History

• First issued in 1994 in 11 states for field testing
  – First 3 courses with 36 high schools
  – 4th course in 28 high schools
Philosophy

The curriculum is written to promote the use of small-group collaborative learning in addition to teacher-led class discussion that launches and summarizes investigative work.
Instructional Design

- Core-Plus Mathematics units are designed around multi-day lessons centered on big ideas
- Each unit has 4-5 lessons
- Each lesson spans 4-5 days
- Lessons are organized around cycles of instructional activities intended primarily for small-group work in the classroom and for individual work outside of the classroom.
The four-phase cycle of classroom activities,

- Launch
- Explore
- Share and Summarize
- Apply
MORE: Out-of-Class Activities

In addition to the classroom investigations, Core-Plus Mathematics provides sets of MORE tasks, which are designed to engage students in

- **Modeling with**
- **Organizing**
- **Reflecting on, and**
- **Extending their mathematical understanding.**

These tasks, which are central to the learning goals of each lesson, are intended primarily for individual work outside of class.
The first three courses in the *Contemporary Mathematics in Context* series provided a common core of broadly useful mathematics for all students. They were developed to prepare students for success in college, in careers, and in daily life in contemporary society.

Course 4 formalizes and extends the core program, with a focus on the mathematics needed to be successful in college mathematics and statistics courses.
Course 1

1. Patterns in Data
2. Patterns of Change
3. Linear Models
4. Graph Models
5. Patterns in Space and Visualization
6. Exponential Models
7. Simulation Models

CAPSTONE: Planning a Benefits Carnival

Course 2

1. Matrix Models
2. Patterns of Location, Shape, and Size
3. Patterns of Association
4. Power Models
5. Network Optimization
6. Geometric Form and Its Function
7. Patterns in Chance

CAPSTONE: Forests, the Environment, and Mathematics
<table>
<thead>
<tr>
<th>Course 3</th>
<th>Course 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Multiple-Variable Models</td>
<td>1. Rates of Change</td>
</tr>
<tr>
<td>3. Symbol Sense and Algebraic Reasoning</td>
<td>3. Logarithmic Functions and Data Models</td>
</tr>
<tr>
<td>5. Patterns in Variation</td>
<td>5. Binomial Distributions and Statistical Inference</td>
</tr>
<tr>
<td>6. Families of Functions</td>
<td>6. Polynomial and Rational Functions</td>
</tr>
<tr>
<td>7. Discrete Models of Change</td>
<td>7. Functions and Symbolic Reasoning</td>
</tr>
<tr>
<td>CAPSTONE: Making the Best of It: Optimal</td>
<td>8. Space Geometry</td>
</tr>
<tr>
<td>Forms and Strategies</td>
<td>9. Informatics</td>
</tr>
<tr>
<td></td>
<td>10. Problem Solving, Algorithms,and Spreadsheets</td>
</tr>
</tbody>
</table>
AAAS Project 2061 Evaluation
Course 1—Algebra

- Identifying a sense of purpose (2.0 Satisfactory)
- Building on student ideas about mathematics (1.5 Fair)
- Engaging students in mathematics (2.7 Good)
- Developing mathematical ideas (2.1 Satisfactory)
- Promoting student thinking about mathematics (2.2 Satisfactory)
- Assessing student progress in mathematics (2.4 Satisfactory)
Identifying a Sense of Purpose 2.0 Satisfactory

- 1.1 Conveying Unit Purpose (1.5)
- 1.2 Conveying Lesson Purpose (1.8)
- 1.3 Justifying Sequence of Activities (2.7)

<table>
<thead>
<tr>
<th></th>
<th>Functions</th>
<th>Variables</th>
<th>Operations</th>
</tr>
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<tbody>
<tr>
<td>Conveying Unit Purpose</td>
<td>1.8</td>
<td>0.3</td>
<td>2.5</td>
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<tr>
<td>Conveying Lesson Purpose</td>
<td>2.5</td>
<td>1.3</td>
<td>1.5</td>
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<td>Justifying Sequence of Activities</td>
<td>2.5</td>
<td>3</td>
<td>2.5</td>
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</table>
Building on Student Ideas about Mathematics 1.5 Fair

- II.1 Specifying Prerequisite Knowledge (1.8)
- II.2 Alerting Teacher to Student Ideas (1.3)
- II.3 Assisting Teacher in Identifying Ideas (1.4)
- II.4 Addressing Misconceptions (1.6)

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>Specifying Prerequisite Knowledge</td>
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<td>2.5</td>
<td>2.5</td>
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<tr>
<td>Alerting Teacher to Student Ideas</td>
<td>1.3</td>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td>Assisting Teacher in Identifying Ideas</td>
<td>1.5</td>
<td>0.5</td>
<td>2.3</td>
</tr>
<tr>
<td>Addressing Misconceptions</td>
<td>2.5</td>
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<td>1.3</td>
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</tbody>
</table>
Engaging Students in Mathematics 2.7 Good

