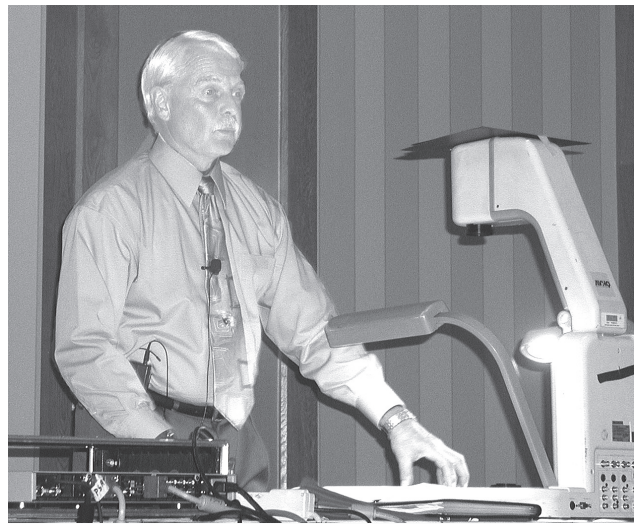


## What is a Standards-Based Curriculum?

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*The goal of the presentation was to discuss what is meant by a standards-based curriculum and to show the benefits of using such a curriculum. Since many of the participants were using standards-based curricula and many others were considering it, the session contributed to their understanding of the issues.*

The goal of the session was to describe what a standards-based curriculum looks like and how it is different than a traditional curriculum. The differences and advantages of teaching from a standards-based curriculum were discussed. This included sharing research showing that students using a standards-based curriculum do better on mathematical assessments especially in the areas of problem solving, reasoning, communication, and connections.

In 1989, the National Council of Teachers of Mathematics (NCTM) published their *Curriculum and Evaluation Standards for School Mathematics*. Between 1989 and 1991, the National Science Foundation (NSF) issued calls for proposals to develop instructional materials for the K-5, 6-8, and 9-12 grade levels to reflect the visions of school mathematics called for in the NCTM's Standards. These became known as the Standards-based curricula.

Standards-based mathematics programs are those with the following characteristics (adapted from "Standards-Based Mathematics: A Phrase in Search of a Definition" by Trafton, Reys, and Wasman, in *Phi Delta Kappan*, November 2001):

- Comprehensive. They are based on both the NCTM's content and process standards. The content standards include Number and Operations, Algebra, Geometry, Measurement, and Data Analysis and Probability, and the process standards include Problem Solving, Reasoning and Proof, Communication, Connections, and Representation.
- Coherent. Ideas are connected and interwoven, and the sequence of ideas builds from grade to grade.

- Depth. The “big ideas” of the curricula are developed more deeply as students move from grade to grade.
- Sense-making. Students are expected to understand and make sense of the mathematics they are learning.
- Engaging. All students are expected to be challenged and to be actively learning.
- Motivating. The mathematics is taught through realistic contexts, which helps students to understand why mathematics is needed.

Research on the effectiveness of the standards-based curricula has shown that students do the same as or better than students using more traditional programs. The ARC Center’s Tri-State Student Achievement Study of more than 100,000 elementary students in three different states found that 51,340 students using one of three standards-based curricula (*Everyday Mathematics*; *Investigations in Number, Data, and Space*; and *Math Trailblazers*) performed as well as or better than 49,535 students using more traditional curricula on state achievement tests. See the Executive Summary at:

<http://www.comap.com/elementary/projects/arc/>

“All significant differences favored the reform students; no significant difference favored the comparison students. This result held across all tests, all grade levels, and all strands, regardless of SES and racial/ethnic identity” (from p. 5 of the Executive Summary).

At the middle school level, in their article “Assessing the Impact of Standards-Based Middle Grades Curriculum Materials on Student Achievement” in the January 2003 issue of the *Journal for Research in Mathematics Education*, Reys, Reys, Lapan, Holliday, and Wasman reported on their study of six school districts. They found that students who had been in classrooms using standards-based curricula (either *MATHThematics* or *Connected Mathematics Project*) for at least two years performed as well as or better than students in classrooms with traditional curricula. In particular, students in the standards-based curricula classrooms performed significantly better on the cluster of algebra tasks. In the University of Missouri’s Center for the study of Mathematics Curriculum’s Middle School Mathematics Study (see [http://mathcurriculumcenter.org/PDFS/MS2\\_report.pdf](http://mathcurriculumcenter.org/PDFS/MS2_report.pdf)), the researchers also measured the level of what they called the “Standards-Based Learning Environment” (SBLE). Students who were in classrooms that had higher levels of SBLE and used standards-based curricula (*MATHThematics*, *Mathematics in Context*, or *Connected Mathematics Project*) performed significantly better than students in classrooms with lower levels of SBLE, whether or not they had standards-based curricula. Students in classrooms with lower levels of SBLE and with standards-based curricula performed comparably to students in classrooms using traditional curricula.

COMPASS (Curricular Options in Mathematics Programs for All Secondary Students), an NSF-funded implementation project; see <http://www.ithaca.edu/compass/index.htm>

is affiliated with five standards-based high school curricula: *Mathematics: Modeling Our World* (ARISE), *Contemporary Mathematics in Context* (Core-Plus Mathematics Project, CPMP), *Interactive Mathematics Program* (IMP), *MATH Connections*, and *Integrated Mathematics: A Modeling Approach Using Technology* (SIMMS IM). Pulling together the research on using these five programs, they have found the following:

- Students using these five curricula performed significantly better on standardized tests that include items on quantitative thinking, reasoning, and problem solving.
- On traditional tasks on tests such as the PSAT, SAT, ACT, and SAT-9, students using the standards-based curricula in general received scores as high as and often higher than students using more traditional curricula.
- There is increasing evidence that the lowest achieving students show the most gains from using these standards-based programs.
- There is also evidence from the data on Core-Plus, IMP, and Mathematics: Modeling Our World that the highest achieving students also do well with these programs.
- Students using these standards-based programs take more math courses. This includes AP math courses.
- These students also tend to have more positive attitudes about mathematics.