This paper is a response by the UCSMP *Everyday Mathematics*® authors to the *Executive Summary of the National Mathematics Advisory Panel Final Report.*

(http://www.ed.gov/about/bdscomm/list/mathpanel/index.htm)

It begins with some brief comments about the Background section of the report.

BACKGROUND

From the early 1980s, *Everyday Mathematics* authors have been concerned with the country's "underachieving curriculum" and the mediocre performance of U.S. students on international tests1. This performance by students was, unfortunately, not consistent with the "peerless mathematical prowess" that the National Mathematics Advisory Panel (NMAP) claims that the U.S. possessed during most of the 20th century. In fact, the report rightly notes that much of the prowess was due to imported talent, not necessarily from the ranks of citizens educated in U.S. schools. So in response to these problems, *Everyday Mathematics* was created to help improve the academic and professional opportunities of individual students and, hopefully, to improve the status of U.S. students in international comparisons.

The historically high 2007 National Assessment of Educational Progress (NAEP) scores noted by the panel at grades 4 and 8 mark the greatest progress since the National Council of Teachers of Mathematics (NCTM) published its Curriculum and Evaluation Standards for School Mathematics in 1989. We believe that this progress is not independent from the wider use (up to 25% in recent years) of curricula aligned with the NCTM Standards, including *Everyday Mathematics*. As more students who have used these curricula reach high school, we have reason to hope for improvement in grade 12 NAEP scores. And, because they begin studying algebra in Kindergarten, we are confident that *Everyday Mathematics* students will be well prepared to succeed in any Algebra course.

For many reasons an Algebra course is a "gateway to later achievement," but for reasons we detail later, the *Everyday Mathematics* authors do not believe it is the only gateway. There is evidence, in fact, that the gateway is much more flexible. For example, in the mid-1990s the U.S. Military Academy changed its first (gateway) mathematics course for all freshmen from Calculus (a primary reason Algebra is so important) to a Modeling course based primarily on discrete mathematics and embedded in computing technology. In short, exactly what are the gateway or critical topics of a 21st-century mathematics education is a matter of considerable debate.

PRINCIPAL MESSAGES AND RECOMMENDATIONS

The following pages contain *Everyday Mathematics* author responses to the principal messages and recommendations found in the Executive Summary of the panel's report. Responses are limited to the recommendations that are relevant to a published curriculum.

The mathematics curriculum in Grades Pre-K–8 should be streamlined and should emphasize a well-defined set of the most critical topics in the early grades.	*Everyday Mathematics* provides elementary school students with a comprehensive curriculum of integrated mathematical strands that are well defined by explicit grade-level goals. The authors believe that a curriculum focused solely on the panel's "Critical Foundations of Algebra" (i.e., arithmetic with whole numbers and fractions) would be a step backward and would not prepare students for success in tomorrow's world. Further, many of the parents of today's children had very unhappy experiences with the panel's limited definition of mathematics. Most of them want their children to have the richer mathematical experience that *Everyday Mathematics* has to offer.
Use should be made of what is clearly known from rigorous research about how children learn, especially by recognizing a) the advantages for children in having a strong start; b) the mutually reinforcing benefits of conceptual understanding, procedural fluency, and automatic (i.e., quick and effortless) recall of facts; and c) that effort, not just inherent talent, counts in mathematical achievement.	The *Everyday Mathematics* authors completely agree with this message. *Everyday Mathematics* creators Max and Jean Bell's 1980s research showed that young children of all backgrounds have remarkable mathematical capabilities and creativity – and they generally like mathematics. To capitalize on these findings, *Everyday Mathematics* has higher expectations than traditional programs and requires that all students systematically practice skills over time to develop deeper, more sophisticated, mathematical understanding.
Our citizens and their educational leadership should recognize mathematically knowledgeable classroom teachers as having a central role in mathematics education and should encourage rigorously evaluated initiatives for attracting and appropriately preparing prospective teachers, and for evaluating and retaining effective teachers.	*Everyday Mathematics* is written to help provide in-class help to teachers above and beyond typical in-service. Even new teachers with good preservice experience can benefit from the extensive support in mathematical content, instruction, and program philosophy.
Instructional practice should be informed by high-quality research, when available, and by the best professional judgment and experience of accomplished classroom teachers. High-quality research does not support the contention that instruction should be either entirely "student centered" or "teacher directed." Research indicates that some forms of particular instructional practices can have a positive impact under specified conditions.	The *Everyday Mathematics* authors agree with this message because we have continually relied on the same body of research evidence as the panel, including that of mathematicians, mathematics educators, cognitive psychologists and experienced classroom teachers. Further, *Everyday Mathematics* is continually asking for input on how to improve the materials (including an actively used listserv for *Everyday Mathematics* teachers and other professionals) and for feedback on what is working in the classroom. That data, combined with lessons learned from the latest in classroom academic research and proven classroom practices, has always served to inform and enhance each edition of *Everyday Mathematics*.

