



## New Greenhouse Allows for Experiential Learning at Red Cloud

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Nestled among a grove of cottonwood trees just past the football field, the sun shimmers off the curving roof of a domed structure in the cool winter air. Inside, natural wood beams and futuristic-looking clear panels join together as intersecting triangles. Despite the cold temperatures and sweeping prairie winds, the newest building on Red Cloud's campus maintains a steady warmth—without the use of any fuel or electricity.

Through generous support from the Toyota USA Foundation, Red Cloud's new greenhouse has everyone, from teachers and students to staff and volunteers, asking questions and looking for ways to get involved.

"The greenhouse gives us flexibility in teaching and learning," says Wendell Gehmen, high school science department chair. "It is important to us that the greenhouse be accessible and provide educational opportunities for all students at all grade levels."

The greenhouse has only been standing for a few months, but those educational opportunities are already presenting themselves.



"I want you to figure out how much energy is stored in the water basin," says Wendell to his senior chemistry class. Before anything begins to grow inside, Wendell is taking advantage of the cold weather to illustrate the science behind the greenhouse's innovative passive heating and cooling system. Using a large water cistern and some strategically placed reflective paneling, the water absorbs the winter sun's heat during the day and releases it back into the greenhouse at night.

"For a botany class, a greenhouse provides a clear and obvious opportunity for kids to work with things that are growing—its hard to have a real discussion about a plant without having a plant there," says Wendell. "But it's also opportunities to use the greenhouse in other classes, where we can explore the interconnections between many science fields, that makes the addition of a greenhouse so useful."

Other teachers at Red Cloud are also looking at ways to use the new greenhouse in experiential learning activities. In the coming months, through a generous gift from the Woape Foundation, students will be designing raised beds for the greenhouse to begin cultivating a variety of plants, fruits and vegetables.

More than 100 miles from the nearest large city, Red Cloud is hours from major grocery stores in what has been called a 'food desert'—where fresh fruits and vegetables are extremely difficult to find. Red



Cloud's health class is hoping to use the greenhouse to address that challenge and to promote community health and sustainability in the process.

Teachers say the greenhouse will show students firsthand how healthy food is grown, how they can grow their own food and, in the future, how to raise seedlings for local families to establish their own gardens.

With the greenhouse's heat-capturing technology, students will have the opportunity to watch different varieties of plants grow all throughout the year, providing countless opportunities for study along the way.

As staff figure out the true temperature range within the greenhouse, Wendell notes that they might try to grow things that typically don't grow in the region, like coffee. However, they will also grow culturally relevant local varieties of plants.

"We have plants [on the reservation] with great medicinal and health benefits," says Ted Hamilton, superintendent of Red Cloud Indian School. "Part of our science curriculum at Red Cloud is for students to better understand their environment—and you really need a lab to do that. That is what this greenhouse will be."



From a purely scientific perspective, Ted believes the greenhouse will become a place for students to experiment with local and non-native varieties of plants. He says people often forget that many of the staples of our diets—pumpkins, corn, and beans—originated through experimentation and cultivation by Native peoples.

"There is a long history of selecting and nurturing seeds, experimenting with varieties and learning how to propagate them for the benefit of society," Ted continues. "The greenhouse will build on this tradition while encouraging students to consider their current needs and interests."

According to Ted, the greenhouse represents a unique opportunity for students to engage with their heritage, consider their place in the environment and work for change. It's a tool, he says, for them to explore the timeless, yet dynamic world around them.

"We've asked for grants around technology in the past," says Wendell. "But the difficulty with technology is that it becomes obsolete very quickly. This greenhouse will always be relevant. It will stand the test of time."