens and closes while maintaining the strength and integrity of their existing design.



Another team applied the DEDP to create a Dine' sweat lodge, while yet another team made a female and also a male hogan. The later team took their prototype to the kindergarten class to test their product with the target audience.



This product, Four Horses Rush In was inspired by the poem, titled Blue Horses Rush In by Dine' poet, Luci Tapahonso. Each color of horse represents the four directions in Dine' Philosophy of Life. This team tied for First Place All Around in the 2019 KARMA Product Challenge.



Diné' alphabet blocks, complete with high tones, glottal stops, and nasal sound symbols for the vowels, and consonant letters such as slash 'l' are being designed and produced by the LSCS Diné' Alphabet Company.





This image contains four different interpretations of the Engineering Design Process. The graphic organizer located in the center of three-panel display board with the different colored gears is from Engineering Is Everywhere and efforts by the Boston Museum of Science. The next graphic organizer which influenced our EDP thought processes was from the ASU and DODE collaborative efforts with STEAM Lab.

The students above are featured with their proportionally constructed portable corral. During that instructional unit, students studied various local livestock characteristics, as well as that of portable corrals, then design blueprints with proportional front and top views of a corral their team wanted to create. Next, they used a variety of objects to construct a proportional corral on the top view blueprint. Using the blueprint to inform construction of the prototype. The purple graphic organizer maps out the team's application of the EDP, with student-authored narratives outlining step-by-step decision-making throughout application of the EDP process.



Another team of four girls presented at the STREAM Family Literacy Night on a book they studied, titled *The Boy Who Harnessed the Wind*. Plus, they explained their wind turbine model which won the spring 2018 KidWind Challenge earning them an invitation to the National KidWind Challenge hosted in Houston, Texas of May 2019. These young engineers and scientists investigated wind turbine blades: blade pitch, blade design as informed by Biomimicry, number of blades, surface area of blades, various materials, etc. In addition, these champion engineers studied gear ratios, electromagnetic induction, and much more.

During their preparation for nationals, they will investigate how to use TinkerCad to engineer and design their own gear box, and use a 3D printer to create a viable solution. In addition, they have been comparing and contrasting the EDP with the DEDP in ways that'll help they articulate the similarities and differences between the two processes. Ideas pertaining to Biomimicry will be revisited and new blade designs inspired by Nature will work the way through the DEDP. Our girls are preparing themselves for the National KidWind Challenge!



Earlier this month of April, for five consecutive evenings, from 4 to 8 p.m., our LSCS F.A.C.E. program students and staff participated in a moccasin making workshop lead by Alex Mitchell of Tsale, Arizona. While crafting these awesome moccasins, participants learned about the symbolism and deeply embedded meanings of Dine' culture and the accompanying Dine' terminology and phrases.



During our LSCS STREAM Family Literacy Night, 4-18-2019, the FACE program displayed and presented the various moccasins as well as the details pertaining to construction.





F.A.C.E. program participants also presented clothing fashion designs in the form of ribbon shirts as well as rug weavings. Such creativity and beauty provided yet another dimension of our LSCS Makerspace program.





Our F.A.C.E. program elders also participated in displaying and presenting on products, providing us all with valuable depth of experience within the intergenerational transference of knowledge. In addition, our elders, community leaders, and family members helped build the conversation and conceptual understandings of what is and can be our Makerspace program at Little Singer Community School.



Our STREAM Family Literacy Night culminated with heritage foods served for supper followed by an hour presentation in Dine' by Alex Mitchell about the Dine' moccasin and its significance within Dine' culture and history. Multiple generations of families and community members listened to his stories related to the Dine' moccasins. The collective set of events comprised a wealth of celebrations experienced that evening at the Birdsprings Chapter House during our LSCS spring 2019 STREAM Family Literacy Night.

Future STREAM Family Literacy Nights may include, but not be limited to the following:

1. Greenscreen filmmaking and retelling of Dine' stories...rug weaving, Navajo Solar Eclipse, etc.
2. Arduino and Raspberry Pi starter kits i.e., computer engineering,
3. Drone flying and filmmaking,
4. Filmmaking workshops and filmmaking process: preproduction, production, and post production,
5. Lego Robotics and coding ...Hour of Code,
6. Little Bits electrical circuit starter kits,
7. Beading,
8. Junkyard generators,
9. Solar energy system scientific process of inquiry and engineering design process,
10. And much more!