CURRICULAR CONTENT

1	*A focused, coherent progression of mathematics learning, with an emphasis on proficiency with key topics, should become the norm in elementary and middle school mathematics curricula. Any approach that continually revisits topics year after year without closure is to be avoided.* *By the term focused, the Panel means that curriculum must include (and engage with adequate depth) the most important topics underlying success in school algebra. By the term coherent, the Panel means that the curriculum is marked by effective, logical progressions from earlier, less sophisticated topics into later, more sophisticated ones. Improvements like those suggested in this report promise immediate positive results with minimal additional cost.* *By the term proficiency, the Panel means that students should understand key concepts, achieve automaticity as appropriate (e.g., with addition and related subtraction facts), develop flexible, accurate, and automatic execution of the standard algorithms, and use these competencies to solve problems.*	*Everyday Mathematics* is a leading example of "A focused, coherent progression of mathematics learning, with an emphasis on proficiency with key topics". The mathematics in *Everyday Mathematics* is an integration of topics in numeration, arithmetic operations, algebra and functions, geometry, measurement and data analysis. This is because the authors believe that an over reliance on paper-and-pencil skills, not ones learned in the mid 1900s, are insufficient preparation for careers and daily life in the 21st century. Proficiency in each of these strands is clearly defined in grade-level goals that are linked to individual lessons and assessments. These goals articulate when closure is achieved and specify detailed expectations for *Everyday Mathematics* users that are far beyond what instructional materials typically provide. Topics in *Everyday Mathematics* are taught to closure every year. Review of core topics is distributed throughout the curriculum, linked to the grade-level goals, and enhanced in subsequent years to help students develop deeper, more sophisticated, and more connected understanding. This distributed practice is based on robust research findings about how people learn. And, of course, as suggested in Learning Processes recommendation 11, some review is necessary for students to practice skills even after they have been mastered, much like musicians practice scales. In *Everyday Mathematics,* this review is embedded in new contexts to keep practice motivating and fresh as students grow older.
2	*To clarify instructional needs in Grades Pre-K–8 and to sharpen future discussion about the role of school algebra in the overall mathematics curriculum, the Panel developed a clear concept of school algebra via its list of Major Topics of School Algebra (Table 1, page 16).* *School algebra is a term chosen to encompass the full body of algebraic material that the Panel expects to be covered through high school, regardless of its organization into courses and levels. The Panel expects students to be able to proceed successfully at least through the content of Algebra II.*	(Regarding recommendations 2 and 3): The UCSMP Pre-K–12 program covers all the "Major Topics of School Algebra" by the end of the tenth-grade Advanced Algebra course. In doing so, the program links algebra to arithmetic, geometry, measurement and data analysis beginning in the earliest grades. This integration helps students become proficient in a much broader range of mathematics than one focused on traditional precalculus.
3	*The Major Topics of School Algebra in Figure 1 should be the focus for school algebra standards in curriculum frameworks, algebra courses, textbooks for algebra, and in end-of-course assessments.*	

