
**PRINCETON PUBLIC
SCHOOLS TAKES MATH
TO THE NEXT LEVEL
WITH AOPS ONLINE AND
BEAST ACADEMY**

**ART OF PROBLEM
SOLVING**
CASE STUDY



AoPS Art of Problem Solving

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OVERVIEW & APPROACH

Incorporating problem solving skills into rigorous instruction

Starting in 2016, Princeton Public Schools in Minnesota began seeking ways to build its accelerated math options with the primary goal of helping students develop high-level problem solving skills. In addition, parents were actively encouraging the district to ensure that the curriculum was appropriately rigorous and set up to challenge students in varied and meaningful ways.

To address these needs, District

Coordinator of Advanced Academics Samantha Heitke initiated a plan to introduce Beast Academy, a full elementary math curriculum developed by Art of Problem Solving (AoPS), which had been well-received in her prior school district. Advanced fifth grade math students in Princeton began using Beast Academy as their core curriculum, while students in second through fourth grades used it as a supplement to classroom instruction.



IMPACT

“Beast Academy really challenges the students in an exciting way, and it has also led to a major perspective change for our participating teachers in realizing how they can teach math differently,” said Heitke. “Students may take an entire class period to solve particularly challenging and interesting problems, and this type of sustained focus and collaborative effort really helps to improve resilience and growth mindset.”

The district’s implementation of AoPS curricula extended to the middle school in the 2018-19 school year, with a small group of sixth grade students taking Prealgebra 1 and 2 through AoPS Online. Students in this course received math instruction via a flipped classroom model – one evening per week they attended a 90-minute online course taught by expert AoPS math instructors, including professors from universities such as MIT. They then met during the school day as a class five days a week with a Princeton faculty mentor to work through practice problems and additional assigned work using the AoPS textbooks.

The implementation of AoPS courses for sixth graders has created a pipeline of students who will continue to use AoPS content throughout their middle school math program. At the beginning of the 2019-20 school year, the multi-age class includes 6th-8th grade students. The faculty mentor and Heitke note several key benefits, including the following:

- Much higher levels of student excitement and enthusiasm.
- Engaging learning materials both in print and online, with an emphasis on understanding the full solution and learning path, including steps and



- reasoning involved.
- Hands-on professional development for teachers who were learning a new way to teach math.
- Opportunity for students to think and act like true mathematicians because materials require students to abstract and generalize; discern mathematical structures; manage data; and master principles of logical thinking and inference.

IMPACT

Parents have also noticed the positive impact of both Beast Academy and AoPS Online on their children. When asked about their children's experience with Beast Academy this year, one parent said, "In many ways this course will, and has been, a key factor in my child's success in school and beyond. His confidence and engagement has soared. Prior to the course, he was bored in school and acquiring negative (lazy) learning habits. I love seeing him thrive and enjoy the challenges and successes this course provides!"



Another parent said, "We loved it! He has been so engaged and excited about math. Prior to this experience, he was missing assignments and just had the 'I don't care' mentality. This has made him change his whole view on school, and he loves it."

Students have also responded with enthusiasm to Beast Academy. "It, overall, has been the greatest math class I have taken ever," said one student. "Using comic strips to teach math worked superbly! Taking a child's fun hobby and turning it into a learning tool is genius!"



FUTURE OUTLOOK

Expanding programs for high school

Next year, the district plans to expand its use of AoPS Online into the high school program. Students who participated in AoPS Online in middle school will take the AoPS courses for Geometry and Algebra II prior to taking AP Calculus.

“After receiving day-to-day guidance from a Princeton faculty mentor in middle school, the high school students are ready to be more independent,” said Heitke. “They will practice using video conferencing to connect with the mentor, as needed. Learning to proactively reach out when they need help is another critical skill to their success after high school, in college and their careers.”

“Perhaps one of the most notable advantages of using Beast Academy and AoPS Online is the fact that we have the opportunity to challenge our students to become advanced problem solvers starting at a young age and are able to further develop their capacities each year,” said Heitke. “Their excitement is palpable, as they are experiencing the pure joy of learning math at a level for which most kids, and even adults, will never be ready.”

Samantha Heitke loves to talk about the success that Princeton Public Schools is having with AoPS programs and can be reached by email at samantha.heitke@isd477.org.

