Shifting teaching towards conceptual understanding and productive struggle: Worthington City Schools’ implementation of CPM

In Worthington City Schools (WCS), the district’s number one goal for students and faculty is alignment with standards. For students, WCS particularly emphasized the state’s adaptation of the Common Core’s eight standards for mathematical practice that support conceptual understanding and productive struggle. For faculty, WCS emphasized the eight ambitious teaching practices described by NCTM, as well as teaching for the eight standards for mathematical practice for students.

Prior to this district’s adoption of CPM in the 2016-2017 school year, WCS’s mathematics curricular materials were procedurally based and did not align with the state’s math learning standards. Before adopting CPM, the district attempted to align teaching to standards by giving teachers flexibility to adapt curricular resources as needed, but this resulted in highly variable teaching practices within school buildings, as teachers down the hall from each other might teach the same course in different ways. This impacted both teachers and students in undesirable ways.

As the district began searching for a new mathematics curriculum, teacher’s voices were amplified in the decision making process. First, district leadership narrowed down viable options for meeting district goals, and then 16 teachers vetted and piloted two curricula. After piloting CPM and Curriculum X (a pseudonym), the piloting teachers unanimously noted that either option was better than their current situation of makeshifting alignment to standards. Importantly, multiple teachers noted that CPM would more strongly support them to be fully aligned with standards and to engage in the eight formerly mentioned teaching practices and standards for mathematical practice. While Curriculum X did include support for conceptual learning, the teachers felt it would be much easier to inadvertently adapt that curriculum in ways that maintained their status quo of teaching for procedural mastery.

During piloting of CPM, district leadership observed significant growth in teachers’ practices, especially in relation to two mutually supportive aspects of instruction: questioning towards conceptual understanding and supporting productive struggle. Teaching in this way involved a dramatic mindset shift, as previous goals for instruction involved supporting students to solve similar problems quickly and efficiently, while new goals for instruction involved supporting students to make sense of a small yet purposeful set of complex problems and persevere in solving them.
Understandably, increasing the rigor and struggle in classrooms does not come without some pushback from students and parents. The district has taken a strong role in supporting these critically important stakeholders to see the increased struggle in math classrooms as not just an increase in struggle, but as productive struggle. WCS leadership understand that a big part of their responsibility in supporting mathematics learning is to help students and parents understand that, unlike in the past, mathematics is now understood to be a subject in which confusion and perseverance are evidence of “doing it right.” In other words, if a student is not challenged enough to need their peers as resources for solving a task, the mathematics task is not likely to support learning. By using “big picture” representations of how WCS students performed on exams after adopting CPM, district leaders are able to mediate conversations with students and parents concerned with the new, higher level of struggle happening in mathematics classrooms. In one such conversation, Tom Kaczmarek, the district’s Mathematics Curriculum Leader, used such representations to show an upset student who historically struggled in math even before CPM that,

“She had been successful in [CPM] math, it’s just that what she had perceived as confusion is actually what it feels like to make sense of a problem and persevere. We just needed her to know it is okay to feel that.”

In sum, creating transparency around data and instructional goals allows WCS to support both students and parents in making sense of standards based mathematics.

Between adopting CPM and the time of this report, WCS has seen a dramatic increase in student performance within cohorts of students. When looking at where WCS students fall on a normal curve as compared to the state on standardized exams (NCE scores), students have grown year-over-year. The 2015/2016 – 2018/2019 NCE average score trendline (Figure 1) and the distribution MAP scores of the 2018/2019 8th grade cohort (Figure 2) are shown below. CPM was initially implemented during the 2017/18 school year.

Figure 1. Ohio State Test
WCS’s success with CPM is unique to them, but it is not an outlier. CPM is always looking to highlight districts and schools that are doing good things for students and teachers. If you would like to share your CPM story, please reach out to research@cpm.org. More Math for More People!

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