4	*A major goal for K–8 mathematics education should be proficiency with fractions (including decimals, percents, and negative fractions), for such proficiency is foundational for algebra and, at the present time, seems to be severely underdeveloped. Proficiency with whole numbers is a necessary precursor for the study of fractions, as are aspects of measurement and geometry. These three areas—whole numbers, fractions, and particular aspects of geometry and measurement—are the Critical Foundations of Algebra. Important elements within each of these three categories are delineated on page 17 of this report.*	(Regarding recommendations 4 and 5): Although we believe that a focus simply on algebra and fractions is too narrow to prepare today's students for academic and professional success, *Everyday Mathematics* grade-level goals for proficiency with fractions of all types are consistent with the "Benchmarks for Critical Foundations."
5	*To encourage the development of students in Grades Pre-K–8 at an effective pace, the Panel recommends a set of Benchmarks for the Critical Foundations (Table 2, page 20). They should be used to guide classroom curricula, mathematics instruction, textbook development, and state assessments.*	
6	*All school districts should ensure that all prepared students have access to an authentic algebra course—and should prepare more students than at present to enroll in such a course by Grade 8. The word authentic is used here as a descriptor of a course that addresses algebra consistently with the Major Topics of School Algebra (Table 1, page 16). Students must be prepared with the mathematical prerequisites for this course according to the Critical Foundations of Algebra (page 17) and the Benchmarks for the Critical Foundations (Table 2, page 20).*	*Everyday Mathematics* students will have a substantial foundation in algebra and functions by the time they take any Algebra course in middle or high school. It is also likely that much of the content of a typical first-year Algebra course will be review for them, including symbols, expressions, linear equations and linear functions, and graphical representations of functions in a coordinate plane.
7	*Teacher education programs and licensure tests for early childhood teachers, including all special education teachers at this level, should fully address the topics on whole numbers, fractions, and the appropriate geometry and measurement topics in the Critical Foundations of Algebra, as well as the concepts and skills leading to them; for elementary teachers, including elementary level special education teachers, all topics in the Critical Foundations of Algebra and those topics typically covered in an introductory Algebra course; and for middle school teachers, including middle school special education teachers, the Critical Foundations of Algebra and all of the Major Topics of School Algebra.*	*Everyday Mathematics* builds in support to help teachers learn content and deal with diversity. The program supports the suggested research, but was written, in part, to address the fact that elementary school teachers' mathematical knowledge is often weak not only in content strands with which they have limited personal experience, such as algebra, geometry and data analysis, but also in the numeration and arithmetic operations strands. To meet these needs, *Everyday Mathematics* is written for teachers – i.e., the program is the Teacher's Lesson Guide, with all other materials (including student materials) supporting the activities, lessons and units. For example, the Student Reference Books help teachers by providing students with an array of data, worked problems, and other support that teachers often have to collect on their own. In addition, the Teacher's Reference Manuals provide extensive support in how and why the lessons are written and organized as they are, why a given mathematics topic is included and how it connects to both other mathematics and other subjects, and how to tailor individual activities and lessons to a variety of student needs and abilities.

