



# Science 2.0

February 2013, Using Web Tools to Support Learning

Eric Brunsell and Martin Horejsi

## A Flipped Classroom in Action

Our February 2011 column explored the flipped classroom of chemistry teachers Aaron Sams and Jonathan Bergmann. Their students watched lectures at home via video podcasts, freeing up precious class time for more active learning experiences. At the time, the flipped classroom approach was almost five years old and had a strong community of implementers. However, it was only beginning to crack the educational mainstream.

Now, two years later, the flipped classroom approach has exploded. Famous people ranging from *New York Times* columnist Thomas Friedman to Microsoft founder Bill Gates have written and talked about the approach in glowing terms. Bill Nye “The Science Guy” recently said that flipped classrooms are “changing the world.” That might be hyperbole, but the approach does hold promise, not because teachers are showing videos, but because they’re replacing passive learning with more laboratory investigations and collaborative problem solving.

Consider Dave Kawecki, a physics teacher in Wisconsin. Last spring, he studied the impact of flipping a unit on magnetic fields. During the two-week unit, he found or created 16 videos and transformed how he used class time. Kawecki collected data on his implementation using the unit test, surveys, and interviews, and by keeping a teaching journal.

Kawecki’s students responded well. Nearly all of them found the video lectures helpful for building understanding, and at least half indicated they liked being able to replay parts or all of the video until they understood specific concepts. During interviews, students said they liked watching the videos to prepare for class and appreciated how the videos freed up class time for activities that helped them understand the content.

That last point is particularly important. Showing video lectures alone is not flipping your classroom—you also need to increase active learning experiences. Kawecki found that he almost doubled the time—from 19 minutes to 36—devoted to hands-on activities and small group problem solving. This allowed students to get more help from their classmates and teacher. Before Kawecki flipped his classroom,

only two-thirds of students said they had enough time to get help. During the flipped unit, nearly all (96%) reported having the in-class time they needed. Additionally, three-quarters of students specifically stated that they learned from their classmates during the increased time devoted to problem solving. On the unit test, students performed equal to or better than students in previous years.

Although results of the flipped unit were positive, some struggles arose. Nearly a quarter of students self-reported that they didn’t watch many of the videos. Kawecki noticed that these students often bogged down his daily introductory discussion. These same students were unprepared to participate in hands-on activities and collaborative problem-solving exercises. Students that were prepared said they were frustrated when having to explain concepts to their unprepared classmates.

Kawecki has begun to address this issue by giving regular online and in-class quizzes on the video content. In addition, he now gives a brief preview of the assigned videos at the end of class to raise student interest. Students requested that he include a brief reading assignment to accompany the videos. Finally, Kawecki has started using a “movie ticket” as a formative assessment at the beginning of each class. Students are asked to identify the big idea and any areas of confusion from the assigned video. This adds a layer of accountability and allows him to follow up with students in large or small groups as needed.

Kawecki found that his experience met the flipped classroom hype. He was able to almost double the time that students engaged in active learning. His students had more time to collaborate with each other. Kawecki saw the benefit of having more “teachers” in the room as students often used peer-friendly language while helping each other. He found that “the ‘flip’ is a refreshing and very effective way to give students more productive time in class to help them learn.”

*Showing video lectures alone is not flipping your classroom. You must add active learning experiences.*

*Eric Brunsell (brunsele@uwosh.edu) is an assistant professor of science education at the University of Wisconsin in Oshkosh; Martin Horejsi (martin.horejsi@umontana.edu) is an associate professor of instructional technology and science education at the University of Montana in Missoula.*