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ELC's Newsletter for Secondary Mathematics Teachers
Vol. 3, No. 2
Spring 2000

ISSUES in MATHEMATICS EDUCATION

Using Technology to Enhance Student Learning in *Contemporary Mathematics in Context*

by Mark Thompson; Teacher; Contemporary Mathematics in Context; Kent City High School; Kent City, Michigan

The use of technology, particularly graphing calculators, is an integral part of the *Contemporary Mathematics in Context (CMIC)* program. It permits the curriculum and instruction to emphasize reasoning with multiple representations (verbal, numerical, graphical, and symbolic) and to focus on goals in which mathematical thinking is central. By the time students complete the first twenty pages of Course 1, they are making and reasoning with histograms on their graphing calculators and the fun has just begun. Students develop facility in using an incredible number of calculator functions as tools. Within a short period of time, they are the pros, often showing me how to do new things. By the time students complete Course 3, they have become quite proficient with technology, using features such as matrices, list operations, random-number generators, and a few of the sequence mode features. Course 4 students use the parametric equation capability to model motion, use the statistical distribution features to evaluate binomial and normal distributions, and utilize a Core-Plus Mathematics Project (CPMP)–developed spreadsheet program for problem solving (to name just a few new uses of technology). CPMP has also developed special calculator software (downloadable from a computer) that enables students to explore topics or do procedures more easily, an opportunity not possible without complicated calculator programs.

From my experience teaching the *CMIC* curriculum the past four years, it seems that technology serves three more specific purposes. The most fascinating use, in my opinion, is the way in which technology facilitates teaching and learning by helping students make connections among different strands of mathematics. A second powerful aspect of technology use is how it enables students to discover relationships and patterns, make and check conjectures, and reason about the relationships. Finally, appropriate technology is used for complex calculations and completing repetitive procedures quickly.

(Technology, continued on page 2)

CONTENTS

elc's **math**link

Vol. 3, No. 2

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ELC's Mathlink is published by Everyday Learning Corporation.

ELC's Mathlink is available upon request to teachers and administrators who use the secondary mathematics programs published by Everyday Learning Corporation.

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(Technology, continued from page 1)

MAKING CONNECTIONS AMONG STRANDS OF MATHEMATICS

One of my favorite examples of how technology helps students make connections among strands of mathematics is from the Course 2 unit, *Patterns in Chance*, Lesson 4: "Expected Value of a Waiting-Time Distribution." While it would be very simple to inform students that the expected value of a waiting-time distribution is the reciprocal of the probability of success on each trial p because I said so, students gain a deeper mathematical understanding of this investigation when they use technology. Students create lists on their graphing calculator similar to Figure 1 where $p = 0.3$. I usually have each student group do two of the probabilities from 0.1, 0.2, 0.3, …, 1. Then the results can be shared with the entire class.

In List 1 (L_1), students enter the numbers 1 through 25. (They even use the seq function to do this quickly if they wish to use larger tables.) In List 2 (L_2), they enter $p(1–p)^{(L_1-1)}$, which produces the probabilities very rapidly. List 3 (L_3) is the product $L_1 \bullet L_2$, and then the built in sum function for L_3 is used to get the estimated average waiting time (or expected value).

A table of average waiting times is completed by the class and entered in other lists on the calculator. (Figure 2)

Next, students construct a scatterplot of this new list (Figure 3) and discuss whether the shape of the graph is linear, quadratic, exponential, power, or some other kind of algebraic model.

After concluding that it may be an inverse power model, they use the calculator again to complete a power regression. (Figures 4 and 5)

Having already discussed that the sum of the lists are low because they are not infinitely long, it is easy to conclude from the regression equation that expected value E.V. = $\frac{1}{p}$ is a good equation for this model.

This investigation would take days to complete by hand, yet students can finish it in one 55-minute class period by using technology. Students have a better understanding of a theoretical expected value, and they have seen an excellent link between statistics, probability, and algebra.

Figure 1

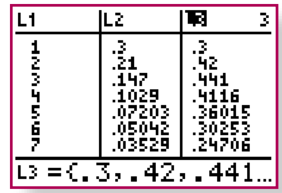


Figure 2

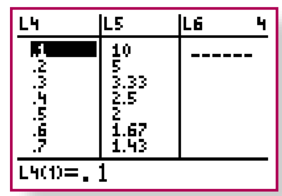


Figure 3

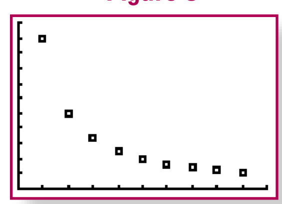


Figure 4

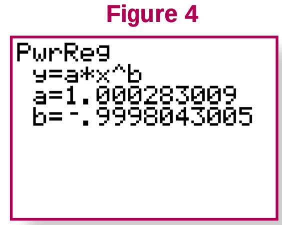
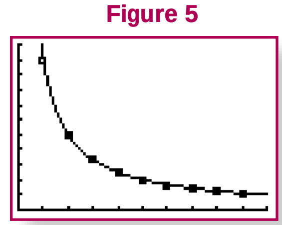
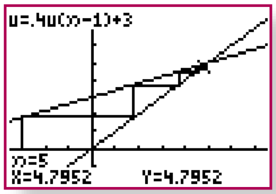


Figure 5



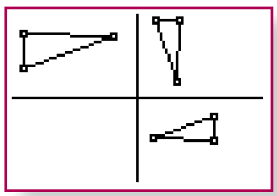
Another situation in which technology is effectively used to connect mathematical ideas is in the Course 3 unit, *Discrete Models of Change,* Lesson 3: "Iterating Functions." In the first investigation, students use the last answer feature of the calculator to iterate a simple linear function. Using the linear function and the line $y = x$ on a graph, they can identify the fixed point (and find it using the intersect feature or table capabilities). Iterating the function determines if it is attracting, repelling, or neither. A graphical iteration can be done using the Web feature of a sequential graph. (Figure 6) With more exploration, students make a connection between the slope of the function and its behavior when iterated. This is certainly a nice link between algebraic functions and the discrete mathematics strand.

