

Kettle Moraine High School

349 N. Oak Crest Drive

Wales, WI 53183

Principal: Tanya Kotlowski

Kettle Moraine is a comprehensive high school located 25 miles west of Milwaukee, Wisconsin. The U.S. Department of Education recognized Kettle Moraine as a 2001–2002 National Blue Ribbon School of Excellence. In 2003, in response to a request by the district’s board of education, the mathematics department began researching new programs.

- ◆ High (9-12)
- ◆ 96% White
- ◆ 1% African American
- ◆ 2% Hispanic
- ◆ 1% Asian
- ◆ 4% free- and reduced-price lunch
- ◆ 10% Special Education/Disabled

A pilot of one nontraditional algebra course by the department chair, Charles Willems, showed that the program contained many effective instructional strategies that supported students who traditionally struggled. The school eventually adopted the new mathematics curriculum, adding new courses each year and providing training for its teachers. Since implementing the new program, the school has seen a rise in mathematics achievement, increasing the number of students scoring proficient or advanced (from 82% to 91%), while decreasing the number of students scoring minimal or basic (18% to 9%) on the Wisconsin Knowledge and Content Examination.

Staff believe the new curriculum’s focus on review is essential to helping students retain material and build mastery over time. Homework assignments are structured to include 4–5 review topics in addition to the current topic being studied. As Willems explains, “We really like the spiraling effect that takes place naturally in the textbook set-up...There are definitely fewer kids failing, higher scores on exams, and less time spent at the end of the year cramming for the final.” Teachers also design tests that include 50% review problems and create daily quizzes to go over topics from previous chapters to support a culture of review and increased mastery over time. One teacher, Matt Forbes, tracks the daily quiz grades by topic through an online grading system and shares the data with students to help them identify problem areas that need more strategic study.

Other innovative features of the math curriculum include the use of small group activities to engage students in explaining their process and thinking for solving problems. Students are asked to explain “why” and “how” they arrive at solutions in their written assignments. Teachers look for accurate answers but also probe for student understanding of the mathematical concepts through the use of higher-order questions that ask students to justify or explain the answer.

The program also makes use of manipulatives, visuals, and real-life scenarios as concrete connections for some of the more difficult, abstract mathematical concepts. For example, algebra tiles are used to show the process of “foiling,” or combining integers. The visual representations help students overcome common misconceptions or errors and are useful in teaching math concepts to struggling students. Once the use of graphics and models are used to illustrate an idea in detail, teachers move to a more abstract formula or shorthand that can be used more efficiently. Another way teachers make concrete connections for students is through closure activities at the end of each unit. In these assignments, students must apply what they have learned to real-world activities that adults use as part of daily life or work.

Teachers at Kettle Moraine alternate worked problems with student practice when introducing new material. A lesson often begins with the teacher modeling at the board in a step-by-step fashion before proceeding with student practice in pairs or small groups. The class will review the correct answer and procedure before the teacher models a second problem. Teachers will circulate around the room to check for correct answers or leave worked solutions for students to check as they complete practice problems. Repeated opportunities for student practice are alternated with whole class discussion, small group work, or individual checks on solved examples, which minimizes the chances of students reinforcing incorrect procedures.

To help create student and parent buy-in for the new curriculum, Kettle Moraine staff implemented several key strategies to ensure a successful transition. The department holds a Math Night each year to educate parents about the philosophy and components of the mathematics curriculum, which are outlined in a brochure. Parents hear from teachers as well as a professional development trainer, and participate in simulated class activities to experience the curriculum firsthand. A walk-in Math Lab serves as an early intervention for struggling students who need extra time or help to master the material. It is staffed by classroom teachers, and is open every period of the day as well as before and after school. In addition, all families have access to parent guides, free access to homework answers online, and additional skill builder homework sets that can be used for strategic review of topic areas.