LEARNING PROCESSES

8	*Most children acquire considerable knowledge of numbers and other aspects of mathematics before they enter kindergarten. This is important, because the mathematical knowledge that kindergartners bring to school is related to their mathematics learning for years thereafter—in elementary school, middle school, and even high school. Unfortunately, most children from low-income backgrounds enter school with far less knowledge than peers from middle-income backgrounds, and the achievement gap in mathematical knowledge progressively widens throughout their Pre-K–12 years.*	*Everyday Mathematics* has been, and continues to be, based on a variety of research foundations, including *Everyday Mathematics* creators Max and Jean Bell's 1980s research documenting children's considerable mathematical knowledge before school, more recent research about how young children acquire mathematical knowledge and understanding, and over 20 years of pilot and field testing of *Everyday Mathematics* in urban, suburban, and rural classrooms. A study of 78,000 students in three states by the ARC Center at the Consortium for Mathematics and its Applications (COMAP) found that scores on every topic on five different state-mandated tests were significantly higher for students in *Everyday Mathematics* schools than for students in matched comparison schools, and that these results did not vary by socioeconomic status. Other research[2] shows that when properly implemented, *Everyday Mathematics* reduces the achievement gap, and documented successes of the program in urban settings such as New York City show high achievement in diverse populations of students.
9	*Fortunately, encouraging results have been obtained for a variety of instructional programs developed to improve the mathematical knowledge of preschoolers and kindergartners, especially those from low-income backgrounds. There are effective techniques—derived from scientific research on learning—that could be put to work in the classroom today to improve children's mathematical knowledge. However, tests of both short-term and long-term effects of these interventions with larger populations of children from low-income families are urgently needed.*	The new Pre-K *Everyday Mathematics* is designed to help young children of all backgrounds develop their mathematical understanding. Unlike most other Pre-K programs, Pre-K *Everyday Mathematics* is fully integrated with Kindergarten *Everyday Mathematics* and, thus, the entire *Everyday Mathematics* program. We are eager to study how this new program will affect students in the future.
10	*To prepare students for Algebra, the curriculum must simultaneously develop conceptual understanding, computational fluency, and problem-solving skills. Debates regarding the relative importance of these aspects of mathematical knowledge are misguided. These capabilities are mutually supportive, each facilitating learning of the others. Teachers should emphasize these interrelations; taken together, conceptual understanding of mathematical operations, fluent execution of procedures, and fast access to number combinations jointly support effective and efficient problem solving.*	*Everyday Mathematics* authors are in full agreement with the panel and believe that simultaneously developing conceptual understanding, computational fluency, and problem-solving ability (not just problem-solving skills) is necessary for preparation in all mathematical strands, not just algebra.

11	*Computational proficiency with whole number operations is dependent on sufficient and appropriate practice to develop automatic recall of addition and related subtraction facts, and of multiplication and related division facts. It also requires fluency with the standard algorithms for addition, subtraction, multiplication, and division. Additionally it requires a solid understanding of core concepts, such as the commutative, distributive, and associative properties. Although the learning of concepts and algorithms reinforce one another, each is also dependent on different types of experiences, including practice.*	*Everyday Mathematics* not only focuses on computational proficiency, it systematically provides a variety of ways to develop and practice it (e.g., Math Messages, Math Boxes, games, fact triangles, and oral drill). These various, mutually supportive paths to proficiency are based in research that shows children learn best when new topics are presented at a brisk pace, with multiple exposures over time, frequent opportunities for review and practice, and closure when mastery is reached as defined by grade-level goals. The sequence of instruction in *Everyday Mathematics* has been carefully mapped out to optimize these conditions for learning. *Everyday Mathematics* also requires that students explore several computational algorithms. Knowing a variety of algorithms can (1) help with a variety of computational tasks, including estimation, in which a standard algorithm might be inefficient; and (2) help students better understand the concepts behind standard algorithms. Yet *Everyday Mathematics* also encourages and supports teachers in being sensitive to individual differences. Some students may need to focus on one algorithm over all others and suggestions for how to identify such students are in the Teacher's Lesson Guides.
12	*Difficulty with fractions (including decimals and percents) is pervasive and is a major obstacle to further progress in mathematics, including algebra. A nationally representative sample of teachers of Algebra I who were surveyed for the Panel rated students as having very poor preparation in "rational numbers and operations involving fractions and decimals."* *As with learning whole numbers, a conceptual understanding of fractions and decimals and the operational procedures for using them are mutually reinforcing. One key mechanism linking conceptual and procedural knowledge is the ability to represent fractions on a number line. The curriculum should afford sufficient time on task to ensure acquisition of conceptual and procedural knowledge of fractions and of proportional reasoning. Instruction focusing on conceptual knowledge of fractions is likely to have the broadest and largest impact on problem-solving performance when it is directed toward the accurate solution of specific problems.*	*Everyday Mathematics* approaches fractions and decimals with the same multifaceted approach as it does whole numbers (i.e., developing conceptual understanding, computational fluency, and problem-solving together). Fractions are represented not only on number lines, but on fraction sticks and fraction-stick charts to help students understand the relations between fractions and to the whole. They are also represented in fraction-manipulating calculators, which are primarily tools for allowing students to do many more calculations with fractions than can be done on pencil-and-paper. As stated before, *Everyday Mathematics* embraces the importance of fractions of all types in the lives of students and adults, and not only as a step toward understanding algebra.

