



The Mission of Our Work

- To provide data-driven tools and supports that enable schools to improve student access to and achievement in challenging high-school mathematics and science curricula
- To support exemplary, sustainable teaching practices
- To use technology—specifically, the Internet—to enhance quality, lower cost, and support continuous feedback and improvement in the services and thereby in the practice of education.

The Contributors to the Work

- **Researchers and educators at the Charles A. Dana Center at The University of Texas and leading mathematics educators throughout the country**
- **Curriculum developers at Biological Sciences Curriculum Study (BSCS)**
- **Experts in development, production, and dissemination at Agile Mind**
- **We work together to develop, produce, disseminate, and continuously improve Internet-delivered and other services and protocols. In a participatory design process now involving hundreds of educators, we have developed instruction advisory, instruction, guided exploration, formative assessment, and reporting services that are continuously modified based on feedback from teacher users.**

The Status of Our Work

- We have developed and are disseminating comprehensive online and face-to-face services for teachers and the students they serve in
 - § Middle School Mathematics
 - § Algebra I
 - § Geometry
 - § Algebra II
 - § Precalculus
 - § APTM Calculus
 - § and APTM Statistics
- As of January 2007, we are in our fifth year of implementation. This year we are serving 290,000 students and 4400 teachers in 492 schools—more than 80% in underserved areas in Texas, California, Illinois, New York, Maine, with incubator sites in New Jersey, Ohio, Washington

Key Principles in Our Theory of Change

- Any effort to improve educational performance in math and science must focus on and shape what happens between educators and students in the classroom
- Efforts to improve performance must engage the commitment of key district and school leaders and give them stable supports to ensure that classroom instruction leads to deep standards-based learning
- To improve practice, teachers and leaders need access to student performance data and the information necessary to act on those data in ways that speak to the realities of classroom instruction
- The collaborative use of technology to improve instruction requires a fundamental cultural shift in the ways in which high schools operate
 - ü from teachers developing lessons individually to teachers working together on the implementation of high-quality lessons
 - ü from using the results of individually constructed tests to using common assessments
 - ü and from using chalk and talk to using visualization and interaction as key instructional components.

How We Approach Equity

- **Our particular objective is to enhance the capacity of educational systems in underserved areas**
- **It is to assure that technology and cost constraints do not impede the opportunities of underserved communities to foster high achievement**
- **It is to support the adults in the system—not to supplant them**
- **It is to design technologies to make it convenient for adults to make the right instructional decisions a higher percentage of the time**
- **It is to foster high achievement for all adolescents and not just those at the two ends of the bell curve**

Supporting Reliability, Flexibility, and Use of Data for Decision Making

- q The services permit educators to make choices based on their experience, their audience, and their teaching preferences
- q The services mine data about usage and performance to give educators and students real-time reports about the results of the choices they make
- q Data mining creates an empirical basis for making improvements at a heretofore unprecedented level
- q Services are optimized for standard browser-based access on 28.8kbs lines anytime/anywhere, with high function: early usage patterns show teacher use at school and home/student use at school, public library, home
 - q No impact on school district IT department
 - q Protected Internet access

How the Services Work, Operationally

- Schools, districts, education entities contract for services
- Services include 20-40 hours of face-to-face professional services for every participating teacher, lesser hours for administrators
- Participating teachers and their students receive access to online services delivered on an ASP model
- We manage technology infrastructure, diagnostic support at every site
- Online services are designed to support a full year of instruction and formative assessment
- Almost every participating teacher has a mentor who provides virtual, face-to-face support

What We Observe To Date

- **After 5 years of intense AM effort, 90% of participating educators are now allowed to participate in their face-to-face services—fewer than 50% during the most optimal period for their practice**
- **75% of participating educators receive 20+ hours of face-to-face professional development; a growing percentage receive 40 hours**
- **36% of participating educators access the services 90 minutes or more per week, the majority during the school day**
- **15% of participating educators access the services 150 minutes or more per week**
- **30% of participating educators use the online services to educate themselves about the mathematics and about useful pedagogical strategies—they do not enable student access for 6-9 months**
- **90% of teachers express wish to continue after use of the services; 82% of schools actually do so**

Central Challenges for Our Work

- **Because of rapidly rising standards, there are too few educators with the knowledge and skill to teach high-school mathematics and science: we must create a respectful environment that enables adults to master new content while teaching**
- **Schools in underserved communities must cope with high student, teacher and administrator mobility**
- **There is no tradition in many school systems of adults' using data effectively to inform instruction**
- **New technologies require a determined and systematic strategy of supporting adults as learners: busy, challenged adults in education do not change their practices more rapidly than those in other professions**

When teachers lack support, their expectations for student performance drop. We find that low expectations of students yield to evidence.

Some Central Questions for Our Next Year of Work

- What are appropriate migratory paths for adults adopting new tools and methods?
- How can we foster appropriate behaviors regarding these tools among both teachers and administrators?
- How do we answer convincingly what beneficial uses of these technologies look like in different settings?
- How do we set priorities for interpreting and acting on the empirical data we are collecting, particularly in domains and subdomains in which the research is thin?
- Which data are truly useful, and which are noise?
- How do we fund the R & D that will produce the greatest benefit?

How do we set reasonable expectations for student outcomes?