Figure 6



Of course, there are many other mathematical connections that are made in the curriculum thanks to features available on a graphing calculator. For example, the *CMIC* calculator software GeoXplor allows students to visually explore how such transformations as translation, rotation, and dilation affect an image. (Figure 7)

Figure 7

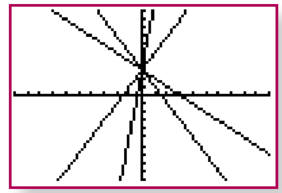


The software also is helpful for finding slopes of lines to show properties of polygons, such as parallel or perpendicular sides, or to calculate lengths to show that opposite sides are equal.

DISCOVERING RELATIONSHIPS AND PATTERNS, MAKING AND CHECKING CONJECTURES, AND REASONING ABOUT THE RELATIONSHIPS

The second advantage of using the power and versatility of graphing calculators in the *CMIC* classroom is that students have opportunities to investigate situations, look for patterns, change parameters, and make conjectures. In Unit 2 of Course 1, students observe the shapes of given sets of functions, including linear, exponential, and quadratic. They are asked to describe, "If we see a rule like …, we expect a table like … and a graph like …." And in Unit 3 of Course 1, students examine graphs and tables to make conjectures about slopes and rates of change and the location of y-intercepts.

Figure 8

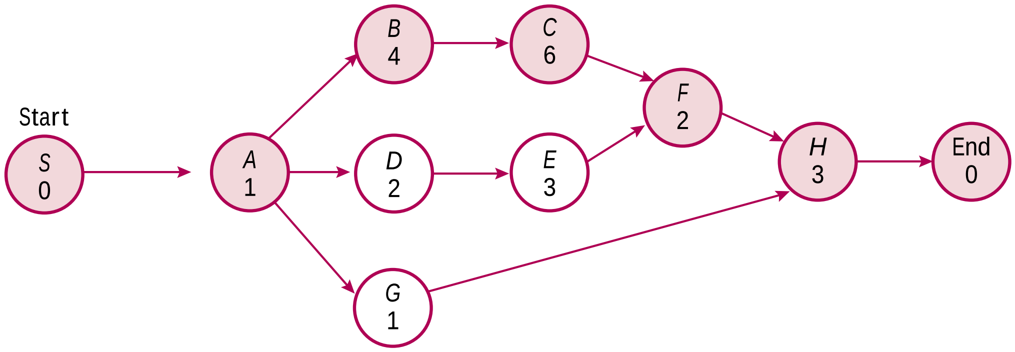


Given $y = a + bx$, students put in positive and negative values for a and b and explore the results. (Figure 8) They are then asked to explain the patterns and properties they see, including the similarities and differences. The same style of exploration is used with exponential, power, quadratic, and trigonometric models within the three-year curriculum.

Additional understanding of graphical and algebraic representations of functions is gained by students in Course 3, since an entire unit is devoted to families of functions. A thorough investigation of how different parameters stretch, compress, or translate a function vertically or horizontally is completed by observing graphs and tables of literally dozens of algebraic functions.

There are many other technology-rich investigations scattered throughout each course; too numerous to mention. One rather simple feature of the graphing calculator, the last answer feature, allows students to explore linear patterns as constant additive change and exponential patterns as multiplicative change. The numerous examples students investigate help them truly understand these patterns of change—numerically, graphically, and symbolically.

Students explore the features of a graphing calculator



DOING COMPLEX CALCULATIONS AND COMPLETING REPETITIVE PROCEDURES QUICKLY

Finally, *CMIC* utilizes technology as a tool to do repetitive, but necessary, calculations. Please understand, however, that virtually every use of the calculator in this manner is preceded by students completing at least one example without the use of technology. Obviously, many graphs and tables need to be created quickly to complete the aforementioned investigations in each of the *CMIC* courses. In addition, as students progress, the calc functions become unbelievably useful. Quickly finding intersections, zeroes, maximums, and minimums are terrific tools. The equation solver referred to in Course 3 is also terrific; but do not let your students in on this one too soon! In Course 4, the numerical derivative and integral features are used after students develop understanding of rates of change and accumulated change. Features that perform operations with matrices are very valuable. Finding the inverse of a matrix, or multiplying it by another matrix is incredibly fast with technology. In fact, even I now choose to solve problems with matrices because $[A^{-1}][B]$ can be done so much more quickly than doing it by hand. Students can then concentrate on the meaning of matrix operations rather than by-hand computation.

While the graphing calculator does not have many discrete mathematical functions built in, software programs such as PERT fill the void. PERT is a version of the Program Evaluation and Review Technique that is frequently used by business and industry to find earliest finish times, critical paths, and more. (Figures 9 and 10)

Figure 9

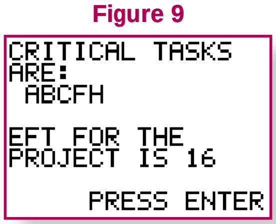
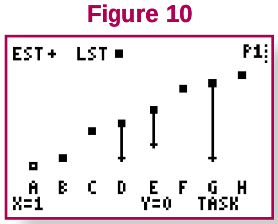
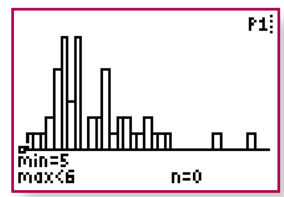


