



STUDENTS USE DECISION SCIENCE TO DESIGN A GREENER FUTURE FOR THEIR COMMUNITY

In Omaha, Nebraska, learning about engineering can be an adventure for students. High school and middle school students have the opportunity to participate in the Student Initiative Mentoring Program (SIMP) to develop an engineering proposal with support from a professional in the field. The program is sponsored by the Peter Kiewit Institute and the Society of American Military Engineers. Benson High School Magnet Center for Academic Research and Innovation encourages its students to take advantage of opportunities like this one.

The magnet high school focuses on applying decision science in projects that can help solve community problems. So when the students in Mr. Wichman's Honors Inventions Seminar decided to participate in the SIMP program, using decision science seemed natural. The team of five began work on a design project that would emphasize six areas of merit: applied science, innovation, research, team work, technology, and sustainability.

Their decision frame was this: "Use engineering to come up with something to help the community, with a focus on being green." The focus on sustainability had recently been added in the SIMP program, and this was very consistent with the students' values. As they began their research on alternatives, the students discovered a plot of land that was open in a growing part of their city, adjacent to the site of an old landfill.

No longer functioning as a landfill, the site has been equipped with facilities to harness the methane gas produced from the decomposition of materials under the ground. The students became intrigued with the idea of burning this gas in a cogeneration facility to utilize its energy efficiently.



Team members Ricki and Chad contemplate decision quality

With their frame clarified to include utilization of the former landfill, and with their values aligned around the environment, the team members began brainstorming alternatives. They quickly became interested in a design that would include a self-sustaining suburb that would sit atop the capped landfill. However, when they invited a landfill expert to review their ideas and provide his perspective, they learned that safety concerns and other issues made such a design infeasible. Ricki, the team's leader, described the process of gathering information from the manager of a nearby landfill. "Our ideas were up in the air, and he just shot them down one by one. Then he got us focused on a project that's doable."

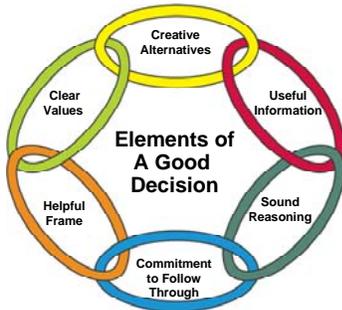


As the team continued exploring their frame, values, and alternatives, new information surfaced about the Omaha school district's plans to create a Learning Community Center. While no details were available about the project, the students found themselves drawn to the idea and decided to develop their own design. Their newly refined frame:

How do you incorporate learning and social experiences for both children and adults in the same environment to create an intergenerational experience?

In their project proposal, the students described a site plan that includes an elementary school complete with a green roof and green house for conservation and study. The plan also includes a library, open to the school and to the larger community, constructed from recycled and recyclable materials just like the school itself. The center of the complex would include a parking lot that would serve both buildings. Following completion of the school and library, two more buildings would be added

to the north: a community center with fitness facilities, and a convention center designed to host events featuring green topics. All of these buildings would feature sky lights, solar panels, and utilization of exhaust heat and steam from the landfill. High-level timelines and budgets were also included in the team’s proposal.



By this time, the team had completed their decision process:

- The frame of the problem had been defined.
- The team’s values were clear.
- Several alternatives for the major design had been considered.
- Information had been gathered and synthesized.
- Sound reasoning had been applied.
- The team had committed to complete the design and the competition.

Now came the time for follow-through.

The team was faced with some challenges in completing their project. Because of scheduling conflicts, only two of the original five team members, Ricki and Chad, continued in the Inventions seminar for the second semester. Still, working before and after school, the team found time to finish the proposal, complete the design, build a model of its layout, and construct a display summarizing the community center’s features.

Team members Mike and Vandra joined Ricki and Chad for the competition presentation. Their teacher Mr. Wichman provided coaching as well as moral support as the students headed to the campus of the University of Nebraska at Omaha for the judging.



Chad, Vandra, Mike, Ricki, and Mr. Wichman at the competition

The students presented for twenty minutes before a panel of four judges, all professional engineers from the Omaha community. In the presentation, the students addressed their motivation for the decision frame they chose, the insights they gained in their decision process, and the conclusions they reached about the importance of green engineering and how it can be done. They also answered questions from the judges, toured of their physical model, discussed the plans already in place for schools and libraries near the proposed location, and explored the importance of budgeting. The judges were pleased that the three seniors, Ricki, Chad, and Mike, all plan to go into engineering or architecture next year. Vandra has two more years to make her decision about what to do next.



After their presentation, the team answered questions from the public in a reception for all competing teams. Later, the Benson students received silver level recognition for the innovation they had applied in their project.

In addition to learning about engineering and the environment, the students also had fun with the project. And decision science helped.

“Decision science kept the students interested and motivated,”

says teacher Matt Wichman, “by allowing the team to continue moving through the project as setbacks occurred rather than starting over at the beginning of a rigid problem solving process.”

Now, having completed their project, the students can recognize the many key points they learned and begin thinking about where they will apply decision science next!