13	*Mathematics performance and learning of groups that have traditionally been underrepresented in mathematics fields can be improved by interventions that address social, affective, and motivational factors. Recent research documents that social and intellectual support from peers and teachers is associated with higher mathematics performance for all students, and that such support is especially important for many African-American and Hispanic students. There is an urgent need to conduct experimental evaluations of the effectiveness of support-focused interventions both small- and large-scale, because they are promising means for reducing the mathematics achievement gaps that are prevalent in U.S. society.*	*Everyday Mathematics* is grounded in the notion of a community of learners. There is a healthy balance of individual, pair, small-group, and whole-class activities. A regular feature of the program is having children present their solutions to problems for whole-class discussion, thus inviting peer-to-peer interaction. The authors fully support more research into how all these interactions can help improve the learning experience of underrepresented students.
14	*Children's goals and beliefs about learning are related to their mathematics performance. Experimental studies have demonstrated that changing children's beliefs from a focus on ability to a focus on effort increases their engagement in mathematics learning, which in turn improves mathematics outcomes: When children believe that their efforts to learn make them "smarter," they show greater persistence in mathematics learning. Related research demonstrates that the engagement and sense of efficacy of African-American and Hispanic students in mathematical learning contexts not only tends to be lower than that of white and Asian students but also that it can be significantly increased.* *Teachers and other educational leaders should consistently help students and parents to understand that an increased emphasis on the importance of effort is related to improved mathematics performance. This is a critical point because much of the public's self-evident resignation about mathematics education (together with the common tendencies to dismiss weak achievement and to give up early) seems rooted in the erroneous idea that success is largely a matter of inherent talent or ability, not effort.*	Max and Jean Bell's research documented young children's enthusiasm for mathematics and concluded that much of the traditional school curriculum effectively squelched that early interest. So *Everyday Mathematics* is designed to keep children's joy and wonder alive, in part by giving them a variety of activities on which to expend their efforts. The *Everyday Mathematics* authors share the panel's belief that effort is very important to understanding mathematics. Yet the focus of the effort makes a big difference in whether the effort pays off. For example, doing many worksheets of meaningless computations takes effort, but is unlikely to improve conceptual understanding even if it does improve quiz and test scores in the short term. And simply telling students that more effort is needed is not enough to make the experience better – *Everyday Mathematics* gives students a variety of interesting activities on which they happily spend their efforts.

15	*Teachers and developers of instructional materials sometimes assume that students need to be a certain age to learn certain mathematical ideas. However, a major research finding is that what is developmentally appropriate is largely contingent on prior opportunities to learn. Claims based on theories that children of particular ages cannot learn certain content because they are "too young," "not in the appropriate stage," or "not ready" have consistently been shown to be wrong. Nor are claims justified that children cannot learn particular ideas because their brains are insufficiently developed, even if they possess the prerequisite knowledge for learning the ideas.*	*Everyday Mathematics* is in full agreement with the cited research and findings, which is why opportunities in all the strands and threads are begun early and revisited often with increasing sophistication (see Learning Processes Recommendation 11).