Figure 10



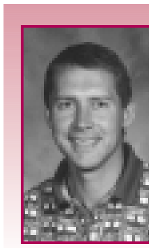
There are several other computational uses of technology in the *CMIC* curriculum. For example, in Course 1 students enter data in lists to construct a variety of graphs, such as scatterplots, histograms, and box-and-whisker plots. They then use these graphical displays to assist in analyzing the data, to reason about the distributions, and to look for trends. List operations are used to find means, sums, modes, maximums, and more. In order to measure and understand variation, the spreadsheet-like capabilities of lists are used to calculate mean absolute deviations and standard deviations before using built-in calculator functions. The last unit in Course 1, entitled "Simulation Models," puts the random-number generator feature into action after, of course, students do things such as roll dice and use a random-digits table. The software program Collect can be used to generate many trials of simulations, saving incredible amounts of time for the student. (Figure 11)

Figure 11



CONCLUSION

Wow! Is technology useful? Is technology important? Is technology beneficial? I certainly am convinced the answers are yes, yes, and yes. Do my students agree? Throughout the teaching of Course 1, students had some difficulties with learning new things like creating a good window, discovering what a rectangular window can do to shapes of graphs, and simply trying to remember where all of the calculator functions are located. By Course 2, students had become more intelligent calculator users, choosing when to use various features and when to forego calculator use. Course 3 students are also making judicious choices of when and how to use technology. They now realize just how useful the technology is in problem solving and in helping them develop deep, connected understandings of mathematics.

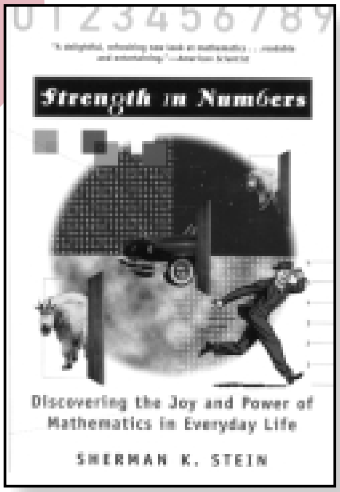


Mark Thompson *has taught CPMP courses at Kent City High School for four years. He has been with the CPMP program since the first summer workshop in 1993.*

mathematics bookshelf

Book Review

Strength in Numbers: Discovering the Joy and Power of Mathematics in Everyday Life
by Sherman Stein
(1996, 272 pages, $16.95 paper, ISBN 0-471-32974-6)
Published by
John Wiley & Sons, Inc.
605 Third Avenue
New York, New York
10158-0012



Review by Susan Halko

Sherman Stein notes that the readers he had in mind while writing *Strength in Numbers* varied from a high school student, a teacher, a counselor, on through a professional mathematician. Stein's engaging conversational style makes it possible for everyone in this range to gain an understanding and appreciation of the importance of mathematics in the real world.

In *Strength in Numbers,* Stein shows us the math concepts that are most relevant to our everyday lives. Using real-world examples, he introduces essential math problems and topics and then walks readers step by step through simple solutions.

The book is divided into three parts. Part, I "About Mathematics," reveals common myths about mathematics, describes the mathematics used in various jobs, and explores the history of mathematics education. In chapter 6, "It Ain't Necessarily So," Stein dispels such myths as the beliefs that there is a special gene for mathematical talent, that there is nothing new in mathematics, that Newton invented calculus to solve the problem of planetary motion, and that Einstein was poor in arithmetic as a boy. Secondary mathematics teachers will want to recommend chapters 9 and 10 of this book to their students—especially those students who ask, "What's in it for me?" In chapters 9 and 10, Stein describes what mathematics is needed in various occupations. He includes a table that matches over 70 specific occupations with particular levels of mathematics needed. He has translated the levels of mathematics into corresponding courses, from Level 1 (rudiments of arithmetic, or Grade 4) to Level 6 (the core of a college-level mathematics program, or three years of calculus, a semester of abstract algebra, and a semester of statistics). In chapter 12, Stein leads readers on an interesting tour of the history of mathematics education reform, starting in the early 1900s.

Secondary teachers will find Part 2 especially useful. This section takes a fresh look at math concepts that are often introduced in school: the geometric series and its application; the theorem of Pythagoras; why you turn a fraction upside down to divide by it; what π is; why a negative times a negative is a positive; and how to draw a picture of an equation. Part 2 opens with a chapter on "How to Read Mathematics." Stein emphasizes that unlike skimming ordinary prose, reading mathematics requires attention on each symbol and word. For example, he compares the prose statement, "Three is a positive number which, when you multiply it by itself, gives nine" to the mathematics equivalent, "$3 = \sqrt{9}$." In mathematics, there are no extraneous symbols. The remainder of chapters in Part 2 walks readers through simple explanations of the concepts mentioned above. Chapters 20 and 21 tell all there is to know about fractions (including why we turn a fraction upside down to divide). Chapter 25, "Why Negative Times Negative is Positive," provides three readable, separate explanations for this "mystery."

Part 3 introduces the ideas behind calculus, including such concepts as developing a technique for finding some unknown quantity; finding the varying steepness of a curve; computing an area bound by a curve; and obtaining a connection between a circle and all the odd whole numbers that provides a way to compute π without drawing a single circle.

At the end of the book, Stein suggests titles for further reading, depending on the reader's area of interest. In *Strength in Numbers,* Sherman Stein provides high school teachers and students with an entertaining and readable look at mathematics as it relates to everyday life.

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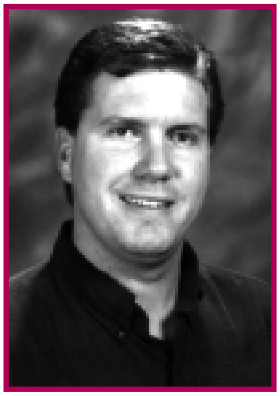
Have you read any good books about mathematics lately? In Mathematics Bookshelf, tell other teachers about what you've been reading. We welcome book and article reviews about mathematical concepts, current research in mathematics education, and first-hand experiences of mathematics teachers. Use the Suggestion Box form on page 15 to tell us which book or article you would like to review.

interview

CORE PLUS AND ACHIEVEMENT IN SCIENCE



Damon Blackman *has been teaching mathematics at San Pasqual High School in Escondido, California, for eight years. Over the past five years, he has participated in the National Field Test to help prepare the* CMIC *curriculum for publishing. He currently teaches* CMIC *Courses 1 and 2. In this interview, he describes the correlation between his* CMIC *students and their achievement in science.*

ML: Describe the makeup of your mathematics department, as well as your classes.

