



# Application Story

STARBASE AND DIMENSION ROCKET ELEMENTARY STUDENTS' DESIGN SKILLS TO NEW HEIGHTS

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*– Christina Johnson, Instructor,  
STARBASE Minnesota*

## CASE STUDY



For many grade-schoolers, talk of mathematics and science invoke a nearly universal response: yuck.

At STARBASE Minnesota, a non-profit educational organization serving nearly 4,000 students each year from more than 30 inner city schools in Minneapolis and St. Paul, instructors have found an assignment that eliminates this aversion – have the students plan a mission to Mars that includes building working rockets.

The program's aerospace-themed curriculum provides a technology-rich environment that inspires students, builds their skills and develops aptitude and confidence. STARBASE Minnesota – largely funded by the Department of Defense and sponsored by the Minnesota National Guard – was established in 1993 to generate excitement and interest in science, mathematics and technology. The program engages students in an intense, five-day, 20-hour program that is aligned with the national and state standards and helps schools meet essential educational benchmarks.

### **Dimension 3D Printing Accelerates Learning**

Although the program had seen substantial growth and success since its inception, supporters and instructors wanted students to experience the work of engineers in a more authentic way. After spending a week designing and creating models on the computer screen, students left with only a two-dimensional image.

In April 2007, the Department of Defense stepped in and supplied STARBASE sites with Dimension 3D printers through First Technologies, Inc. First Technologies is a Dimension authorized reseller that provides curriculum, computer hardware and software, lab equipment, lab furniture and training across the states of Wisconsin, Minnesota, North Dakota, and South Dakota.

Instructor Christina Johnson, now in her eighth year with the program, has her students designing their own model rocket fins. "They first learn about the science behind the fins and test different rocket parts throughout the week using the wind tunnel and air rockets," said Johnson.

The week is centered on planning a mission to Mars and the culminating project is to launch a working rocket. Students build their rockets using CAD software. Fin designs are then printed on the Dimension 3D Printer and attached to the rockets on the final day of the program – the day students get to take their rockets outside for an explosively exciting day of blast-offs.

After the rockets have completed flight, the students collect data about where the rocket lands and map the locations on Google Earth. They then discuss the results as engineers would and have conversations about how fin designs affected the rockets' flight paths.

### **A High Flying Success**

"It's amazing the impact of having the Dimension 3D Printer in the classroom," said Johnson. "We knew the kids would love this exercise, but what's been most surprising is to see how excited the instructors and other faculty get when they see rocket parts come to life in the Dimension 3D printer."

Johnson has noticed students' discovery of a connection between the results and their design once they see their design tested in flight. "It carries further in their education and their interest in engineering, which, statistics show, is increasingly important to the future of education."



“Students can actually test their rocket designs modeled in the Dimension 3D Printer the way an engineer would, which gets them excited about the process – even the icky math part,” said Johnson.

Multiple STARBASE instructors are also able to create models in the printer to enhance their curriculum where they otherwise couldn't. For example, instructors were able to take advantage of the Dimension 3D printer and replace pieces of a new rocket launcher that were not functioning effectively.

“STARBASE serves up to 115 students each week, and it never ceases to amaze me the genuine excitement and pride on each face as they launch their rockets,” Johnson said. “It's a real sense of accomplishment for them, and for us as instructors. The Dimension 3D printer has played a major role in helping both students and instructors find success in this program.”



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