Implementing Digital Math Curricula

Indiana educators share their experience of replacing math textbooks with digital materials.

By Zach Foughty and John Keller

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Across Indiana, a number of schools have thrown out their textbooks and have embraced the use of digital curricula in their mathematics classrooms. Teachers involved in Indiana's Classroom Innovation Grant for Mathematics classrooms have shifted to a digital math curriculum as part of a state-funded exploration of textbook alternatives and discovered that the digital curriculum can allow students to proceed at a pace that is appropriate for them. The more-personalized learning has enabled some students to accomplish a year's worth of curriculum in just a few months.

Digital curricula are fundamentally changing the interactions of teachers and students. As the pilot progressed, teachers found that they spent less time grading and more time on data analysis and planning for customized instruction. "I feel more like a coach than a teacher," said one Indiana middle school educator. The shift is motivating teachers to move from classroom practice in which technology use was on the periphery to a learning environment that is infused with digital curricula.

Classroom Innovation Through Digital Curricula

In February 2009, the Indiana State Board of Education approved the use of digital curricula as a replacement for or alternative to traditional textbooks. Following this "textbook waiver," schools across the state have been experimenting with nontraditional curricular approaches.

In April 2010, the Indiana Department of Education awarded Classroom Innovation in Mathematics grants to 18 school corporations (districts). The grants provided funds and support for schools to pilot digital curricula in math classes for grades 6–8 math and Algebra I. Schools were given the flexibility to choose any digital curriculum program, but all chose one of the following: Agile Mind, ALEKS, Compass Learning, or iCore. The programs provide curricular materials that allow teachers to adjust their instruction and interactive modules that students can complete independently.

The implementations have been vastly different from one corporation to another. Some schools leverage their existing one-to-one programs to increase the amount of time students spend with computer-directed instruction, and others rely more on teacher delivery of digital content but have a dedicated mathematics computer lab for weekly computer-based instruction.

Along with funds for the purchase of digital curricula, schools received funds to purchase interactive whiteboards, which provide teachers with an additional tool to deliver digital content. In schools that have one-to-one computing, the teacher still remains an integral part of the learning process. In nearly all implementations, there is a healthy mix between teacher-guided and computer-guided instruction.

Through technical assistance visits, we have observed teachers' enthusiasm for the digital curricula. At the heart of this transformation is the move away from a one-size-fits-all model to a model of customized and personalized learning. Transformation does not usually come in tidy packages, but we believe that documenting our process is an important part of the journey.

Shifting Toward Individualized Instruction

Some of the schools we've visited are moving away from whole-group instruction and toward individualized learning progressions for each student. Differentiation is an amazing concept, but it is extremely hard to differentiate instruction effectively in a whole-group setting, especially when a classroom may have 30 or more students. By coupling digital curricula with one-to-one computing, students in some schools are able to work at their own paces and on the mathematical concepts that they are ready to learn—a shift especially needed for exceptional learners. This is in contrast to many classrooms, in which a predetermined schedule establishes what part of the curriculum all students should be ready to learn.

The role of the teacher has become more focused on understanding the progress of individual students and less focused on modeling effective practices for the whole class. Teacher time outside of class is spent using student data to develop lessons for small-group instruction instead of trying to develop a robust lesson plan on a single concept that may or may not be effective for all students.

Allowing for a Proficiency-Based Credit System

A natural consequence of individualized learning paths is that high-ability students are finishing courses in much less than a year. During a visit to a middle school Algebra I course, we observed a student who had already mastered nearly 60% of the standards for the year—by September. A principal recently called to ask what to do for the next seven months with students who have already mastered all of the content from Algebra I. Schools are discovering that such "problems" caused by digital curricula can also be solved with digital curricula that allow individually tailored learning paths. In classrooms that use digital curricula, students will receive credit for Algebra I and move on to either Geometry or Algebra II, but they won't have to switch classes.

Enhancing Effective Instructional Practices

Although some technology implementations in mathematics classrooms are viewed skeptically as "teacher replacements," Indiana educators view the digital curriculum as a "teacher enhancement." The word *enhancement* is carefully chosen: digital curricula won't necessarily turn an ineffective teacher into an effective teacher, but it should make it easier for teachers to implement effective instructional practices. We've informally observed that regardless of the choice of curriculum or the implementation plan, the quality of the teacher—and the willingness of that teacher to adapt—plays a large role in the success of implementation. Simply put, great teachers can make any tool work in their classrooms, and ineffective teachers will struggle to use even the greatest of tools.

Supporting Teachers

Teacher "buy-in" is essential to the success of the program. The best implementations we've seen have been in corporations (districts) in which the teachers played an important role in the decision-making and grant-writing processes. This is especially true for secondary mathematics teachers, who tend to be fairly averse to using technology in their classrooms.

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Many mathematics teachers may be uncomfortable with the use of technology, and tensions have risen between administrators and teachers in corporations in which the teachers felt forced to use tools with which they were uncomfortable. As great as the technology may be, it's guaranteed to be ineffective if it's sitting on a shelf, so professional development and collaborative efforts are necessary to support and encourage teachers.

Professional Development

Opportunities for teachers to understand how the technology can be used effectively and what the impact on student learning can be is vital to them using it well. A digital curriculum is not simply a textbook converted to PDF, and it should not be used like a textbook. The changes in focus and teacher practice do not come naturally—teachers and administrators must know how to effectively use the technology to support these changes. The following are a few questions that should be answered before implementation:

- How do I manage a classroom where not all students are working on the same task?
- When I have more data, what will I actually do with it?
- How can I identify trends in data for subgroups, instead of recognizing only specific problems for specific students?
- What can I do with this technology that I couldn't do with a traditional textbook?
- What do I lose by giving up my textbook? How does this affect the way I teach?

Learning Communities

The schools we've been most impressed with are those where there is schoolwide support. For example, a seventh-grade teacher told us not only how he has used the technology but also how the sixth- and eighth-grade teachers have used it and what their results have been—evidence that the teachers have built a professional learning community to support the implementation of digital curricula. We've heard about teachers who spend three or four hours a night planning together but who are so impressed by what the technology allows them to do that they feel it's worth the extra time.

Switching to digital curriculum will be a huge change for many teachers; without the proper mechanisms for support, the transition may be fairly rocky. But the learning curve doesn't seem quite as steep when you have a strong support system to fall back on.

Conclusion

Because the pilot is still young, we do not yet have student achievement data. We expect the results to be mixed. It takes time for teachers to adjust their practices and become comfortable with a new curriculum, whether it is digital or in print. Some teachers have embraced the use of technology in their classrooms, and others have been more reluctant. Students have generally expressed that they have enjoyed their math classes more than they have in the past—which any math teacher can tell you is a significant change.

Some of the pilot schools are excited about adopting digital curricula in lieu of textbooks after the pilot period ends in June, but others seem more likely to go back to their textbooks. We don't have a timeline in place for replacing textbooks with digital curricula statewide, but we do know that textbooks are becoming increasingly foreign and irrelevant to the younger generation. As we move forward, we will continue to encourage schools to consider making the switch, and we will provide support to those schools that do. We know the digital curriculum train is coming down the tracks—we're just not sure when it will arrive. We want to position our schools to board the train, not get run over by it. PL