DB: San Pasqual High School is located in Escondido, California, just north of San Diego. We have been using the *Contemporary Mathematics in Context* curriculum since the 1994–95 school year. Currently, students are given a choice between enrolling in the traditional sequence of algebra I, geometry, algebra 2/trigonometry, and pre-calculus and enrolling in *CMIC* 1–3 through their junior year. For their senior year, students would select from *CMIC* 4, precalculus, AP calculus, and AP statistics, depending on their undergraduate interests for college. It is not uncommon to have a few *CMIC* students enroll in two math courses their senior year if their schedules permit.

The 1995–96 and 1996–97 school years were the first years that students took *CMIC* at San Pasqual. This group of students also represented the largest number of heterogeneously grouped, non-accelerated students who took *CMIC* 2.

ML: How do science teachers in your school view the achievement level of *CMIC* students?

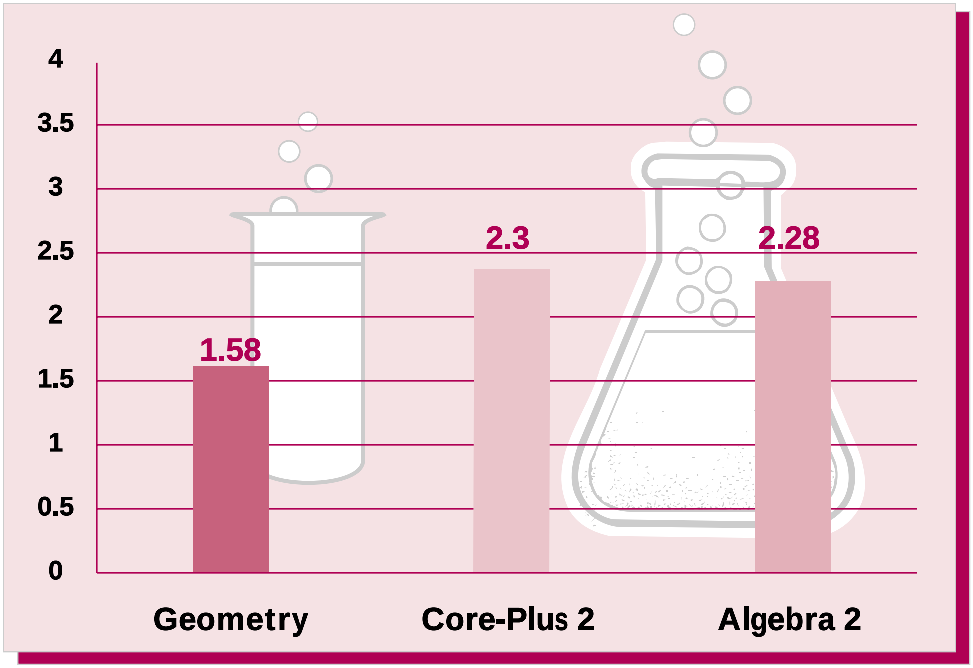
DB: Our science department administers a short, computational test assessing students' ability to solve simple linear equations and proportions, factor trinomials, and solve quadratics without a calculator. Prior to *CMIC,* the science department teachers said that the test was a reasonably good indicator for success in chemistry. Since solving proportions, factoring trinomials, and solving quadratic equations are not taught until later *CMIC* courses, however, students subsequently did very poorly on the pretest.

The *CMIC* teachers met with teachers in the science department to discuss the results of the test. Our department reassured the science teachers that *CMIC* students had the math skills to adequately prepare them for science, and, in particular, for chemistry. Some math teachers questioned whether or not factoring trinomials and solving quadratic equations were essential skills required for success in chemistry. It seemed to the chemistry teachers that, in the past, students with a mastery of those math skills were ready for the rigorous work required in chemistry. In retrospect, it would have been better if the math and science teachers discussed the alignment between *CMIC* math skills and the requisite skills needed for various science courses. We are doing this now.

ML: How does *CMIC* students' performance in science compare to performance of students in traditional mathematics classes?

DB: It was very important to monitor the progress of students in other content areas, especially science. Initially, the only concern of science teachers seemed to be in the area of chemistry. This was solely based on the *CMIC* students' performances on the chemistry pretest; students had already shown a solid performance in biology. The math department decided to measure the success of *CMIC* 2 sophomores who were taking chemistry. These students were compared to other sophomores in chemistry who were taking geometry. The data clearly revealed that chemistry grades for the second semester in 1996 and 1997 were significantly higher for students taking *CMIC* rather than traditional mathematics. In fact, sophomores in *CMIC* 2 (at grade level in math) performed as well as a mix of sophomores (accelerated in math by 1 year, about 25% of that group) and juniors (at grade level, approximately 75%) in algebra 2/trigonometry. Both of these results, especially the latter, surprised the chemistry teachers and led to a discussion of why *CMIC* students did so well in chemistry. This also dispelled the original concern of the science department that *CMIC* students were ill prepared for chemistry as shown by the poor performance on the chemistry pretest.

Chemistry Grades* by Math Course at S.P.H.S. – Listed as G.P.A.s



For Spring Semesters in 1996 and 1997

ML: Why do you think students in the *CMIC* classroom had higher test scores?