TEACHERS AND TEACHER EDUCATION

17	*Research on the relationship between teachers' mathematical knowledge and students' achievement confirms the importance of teachers' content knowledge. It is self-evident that teachers cannot teach what they do not know. However, because most studies have relied on proxies for teachers' mathematical knowledge (such as teacher certification or courses taken), existing research does not reveal the specific mathematical knowledge and instructional skill needed for effective teaching, especially at the elementary and middle school level. Direct assessments of teachers' actual mathematical knowledge provide the strongest indication of a relation between teachers' content knowledge and their students' achievement. More precise measures are needed to specify in greater detail the relationship among elementary and middle school teachers' mathematical knowledge, their instructional skill, and students' learning.*	*Everyday Mathematics* supports the suggested research, but was written, in part, to address the fact that elementary school teachers' mathematical knowledge is often weak not only in content strands with which they have limited personal experience, such as algebra, geometry and data analysis, but also in the numeration and arithmetic operations strands. To meet these needs, *Everyday Mathematics* is written for teachers – i.e., the program is the Teacher's Lesson Guide, with all other materials (including student materials) supporting the activities, lessons and units. For example, the Student Reference Books help teachers by providing students with an array of data, worked problems, and other support that teachers often have to collect on their own. In addition, the Teacher's Reference Manuals provide extensive support in how and why the lessons are written and organized as they are, why a given mathematics topic is included and how it connects to both other mathematics and other subjects, and how to tailor individual activities and lessons to a variety of student needs and abilities.

19	*The mathematics preparation of elementary and middle school teachers must be strengthened as one means for improving teachers' effectiveness in the classroom. This includes preservice teacher education, early career support, and professional development programs. A critical component of this recommendation is that teachers be given ample opportunities to learn mathematics for teaching. That is, teachers must know in detail and from a more advanced perspective the mathematical content they are responsible for teaching and the connections of that content to other important mathematics, both prior to and beyond the level they are assigned to teach.* *High-quality research must be undertaken to create a sound basis for the mathematics preparation of elementary and middle school teachers within preservice teacher education, early-career support, and ongoing professional development programs. Outcomes of different approaches should be evaluated by using reliable and valid measures of their effects on prospective and current teachers' instructional techniques and, most importantly, their effects on student achievement.*	*Everyday Mathematics* is a model for how a curriculum can contribute to improving teacher effectiveness. Not only is professional development of teachers supported in *Everyday Mathematics*' design (see Learning Processes 17 above), the publisher and the authors provide extensive professional development through workshops and inservice programs for new and experienced users. These explore the philosophy of the program, components of the curriculum, mathematics content, assessment, differentiation, and other expectations for children. *Everyday Mathematics* authors also maintain and moderate an active listserv that provides detailed support on program intentions as well as a means for teachers to share their experiences with *Everyday Mathematics*.

INSTRUCTIONAL PRACTICES

23	*All-encompassing recommendations that instruction should be entirely "student- centered" or "teacher-directed" are not supported by research. If such recommendations exist, they should be rescinded. If they are being considered, they should be avoided. High-quality research does not support the exclusive use of either approach.*	*Everyday Mathematics* encourages a careful balance of student-centered, teacher-directed, and many types of instruction in-between, not the least of which is a systematic sharing of students problem-solving strategies with one another and follow-up discussion of the strategies by the whole class.
24	*Research has been conducted on a variety of cooperative learning approaches. One such approach, Team Assisted Individualization (TAI), has been shown to improve students' computation skills. This highly structured pedagogical strategy involves heterogeneous groups of students helping each other, individualized problems based on student performance on a diagnostic test, specific teacher guidance, and rewards based on both group and individual performance. Effects of TAI on conceptual understanding and problem solving were not significant.*	Extensive suggestions for how to manage students working alone, in pairs, small groups or whole-class discussions are given in the Teacher's Lesson Guides for specific activities and discussed at length in the Teacher's Reference Manuals.

