

# Stop the Spread

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## *Challenge Problem and Resources*



### **Developed by:**

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## 1. CHALLENGE PROBLEM: STOP THE SPREAD

Due to the lack of snowfall during the winter of the 2011 – 2012 school year, many school districts in the Midwest did not have to close down for a single snow day. Escaping the threat of snowfall, most districts thought they would survive the winter without having to use any of their calamity days. But having students remain indoors in constant contact with each other can prove to be as much of a threat to their well-being as the dangers of driving in the snow. The threat can come in the form of a highly contagious virus. Valley View Local School District, located approximately 15 miles west of Dayton, had to use two of their calamity days to close down the entire district after being hit by the highly contagious norovirus. According to the Dayton Daily news, Valley View Primary School, located in Germantown, Ohio had 172 students fall sick out of a student population of 550. Out of a staff of 30, nine of the teachers became ill as well. That same article quotes Mrs. Sherry Parr, the Superintendent, as saying that there were a “smattering” of students out at the intermediate school and a “typical amount” of students absent at Valley View Junior High and High School. Due to the highly contagious nature of the virus, it spread quickly through the community resulting in the entire school district shutting down for a Friday and the following Monday in order for students and staff to recover. The district used this time to disinfect classrooms and buses. Across the country, this scene was replayed in daycare centers, nursing homes, cruise ships, and many other facilities with lots of person to person contact.

The norovirus does not discriminate. According to the Centers for Disease Control and Prevention, noroviruses are the most common cause of gastroenteritis and there are about 21 million illnesses in the United States each year. The norovirus contributes to about 70,000 hospitalizations a year and approximately 800 deaths. Symptoms of the illness include vomiting, diarrhea, and stomach cramps. Most episodes last from 2 to four days. Even after a person is feeling better, he or she may be contagious for from three days to two weeks. Children can be contagious for a longer period of time than adults.

The challenge is two-fold. First, come up with a way to model the spread of the virus. Note: A virus other than norovirus may be modeled. This may include, but is not limited to a gaming engine, software, or a physical model. Once the model is developed, come up with an interactive way for the user to slow down or decrease the spread of the virus within the modeling software. The user should be forced to make some decisions along the way and see how the decision impacts the spread of the virus through the community.

## 1.1. THE TOOLS

Some possible tools to design a dynamic, virtual model are listed below. Do some research on the virus that is modeled and take into account how a virus spreads. For example, the norovirus takes less than 100 viral particles to infect someone and a sick person can shed billions of particles. Any surface they touch becomes infected and needs to be disinfected with a bleach solution. The virus can live on a surface for up to 21 days. Take into account the normal contact students have throughout the day and the population of the school you are modeling.

- Cryengine®
- Excel
- MATLAB
- Scratch
- Source
- Unity
- SciLab

## 1.2. THE SOLUTION

Create an engaging, informative, interactive model that demonstrates the spread of a virus through a school environment and allows the user to interact with the model to slow down its spread in hopes of educating the public and being more prepared to deal with the virus when it hits. After running the simulation, the user should not only have a better understanding of how a virus spreads, but take the appropriate precautions in the future to reduce the risk of contracting and passing on the virus.