DB: There are many reasons why *CMIC* students perform well in science courses. For example, *CMIC* 1 students study ways of calculating changes in population over time (also solved in biology, but in a different way). Students learn how to solve linear equations and add like terms in *CMIC* 1–3, which are important skills for balancing equations in chemistry. *CMIC* 3 students who solve for a variable in the abstract PV = nRT, solve for T in chemistry. *CMIC* 3 students study position over time, velocity over time, rates of change, and vectors.

More important, the success of *CMIC* students in science courses is furthered by the habits of mind, or ways of thinking that are an integral part of the connections between mathematics and science. Students continually collect, analyze, display data, and interpret many different types of graphs. Students are taught how to find equations that model data well and are taught how to determine if any data collected may be invalid.

ML: What feedback have you received from students about how *CMIC* has helped them in science classes?

DB: Students have reported that they see the connection between mathematics and science much more clearly than ever before—partly because the *CMIC* text includes a large number of science questions and investigations, and partly because they understand "why" something works rather than just getting an answer from a formula. Students clearly have a much deeper understanding of science through achieving greater mathematical power.

ML: What feedback have you received from science teachers about how *CMIC* students perform in their classes?

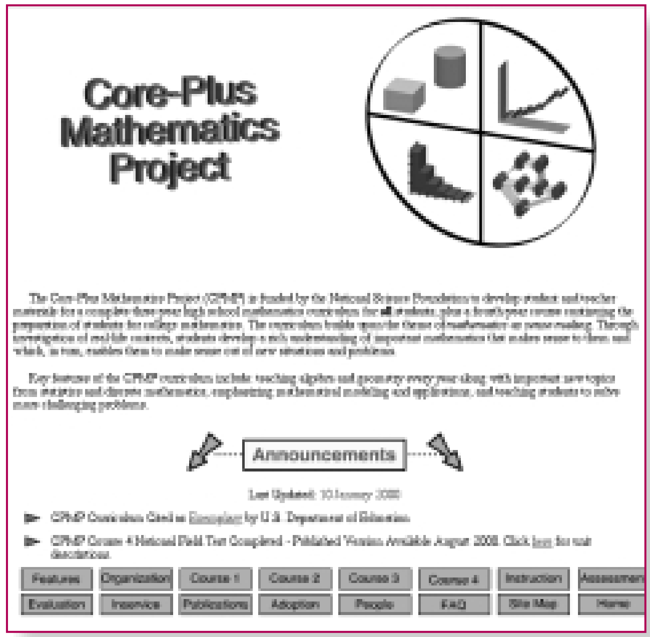
DB: Science teachers are excited about the new mathematics skills *CMIC* students bring to science. For example, systems of linear equations are solved using matrices (*CMIC* 2). Students are able to recognize patterns in data used for writing equations. The science department plans on including graphing calculators and a CBL.

CORE-PLUS MATHEMATICS PROJECT
➤ Web Site: *AN INVALUABLE RESOURCE*

by James K. Laser and Marcia Weller Weinhold
Core-Plus Mathematics Project

Whether you are presently implementing or considering implementing the Core-Plus Mathematics Project (CPMP) curriculum, *Contemporary Mathematics in Context (CMIC)*, or simply want more information, you will find something helpful at http://www.wmich.edu/cpmp. Our intent in this article is to give you a "map" of the information to be found on the CPMP Web site.

Upon accessing the CPMP Web site, you will see the home page shown at the right. The logo represents the four mathematical strands developed throughout each year of the *CMIC* curriculum: algebra and functions, statistics and probability, geometry and trigonometry, and discrete mathematics. On the home page, there are also "Announcements" that guide visitors to the most recent items on the site, or to those items which are updated more frequently, such as the FAQ or the professional development programs.



When you "Enter" the site, you are provided access to information on 16 main topics. Depending on the browser you are using, you may navigate by using buttons with frames or by using hyperlinks with no frames.

The 16 main topics can be organized into three groups that focus on particular aspects of the CPMP Web site: the *CMIC* materials; the development of the materials and results of implementation; and site navigation aids.

TEACHING *CMIC*

Topics that deal with teaching *CMIC* materials are introduced in the following outline.

Topic/Button — **Information on the CMIC Curriculum**

Features ➤

This page describes features that characterize *CMIC* as a distinct mathematical experience for students. These include multiple connected strands, mathematical modeling, access and challenge for all types of students, use of graphing calculators, active learning, and multi-dimensional assessment.

Organization ➤

This page contains a more detailed description of the connected strands featured in each year of the curriculum. The concepts included in each strand are listed, and connections are indicated. Some of the concepts and habits of mind are hyperlinked to examples in sample excerpts of course materials showing how these concepts are developed. This page also features a chart that shows the organization of the units of each course according to the strand (or strands) that are emphasized in the unit.