25	*Teachers' regular use of formative assessment improves their students' learning, especially if teachers have additional guidance on using the assessment to design and to individualize instruction. Although research to date has only involved one type of formative assessment (that based on items sampled from the major curriculum objectives for the year, based on state standards), the results are sufficiently promising that the Panel recommends regular use of formative assessment for students in the elementary grades.*	*Everyday Mathematics* wholeheartedly embraces the use of formative assessment. Ongoing formative assessment using a variety of tools and techniques has been a core aspect of the program's assessment philosophy since its inception. In the latest edition, formative assessments are clearly tied to grade-level goals and help teachers recognize student achievement in journals and homework assignments, during whole- and small-group problem-solving activities, and while students play games. These ongoing formative assessments complement summative progress checks at the end of each unit.
26	*The use of "real-world" contexts to introduce mathematical ideas has been advocated, with the term "real world" being used in varied ways. A synthesis of findings from a small number of high-quality studies indicates that if mathematical ideas are taught using "real-world" contexts, then students' performance on assessments involving similar "real-world" problems is improved. However, performance on assessments more focused on other aspects of mathematics learning, such as computation, simple word problems, and equation solving, is not improved.*	Using mathematics in real-world contexts (i.e., applying mathematics) is important in many adult careers and daily activities, so teaching about applications is a significant part of all UCSMP courses Pre-K–12, including *Everyday Mathematics*. Additionally, UCSMP courses teach the other aspects of mathematics learning that the panel points out. (These aspects are called the four "dimensions of mathematical understanding" in the UCSMP secondary books: mathematical skills, properties, applications, and representations.) *Everyday Mathematics* also uses real-world contexts to motivate the presentation of new mathematics ideas, believing that this helps students connect the new ideas to their existing mathematical understanding, thereby expanding that understanding.

27	*Explicit instruction with students who have mathematical difficulties has shown consistently positive effects on performance with word problems and computation. Results are consistent for students with learning disabilities, as well as other students who perform in the lowest third of a typical class. By the term explicit instruction, the Panel means that teachers provide clear models for solving a problem type using an array of examples, that students receive extensive practice in use of newly learned strategies and skills, that students are provided with opportunities to think aloud (i.e., talk through the decisions they make and the steps they take), and that students are provided with extensive feedback.* *This finding does not mean that all of a student's mathematics instruction should be delivered in an explicit fashion. However, the Panel recommends that struggling students receive some explicit mathematics instruction regularly. Some of this time should be dedicated to ensuring that these students possess the foundational skills and conceptual knowledge necessary for understanding the mathematics they are learning at their grade level.*	*Everyday Mathematics* offers a variety of instructional approaches, including explicit instruction, to help children that have learning difficulties. The Student Reference Books make extensive use of worked examples. As mentioned in the response to Curriculum Content recommendation 1, *Everyday Mathematics* provides students with extensive practice distributed over time. This is in sharp contrast to a traditional approach of saturating a few lessons or a unit with practice problems in preparation for a test, but then never practicing the skills again. All these approaches to instruction and more have been careful articulated in the third edition of *Everyday Mathematics* to help teachers meet the needs of diverse populations and the whole range of children from struggling to gifted.
29	*A review of 11 studies that met the Panel's rigorous criteria (only one study less than 20 years old) found limited or no impact of calculators on calculation skills, problem solving, or conceptual development over periods of up to one year. This finding is limited to the effect of calculators as used in the 11 studies. However, the Panel's survey of the nation's algebra teachers indicated that the use of calculators in prior grades was one of their concerns. The Panel cautions that to the degree that calculators impede the development of automaticity, fluency in computation will be adversely affected.* *The Panel recommends that high-quality research on particular uses of calculators be pursued, including both their short- and long-term effects on computation, problem solving, and conceptual understanding.*	*Everyday Mathematics* recognizes that people need to use calculators in everyday life and in many professions, and so accepts the responsibility of teaching students to use them well and wisely. *Everyday Mathematics* also recognizes the need for people to do mental arithmetic and some paper-and-pencil calculations quickly and accurately, and so teaches these skills as well. In addition, calculators are useful tools for helping students learn estimation skills that are needed, among other things, to check the accuracy of any calculation whether on a calculator or not. *Everyday Mathematics* authors agree with the need for high-quality research into calculator use as well as the use of other mathematical technology such as dynamic geometry and computer algebra systems.
30	*Mathematically gifted students with sufficient motivation appear to be able to learn mathematics much faster than students proceeding through the curriculum at a normal pace, with no harm to their learning, and should be allowed to do so.*	*Everyday Mathematics* authors agree with the recommendation and, as mentioned in the comment for Instructional Practices recommendation 30, *Everyday Mathematics* includes widespread ideas to help teachers encourage gifted students.