- III.1 Providing a Variety of Contexts (2.8)
- III.2 Providing First Hand Experiences (2.6)

<table>
<thead>
<tr>
<th></th>
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<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Providing a Variety of Contexts</td>
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<td>2.5</td>
<td>3</td>
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<tr>
<td>Providing First Hand Experiences</td>
<td>2.5</td>
<td>2.5</td>
<td>3</td>
</tr>
</tbody>
</table>
Developing Mathematical Ideas 2.1 Satisfactory

- IV.1 Justifying the Importance of Standards Ideas (2.3)
- IV.2 Introducing Terms and Procedures (2.7)
- IV.3 Representing Ideas Accurately (2.3)
- IV.4 Connecting Standards Ideas (2.2)
- IV.5 Demonstrating/Modeling Procedures (0.4)
- IV.6 (2.8) Providing Practice

<table>
<thead>
<tr>
<th></th>
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<tr>
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<tr>
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<td>3</td>
</tr>
<tr>
<td>Representing Ideas Accurately</td>
<td>2.5</td>
<td>2.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Connecting Standards Ideas</td>
<td>3</td>
<td>0.5</td>
<td>3</td>
</tr>
<tr>
<td>Demonstrating/Modeling Procedures</td>
<td>0</td>
<td>0.3</td>
<td>1</td>
</tr>
<tr>
<td>Providing Practice</td>
<td>3</td>
<td>2.5</td>
<td>3</td>
</tr>
</tbody>
</table>
## Promoting Student Thinking about Mathematics 2.2

Satisfactory

- V.1 Encouraging Students to Explain their Reasoning (1.5)
- V.2 Guiding Interpretation and Reasoning (2.9)
- V.3 Encouraging Students to Think about What They’ve Learned (2.2)

<table>
<thead>
<tr>
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<th>Functions</th>
<th>Variables</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encouraging Students to Explain their Reasoning</td>
<td>1</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>Guiding Interpretation and Reasoning</td>
<td>3</td>
<td>3</td>
<td>2.8</td>
</tr>
<tr>
<td>Encouraging Students to Think about What They’ve Learned</td>
<td>3</td>
<td>0.8</td>
<td>2.8</td>
</tr>
</tbody>
</table>
**Assessing Student Progress in Mathematics 2.4**

**Satisfactory**

- VI.1 Aligning Assessment (2.8)
- VI.2 Assessing through Applications (2.7)
- VI.3 Using Embedded Assessment (1.8)

<table>
<thead>
<tr>
<th></th>
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<th>Variables</th>
<th>Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aligning Assessment</td>
<td>3</td>
<td>2.5</td>
<td>3</td>
</tr>
<tr>
<td>Assessing through Applications</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Using Embedded Assessment</td>
<td>2</td>
<td>1.5</td>
<td>2</td>
</tr>
</tbody>
</table>
Enhancing the Mathematics Learning Environment

- VII.1 Providing Teacher Content Support
- VII.2 Establishing a Challenging Classroom
- VII.3 Supporting All Students
Evaluation of Data

“Based on evidence from nationally standardized tests (ITED, SAT, ACT, NAEP), course-specific tests, researcher-developed tests, college mathematics placement tests, interviews, surveys, and other data, the Core Plus curriculum has been shown to enhance students' mathematical achievement and attitudes toward mathematics.”

Let’s see for ourselves….
Evaluation of Data

• We will examine how well Core Plus Students performed on...:
  - SAT
  - ACT
  - Math Placements Tests at the College Level

• We will also review students attitudes perceptions and attitudes about the Core Plus Curriculum.
Evaluation of Data

Table 1: *Means and Standard Deviations of 1997 SAT Mathematics Scores*

<table>
<thead>
<tr>
<th>CPMP3</th>
<th>Advanced Algebra</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Students</td>
<td>Average</td>
</tr>
<tr>
<td>371</td>
<td>552.0</td>
</tr>
</tbody>
</table>

- The CPMP 3 average (mean) is greater than that of the Advanced Algebra students, but the difference is not significant at the 0.05 level.
## Evaluation of Data

Table 2: *ITBS Math and SAT Math Means and Standard Deviations for CPMP and Well-Matched Traditional Students in One High School*

<table>
<thead>
<tr>
<th>Group</th>
<th>Grade 8 ITBS Math Percentile</th>
<th>SAT Math</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Students</td>
<td>Average</td>
</tr>
<tr>
<td>CPMP</td>
<td>54</td>
<td>57.1</td>
</tr>
<tr>
<td>Traditional</td>
<td>44</td>
<td>57.5</td>
</tr>
</tbody>
</table>

- The average SAT Math score for the CPMP group is greater than that of the traditional group, but the difference is not statistically significant at the 0.05 level.
Evaluation of Data