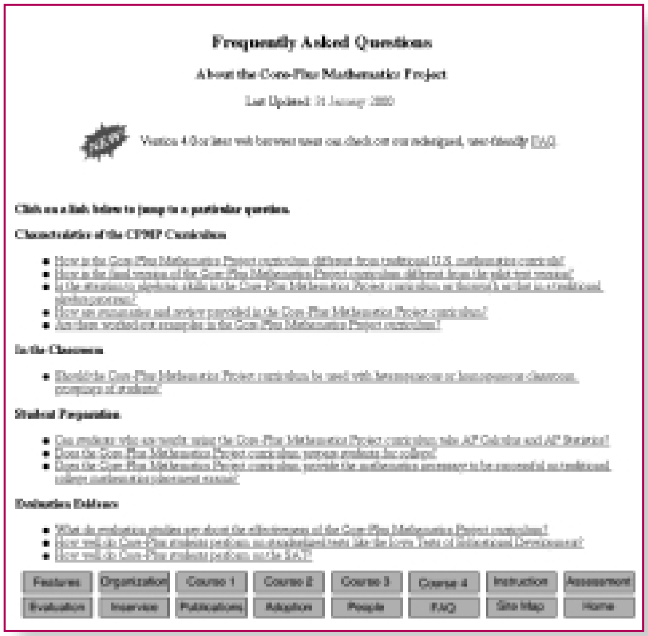
Course 1 ➤	Here you will find an overview of the Course 1 units and Capstone, with links to sample excerpts from Units 2, 4, 6, and 7.
Course 2 ➤	In addition to the Course 2 units and Capstone overview, this page includes links to excerpts from Units 6 and 7.
Course 3 ➤	The Course 3 overview of units and the Capstone are on this page.
Course 4 ➤	This page presents the overview of Course 4 units and includes possible sequences of units to use with fourth-year students who have different proposed fields of study in college. Also on this page are descriptions of the two alternate units designed for use with a computer algebra system (CAS).
Instruction ➤	Here you will find an introduction to the instructional design for lessons in the *CMIC* materials. Both in-class and out-of-class activities are discussed. A detailed explanation and sample are provided for each part of the four-phase cycle of in-class activities (Launch, Explore, Share and Summarize, and On Your Own). The out-of-class MORE (Modeling, Organizing, Reflecting, Extending) tasks are also explained, and links are given to sample tasks of each type.
Assessment ➤	This page describes the types of formal and informal assessment opportunities that are provided for in the *CMIC* instructional design, for both individuals and groups. The assessments provided with the *CMIC* Teacher's Resource Package are also described.

DEVELOPMENT AND IMPLEMENTATION OF *CMIC*

Topics that explain more about the development of the materials, their testing and evaluation, and the people involved with the project are introduced in the next chart. Information about implementation of the program and issues to consider when getting started are also included.

Topic/Button	Information on Development Process, Evaluation, and Implementation
People ➤	Here you will find a list of the developers of the CPMP curriculum, advisory board, consultants, collaborating teachers, graduate assistants, and other project staff.
Evaluation ➤	This page contains abstracts of five documents produced as part of the evaluation of the CPMP and how the achievement of students in CPMP classrooms compares to that of other students. Information is given on how to receive copies of these documents. There is also a collection of comments by teachers and students who have used CPMP materials.
Publications➤	For comprehensive information, this page gives an annotated bibliography of over 40 publications about the development, implementation, and evaluation of the CPMP curriculum.
Adoption ➤	On this page, there is a list of issues that experience has shown are important for successful implementation of *CMIC* materials.
Inservice ➤	If you are looking for opportunities to learn more about *CMIC*, this page lists workshops and conference presentations that will help you. If you are planning a workshop or presentation that is open to all, we would be happy to receive information about it. Please E-mail information to cpmp@wmich.edu.
FAQ ➤	Frequently asked questions are listed here, with answers prepared by CPMP developers, members of the CPMP staff, or experienced teachers. Questions are organized under the headings "Characteristics of the CPMP Curriculum," "In the Classroom," "Student Preparation," "Evaluation Evidence," and "Local Implementation."

The FAQ is one of the most popular features of the CPMP Web site. Shown below are the questions currently dealt with in the FAQ.



A sample of two frequently asked questions together with project responses follows.

Evaluation Evidence

Q How well do Core-Plus students perform on the SAT?

A On the SAT-I Mathematics test, students completing Core-Plus mathematics field-test courses performed at least as well as students in traditional mathematics curricula.

SAT data for 1997 from 13 CPMP schools were separated into groups according to the secondary mathematics courses the students had completed. SAT Mathematics scores of students who had completed Courses 1, 2, and 3 were compared to students who completed traditional algebra, geometry, and advanced algebra. In Table 1, these groups are labeled "CPMP 3" and "Advanced Algebra," respectively. 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.

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

CPMP3	
Number of Students	Average Score
371	552.0

Advanced Algebra	
Number of Students	Average Score
190	543.4

In one field-test school at the beginning of the CPMP field test (fall 1994), all ninth-grade students who qualified for pre-algebra or algebra were randomly assigned by computer to CPMP Course 1 or to a traditional course. Many of these students completed Advanced Algebra or CPMP Course 3 in their junior year and took the SAT either in spring or summer of their junior year or in fall of their senior year. As shown in Table 2, the average Grade 8 ITBS Mathematics scores are nearly identical for the CPMP students and those in the traditional curriculum. Thus, these two groups were well-matched on mathematical achievement prior to high school. They learned mathematics in the same school and sometimes from some of the same teachers. The only apparent systematic difference between the groups was the curriculum. 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.

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

		Grade 8 ITBS Math Percentile	SAT Math
Group	Number of Students	Average Score	Average Score
CPMP	54	57.1	484.6
Traditional	44	57.5	467.0

Note: The web-based response also provides a graphical display of the data from which these statistics were derived.

Local Implementation

Q How can students be accelerated in the Core-Plus Mathematics Project curriculum?

A If your district has a history of enrolling strong eighth-grade students in an algebra course, you may wish to maintain an accelerated program using CPMP Course 1 for select eighth graders. (These students could then enroll in AP Calculus as seniors upon completing Course 4 as juniors. Students can enroll in AP Statistics anytime after completion of Course 3.)

- For students who don't start Course 1 until ninth grade, consider ways to schedule classes to allow students to move through the curriculum more quickly. The following is a list of options that some districts implementing the CPMP curriculum have successfully used:

1. A student could double up on classes as a senior by enrolling in both Course 4 and AP Statistics.
2. In schools with semester block scheduling, a student could enroll in two courses in a given year.
3. In schools with alternate-day academic-year block schedules, the schedule could be adjusted for one or more classes of a course to meet each day for the first semester and classes of the next course similarly scheduled the second semester.
4. In schools with traditional academic-year schedules, two mathematics classes may be scheduled back-to-back to allow study of one course in the first semester and the next course the second semester.
5. Strong students who have completed one of the NSF-funded middle school mathematics programs, or an algebra course, could enroll in Course 2 in ninth grade. (Some supplemental material on Course 1 topics may be needed.)