TEACHERS AND TEACHER EDUCATION

31	*U.S. mathematics textbooks are extremely long—often 700–1,000 pages. Excessive length makes books more expensive and can contribute to a lack of coherence. Mathematics textbooks are much smaller in many nations with higher mathematics achievement than the U.S., thus demonstrating that the great length of our textbooks is not necessary for high achievement. Representatives of several publishing companies who testified before the Panel indicated that one substantial contributor to the length of the books was the demand of meeting varying state standards for what should be taught in each grade. Other major causes of the extreme length of U.S. mathematics textbooks include the many photographs, motivational stories, and other nonmathematical content that the books include. Publishers should make every effort to produce much shorter and more focused mathematics textbooks.*	(Regarding recommendations 31 and 32): While the *Everyday Mathematics* Teacher's Learning Guides are in the 700-1000 page range (in large part to meet the teacher support needs called for in other recommendations), student journals range from 300-400 pages (roughly 2-3 pages per school day). These journals are the core "textbook" part of *Everyday Mathematics*, a part that keeps students focused on the grade-level goals, and a part that students may keep after the school year is over. Student Reference Books are about the same length as journals, but they are reference books and, like dictionaries or encyclopedias, are used as needed – students are not expected to read them cover-to-cover.
32	*States and districts should strive for greater agreement regarding which topics will be emphasized and covered at particular grades. Textbook publishers should publish editions that include a clear emphasis on the material that these states and districts agree to teach in specific grades.*	
33	*Publishers must ensure the mathematical accuracy of their materials. Those involved with developing mathematics textbooks and related instructional materials need to engage mathematicians, as well as mathematics educators, at all stages of writing, editing, and reviewing these materials.*	*Everyday Mathematics* has always had the highest standards for mathematical accuracy and has an ongoing process for recording errors that are subsequently corrected in copyright updates and new editions. From the first edition on, mathematicians, mathematics educators, and expert classroom teachers have worked as *Everyday Mathematics* authors and consultants at all stages of program development. (It is noteworthy that the panel does not suggest having the latter group included in the process.)

ASSESSMENT

38	*Calculators should not be used on test items designed to assess computational facility.*	*Everyday Mathematics* authors agree, of course, that calculators should not be used for tests of mental or paper-and-pencil computational facility. It is also appropriate to test a student's ability to use a calculator correctly.

1 McKnight, C. C., Crosswhite, F. J., Dossey, J. A., Kifer, E., Swafford, J. O., Travers, K. J., & Cooney, T. J. (1987). *The underachieving curriculum: Assessing U.S. school mathematics from an international perspective*. Champaigne, IL: Stipes

2 Briars, D. and Resnick, L. (2000) *Standards, Assessments – and What Else?: The Essential Elements of Standards-Based School Improvement.* Center for the Study of Evaluation Technical Report 528. Los Angeles: University of California National Center for Research on Evaluation, Standards, and Student Testing.