Table 1

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Students</th>
<th>ACT Mathematics</th>
<th>ACT Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPMP</td>
<td>531</td>
<td>19.2</td>
<td>20.4</td>
</tr>
<tr>
<td>Traditional</td>
<td>111</td>
<td>19.8</td>
<td>20.3</td>
</tr>
</tbody>
</table>

- There is no significant difference (0.05 level) between the CPMP and traditional averages (means) for either the Mathematics or Composite score.
### Evaluation of Data

**Table 2**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Students</th>
<th>CAT Math Percentile</th>
<th>ACT Mathematics</th>
<th>ACT Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPMP</td>
<td>71</td>
<td>66.3</td>
<td>18.3</td>
<td>20.3</td>
</tr>
<tr>
<td>Traditional</td>
<td>42</td>
<td>68.5</td>
<td>18.4</td>
<td>19.1</td>
</tr>
</tbody>
</table>

- For this set of students, the average ACT Math scores for the CPMP group is almost identical to that of the traditional group.
The average ACT Composite score for the CPMP group is greater than that of the traditional group, but the difference is not statistically significant at the 0.05 level.

The results in Tables 1 and 2 are illustrated in the following graph.
Evaluation of Data

- Means by group and subtest are plotted in Figure 1.

- The CPMP Course 4 mean was significantly ($p < 0.05$) greater than the Pre-calculus mean on the Calculus Readiness subtest.

- The group means did not differ significantly on the Basic Algebra or Advanced Algebra subtests.
Evaluation of Data

- A written, likert-type survey of students' perceptions and attitudes about various aspects of their mathematics course experience was administered at the end of each school year during the field test.

- In four field-test schools, both CPMP Course 2 students ($n = 221$) and traditional geometry students ($n = 134$) completed this survey at the end of their respective courses.
• A significantly higher percent of CPMP students than of geometry students agreed that:

  - The mathematics course made them feel more confident that they could solve mathematical problems (71.1% compared to 55.6%)

  - They learned to reason mathematically (68.8% to 53.0%).

  - The course helped them see that mathematical ideas make sense (64.7% to 51.1%).

  - The mathematics course contained realistic problems (76.5% to 47.8%).
- Made the mathematical ideas interesting (70.1% to 41.4%)

- Increased their ability to talk about (68.2% to 42.9%) and to write about mathematics (66.5% to 40.6%).

- They want to take a mathematics course taught in the same way the next year (75.0% compared to 43.0% agreement).

- 27% of CPMP students at the end of Course 3 agreed that it was mainly because of CPMP that they took a third year of mathematics.
Teacher Support and Resources

- **Components** of CPM P

Student Materials:
- Student Editions
  - Part A (Units 1-4)
  - Part B (Units 5-7, plus Capstone)
- Reference and Practice Book
- Calculator Software CD-ROM
Teacher Materials

- Teacher Resource Package
- Teacher Guide, Part A & Part B
- Teaching Resources, Part A & Part B
- Implementation Guide
- Scope and Sequence
- TeacherWorks® CD-ROM (WIN/MAC)
- Assessment Resources, Part A & Part B
- Assessment and Maintenance Worksheet Builder CD-ROM
Teacher Support and Resources

• The Core-Plus Mathematics Project Listserv
  - The goal of the CPMP email listserv is to provide a vehicle for teachers, currently teaching the *Core-Plus Mathematics* program, to assist each other in effective implementation of the program.

• The CPMP list is monitored by CPMP staff who contribute to discussions where appropriate.
Teacher Support and Resources

- There is an extended professional development plan for ongoing support for teachers.

- Information on course-specific CPM implementation workshops is under “Teacher Support”, on the Core Plus Website.

- On-site programs can be designed to meet district needs.
Teacher Support and Resources

- A Workshop that is offered:

*Getting to Know Contemporary Mathematics in Context: A Unified Approach*

- This workshop can be presented locally.
Teacher Support and Resources

- Other organizations that also provide support:
  - The National Implementation Center for Standards-based high school mathematics curricula is, COMPASS.
Teacher Support and Resources

- The K–12 Mathematics Curriculum Center (K–12 MCC) at the Education Development Center, Inc., also supports districts as they build effective mathematics education programs.
  - They offer a series of three seminars nationwide
  - The seminars address:
    - the selection and implementation of new curricula,
    - Professional development for successful implementation
    - Leadership for curriculum change.
Publisher Info & Website

- The CPMP curriculum is published by Glencoe/McGraw-Hill under the title *Contemporary Mathematics in Context: A Unified Approach*. Courses 1, 2, 3, and 4 are available.

- For further information contact Glencoe Customer Service at 1-800-334-7344 or go to the Core Plus Mathematics Project Websites:
  http://www.wmich.edu/cpmp/index.html
  http://www.glencoe.com/sec/math/cpmp/