NAVIGATING THE SITE

Finally, we call your attention to two topics that will help you find your way on the CPMP Web site: the site map and the home page.

Topic/Button Aids	Site Navigation
Site Map ➤	The site map is an outline of all the topics on the site, including hyperlinks to pages that cover each topic.
Home ➤	This button provides a quick way to get back to the beginning (home) page of the site, where the announcements are listed.

We hope that this "map" will motivate you to use our Web site as a valuable and evolving resource in your efforts to improve the teaching and learning of school mathematics. Or you may want to suggest a visit to someone else—an administrator, a parent, a school board member, or a colleague. Since different people may want different information, we make the following suggestions for some groups:

- New visitors—including new-to-the-program parents or community leaders—may be interested in the organization charts, features and sample materials, the Exemplary Program announcement, the instructional design, FAQ, and evaluation information.
- Those considering implementation of the CPMP curriculum may want to look at all of the topics listed for "new visitors" and also the Publications, Adoption, and Inservice pages to begin planning for successful implementation.
- People already using *Contemporary Mathematics in Context* may find helpful information in the new announcements (such as the Exemplary Program designation recently awarded by the U.S. Department of Education) as they are posted, as well as in the schedules of professional development programs and conference presentations, and the FAQ. The FAQ is periodically updated based on our contacts with users and potential users.

In addition to this Web site, the CPMP E-mail listserv provides another resource for answers to specific questions you may have. If you want to subscribe, send an E-mail message to **cpmp@wmich.edu.** You will then receive detailed instructions for joining. You can also use this address to E-mail suggestions for the Web site. We intend to continue making improvements to the site that will make it even more useful to all visitors.

eLCnews
Everyday Learning Corporation

Core-Plus Mathematics Project Implementation Workshops

Western Michigan University, Kalamazoo, MI

Standards-based reform is more than selecting curriculum materials. It's rethinking and reshaping the way mathematics is taught and learned. The 2000 Workshops are designed for mathematics teachers and department chairs currently using *Contemporary Mathematics in Context* or planning to implement the program during the 2000–2001 school year.

Workshops provide …

- an overview of the four-year *Contemporary Mathematics in Context* curriculum, focusing on specific course content
- hands-on experience with the curriculum materials, instructional model, and assessment strategies
- ideas and discussions on how to facilitate collaborative learning
- effective strategies for gaining support from parents and administrators, scheduling of courses, and classroom management
- practical suggestions for evaluation and school-home communication

Make plans now to attend one of the following workshops:

Course 1	June 19–23	($450.00)
Course 1	July 24–28	($450.00)
Follow-up for Course 1	October 13–14	
Course 2	June 26–30	($375.00)
Course 3	July 24–28	($375.00)
Course 4	June 19–24	($375.00)

Workshop Descriptions

Course 1

Participants will be engaged in hands-on experiences with Course 1 materials. Units 1–5 will be explored in detail, focusing on the mathematical content, the instructional model, and related assessment methods. Sessions will include modeling lessons, sharing suggestions for facilitating collaborative learning, and discussing implementation issues.

Special Course 1 Follow-Up

This follow-up workshop in October will provide the opportunity for teachers to share ideas and concerns generated from the first few months of teaching the curriculum. Participants will also continue in-depth study of Units 6 and 7 and the Capstone.

Courses 2, 3, and 4

Participants will be actively engaged with the Course 2, 3, or 4 materials. The complete Course 2, 3, or 4 curriculum will be examined, and selected units explored in detail. The focus will be on the mathematical content, the instructional model, and related assessment methods. Sessions will include modeling lessons, sharing suggestions for facilitating collaborative learning, and discussing implementation issues.

Leadership Institute

The Core-Plus Mathematics Project will be hosting a four-day Leadership Institute on July 17–20, 2000. The goal of this institute is to build a network of staff developers with expertise in helping districts design and carry out successful implementation plans.

Mathematics educators, mathematics curriculum coordinators, and experienced teachers who intend to play lead roles in local implementation of *Contemporary Mathematics in Context (CMIC)* would benefit from attending this institute.

The Leadership Institute will provide an overview of the mathematical content and approaches of Courses 1–4 while actively involving participants in selected investigations from the curriculum. Participants will also analyze the instructional model and associated assessment methods. Time will be devoted to discussing various kinds of professional development activities the Core-Plus Project has found effective. Attention will also be given to the challenges teachers and districts face in implementing *CMIC.*

This is an excellent opportunity for participants to interact and share ideas regarding professional development and implementation issues related to improving school mathematics.

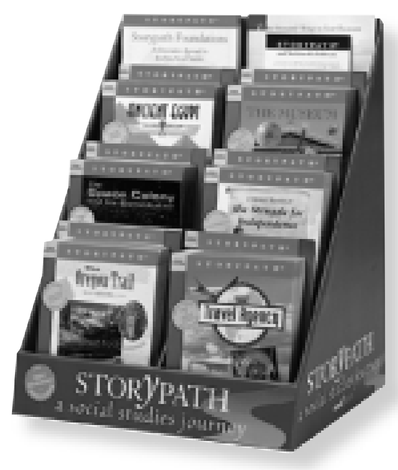
For more information, or to obtain an application to participate in the Leadership Institute, please contact the Core-Plus Mathematics Project (CPMP) office at (616) 387-4562 or send an E-mail to cpmp@wmich.edu.

STORYPATH UNIT ON THE WEB

Storypath is a unique approach to teaching social studies that creates an irresistible need in students to learn more about the place, the times, and the people of the topic under study. Now, a new *Storypath* unit about the Civil War is available on the Web. "A Nation Divided" evolves over eight episodes as students learn about this time from the views of families living in Chattanooga, Tennessee. The unit naturally integrates such subjects as history, geography, art, reading, and writing as students create a community, the families that live and work there, the events that led to the Civil War, and the war itself.

