



# Flipped Learning Model Increases Student Engagement and Performance

Byron High School, Byron, Minnesota

Foundations of Flipped Learning™

## Demographics

- › Rural/suburban school in greater Rochester area
- › Grades 9–12
- › 32 teachers
- › 525 students
- › 11% free and reduced lunch
- › 95% white
- › 8% special education

## Challenge

In 2006, when only 30 percent of students at Byron High School were rated as proficient in math on the Minnesota Comprehensive Assessments, the math teachers committed to a process of continuous improvement. In 2009, however, Byron High School faced substantial budget cuts. The school was unable to replace its outdated math textbooks, although the books no longer matched state standards and were not meeting student needs.

According to Troy Faulkner, the math department chair, “We needed to change our curriculum, but there was no money available. So we decided to write our own.” Recognizing that they would need new resources, the math teachers created units aligned to state standards and based on student data. They also recorded all their lessons and posted them online during the summer of 2010 so the lessons would be available for students in the fall.

Over the summer, when one of the math teachers, Jen Green, came across the pioneering work on flipped learning by Jonathan Bergmann and Aaron Sams, the team realized that the flipped learning model could take their work to a whole new level.

## Implementation

In the fall of 2010, Mr. Faulkner piloted flipped learning using one unit in each of his math classes in grades 10, 11, and 12. He liked the flipped learning model right away. “With flipped learning, students were actively doing math rather than passively watching me do math on the interactive whiteboard,” he said.

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In the spring of 2011, encouraged by improvements in student engagement and performance, Mr. Faulkner switched to the flipped learning model in almost every one of his classes, and the other math teachers began to make the transition as well. Teachers recorded their classroom lectures, posted them online, and assigned the videos for homework. In class, they worked with students on individual and group assignments.

In January 2012, when another math teacher, Rob Warneke, came across Eric Mazur’s book *Peer Instruction: A User’s Manual*, he and Mr. Faulkner decided to try the methodology, since peer instruction was an integral part of the flipped learning model. Students answered questions individually and worked in groups to try to convince their peers that their answers were correct, and the teacher quickly went over the answers with the whole class. Peer instruction soon became part of the flipped learning model in every math class.

Mr. Faulkner now implements flipped learning in every course, right from the start. In January 2013, when the first two days of a new course were snow days, he sent an email to all his students, including new students he had not met, asking them to watch the online videos at home and do the homework. On the first day back in school, one class took a quiz on the material. “One of the many benefits of flipped learning is that we don’t have any downtime due to weather,” said Mr. Faulkner.

Flipped learning was soon adopted by middle school math teachers in the district and is now spreading to social studies, science, and English. “Math is the most flipped subject area, but the others are in process,” said Mr. Faulkner.

## Results

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Flipped learning has been a success with teachers, students, and parents. In surveys administered by Byron High School math teachers, 87 percent of parents and 95 percent of students said that they preferred flipped learning to the traditional lecture format. Some students said they preferred interacting with others to sitting through classroom lectures, others said they liked re-watching the videos when they needed to, and still others said they appreciated always having help available.

Teacher-student relationships have improved with the implementation of flipped learning. “We have been able to build better relationships with students because of the increased one-on-one time in the classroom,” said Mr. Faulkner, who is now training other educators as part of the Foundations of Flipped Learning™ course developed by the Flipped Learning Network.

The gains that can be obtained from flipped learning are clear when results from Mr. Faulkner’s math classes from 2007–2010, when he used a lecture format, are compared with the results from 2010–2013, when he used the flipped learning model. The number of students scoring proficient or above in Algebra 2 increased by 12 percentage points, in pre-calculus the number increased by 11 percentage points, and in Calculus I the number grew by 9 percentage points. “The increase in Calculus I proficiency is a testament to flipped learning, since students are coming in with significantly lower test scores but outperforming students who learned calculus the old way. More students are now taking the higher-level math courses because their overall proficiency has increased,” said Mr. Faulkner.

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In 2011, Byron High School was named an Intel School of Distinction, in recognition of the school’s exemplary instruction in math.