Teachers can download "A Nation Divided" free of charge by visiting:

http://fac-staff.seattleu.edu/mmcguire/storypath.html.



new & revised PRODUCTS

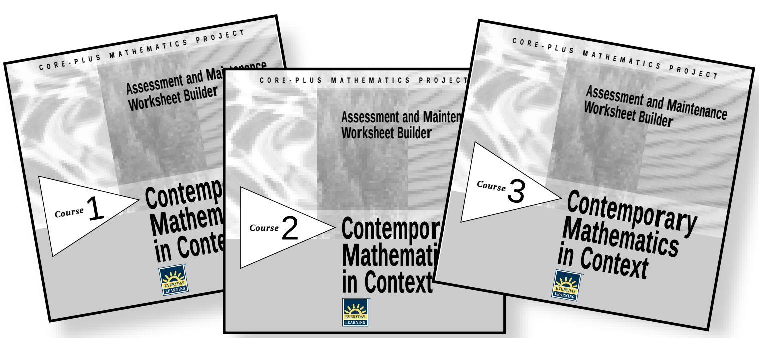
Introducing *Impact Mathematics: Algebra and More for the Middle Grades*

Developed in cooperation with Education Development Center, Inc., *Impact Mathematics: Algebra and More for the Middle Grades* is designed to make more mathematics accessible to more middle grades students. The program features:

- Full and rigorous coverage of Algebra I by the end of Grade 8
- Informal to formal concept development especially designed for middle grades students
- Number, measurement, algebra, geometry, probability, and statistics integrated throughout
- Problem-solving and engaging contexts that promote mathematical thinking
- Appropriate attention to and practice with computational skills and symbolic manipulation skills

NOW AVAILABLE!
Customizable assessment and maintenance for *Contemporary Mathematics in Context*

Contemporary Mathematics in Context Assessment and Maintenance CD-ROMs will be available this spring. The CDs allow teachers to choose and customize the assessment items that appear in print format in the Assessment Resources. A CD sampler for the *Contemporary Mathematics in Context* Assessment and Maintenance Builder CDs as well as CDs for Courses 1–3 will be available in April 2000. To request a sampler, or to find out more information, call 1-800-382-7670.



AVAILABLE NOW!
Contemporary Mathematics in Context Reference and Practice Books

What are the Reference and Practice (RAP) Books? The *CMIC Reference and Practice Books* provide Core-Plus students with summaries of previously learned concepts and skills, maintenance practice to review previously learned concepts and skills, and test-taking practice for standardized tests, college admission tests, and college placement tests. There is one Reference and Practice Book per course (Courses 1–3), and each student book contains an answer key.

COMING SOON!
Contemporary Mathematics in Context Course 4

suggestion box

Name ______________________ Position ______________________

School ______________________ City & State ______________________

Secondary Mathematics Program ______________________

Home Phone ______________________ School Phone ______________________

E-mail Address ______________________

Check all that apply. Below is my

- ❑ Question for the **Ask the Authors** section (Please be specific.)
- ❑ **Tip Trade** idea
- ❑ **Interview** topic
- ❑ Suggestion for **Techlink**
- ❑ Suggestion for **Mathematics Bookshelf**
- ❑ Other ______________________

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I would also consider

- ❑ Participating in a survey or interview
- ❑ Writing for *ELC's Mathlink*. Topic ______________________
- ❑ Reviewing books, articles, or software
- ❑ Interviewing another teacher or administrator

ELC's Mathlink's success depends upon educators like YOU who are willing to get involved in the exchange of ideas.

Please take a moment to share your ideas, questions, answers, suggestions, thoughts, experience, advice, achievements, or insight.

Return this form to:
ELC's Mathlink
P.O. Box 812960
Chicago, IL 60681

You may also call 1-800-382-7670 or fax 312-540-4660 with your ideas or send E-mail to mathlinkeditor@tribune.com.

Thank you for participating in *ELC's Mathlink* **Suggestion Box.**

the **LAST** word

Share your ideas and experiences in *ELC's Mathlink*

Have you ever thought that you might like to contribute to *ELC's Mathlink* but have some questions? Below are some commonly asked questions and our responses.

Who writes the articles for ELC's Mathlink**?**
Secondary mathematics teachers and administrators write about their ideas, research, and experiences in the classroom. The curriculum authors also write articles for the newsletter. Each contributor offers a unique perspective on secondary mathematics curricula, including algebra, geometry, precalculus, calculus, and integrated mathematics; and current issues in mathematics education.

I would like to contribute an article, but I haven't written for a publication before. Will I receive input from ELC's Mathlink *editors as I write the article?*
We will be available to answer your questions and offer input on your writing from the time you propose a topic to the time you turn in that well-crafted final draft. Contributing to *ELC's Mathlink* is a valuable opportunity to write for an audience of fellow teachers. You have the option of writing an article, a book or software review, classroom management hints, or an interview. Or, if you have another idea, tell us about it.

What should I do if I want to write an article for ELC's Mathlink?
Write down your ideas and send them in! Either send in a rough draft of an article or just jot down a few notes about the topic you would like to address. Don't forget to include your name, school name, address, and phone number. E-mail addresses work, too! You can send *ELC's Mathlink* a note addressed to **mathlinkeditor@tribune.com.**

I want to comment on an article that was in the last issue of ELC's Mathlink. *Do you print a "Letters to the Editor" column?*
Yes, we welcome your input on the articles and features in the newsletter. You can send all letters and other submissions to Everyday Learning Corporation, attn: *ELC's Mathlink* Editor, Two Prudential Plaza, Suite 1200, Chicago, IL 60601. You may choose to use the **Suggestion Box** form on page 15 of this issue to share your ideas.

EVERYDAY LEARNING

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